UTAH DEPARTMENT OF HEALTH

Report Immediately

Viral Hemorrhagic Fevers (VHFs)

Disease Plan

Quick Links:

Last updated: August 2019, by Kylie Sage

CSTE case definition updated March 2022

Questions about this disease plan?

Contact the Utah Department of Health Bureau of Epidemiology: 801-538-6191.

✓ CRITICAL CLINICIAN INFORMATION

Clinical Evidence

Signs/Symptoms

- Serious, acute illness with sudden onset of fever, fatigue, muscle aches, and headache. Patient may progress with pharyngitis, abdominal pain, vomiting, diarrhea, and maculopapular rash. Severe illness is associated with hemorrhage, hypotension, shock, CNS involvement, renal failure, pleural and pericardial effusions, and death.

Mode of Transmission

- Variable by the specific virus, but generally transmissible via blood or secretions (e.g. sweat, stool, urine, breastmilk) from infected people or animals. This includes sexual contact and contact with contaminated bedding and surface. Some VHFs may be transmissible through arthropod vector bites like mosquitos and ticks. Arenaviruses and bunyaviruses are transmitted by aerosol.

Period of Communicability

- Variable by specific disease, generally patients are most infectious during peak hemorrhaging and fluid loss. However, patients can be infectious from days to weeks before clinical symptoms, and weeks to months after symptoms resolve. For example, Ebola virus RNA has been detected in semen up to 284 days after illness onset.

Incubation Period

- Variable by specific virus, ranges from 1–21 days, with an average of 3–10 day.

Laboratory Testing

Type of Lab Test/Timing of Specimen Collection

- These organisms can be identified via serology, PCR, and viral culture at CDC. Consult UDOH on-call epidemiologist. Specific testing requirements at: https://www.cdc.gov/laboratory/specimen-submission/list.html

Type of Specimens

- Whole blood, serum, fresh frozen tissues, fixed tissues.

Treatment Recommendations

Treatment

- Treatment generally consists of supportive care. Ribavirin, an anti-viral drug, has been effective in treating some individuals with Lassa fever, Sabia virus, Bolivian HF, Lujo virus, and Hemorrhagic Fever with Renal Syndrome (HFRS). Treatment with convalescent-phase plasma has been used with success in some patients with Argentine hemorrhagic fever.

Prophylaxis

- None

Contact Management

- Dependent on the virus. For high consequence pathogens contacts should be actively monitored according to Ebola Guidance: http://health.utah.gov/epi/diseases/ebola/UDOH_Active%20Monitoring_EME_Protocol.pdf

Infection Control Procedures

- Dependent on the virus. Standard, contact, and droplet precautions are recommended for management of hospitalized patients. Often patient should be placed in a negative airflow room. Patient access should be limited to essential designated trained staff and family members. Use hemorrhagic fever-specific barrier precautions with airborne infection isolation, contact, and droplet precautions, and with double gloving and strict hand hygiene, impermeable gowns, face shields
- CDC PPE recommendations for Ebola are here: https://www.cdc.gov/vhf/ebola/healthcare-us/ppe/guidance.html

✓ WHY IS VIRAL HEMORRHAGIC FEVER IMPORTANT TO PUBLIC HEALTH?

Viral hemorrhagic fevers (VHFs) are a group of diseases which have in common bleeding, shock, plasma leakage and organ impairment. There are a number of viruses that cause VHF-like clinical signs and symptoms. These include flaviviruses, e.g., dengue, yellow fever and Zika, which are discussed in separate disease plans. Here we will discuss the rarer VHF viruses that are usually imported from Africa or South America. These are virulent and highly infectious viruses (e.g., arenaviruses, bunyaviruses, and filoviruses) transmitted through person-to-person or animal or insect vector-to-person contact with infected blood, bodily fluids or secretions. Effective therapies and prophylaxis are extremely limited for these VHFs; therefore, early detection and strict adherence to infection control measures to prevent transmission are essential.

Travel is a prominent risk factor in the emergence of VHF infections worldwide, and the current volume, speed and distance of travel are unprecedented. This has increased the risk that persons infected with a VHF may be diagnosed outside of endemic areas.

Although nosocomial transmission has occurred in areas with endemic disease, accumulated evidence suggests that transmission of these viruses does not commonly occur through casual or remote contact. Several importations to non-endemic countries have occurred without subsequent disease outbreaks. While the potential for an VHF outbreak in Utah is low, the basic principles of management of potential VHF cases are essential competencies for all public health and medical practitioners in Utah.

Since the West African Ebola outbreak in 2014, Utah's local health departments (LHDs), medical facilities, emergency medical services (EMS) and many other partners have worked to enhance preparedness and response capacity for Ebola and other VHFs in the state (see Ebola Disease Plan).

