

YELLOW FEVER

Report Immediately
By Phone

Responsibilities:

Hospital: Report immediately by phone

Lab: Report immediately by phone

Physician: Report immediately by phone

Local Public Health Agency (LPHA): Follow-up required. Iowa Department of Public Health will lead the follow-up investigation.

Iowa Department of Public Health

Disease Reporting Hotline: (800) 362-2736

Secure Fax: (515) 281-5698

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Agent

Yellow fever is a mosquito-borne viral illness. It is caused by the yellow fever virus, which is in the genus *Flavivirus* and family *Flaviviridae*.

B. Clinical Description

Many cases of yellow fever are so mild they go undetected. Yellow fever is only known to occur in Africa and South and Central America.

Symptoms: In typical cases of recognized illness, sudden onset of fever, chills, headache, backache, generalized muscle pain, prostration, nausea and vomiting, jaundice, and albuminuria (the presence of protein in the urine) may occur. Most infections resolve at this stage.

Complications: In more severe cases of illness, after a brief remission of hours to a day, there is progression to liver and kidney failure and to hemorrhagic symptoms, including nosebleeds, bleeding gums, bloody vomiting and bloody stools. Twenty to 50% of severe cases with jaundice are fatal. The overall case-fatality rate is 20-50 percent. Lifetime immunity follows yellow fever recovery.

C. Reservoirs

Monkeys are the primary reservoirs in forested areas of Africa and South America. Humans and *Aedes aegypti* mosquitoes are involved in the infective cycle in urban areas.

D. Modes of Transmission

Yellow fever has two different transmission cycles that affect humans, the urban cycle and the jungle cycle.

Urban cycle: The virus is transmitted among humans by the bite of an infective house-dwelling *Aedes aegypti* mosquito. Monkeys play little or no role as a reservoir.

Jungle cycle: Several species of mosquitoes are vectors and transmit virus from monkey to monkey. Humans are involved in the jungle cycle accidentally if bitten by infected mosquitoes. In South America, sporadic infection of humans occurs almost exclusively in forestry and agricultural workers through occupational exposure, however outbreaks can and do occur. Direct person-to-person spread of yellow fever does not occur.

E. Incubation Period

The incubation period for yellow fever is 3 - 6 days.

F. Period of Communicability or Infectious Period

Yellow fever is not transmitted from person-to-person. The blood of patients is infective for mosquitoes from shortly before onset of fever until 3 - 5 days of illness. The incubation period in *Aedes aegypti* mosquitoes is commonly 9 - 12 days at the usual tropical temperatures. Once infected, mosquitoes remain so for life.

G. Epidemiology

Yellow fever is now endemic only to certain regions of South and Central America and Africa. Any cases in Iowa are likely due to recent travel abroad.

H. Bioterrorism Potential

None.

2) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify imported cases of yellow fever to understand the global epidemiology of endemic and epidemic yellow fever.
- To ensure that cases are appropriately contained to prevent the introduction of virus into native mosquito populations.
- To identify locally acquired cases, if they occur, so appropriate active surveillance and mosquito control interventions can be taken.
- To identify cases that may be part of a larger, worldwide outbreak.
- To provide travelers with appropriate preventive health information.

B. Laboratory and Healthcare Provider Reporting Requirements

Iowa Administrative Code 641-1.3(139) stipulates that the laboratory and the healthcare provider must report immediately. The reporting phone number for IDPH Center for Acute Disease Epidemiology (CADE) is (800) 362-2736; fax number (515) 281-5698.

Laboratory Testing Services Available

Laboratory testing for yellow fever is not available at the University of Iowa State Hygienic Laboratory (SHL). However, the SHL serology laboratory will forward specimens to the Centers for Disease Control and Prevention (CDC) for yellow fever testing. CDC requests that physicians submit complete case history information with the specimens. For additional information on submitting samples, contact SHL Serology at 319-335-4500, or visit: www.shl.uiowa.edu/

C. Local Public Health Agency Follow-Up Responsibilities

Case Investigation

- a. Case investigation of yellow fever in Iowa residents will be directed by IDPH Center for Acute Disease Epidemiology (CADE).
- b. Following notification of IDPH, the LPHA(s) may be asked to assist in an investigation of a case of yellow fever by interviewing the case and others who may be able to provide pertinent information. Most of the information required can be obtained from the medical provider or the medical record. Use the following guidelines to assist in conducting an investigation:
 - 1) Confirm the diagnosis of Yellow Fever with the case's healthcare provider and request a copy of all laboratory tests used to diagnose the illness.
 - 2) Record the case's demographic information.
 - 3) Record the date of symptom onset, symptoms, date of diagnosis, hospitalization information (if applicable), and outcome of disease (*e.g.*, recovered, died).
 - 4) Exposure history: use the approximate incubation period range for yellow fever (3–6 days). Specifically, focus on the period beginning 3 days prior to the onset date back to approximately 6 days before onset for travel history: determine the date(s) and geographic area(s) traveled to by the case.

