

Yellow Fever Information for Pilots

NOTE

This paper is an update to, and supersedes 10MEDBL05, of the same name.

INTRODUCTION

Yellow fever has been known for over 400 years, and the name originates from the jaundice that some patients acquire. The disease is caused by a mosquito-spread virus. The virus can infect both humans and primates. It is endemic in African and American countries close to the equator. Most of those infected remain asymptomatic, but about 15% develop a hemorrhagic infection and with an approximate 50% mortality rate.

Symptoms include fever, muscular pain, headache, chills, loss of appetite, nausea and/or vomiting, and often a low pulse rate despite the fever. There is no specific treatment for the virus. Yellow fever vaccination is effective and may be required to enter certain countries. It is suggested that all pilots who fly to, or over the endemic yellow fever countries take this vaccine.

On July 11, 2016, the World Health Organization adopted the policy that all Yellow Fever vaccinations were valid for the lifetime of the person vaccinated. This applies to all existing and new vaccinations. No modifications need to be made to existing vaccination cards. However, some health authorities recommend the booster for individual protection and some countries may require the booster.

VIRUS

Yellow fever virus belongs to the Flavivirus group. The virus infects both humans and primates and is carried from one animal to another by a biting mosquito. Mosquitoes are also able to pass the virus via infected eggs to their offspring. Mosquitoes are the true reservoir of the virus. The mosquitoes bite during daylight hours and at altitudes of up to 2,500 metres.

EPIDEMICS

The virus is constantly present with low levels of infection (i.e. endemic) in some tropical areas of Africa and the Americas, but this viral presence can amplify into epidemics.

There are 200,000 estimated cases of yellow fever (with 30,000 deaths) per year.

However, due to underreporting, only a small percentage of these cases are identified.

Small numbers of imported cases also occur in countries free of Yellow Fever. Although the disease has never been reported from Asia, this region is at risk because the appropriate primates and mosquitoes are present.

TRANSMISSION

There are three types of transmission cycles for Yellow Fever: Sylvatic, Intermediate, and Urban. All three cycles exist in Africa, but in South America, only Sylvatic and Urban yellow fever occur.

Sylvatic (or "jungle") yellow fever

In tropical rainforests, yellow fever occurs in primates that are infected by wild mosquitoes. The infected monkeys can then pass the virus on to other mosquitoes that feed on them. These infected wild mosquitoes bite humans entering the forest, resulting in sporadic cases of Yellow Fever. The majority of cases are in young workers in the forest (logging, etc). On occasion, the virus spreads beyond the affected individual.

Intermediate yellow fever

In humid or semi-humid savannahs of Africa, small-scale epidemics occur. These behave differently from urban epidemics; many separate villages in an area suffer cases simultaneously, but fewer people die from infection. Semi-domestic mosquitoes infect both primate and human hosts. This area is often called the "zone of emergence", where increased contact between human and infected mosquito leads to disease. This is the most common type of outbreak seen in recent decades in Africa. It can shift to a more severe urban-type epidemic if the infection is carried into a suitable environment (with the presence of domestic mosquitoes and unvaccinated humans).

Urban Yellow Fever

Large epidemics can occur when migrants introduce the virus into areas with high human population density. Domestic mosquitoes (of one species *Aedes aegypti*) carry the virus from person to person with no primates involved in transmission. These outbreaks tend to spread outwards from one source to cover a wide area.

GEOGRAPHY

In Africa, Yellow Fever exists in countries within a band from 15°N to 10°S of the equator. In the Americas, yellow fever is endemic in nine South American countries and in several Caribbean islands. Bolivia, Brazil, Colombia, Ecuador, and Peru are considered at greatest risk.

SYMPTOMS

The incubation period (i.e. the time in which the symptoms develop) is three to six days and most infections seem asymptomatic. However, if the symptoms develop, there are two different phases: "acute" and "toxic". The acute phase is characterized by fever, muscle pain, headache, shivers, loss of appetite, nausea and/or vomiting and the paradoxically slow pulse despite the fever.

15% of the patients enter a "toxic phase" within 24 hours. Fever reappears and several body systems are affected. Patients develop jaundice and abdominal pain with vomiting. They also suffer from different hemorrhagic manifestations, including bleeding from the mouth, nose, eyes, and/or stomach. Kidney function deteriorates; this can range from mild dysfunction to complete renal failure. Half of patients in the "toxic phase" die within 10-14 days. The remainder recover without significant organ damage.

DIAGNOSIS

Yellow fever is difficult to recognise, especially during the early stages. Antibodies, or the virus itself, can be detected in the blood, but these tests require highly trained laboratory staff using specialised equipment and materials.

TREATMENT

There is no specific antiviral treatment available and thus the treatment is based upon symptoms. Dehydration and fever can be corrected with oral rehydration solution and painkillers. Any superimposed bacterial infection should be treated with an appropriate antibiotic. Intensive care may improve the outcome of seriously ill patients.

VACCINATION

The Yellow Fever vaccine is safe and highly effective. Immunity occurs within one week in 95% of people vaccinated. A single dose of vaccine provides protection for the lifetime of the vaccinated person. However, some health authorities recommend a booster for individual protection and some countries may require it.

There have been reports of a small number of serious adverse reactions, including deaths, following Yellow Fever vaccination; most of these reactions occurred in elderly persons. However, the risk to unvaccinated individuals who visit endemic countries is far greater than the risk of a vaccine-related adverse event. It remains important for all travellers at risk to be vaccinated; nonetheless, yellow fever vaccination should not be prescribed for individuals who are not at risk of exposure to infection.

Side effects of the vaccination are usually slight. They include local reactions at the site of inoculation (in up to 10 % of those vaccinated), after four to six days there may be more general reactions, such as an elevated body temperature, malaise, headache and muscle pain which usually subside within 24 hours. Contraindications for vaccination are acute febrile diseases within the last two weeks, immuno suppression and immune defects, corticoid medication, allergy against chicken protein, and age (<6 months).

Only Authorised Vaccination Centres may give the Yellow Fever vaccine and one must have an official vaccination certificate as proof of the vaccination. This is mandatory when entering certain countries of the endemic zones and, after having visited endemic zones within the last six days, when entering certain other countries of the endemic zones and outside. The list of countries that require vaccination can be found, for example, from the International Travel and Health booklet that is accessible from WHO web pages www.WHO.int. The validity of the certificate begins 10 days from the vaccination day, by then the person has developed immunity.

SOURCES

As of May 2024

<https://www.who.int/topics/travel/en/>

<https://wwwnc.cdc.gov/travel/yellowbook/2018/infectious-diseases-related-to-travel/yellow-fever>