✓ DISEASE AND EPIDEMIOLOGY

Clinical Description

Specific signs and symptoms vary by the type of viral hemorrhagic fever (VHF), but initial signs and symptoms often include marked fever (100.4°F), fatigue, dizziness, muscle aches, loss of strength, and exhaustion. Patients experience an insidious or sudden onset of progressive fever (that may be biphasic – occurring twice per day), chills, malaise, generalized myalgias and arthralgias, headache, anorexia, and cough. Most patients have a severe sore throat and may have abdominal pain, vomiting, and diarrhea. Typical findings are not distinctive, including nonspecific conjunctival injection (bloodshot eyes), facial and truncal flushing, petechiae, purpura, ecchymoses, jaundice, epistaxis (nosebleed), gastrointestinal and genitourinary bleeding, and lymphadenopathy. Severe illness is associated with hypotension and shock,

nervous system malfunction, pneumonitis (inflamed lungs), pleural and pericardial effusions, hemorrhage, encephalopathy, seizures, coma, delirium, and death.

Arenaviridae

- Diseases associated with arenaviruses ranges in severity from mild, acute, febrile infections to severe illnesses in which vascular leak, shock, and multiorgan dysfunction are prominent features.
- Fever, headache, myalgia, conjunctival suffusion, retro-orbital pain, facial flushing, bleeding, and abdominal pain are common early symptoms in all infections.
- Thrombocytopenia (platelet deficiency), leukopenia (reduction in white blood cells), petechiae, lymphadenopathy, and encephalopathy usually are present in Argentine HF, Bolivian HF, and Venezuelan HF, and exudative pharyngitis often occurs in Lassa fever.
- Mucosal bleeding occurs in severe cases as a consequence of vascular damage, thrombocytopenia, and platelet dysfunction.
- Proteinuria is common, but renal failure is unusual.
- Shock develops 7 to 9 days after onset of illness in more severely ill patients with these infections. Upper and lower respiratory tract symptoms can develop in people with Lassa fever.
- Encephalopathic signs, such as tremor, alterations in consciousness, and seizures, can occur in South American HFs and in severe cases of Lassa fever.

Bunyaviridae

- *Hemorrhagic fever with renal syndrome (HFRS)* is a complex, multiphasic disease characterized by vascular instability and varying degrees of renal insufficiency. Fever, flushing, conjunctival injection, headache, blurred vision, abdominal pain, and lumbar pain are followed by hypotension, oliguria, and subsequently, polyuria. Petechiae are frequent, but more serious bleeding manifestations are rare. Shock and acute renal insufficiency may occur.
- *Crimean-Congo hemorrhagic fever (CCHF)* is a multisystem disease characterized by hepatitis and profuse bleeding. Fever, headache, and myalgia are followed by signs of a diffuse capillary leak syndrome with facial suffusion, conjunctivitis, icteric hepatitis, proteinuria, and petechiae and purpura on the skin and mucous membranes. Hemorrhage from the gastrointestinal tract, nose, mouth, or uterus may occur. Cotton wool spots are visible on the macula.
- *Rift Valley fever (RVF)* is often a self-limited undifferentiated febrile illness. Occasionally, hemorrhagic fever with shock and hepatitis, encephalitis, or retinitis develops.

Filoviridae

- Ebola and Marburg virus diseases are caused by Filoviruses (see Ebola Disease Plan).
- Diseases usually occur with sudden onset of fever, malaise, myalgia and headache, followed in most cases by pharyngitis, vomiting, diarrhea, and maculopapular rash.
- In severe and fatal forms, hemorrhage, hepatic damage, renal failure, central nervous system (CNS) involvement and terminal shock with multiorgan dysfunction may occur.

Causative Agent

Viral hemorrhagic fevers (VHFs) include numerous zoonotic diseases caused by different viruses, all of which result in a hemorrhagic syndrome in humans. VHFs are known to be caused by arenaviruses, bunyaviruses, filoviruses, and flaviviruses.

Arenaviruses: These are segmented, single-stranded RNA viruses. Hemorrhagic arenaviruses are grouped into Old World and New World viruses. The Old World arenaviruses include Lassa and Lujo virus, while the New World arenaviruses include Junin, Machupo, Guanarito, Chapare virus, and Sabia virus.

Bunyaviruses: These are segmented, single-stranded RNA viruses with different geographic distributions depending on their vector or reservoir. Hemorrhagic bunyaviruses include Rift Valley Fever and Crimean Congo hemorrhagic fever.

Filoviruses: These are elongated RNA viruses. Hemorrhagic filoviruses include Marburg and Ebola viruses.

