MARBURG HEMORRHAGIC FEVER
(Marburg HF)

REPORTING INFORMATION

- **Class A:** *Report immediately via telephone* the case or suspected case and/or a positive laboratory result to the local public health department where the patient resides. If patient residence is unknown, report immediately via telephone to the local public health department in which the reporting health care provider or laboratory is located. Local health departments should report immediately via telephone the case or suspected case and/or a positive laboratory result to the Ohio Department of Health (ODH).
- Reporting Form(s) and/or Mechanism:
    - *Immediately via telephone*.
    - For local health departments, cases should also be entered into the Ohio Disease Reporting System (ODRS) within 24 hours of the initial telephone report to the ODH.
- Key fields for ODRS reporting include: import status (whether the infection was travel-associated or Ohio-acquired), date of illness onset, and all the fields in the Epidemiology module.

AGENT

Marburg hemorrhagic fever is a rare, severe type of hemorrhagic fever which affects both humans and non-human primates. Caused by a genetically unique zoonotic RNA virus of the family Filoviridae, its recognition led to the creation of this virus family. The five species of Ebola virus are the only other known members of the family Filoviridae. Marburg virus was first recognized in 1967, when outbreaks of hemorrhagic fever occurred simultaneously in laboratories in Marburg and Frankfurt, Germany and in Belgrade, Yugoslavia (now Serbia). A total of 31 people became ill, including laboratory workers as well as several medical personnel and family members who had cared for them. The first people infected had been exposed to African green monkeys or their tissues. In Marburg, the monkeys had been imported for research and to prepare polio vaccine.

CASE DEFINITION

The case definition below is the standard CDC case definition for viral hemorrhagic fevers (VHF).

Clinical Description

An illness with acute onset with ALL of the following clinical findings:

- A fever > 40°C, 104°F
- One of more of the following clinical findings:
    - Severe headache
    - Muscle pain
    - Erythematous maculopapular rash on the trunk with fine desquamation 3-4 days after rash onset
    - Vomiting
    - Diarrhea
    - Pharyngitis (arenavirus only)
    - Abdominal pain
    - Bleeding not related to injury
    - Retrosternal chest pain (arenavirus only)
    - Proteinuria (arenavirus only)
    - Thrombocytopenia

Laboratory Criteria for Diagnosis

One or more of the following laboratory findings:

- Detection of VHF viral antigens in blood by enzyme-linked Immunosorbent Assay (ELISA) antigen detection
- VHR viral isolation in cell culture for blood or tissues
- Detection of VHF-specific genetic sequence by Reverse Transcription-Polymerase Chain Reaction (RT-PCR) from blood or tissues
- Detection of VHF viral antigens in tissues by immunohistochemistry

Criteria for Epidemiologic Linkage

One or more of the following exposures within the 3 weeks before onset of symptoms:

- Contact with blood or other body fluids of a patient with VHF
- Residence in or travel to a VHF endemic area
- Work in a laboratory that handles VHF specimens
- Work in a laboratory that handles bats, rodents, or primates from endemic areas
- Exposure to semen from a confirmed acute or convalescent case of VHF within 10 weeks of that person's onset of symptoms

Case Classification

Suspect: Case meets the clinical and epidemiologic linkage criteria.

Confirmed: Case meets the clinical and laboratory criteria.

SIGNS AND SYMPTOMS

Marburg hemorrhagic fever onset is sudden and is marked by fever, chills, headache, and myalgia. Around the fifth day after the onset of symptoms, a maculopapular rash, most prominent on the trunk, may appear. Nausea, vomiting, chest pain, sore throat, abdominal pain and diarrhea then may appear. Symptoms become increasingly severe and may include jaundice, pancreatitis, severe weight loss, delirium, shock, liver failure, massive hemorrhage and multi-organ dysfunction. Because many of the signs and symptoms of Marburg hemorrhagic fever are similar to those of other infectious diseases, such as malaria or typhoid fever, diagnosis of the disease can be difficult, especially if only a single case is involved.

DIAGNOSIS

ELISA testing, IgM-capture ELISA, PCR, and virus isolation can be used to confirm a case of Marburg hemorrhagic fever within a few days of the onset of symptoms. The IgG-capture ELISA is appropriate for testing persons later in the course of disease or after recovery. The disease is readily diagnosed by immunohistochemistry, virus isolation, or PCR of blood or tissue specimens from deceased patients.

EPIDEMIOLOGY

Occurrence

Marburg virus was first recognized in 1967, when outbreaks of hemorrhagic fever occurred simultaneously in laboratories in Marburg and Frankfurt, Germany and in Belgrade, Yugoslavia (now Serbia). Thirty-one people became ill, and seven deaths occurred. The first people infected had been exposed to imported African green monkeys or their tissues while conducting research. Marburg hemorrhagic fever typically appears in sporadic outbreaks throughout Africa; laboratory-confirmed cases have been reported in Uganda, Zimbabwe, the Democratic Republic of the Congo, Kenya, Angola and South Africa. Many of the outbreaks started with male mine workers working in bat-infested mines. The virus is then transmitted within their communities through cultural practices, under-protected family care settings and under-protected health care staff. It is possible that sporadic, isolated cases occur as well, but go

unrecognized. Cases of Marburg hemorrhagic fever have occurred outside Africa, such as during the 1967 outbreak, but are infrequent and have involved travelers returning from endemic countries who visited caves inhabited by the fruit bat reservoir.

