## Virginia Department of Health

**Viral Hemorrhagic Fever (VHF): Overview for Healthcare Providers**

<table>
<thead>
<tr>
<th>Organism*</th>
<th>Arenaviridae: Lassa virus, Lujo virus, New World arenaviruses (Guanarito, Junin, Machupo and Sabia)</th>
<th>Bunyaviridae: Crimean-Congo hemorrhagic fever (CCHF) virus, Rift Valley fever (RVF) virus, hantavirus</th>
<th>Filoviridae: Ebola virus, Marburg virus</th>
<th>Flaviviridae: Yellow fever (YF) virus, dengue virus, Alkhurma hemorrhagic fever (AHF) virus, Kyasanur Forest disease (KFD) virus, Omsk hemorrhagic fever (OHF) virus</th>
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<tr>
<td><strong>Incubation Period</strong></td>
<td>Lassa: 6–21 days; New World arenaviruses: 5–21 days</td>
<td>CCHF, RVF: 2–10 days</td>
<td>Ebola, Marburg: 2–21 days</td>
<td>YF: 3–6 days; dengue: 4–7 days; AHF: 2–4 days; KFD and OHF: 3–8 days</td>
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<td><strong>Risk Factors</strong></td>
<td>Rodent exposure (inhalation of aerosols, direct contact), close contact with infected patients; manipulating specimens in labs</td>
<td>Close contact with infected patients or animals; manipulating specimens in labs</td>
<td>All: Close contact with infected patients or animals; manipulating specimens in labs; Marburg: also visiting bat caves</td>
<td>All: Insect exposure; AHF: also contact with livestock; KFD: also exposure to rural, outdoor settings, handling of cattle; OHF: also contact with infected animals (e.g., muskrats), manipulating specimens in labs</td>
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<td><strong>Case-fatality Rate</strong></td>
<td>Lassa: 1% overall, 15%–20% among hospitalized cases; Lujo: 80% in 1 outbreak</td>
<td>CCHF: 9%–50% among hospitalized cases, 10%–40% in outbreaks; RVF: &lt;1% overall, ~50% among hemorrhagic cases</td>
<td>Ebola: ~50% overall, 25%–90% in outbreaks; Marburg: 23%–90%</td>
<td>YF: 30%–60% for severe cases; AHF: 1%–20% among hospitalized cases; KFD: 3%–5%; OHF: &lt;1%–3%</td>
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<td><strong>Route of Infection</strong></td>
<td>All: Primarily inhalation of aerosols of rodent excreta; ingestion of contaminated food; Lassa: also percutaneous, person-to-person transmission, sexual transmission; Lujo: also person-to-person transmission</td>
<td>All: Vector-borne, contact with infected animals; RVF: also possible consumption of contaminated raw milk, reported airborne transmission in labs; CCHF: also person-to-person transmission</td>
<td>Contact with infected persons, body fluids or animals; percutaneous, person-to-person, sexual transmission</td>
<td>All: Bite from infected insect; YF: also parenteral or unexplained (possibly aerosol) transmission in labs; vertical transmission from mother to infant; KFD: also, aerosol transmission in lab; OHF: also contact with infected animal; waterborne and airborne transmission might occur</td>
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<td><strong>Natural Reservoir or Vector</strong></td>
<td>Rodents</td>
<td>CCHF: tick; RVF: mosquito</td>
<td>Ebola: potentially fruit bats; Marburg: fruit bats</td>
<td>YF, dengue: mosquito; AHF, KFD: OHF: ticks</td>
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<td><strong>Reporting to Public Health</strong></td>
<td>In general, suspected or confirmed cases of VHF require immediate notification to the local health department (LHD). Suspected or confirmed cases of dengue and hantavirus pulmonary syndrome require reporting to the LHD within 3 days.</td>
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*Revised February 2019*
Clinical Description
In general, initial signs and symptoms include fever, headache, muscle pain, erythematous maculopapular rash on the trunk, vomiting, diarrhea, abdominal pain, or bleeding.

Differential Diagnosis
Malaria, influenza, viral hepatitis, bacterial sepsis, toxic shock syndrome, meningococccemia, salmonellosis, shigellosis, rickettsial disease, leptospirosis, borreliosis, psittacosis, dengue, trypanosomiasis, septicemic plague, rubella, measles and hemorrhagic smallpox.

Radiography
Pulmonary edema or hemorrhage, acute respiratory distress, dilated bowels with signs of ileus or dynamic intestinal obstruction.

Specimen Collection and Laboratory Testing
Tests include serology, immunohistochemistry, PCR and virus isolation. Testing requires high containment (Biosafety Level 3 or 4). Testing is performed at CDC, with the exception of preliminary testing for Ebola virus by PCR that can be performed at DCLS (preliminary positive results require confirmatory testing at CDC). If VHF is suspected, notify LHD immediately to discuss the case and laboratory testing. Specimens may be sent to the Division of Consolidated Laboratory Services (DCLS) after VDH has approved testing. For questions about specimen collection, the DCLS Emergency Officer can be reached 24/7 at 804-335-4617.

Treatment
Ribavirin, supportive care
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Supportive care.
Supportive care

Postexposure Prophylaxis†
Lassa: oral ribavirin may be used for high-risk exposures
CCHF: ribavirin has shown some benefit
Not available
Not available

Vaccine
Argentine hemorrhagic fever (Junin virus): investigational vaccine available
RVF: investigational vaccine available
Ebola: investigational vaccines are available
YF: FDA-approved vaccine available; KFD: vaccine used in India

Infection Control§
In general, immediately isolate the patient and implement Standard, Contact and Droplet Precautions for the duration of illness. Hemorrhagic fever specific barrier precautions (Standard, Contract, and Airborne Precautions) are recommended if bioterrorism is suspected or if the epidemiology of virus transmission is unpredictable or unknown. For Ebola, refer to CDC's Ebola guidance for clinicians.

*Other hemorrhagic fever viruses exist within these categories. However, the viruses that pose the most serious risk as biological weapons are the following: arenaviruses (Lassa virus, New World arenaviruses), bunyaviruses (Rift Valley fever virus), filoviruses (Ebola virus, Marburg virus), and flaviviruses (yellow fever virus, Omsk hemorrhagic fever virus, Kyasanur Forest disease virus); dengue virus, Crimean-Congo hemorrhagic fever viruses and hantaviruses are considered less likely to be used as biological weapons (Borio, et al 2002). The role of other hemorrhagic fever viruses as potential weapons is not known.

†In 2002, the Working Group on Civilian Biodefense does not recommend prophylactic antiviral therapy for persons exposed to any hemorrhagic fever viruses (including Lassa virus) in the absence of clinical illness (Borio, et al 2002); instead, the group recommended monitoring the exposed person for 21 days and, if symptoms suggestive of VHF develop or fever (≥101°F) is documented, ribavirin therapy should be initiated unless another diagnosis is confirmed (or the etiologic agent is known to be a filovirus or flavivirus).

§Source: Siegel JD, et al 2007 for VHFs caused by Lassa, Ebola, Marburg, or Crimean-Congo fever viruses. Note that Borio, et al (2002) recommends additional airborne precautions because airborne transmission of VHFs cannot be conclusively excluded. For Ebola, CDC has developed extensive infection control guidance (https://www.cdc.gov/vhf/ebola/clinicians/index.html). Clinicians should consult with their local health department for additional guidance.