Flaviviruses: These are single stranded RNA viruses. Dengue hemorrhagic fever is a viral hemorrhagic fever (see Dengue Disease Plan)

Differential Diagnosis

In the absence of hospital or laboratory exposure these diseases are acquired almost exclusively in rural areas. Following an incubation period of 2 to 21 days, initial symptoms of all five VHFs are usually systemic and compatible with influenza: fever, fatigue, dizziness, muscle aches, loss of strength, and exhaustion. At this point, such symptoms in a returning traveler who has a history of rural travel exposure, who has a history of contact with an ill individual or who has travelled to an area affected by an outbreak, could suggest a risk of VHF. However, the most likely diagnostic possibilities would still be the following more common infectious diseases:

- **Bacterial:** Typhoid, other enteric fevers, pyelonephritis, pneumonia, sepsis meningococcal disease, invasive streptococcal disease, and leptospirosis.
- **Helminthic:** Acute schistosomiasis, Katayama syndrome.
- **Protozoal:** Malaria, amebic liver abscess.
- **Rickettsial:** Typhus, Q fever, tickborne rickettsioses.
- **Viral:** Mononucleosis, Dengue fever, hepatitis A, and acute HIV infection.

Conjunctivitis, petechiae, and in the case of filovirus infections, a maculopapular skin rash appear later and are more suggestive of VHF. It should be noted that these symptoms do not occur until the second week of illness. At this point, a reasonable suspicion of VHF would exist in the presence of a compatible travel history, the absence of a history strongly suggestive of other illnesses, and at least one negative blood smear for malaria. Additionally, it should be remembered that individuals with indigenous malaria immunity may have parasitemia but may be symptomatic for other reasons, including VHF. The additional signs of hemorrhage and shock are strongly suggestive of VHF.

Laboratory Identification

The identification of VHFs should be handled by the Centers for Disease Control and Prevention. These organisms can be identified via serology, PCR, and viral culture. Tests are typically done in a laboratory with higher level containment. Consult UDOH Epidemiology to coordinate any testing at Utah Public Health Lab or CDC.

Treatment

Patients receive supportive therapy, but generally speaking, there is no other treatment or established cure for VHFs. Clinical treatments may include fluid management, blood products, oxygenation and ventilation, convalescent plasma, coagulation modulators, and pain control. Ribavirin, an anti-viral drug, has been effective in treating some individuals with Lassa fever, Sabia virus, Bolivian HF, Lujo virus, and Hemorrhagic Fever with Renal Syndrome (HFRS). Treatment with convalescent-phase plasma has been used with success in some patients with Argentine hemorrhagic fever.

Case Fatality

Case fatality rates following development of clinical disease also vary depending on the agent and the strain; rates range from 15% to 90%. Case fatality rates have ranged from 25% to 90% for Ebola; 22% to 90% for Marburg; and 15% to 30% for New World arenavirus HFs.

Reservoir

Many wild and domestic animals, ticks, and mosquitoes are known to carry some of the VHF agents, although reservoirs have not been identified for all VHF agents. Rodents are known to be the carriers of Lassa, Lujo, Junin, Machupo, Guanarito, Sabia, Chapare, Crimean Congo hemorrhagic, and Rift Valley fever viruses. Mosquitoes, ticks, and animals (including rodents, foxes, hares, and groundfeeding birds) are known to carry bunyaviruses that cause VHFs. Recent evidence suggests that the bats are the most likely reservoir for Ebola virus, however non-human primates are known to be affected by Ebola and Marburg viruses.

Transmission

The mode of transmission of VHF in an individual case is typically animal, tick, or mosquito exposure. Once a human has acquired infection with a VHF agent, transmission may occur from person-to-person. Humans can become infected through contact with infectious blood or with secretions (such as urine, vomitus, pus, stool, semen, and saliva) from infected persons or animals. Individuals have acquired VHFs through sexual contact. Infants have acquired VHFs through birth and breastfeeding, although not all VHFs are transmitted via breast milk. For most VHFs, direct physical contact with infectious blood or secretions is thought to be required for transmission. Arenaviruses and bunyaviruses can be transmitted by aerosol.

The transmission risk of VHFs in the health care and laboratory setting is well documented as contaminated objects may serve as a source of infection. This includes unsterilized bedding, surfaces, PPE, medical equipment, and laboratory specimens. During the 1995 Ebola outbreak in Kikwit (former Zaire, and now the Democratic Republic of the Congo), one fourth of the cases were in healthcare workers with a history of recent patient care.

Susceptibility

Everyone not previously infected is susceptible, as infection usually confers immunity. Diseases with more than one serotype, such as Dengue, pose a risk of reinfection. Immunity that follows infection Bunyaviridae will protect against reinfection.

Incubation Period

The incubation periods for VHFs range from 1–21 days, with an average of 3–10 days.