Mode of Transmission and Source

Marburg virus is indigenous to Africa. While the geographic area to which it is native is unknown, this area appears to include at least parts of Uganda, Kenya, Zimbabwe, Democratic Republic of the Congo, and Angola. The reservoir host of Marburg virus is the African fruit bat, *Rousettus aegyptiacus*. Fruit bats infected with Marburg virus do not show obvious signs of illness. Persons who have handled infected monkeys and have come in direct contact with their fluids or cell cultures, have become infected. Spread of the virus between humans has occurred in a setting of close contact, often in a hospital. Droplets of body fluids, or direct contact with persons, equipment, or other objects contaminated with infectious blood or tissues are all highly suspect as sources of disease.

Incubation Period

5-10 days.

PUBLIC HEALTH MANAGEMENT

Case

Investigation

Obtain information about the patient's occupation, history of travel outside the United States, contact with wild animals or lab animals, contact with a suspected or confirmed case of viral hemorrhagic fever, or close contact with an ill individual who traveled to a viral hemorrhagic fever-endemic area.

Treatment

A specific treatment for Marburg hemorrhagic fever is unknown; however, supportive therapy should be provided. This includes balancing the patient's fluids and electrolytes, maintaining their oxygen status and blood pressure, replacing lost blood and clotting factors and treating for any complicating infections.

Isolation

Ohio Administrative Code (OAC) 3701-3-13 (DD) states:
"Viral hemorrhagic fever (VHF): a person with confirmed or suspected viral hemorrhagic fever shall be placed in airborne isolation until no longer considered infectious."

Clinicians evaluating suspect cases should use standard (e.g. hand hygiene), airborne (e.g. N-95 respirator) and contact (e.g. gowns and gloves) precautions.

Contacts

Investigation

Currently there is no post-exposure prophylaxis available for individuals exposed to these agents. Investigation of contacts and source of infection: Identify all close contacts in the three weeks after the onset of illness. Initiate quarantine and active surveillance of contacts by having contacts take and maintain record of body temperature twice a day for 3 weeks after last exposure. If temperature is greater than 101°F (38.3°C), hospitalize patient immediately and initiate appropriate isolation precautions.

On October 6, 2014, the Ministry of Health (MoH) of Uganda reported a single confirmed, fatal case of Marburg hemorrhagic fever (MHF). The patient was treated in Mengo Hospital in Kampala. Investigations of contacts are ongoing and testing of suspect cases is being conducted at the Uganda Virus Research Institute with support from CDC.

On Nov. 13, 2014, the Ministry of Health of Uganda declared Uganda free of Marburg virus related to the case first reported in early October. Overall, one case was confirmed (fatal) and a total of 197 contacts were followed for 3 weeks. Out of these 197 contacts, 8 developed symptoms similar to Marburg, but all tested negative at the Uganda Virus Research Institute with support from CDC.

What is Marburg Hemorrhagic fever?

Marburg hemorrhagic fever is a very rare and deadly disease caused by an infection with the Marburg virus. Marburg virus is found in several African countries. The virus was first recognized in 1967 when simultaneous outbreaks occurred in Marburg and Frankfurt, Germany and in Belgrade, Yugoslavia (now Serbia). Since then, outbreaks have occurred sporadically throughout Africa.

What are the signs and symptoms of Marburg hemorrhagic fever?

Signs and symptoms of Marburg hemorrhagic fever include fever, chills, headache, and myalgia. Around the fifth day after the onset of symptoms, a maculopapular rash, most prominent on the trunk, may appear. Nausea, vomiting, chest pain, sore throat, abdominal pain and diarrhea then may appear. Signs and symptoms may appear anywhere from 5 to 10 days after exposure to Marburg virus.

How is Marburg hemorrhagic fever spread?

The virus is spread through **direct contact** (through broken skin or mucous membranes) with blood and body fluids (urine, feces, saliva, vomit, and semen) of a person who is sick with Marburg virus, or with objects (like needles) that have been contaminated with the virus. Persons who have handled infected monkeys and have come in direct contact with their fluids or cell cultures, have become infected.

Who is most at risk of getting Marburg hemorrhagic fever?

Individuals at greatest risk of Marburg virus infection are those who have close contact with African fruit bats, human patients, or non-human primates infected with Marburg virus.

Healthcare providers caring for patients with Marburg virus and family and friends in close contact with Marburg patients are at the highest risk of getting sick because they may come in direct contact with the blood or body fluids of sick patients.

Additionally, exposures can be higher for travelers visiting endemic regions in Africa, including Uganda and other parts of central Africa, and have contact with fruit bats, or enter caves or mines inhabited by fruit bats.

How is Marburg hemorrhagic fever treated?

There is no specific treatment for Marburg hemorrhagic fever. Supportive hospital therapy should be utilized. The following basic interventions, when used early, can increase the chances of survival.

- Providing fluids and electrolytes
- Maintaining oxygen status and blood pressure
- Treating other infections if they occur

How do I protect myself against Marburg hemorrhagic fever?

Avoiding close physical contact with infected people and their body fluids is the most important way of controlling the spread of disease. Barrier nursing or infection control techniques include isolating infected individuals and wearing protective clothing. Other infection control recommendations include proper use, disinfection, and disposal of instruments and equipment used in treating or caring for patients with Marburg HF, such as needles and thermometers.

Transmission from wildlife to humans remains an area of ongoing research. However, avoiding fruit bats, and sick non-human primates in central Africa, is one way to protect against infection.