- 5) If there is NO history of travel outside of the United States within 6 days prior to illness onset notify IDPH immediately and begin active surveillance for additional cases where the individual may have traveled, their home and work.
- 6) Include information about the case's yellow fever vaccination status, including the date most recently vaccinated.
- 7) If several attempts to obtain case information have been made, but have been unsuccessful (*e.g.*, the case or healthcare provider does not return calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please gather as much information as possible, notify CADE and enter as much information as is possible through the Iowa Disease Surveillance System (IDSS).

3) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements

None.

B. Protection of Contacts of a Case

It is important to prevent mosquitoes from biting a case for at least 5 days after onset of illness. Mosquito control can be done by screening sickrooms, spraying with insecticides and using bed nets. These measures can prevent transmission of yellow fever from infected mosquitoes to contacts of a case. Concerns over local transmission should be small.

C. Managing Special Situations

Locally Acquired Case

As noted above in Section C 4), a locally acquired case of yellow fever would be an unusual occurrence. Contact the Iowa Department of Public Health immediately at (800) 362-2736 and request assistance if the case is believed to be acquired locally. Environmental measures such as investigating local areas visited by the case to locate the focus of infection and surveillance of other people for illness may be necessary.

Reported Incidence Is Higher than Usual/Outbreak Suspected

If an outbreak is suspected, investigate to determine the source of infection and mode of transmission. A common exposure to or association with *A. aegypti* mosquitoes (*e.g.*, travelers returning from endemic countries) should be sought and applicable preventive or control measures should be instituted. Contact IDPH using the disease reporting hotline (800) 362-2736 as soon as possible. CADE can help determine a course of action to prevent further cases and can perform surveillance for cases that may cross several town lines and therefore be difficult to identify at a local level.

D. Preventive Measures

International Travel and Vaccination

- A live vaccine is recommended for everyone over 9 months old who will be living in or traveling to endemic areas, and required by international regulations for travel to and from certain countries. Pregnant women should not be vaccinated except when travel to an endemic area is unavoidable and if an increased risk for exposure exists. .
- In unusual circumstances, physicians considering vaccinating infants aged <9 months or pregnant women should contact the Division of Vector-Borne Infectious Diseases (970) 221-6400) or the Division of Global Migration and Quarantine (404) 498-1600) at CDC for advice (see Precautions and Contraindications).
- Without a valid certificate of immunization against yellow fever, many countries require a 6-day quarantine of travelers coming from or going to recognized yellow fever zones of Africa and South America.
- Travelers to yellow fever endemic countries are encouraged to protect themselves from mosquitoes by using repellents, wearing protective clothing and using mosquito nets when rooms

are not screened. Unlike other vectors, the principal mosquito vectors of yellow fever bite during daytime hours.

- For more information regarding international travel and the yellow fever vaccine, contact the CDC's Traveler's Health Office at (877) 394-8747 or at www.cdc.gov/travel

ADDITIONAL INFORMATION

The Council of State and Territorial Epidemiologists (CSTE) surveillance case definitions for Yellow Fever can be found at: www.cdc.gov/osels/ph_surveillance/nndss/phs/infdis.htm#top

CSTE case definitions should not affect the investigation or reporting of a case that fulfills the criteria in this chapter. (CSTE case definitions are used by the state health department and the CDC to maintain uniform standards for national reporting.)

Additional Information

In this Epi Manual:

DEET Fact Sheet

Mosquito Repellents Fact Sheet

References

American Academy of Pediatrics. *2003 Red Book: Report of the Committee on Infectious Diseases, 26th Edition*. Illinois, American Academy of Pediatrics, 2003.

Yellow Fever-Disease and Vaccine, Division of Vector-Borne infectious diseases:

www.cdc.gov/yellowfever/

Evans, Alfred. *Viral Infections of Humans, Epidemiology and Control, Second Edition*. New York, Plenum Medical Book Company, 1984.

Heymann, D.L., ed. *Control of Communicable Diseases Manual, 20th Edition*. Washington, DC, American Public Health Association, 2015.

Mandell, G., Bennett, J., Dolin, R., eds. *Principles and Practice of Infectious Diseases, Fourth Edition*. New York, Churchill Livingstone Inc., 1995.