Period of Communicability

Infected individuals are generally considered to be infectious for a variable period preceding the onset of symptoms (up to about three weeks for some VHFs) and during the course of clinical symptoms. The virus may remain in the blood and in secretions for months after an individual recovers. Patients who survive continue to shed virus for weeks to months. Ebola virus has been isolated from seminal fluid 82 days after the onset of clinical disease; therefore, those patients should abstain from sexual intercourse for 3 months after infection. Contaminated bedding and medical equipment may remain infectious for several days. For some VHFs, the virus may remain viable for a variable duration post-mortem, permitting transmission from recently deceased patients.

Epidemiology

VHFs are caused by a number of different viruses that infect wild animals, birds, mosquitoes, and ticks; taken together, VHFs are distributed over much of the globe. Individual VHFs, however, occur in different geographic regions, depending on where the host species are found, and people usually become infected only in those areas. Occasionally, a host that has been exported from its native habitat can infect people with VHF. A person can become infected in an area where a virus occurs naturally, and then by traveling elsewhere, can spread the disease from person-to-person. Because travel is now so common, outbreaks of these diseases are becoming an increasing threat in places where they rarely, if ever, have been seen before.

While outbreak of VHFs have occurred sporadically in endemic countries, the 2014 Ebola Outbreak in West Africa highlighted how VHD can spread rapidly in communities and healthcare settings. This outbreak was widespread in Guinea, Liberia, and Sierra Leone, which had combined 28,652 cases of suspected, probable, and confirmed EVD resulting in 11,325 deaths (39.5%). Other countries that have had Ebola cases linked to this outbreak include Mali, Nigeria, Senegal, Spain and the United States.

In the US: Generally, the bunyaviral Hantavirus Pulmonary Syndromes (Bayou, Black Creek Canal, Four Corners, Muleshoe, Sin Nombre) and rare cases of Hemorrhagic Fever with Renal Syndrome are the only VHFs to occur endemically in the United States. Hantaviruses are spread via contaminated rodent dropping and occur in Utah (see Hantavirus Disease Plan).

Other VHF's are imported to the US via infected travelers or animals, most frequently Lassa fever or Dengue Hemorrhagic Fever. The first imported case of Lassa fever in more than 20 years occurred in New Jersey in 2004. As of December 2014, four confirmed cases of Ebola

have been diagnosed in the U.S. – two were imported cases and two were healthcare workers who provided care for one of the imported cases.

Internationally: Arenaviridae, including Guanarito (Venezuelan HF), Junin (Argentine HF), Machupo (Bolivian HF), Sabia (Brazilian HF), Lujo and Lassa viruses, are found throughout South America, particularly in the Argentine pampas, Bolivia, Venezuela, and rural Brazil near Sao Paul. Chronic infection of small field rodents makes rural residents and farmers the most at risk for infection, with a strong seasonal predominance for the fall. In Argentina, agricultural workers are disproportionately infected. In Bolivia, rodents can invade towns and cause epidemics. In West Africa, Lassa fever is spread to humans through contact with small rodents (often as hunted food), as well as by person-to-person exposures. Outbreaks of Lassa fever have as recently as June 2017 in Nigeria, where 501 suspected cases (175 of which are laboratory confirmed) resulted in 104 deaths. In 2008 a new arenavirus, Lujo, was identified as the cause of a South African outbreak involving 5 human cases, 4 of which were fatal. The Lujo virus is classified as an Old World arenavirus that is distantly related to Lassa virus.

Bunyaviridae (Crimean-Congo HF [CCHF], Rift Valley fever [RVF]) are seen throughout Africa, the Middle East, the Balkans, southern Russia, and western China.

Filoviridae (Ebola, Marburg viruses) are found in Africa and possibly in the Philippines. Bats are the strongly suspected vector of Ebola virus, but infected primates and other mammals may provide a link for spread to humans. Viruses may then spread from person to person through contact with blood or other infectious fluids. Aerosol transmission is suspected in some primate infections. It appears that outbreaks of Ebola disease often follow uncommonly dry periods, when rainfall resumes and reaches unusually high levels.

✓ PUBLIC HEALTH CONTROL MEASURES

Public Health Responsibility

- Investigate all suspect cases of disease and fill out and submit appropriate disease investigation forms.
- Provide education to the general public, clinicians, and first responders regarding disease transmission and prevention.
- Identify clusters or outbreaks of this disease.
- Identify sources of exposure and stop further transmission.
- Identify potential sources of transmission that may exist in the U.S. (such as non-human primates [NHPs] or laboratory specimens).
- Identify sources of transmission and geographical areas of risk outside of the U.S.
- Stop transmission from such sources and geographical areas.
- Identify cases as early as possible to prevent transmission to other persons or animals.
- Identify cases and clusters of human illness that may be associated with a bioterrorism incident.
- Monitor exposed persons for onset of fever and other symptoms and ensure quarantine during the infectious period to prevent transmission.

