World Health Organization

Media centre

Yellow fever

Share Print

Fact sheet N°100
May 2013

For more information contact:

WHO Media centre
Telephone: +41 22 791 2222
E-mail: mediainquiries@who.int

Related links

Yellow fever

Weekly Epidemiological Record, 17 May 2013, vol. 88, 20 (pp. 201–216)

Global Alert and Response (GAR)

International Health Regulations (IHR)

More about yellow fever

Key facts

- Yellow fever is an acute viral haemorrhagic disease transmitted by infected mosquitoes. The "yellow" in the name refers to the jaundice that affects some patients.
- Up to 50% of severely affected persons without treatment will die from yellow fever.
- There are an estimated 200 000 cases of yellow fever, causing 30 000 deaths, worldwide each year.
- The virus is endemic in tropical areas of Africa and Latin America, with a combined population of over 900 million people.
- The number of yellow fever cases has increased over the past two decades due to declining population immunity to infection, deforestation, urbanization, population movements and climate change.
- There is no specific treatment for yellow fever. Treatment is symptomatic, aimed at reducing the symptoms for the comfort of the patient.
- Vaccination is the most important preventive measure against yellow fever. The vaccine is safe, affordable and highly effective, and a single dose of yellow fever vaccine is sufficient to confer sustained immunity and life-long protection against yellow fever disease and a booster dose of yellow fever vaccine is not needed. The vaccine provides effective immunity within 30 days for 99% of persons vaccinated.

Signs and symptoms

Once contracted, the virus incubates in the body for 3 to 6 days, followed by infection that can occur in one or two phases. The first, "acute", phase usually causes fever, muscle pain with prominent backache, headache, shivers, loss of appetite, and nausea or vomiting. Most patients improve and their symptoms disappear after 3 to 4 days.

However, 15% of patients enter a second, more toxic phase within 24 hours of the initial remission. High fever returns and several body systems are affected. The patient rapidly develops jaundice and complains of abdominal pain with vomiting. Bleeding can occur from the mouth, nose, eyes or stomach. Once this happens, blood appears in the vomit and faeces. Kidney function deteriorates. Half of the patients who enter the

toxic phase die within 10 to 14 days, the rest recover without significant organ damage.

Yellow fever is difficult to diagnose, especially during the early stages. It can be confused with severe malaria, dengue hemorrhagic fever, leptospirosis, viral hepatitis (especially the fulminating forms of hepatitis B and D), other hemorrhagic fevers (Bolivian, Argentine, Venezuelan hemorrhagic fevers and others flavivirus as West Nile, Zika virus etc) and other diseases, as well as poisoning. Blood tests can detect yellow fever antibodies produced in response to the infection. Several other techniques are used to identify the virus in blood specimens or liver tissue collected after death. These tests require highly trained laboratory staff and specialized equipment and materials.

Populations at risk

Forty-four endemic countries in Africa and Latin America, with a combined population of over 900 million, are at risk. In Africa, an estimated 508 million people live in 31 countries at risk. The remaining population at risk are in 13 countries in Latin America, with Bolivia, Brazil, Colombia, Ecuador and Peru at greatest risk.

There are an estimated 200 000 cases of yellow fever (causing 30 000 deaths) worldwide each year. Small numbers of imported cases occur in countries free of yellow fever. Although the disease has never been reported in Asia, the region is at risk because the conditions required for transmission are present there. In the past centuries (XVII to XIX), outbreaks of yellow fever were reported in North America (New York, Philadelphia, Charleston, New Orleans, etc) and Europe (Ireland, England, France, Italy, Spain and Portugal).

Transmission

The yellow fever virus is an arbovirus of the *flavivirus* genus, and the mosquito is the primary vector. It carries the virus from one host to another, primarily between monkeys, from monkeys to humans, and from person to person.

Several different species of the *Aedes* and *Haemogogus* mosquitoes transmit the virus. The mosquitoes either breed around houses (domestic), in the jungle (wild) or in both habitats (semi-domestic). There are three types of transmission cycles.

- *Sylvatic (or jungle) yellow fever*: In tropical rainforests, yellow fever occurs in monkeys that are infected by wild mosquitoes. The infected monkeys then pass the virus to other mosquitoes that feed on them. The infected mosquitoes bite humans entering the forest, resulting in occasional cases of yellow fever. The majority of infections occur in young men working in the forest (e.g. for logging).
- *Intermediate yellow fever*: In humid or semi-humid parts of Africa, small-scale epidemics occur. Semi-domestic mosquitoes (that breed in the wild and around households) infect both monkeys and humans. Increased contact between people and infected mosquitoes leads to transmission. Many separate villages in an area can suffer cases

simultaneously. This is the most common type of outbreak in Africa. An outbreak can become a more severe epidemic if the infection is carried into an area populated with both domestic mosquitoes and unvaccinated people.

- *Urban yellow fever*: Large epidemics occur when infected people introduce the virus into densely populated areas with a high number of non-immune people and Aedes mosquitoes. Infected mosquitoes transmit the virus from person to person.