Prevention

To avoid cases of VHFs:

- Individuals should avoid traveling to areas with known outbreaks of VHFs.
- Public health should work with health care facilities, especially emergency rooms and urgent care centers, to ensure that they remain in a state of readiness to recognize possible cases of VHF by routinely asking travel histories of patients entering their facilities.
- Patients with travel histories that are suggestive of infection with a VHF agent should be immediately isolated to prevent transmission.
- Laboratory workers handling specimens suspected of containing the agents of VHF must take appropriate biosafety precautions.
- Persons working with imported NHPs should know the signs of VHF in NHPs, and they should immediately report any cases of suspect or confirmed VHF in NHPs to the UDOH Bureau of Epidemiology.

Chemoprophylaxis

Ribavirin has not proven effective with most cases of VHF. Post-exposure prophylaxis with ribavirin may be considered for high-risk contacts of patients with Crimean-Congo hemorrhagic fever. Oral and intravenous ribavirin given to patients with CCHF has been associated with milder disease, although no controlled studies have been performed. Ribavirin also may be efficacious as postexposure prophylaxis of CCHF. Intravenous ribavirin substantially decreases the mortality rate in patients with severe Lassa fever, particularly if they are treated during the first week of illness.

Vaccine

For arenaviruses, live-attenuated Junin vaccine protects against Argentine HF and probably against Bolivian HF. However, the vaccine is not available in the United States. Although there are currently no FDA-approved vaccines for Ebola and Marburg, a number of experimental vaccines and other compounds are in development after the 2014 West Africa outbreak.

Isolation and Quarantine Requirements

Isolation: Patient should be isolated as soon as possible to prevent further spread to others.

- **Minimum Period of Isolation of Patient**: It is prudent to place the patient in a negative airflow room if available. Patient access should be limited to essential designated trained staff and family members. Place on hemorrhagic fever-specific barrier precautions with airborne infection isolation, contact, and droplet precautions, and with double gloving and strict hand hygiene, impermeable gowns, face shields, eye protection, and leg and shoe coverings, until clinical illness has resolved.
- **Postmortem**: If the patient should die, handling of the body should be minimal. The corpse should be wrapped in a sealed leak-proof material, not embalmed, and then cremated or buried promptly in a sealed casket.

Quarantine: Individuals who have had any contact with infectious patients should be monitored by their health care provider for the maximum incubation period for the specific agent. See Contact management section below.

Infection Control Measures

Although normal barrier nursing and precautions to prevent parenteral and droplet exposure to blood and body fluids suffice in most instances, for added safety these should be upgraded to "VHF precautions" once the diagnosis is suspected, which includes patient isolation and the use of surgical masks, face shields, double gloves, gowns, head and shoe covers, and protective aprons.

Evidence from outbreaks strongly indicates that the main routes of transmission of VHF infection are direct contact (through broken skin or mucous membrane) with blood or body fluids and indirect contact with environments contaminated with splashes or droplets of blood or body fluids. Avoiding transmission requires strict adherence to standard precautions as well as droplet and contact precautions for health care, environmental and laboratory workers. Moreover, aerosol-generating procedures should be avoided if possible, or health workers and other patients should be adequately protected during procedures that might aerosolize virus. All health workers (clinical and non-clinical) should use standard precautions in caring for all patients in all health facilities. These include:

- Hand hygiene
- Appropriate personal protective equipment (PPE) based on risk assessment at the point of care
- Respiratory hygiene
- Prevention of injuries from needles and other sharp instruments
- Safe waste disposal
- Cleaning and disinfection of the environment
- Safe handling of contaminated linens
- Cleaning and disinfection of patient-care equipment.

In addition to standard precautions, WHO recommends that those with direct patient care responsibilities use the following standard, contact, and droplet precautions:

- Restrict all non-essential staff from patient areas.
- Maintain a register of people entering the patient care area.
- Limit the number of visitors allowed access to the patient to those necessary for the patient's well-being and care, such as a child's parent or caregiver. All visitors should wear full PPE. If a patient is infected with a very pathogenic virus, e.g., Ebola, direct visitation may not be allowed and the patient will be asked to communicate with their family members through video conferencing.
- Ensure that all those entering the patient care area use full PPE according to recommendations. ***All health care workers entering the patient care area should be trained in proper donning and doffing of PPE and should have practiced these procedures under observation to ensure that they are proficient in these procedures.***

- Apply infection control precautions to avoid any possible unprotected direct contact with blood and body fluids (e.g., blood, urine, feces, vomit, sweat, saliva, semen, breast milk) when providing care to any VHF patient, including suspected cases.
- Perform hand hygiene by using either an alcohol-based handrub or soap and running water and applying the correct hand hygiene technique.
- Perform hand hygiene before and after direct patient care, after any contact with potentially contaminated surfaces, and after removing PPE.
- Wear double correctly sized gloves when entering the patient care area.
- Wear a disposable gown and waterproof apron, or a disposable coverall and waterproof apron, to cover clothing and exposed skin. The gown and the coverall should be made of fabric that is tested for resistance to penetration by blood and body fluids and to blood-borne pathogens.
- Wear facial protection to prevent splashes to the nose, mouth and eyes.
- Wear a fluid-resistant medical/surgical mask with a structured design that does not collapse against the mouth.
- Wear either a face shield or goggles.
- Wear waterproof boots.
- Wear a head cover that covers the head and neck.
- Before leaving the isolation area of a patient with suspected VHF, carefully remove and dispose of protective equipment.
- When removing protective equipment, be careful to avoid any contact between the soiled items and any area of the face (eyes, nose or mouth).
- Ensure that clinical and non-clinical personnel are assigned exclusively to VHF patient care areas and that staff do not move freely between the isolation areas and other clinical areas during the outbreak.
- Limit the use of needles and other sharp objects as much as possible.
- Limit the use of phlebotomy and laboratory testing to the minimum necessary for essential diagnostic evaluation and patient care.

The systematic application of these precautions can help prevent the transmission of viral hemorrhagic fever in healthcare settings. Additional guidance for managing VHF patients and VHF infection control procedures can be found in the WHO Clinical Management of Patients with Viral Hemorrhagic Fever publication.

✓ CASE INVESTIGATION

Reporting

Report any illness to public health authorities that meets any of the following criteria:

1. A person for whom a diagnostic test specific for VHF has been ordered.
2. A person with ALL of the following findings:
    - a fever > 38°C;/100.4 °F

- one or 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
    - pharyngitis (arenavirus only)
    - diarrhea
    - bleeding not related to injury
    - thrombocytopenia
    - proteinuria (arenavirus only)
    - retrosternal chest pain (arenavirus only)
- one or more of the following epidemiological risk factors:
    - contact within the past 3 weeks with blood or other body fluids of a patient with VHF
    - residence in—or travel within the past 3 weeks to—a VHF endemic area
    - work within the past 3 weeks in a laboratory that handles VHF specimens
    - work within the past 3 weeks in a laboratory that handles bats, rodents, or primates from endemic areas
    - exposure within the past 3 weeks to semen from a confirmed acute or convalescent case of VHF.

3. A person whose death certificate lists VHF (i.e., Ebola, Lassa, Lujo, Marburg, new world Arenavirus, or Crimean-Congo hemorrhagic fever) as a cause of death or a significant condition contributing to death.

Other recommended reporting procedures

- All cases (suspected or confirmed) of viral hemorrhagic fever should be reported.
- Reporting should be ongoing and routine.
- Reporting should be immediate.

Table 1. Criteria for Reporting a Case of Viral Hemorrhagic Fever to Public Health Authorities

Criterion	**Reporting**
Clinical Evidence	
Fever (> 38°C)	N
Severe headache	O
Muscle pain	O
Erythematous maculopapular rash on the trunk with fine desquamation 3–4 days after rash onset	O
Retrosternal chest pain	O1
Pharyngitis (sore throat)	O1

Vomiting	O
Diarrhea	O
Bleeding not related to injury	O
Proteinuria	O1
Thrombocytopenia	O
Healthcare record contains a diagnosis of viral hemorrhagic fever	S
Death certificate lists viral hemorrhagic fever as a cause of death or a significant condition contributing to death	S
Laboratory Evidence	
Detection of VHF viral antigens in blood or tissues by ELISA antigen detection	S*
VHF viral isolation in cell culture from blood or tissues	S*
Detection of VHF-specific genetic sequence by RT-PCR from blood or tissues	S*
Detection of VHF viral antigens in tissues by immunohistochemistry	S*
Detection of IgM or IgG in blood by ELISA	S*
Epidemiological Evidence	
Contact with blood or other body fluids of a patient with VHF within the past 3 weeks	O
Residence in—or travel within the past 3 weeks to—a VHF endemic area	O
Work within the past 3 weeks in a laboratory that handles VHF specimens	O
Work within the past 3 weeks in a laboratory that handles bats, rodents, or primates from endemic areas	O
Exposure within past 3 weeks to semen from a confirmed acute or convalescent VHF case.	O

Notes:
S = This criterion alone is sufficient to report a case
O = At least one of any “O” criteria in each category (e.g., clinical presentation and epidemiologic evidence) —in conjunction with all other “N” criteria—is required to report a case. A number following an “O” indicates that this criterion only applies to a specific virus causing VHF (see below).
1 = Additional criteria that apply only to the Arenaviruses (Lassa, Lujo or new world arenaviruses including Junin, Machupo, Sabia, or Guanarito)
* A requisition or order for any of the “S” or “N” laboratory tests is sufficient to meet the reporting criteria.