Treatment

There is no specific treatment for yellow fever, only supportive care to treat dehydration, respiratory failure and fever. Associated bacterial infections can be treated with antibiotics. Supportive care may improve outcomes for seriously ill patients, but it is rarely available in poorer areas.

Prevention

1. Vaccination

Vaccination is the single most important measure for preventing yellow fever. In high risk areas where vaccination coverage is low, prompt recognition and control of outbreaks through immunization is critical to prevent epidemics. To prevent outbreaks throughout affected regions, vaccination coverage must reach at least 60% to 80% of a population at risk. Few endemic countries that recently benefited from a preventive mass vaccination campaign in Africa currently have this level of coverage.

Preventive vaccination can be offered through routine infant immunization and one-time mass campaigns to increase vaccination coverage in countries at risk, as well as for travelers to yellow fever endemic area. WHO strongly recommends routine yellow fever vaccination for children in areas at risk for the disease.

The yellow fever vaccine is safe and affordable, providing effective immunity against yellow fever within 7-10 days for 95% of those vaccinated. A single dose of yellow fever vaccine is sufficient to confer sustained immunity and life-long protection against yellow fever disease and a booster dose of yellow fever vaccine is not needed. Serious side effects are extremely rare. Serious adverse events have been reported rarely following immunization in a few endemic areas and among vaccinated travelers (e.g. in Brazil, Australia, the United States, Peru and Togo). Scientists are investigating the causes.

In regard to the use of yellow fever vaccine in people over 60 years of age, it is noted that while the risk of yellow fever vaccine-associated viscerotropic disease in persons ≥60 years of age is higher than in younger ages, the overall risk remains low. Vaccination should be administrated after careful risk-benefit assessment, comparing the risk of acquiring yellow fever disease versus the risk of a potential serious adverse event following immunization for persons ≥60 years of age who have not been previously vaccinated and for whom the vaccine is recommended.

The risk of death from yellow fever disease is far greater than the risks related to the vaccine. People who should not recommended to be vaccinated include:

- children aged less than 9 months (or between 6-9 months during an epidemic, where the risk of disease is higher than an adverse event of the vaccine);
- pregnant women – **except** during a yellow fever outbreak when the risk of infection is high;
- people with severe allergies to egg protein; and
- people with severe immunodeficiency due to symptomatic HIV/AIDS or other causes, or in the presence of a thymus disorder.

Travelers, particularly those arriving to Asia from Africa or Latin America must have a certificate of yellow fever vaccination. If there are medical grounds for not getting vaccinated, International Health Regulations state that this must be certified by the appropriate authorities.

2. Mosquito control

In some situations, mosquito control is vital until vaccination takes effect. The risk of yellow fever transmission in urban areas can be reduced by eliminating potential mosquito breeding sites and applying insecticides to water where they develop in their earliest stages. Application of spray insecticides to kill adult mosquitoes during urban epidemics, combined with emergency vaccination campaigns, can reduce or halt yellow fever transmission, "buying time" for vaccinated populations to build immunity.

Historically, mosquito control campaigns successfully eliminated *Aedes aegypti*, the urban yellow fever vector, from most mainland countries of Central and South America. However, this mosquito species has re-colonized urban areas in the region and poses a renewed risk of urban yellow fever.

Mosquito control programmes targeting wild mosquitoes in forested areas are not practical for preventing jungle (or sylvatic) yellow fever transmission.

3. Epidemic preparedness and response

Prompt detection of yellow fever and rapid response through emergency vaccination campaigns are essential for controlling outbreaks. However, underreporting is a concern – the true number of cases is estimated to be 10 to 250 times what is now being reported.

WHO recommends that every at-risk country have at least one national laboratory where basic yellow fever blood tests can be performed. One laboratory confirmed case of yellow fever in an unvaccinated population could be considered an outbreak, and a confirmed case in any context must be fully investigated, particularly in any area where most of the population has been vaccinated. Investigation teams must assess and respond to the outbreak with both emergency measures and longer-term immunization plans.

WHO response

WHO is the Secretariat for the International Coordinating Group for Yellow Fever Vaccine Provision (ICG). The ICG maintains an emergency stockpile of yellow fever vaccines to ensure rapid response to outbreaks in high risk countries.

The Yellow Fever Initiative is a preventive control strategy of vaccination led by WHO and supported by UNICEF and National Governments, with a particular focus on most high endemic countries in Africa where the disease is most prominent. The Initiative recommends including yellow fever vaccines in routine infant immunizations (starting at age 9 months), implementing mass vaccination campaigns in high-risk areas for people in all age groups aged 9 months and older, and maintaining surveillance and outbreak response capacity. Between 2007 and 2012, 12 countries have completed preventive yellow fever vaccination campaigns: Benin, Burkina Faso, Cameroon, Central African Republic, Côte d'Ivoire, Ghana, Guinea, Liberia, Mali, Senegal, Sierra Leone and Togo. The Yellow Fever Initiative is financially supported by the GAVI Alliance, ECHO, Ministries of Health, and country-level partners.

For more information contact:
WHO Media centre
Telephone: +41 22 791 2222
E-mail: mediainquiries@who.int