Case Definition

Clinical Presentation Criteria

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

- fever > 38°C
- one or 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 (Arenaviruses only)
  - abdominal pain
  - bleeding not related to injury
  - retrosternal chest pain (Arenaviruses only)
  - proteinuria (Arenaviruses only)
  - thrombocytopenia

Laboratory Criteria for Diagnosis

One or more of the following laboratory findings:

- detection of VHF viral antigens in blood by ELISA antigen detection
- VHF viral isolation in cell culture for blood or tissues
- detection of VHF-specific genetic sequence by RT-PCR from blood or tissues
- detection of VHF viral antigens in tissues by immunohistochemistry

Note: VHF refers to viral hemorrhagic fever caused by either Ebola, Lassa, Lujo, or Marburg virus, a new world arenavirus, or Crimean-Congo hemorrhagic fever.

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

Suspected: Case meets the clinical and epidemiologic linkage criteria
Confirmed: Case meets the clinical and laboratory criteria

Classification Tables

Table 2. Criteria for Defining a Case of Viral Hemorrhagic Fever

Criterion	Confirmed	Suspected
Clinical Evidence		
fever (> 38°C)	N	N
severe headache	O	O
muscle pain	O	O
erythematous maculopapular rash on the trunk with fine desquamation 3–4 days after rash onset	O	O
retrosternal chest pain	O1	O1
pharyngitis (sore throat)	O1	O1
Vomiting	O	O
Diarrhea	O	O
abdominal pain	O	O
bleeding not related to injury	O	O
Proteinuria	O	O1
thrombocytopenia	O	O
Laboratory Evidence		
detection of VHF viral antigens in blood or tissues by ELISA antigen detection	S	
VHF viral isolation in cell culture from blood or tissues	S	
detection of VHF-specific genetic sequence by RT-PCR from blood or tissues	S	
Detection of VHF viral antigens in tissues by immunohistochemistry	S	
Epidemiological Evidence		
contact with blood or other body fluids of a patient with VHF within the past 3 weeks		O
residence in—or travel within the past 3 weeks to—a VHF endemic area		O
work within the past 3 weeks in a laboratory that handles VHF specimens		O

work within the past 3 weeks in a laboratory that handles bats, rodents, or primates from endemic areas		O
exposure within past 3 weeks to semen from a confirmed acute or convalescent VHF.		O

Notes:
S = This criterion alone is sufficient to classify a case
N = All "N" criteria in the same column—in conjunction with at least one of any "O" criteria in each category (e.g., clinical presentation and laboratory findings) in the same column—are required to classify a case. A number following an "N" indicates that this criterion is only required for a specific clinical presentation (see below).
O = At least one of any "O" criteria in each category (e.g., clinical presentation and laboratory findings) in the same column—in conjunction with all other "N" criteria in the same column—is required to classify a case. A number following an "O" indicates that this criterion is only required for a specific clinical presentation (see below).
1 = Additional criteria that apply only to Arenavirus (Lassa, Lujo or new world arenaviruses, including Junin, Machupo, Sabia, Guanarito)

Case Investigation Process

1. Following immediate notification of UDOH and the LHD, immediately investigate cases including gathering the following information into UT-NEDSS:
    a. The case's name, age, address, phone number, status (e.g., hospitalized, at home, deceased), and parent/guardian information, if applicable.
    b. The name and phone number of the hospital where the case is or was hospitalized.
    c. The name and phone number of the attending physician.
    d. The name and phone number of the infection control official at the hospital.
    e. If the patient was seen by a health care provider before hospitalization or seen at more than one hospital, these names and phone numbers.
2. Please complete the VHF form in UT-NEDSS and include the following information:
    a. Record the case's demographic information.
    b. Accurately record clinical information including "Viral Hemorrhagic Fever" as the disease being investigated, the type of VHF, if known (e.g., Ebola, Marburg, Lassa, Junin, Machupo, Sabia, Guanarito, Crimean Congo hemorrhagic, or Rift Valley fevers), date of symptom onset, symptoms, whether hospitalized, and hospital and clinician contact information.
    c. Include all available diagnostic laboratory test information that is available.
    d. Record information relevant to prevention and control. Use the incubation period range for VHFs (1-21 days, varying by etiologic agent). Specifically, focus on the period beginning a minimum of 1 day prior to the case's onset date back to no more than 21 days before onset for travel history. Determine the date(s) and geographic area(s) of travel to identify where the patient may have become infected.
    e. Include any additional comments regarding the case.

f. If you have made several attempts to obtain case information but have been unsuccessful (e.g., the case or health care provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason(s) why it could not be filled out completely.

Outbreaks

One case of VHF in Utah is considered an outbreak. A source of infection, such as travel to a geographical region where a known outbreak of VHF is occurring, should be sought, and applicable preventive or control measures should be instituted.

Identifying Case Contacts

Identify all other potentially exposed persons immediately.

Case Contact Management

A contact is defined as a person who has been exposed to an infected person or to an infected person's secretions, excretions, or tissues from the patient's onset of illness until 3 weeks after onset. Contacts may be subdivided into three levels of risk.

1. **Casual contacts** are persons who have not had close personal contact with the ill patient. Given the generally low secondary attack rates, widespread contact tracing, laboratory testing, or postexposure prophylaxis are not indicated for casual contacts. Casual contacts should be monitored daily for the duration of the longest possible incubation period starting after their last contact, checking and recording their temperature daily. It is usually recommended that exposed persons avoid intimate contact and sharing of utensils with household members for the duration of the incubation.
2. **Close contacts** are persons who have had more than casual contact with the patient. They include persons living with the patient, nursing or serving the patient, skin-to-skin contact with or hugging the patient, and handling the patient's laboratory specimens, before the recognition of the nature of the diagnosis. These contact persons should be identified by local health departments, in collaboration with UDOH, as soon as VHF is considered a likely diagnosis for the index case. Once the diagnosis is confirmed, close contacts should be placed under surveillance by public health. These individuals should record their temperature twice daily and report any temperature >=100.9 F or any symptom of illness to the public health officer responsible for surveillance. Surveillance should be continued for 3 weeks after the person's last contact with the index patient. Surveillance is not indicated for routine occupational contact with patients in situations where the diagnosis has been considered and appropriate isolation precautions implemented.
3. **High-risk contacts** are persons who have had mucous membrane contact with the patient, such as kissing or sexual intercourse, or have had a needle stick or other penetrating injury involving contact with the patient's secretions, excretions, blood,

tissues, or other body fluids. These individuals should be placed under surveillance as soon as VHF is considered a likely diagnosis in the index case.

Any close or high-risk contact who develops a temperature of >=100.9 F or any other symptoms of illness should be immediately isolated and treated as a VHF.

During the 2014 West Africa Ebola Outbreak, UDOH developed a series guiltiness for assessing and monitoring people with confirmed or potential exposure to Ebola. In the case of an exposure to Ebola or other filoviruses, contacts should be assessed and monitored according to the contacts should be assed for risk and monitored according to the Protocol for Managing and Documenting Active Monitoring of Persons Exposed to Ebola Virus Disease (EVD) in Utah.

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✓ VERSION CONTROL

Update July 2015: Update to document format.

Update. May 2016. Updated sections: Clinical Description, Treatment, Case Fatality, Epidemiology, Chemoprophylaxis, Vaccine, Isolation and Quarantine Requirements, Infection Control Measures, Reporting, References, and UT-NEDSS Minimum/Required Fields.

Update. March 2022. Updated CSTE case definition.

✓ UT-NEDSS MINIMUM/REQUIRED FIELDS BY TAB

Demographic
- First Name
- Last Name
- Date of Birth
- County
- Birth Gender
- Race
- City
- Street Name
- Zip Code
- Ethnicity
- Area Code
- Phone Number
- Date first reported to public health

Clinical
- Disease
- Date Diagnosed
- Hospitalized
- Died
- Date of Death
- Onset Date
- Clinical Presentation:
  - Fever >40°C
  - Severe headache
  - Muscle pain
  - Erythematous maculopapular rash on the trunk with fine desquamation 3–4 days after rash onset
  - Retrosternal chest pain (arenavirus only)
  - Pharyngitis (sore throat) (arenavirus only)
  - Vomiting
  - Diarrhea
  - Abdominal pain
  - Bleeding not related to injury
  - Proteinuria (arenavirus only)
  - Thrombocytopenia

Laboratory
- Test Type
- Organism
- Result Value
- Test Result
- Lab Test Date
- Specimen sent to state lab
- Specimen source

Contacts
- Contact type
- Disposition

Epidemiological
- Occupation
- Imported from

Investigation
- *VHF Exposure Assessment*
  - Risk level
  - Monitoring method to be used
  - Public and travel restrictions to be imposed
  - Type of travel
  - What countries was the case in?
  - Purpose of case's travel
  - Citizenship status
  - Date of entry to the US
  - Date of last possible exposure
  - Does the patient plan on traveling outside of Utah during monitoring period?
  - Detail location and dates of intended travel
- *VHF Case Form*
  - Contact with blood or other body fluids of a patient with VHF within the past 3 weeks
  - Residence in – or travel within the past 3 weeks – to a VHF endemic area
  - Work within the past 3 weeks in a laboratory that handles VHF specimens
  - Work within the past 3 weeks in a laboratory that handles bats, rodents, or primates from endemic areas
  - Exposure within past 3 weeks to semen from a confirmed acute or convalescent VHF case within 10 weeks of onset of illness
  - Are the symptoms appropriate for this disease?

Reporting
- Reporting agency name

Administrative
- LHD/State case status
- Event name