

**VIRAL HEMORRHAGIC FEVERS: Health Care Information**

Viral hemorrhagic fevers (VHFs) refer to a group of systemic viral illnesses associated with fever and a propensity to cause shock and bleeding. VHFs are caused by > 25 viruses from four families: *Filoviridae* (Ebola, Marburg), *Arenaviridae* (Lassa, South American), *Bunyaviridae* (Sin Nombre, Rift Valley, Crimean-Congo, Hantaan and related viruses) and *Flaviviridae* (Dengue, yellow fever and others). VHFs are primarily zoonosis, and human infection is rare. VHFs are endemic in parts of Africa, Asia and the Americas. Transmission of VHF agents usually occurs through direct exposure to virus-contaminated blood and body fluids from animal hosts or through arthropod vectors. Secondary human-to-human transmission is a particular concern with Ebola, Marburg, Lassa and Crimean-Congo hemorrhagic fevers. VHFs are considered Category A bioterrorism agents since most (except for Dengue) have been proven to be infectious when delivered in the aerosol form.

**Signs and Symptoms:** The disease spectrum can vary from a mild nonspecific illness to severe multi-organ system failure and death. After an **incubation period of 2 to 35 days** (*Arenaviridae*, 5 to 16 days; *Bunyaviridae*, 2 to 35 days; *Filoviridae*, 3 to 16 days; *Flaviviridae*, 3 to 8 days), initial symptoms are non-specific and can include **fever, chills, headache, nausea, diarrhea, arthralgias and myalgias**. This may be followed by the onset of hemorrhage, which can include **hematemesis, melena, hematuria, metrorrhagia, purpura, petechiae, epistaxis, and hemorrhage from gums as well as venipuncture sites** after several days. Evidence of vascular permeability leading to **edema, hypotension and shock** is common. A **relative bradycardia** is a clinical hallmark for some VHFs. Specific syndromes have been described for each of the VHF. End stages are characterized by **DIC, multi-organ failure and coma**. Laboratory findings **include leukopenia, thrombocytopenia, elevated transaminases, and coagulopathy**.

**Diagnosis:** Report all suspected cases immediately to the local and state health departments as well as the CDC (see attached contact sheet). Testing for VHF in serum (via the enzyme-linked immunosorbent assays (ELISA or PCR) is beyond the scope of hospital laboratories. Blood (>1 mL) in a plastic red top tube must be sent to the CDC via the hospital laboratory and through the Reference Laboratory Network. Clinical specimens should be considered highly infectious and handled with extreme caution. Notify your laboratory of potentially infectious VHF samples (samples should be handled under BSL-4 conditions).

**Decontamination:** Patients who were recently exposed to aerosolized VHF viruses require removal of their clothing and washing of all exposed skin with soap and water. Patients who are symptomatic (i.e., exposed days to weeks ago) do not require decontamination.

**Treatment:** The treatment of most VHFs is primarily supportive. Intramuscular and subcutaneous injections as well as the use of anti-platelet drugs should be avoided. Secondary bacterial and parasitic (e.g., malaria) infections should be treated if present. Corticosteroids should not be used for most VHFs. The antiviral agent ribavirin may be effective for the treatment of *Bunyaviridae* and *Arenaviridae* VHFs.

**Dosing Recommendations**

**Ribavirin:** 30 mg/kg IV up to 2 gm IV as a single loading dose  
16 mg/kg up to 1 gm IV every six hours x 4 days  
8 mg/kg up to 500 mg IV every eight hours x 6 days

30 mg/kg up to 2 gm once orally as a loading dose  
7.5 mg/kg up to 600 mg orally twice a day x 10 days

**Post-exposure Prophylaxis:** Not recommended routinely. Individuals exposed to Lassa, South American, Rift Valley and Crimean-Congo VHFs should be monitored for fever and considered for empiric treatment with ribavirin if this occurs.

**Isolation and Personal Protection:** Experimental aerosol transmission has been demonstrated for several of the VHFs, so **isolation in negative air pressure rooms** should be instituted early for suspected cases. **Strict contact and barrier precautions** must be instituted (**gloves, HEPA masks, gowns, covers**) since secondary transmission of the VHF viruses has been documented through close contact with infected individuals and their body fluids. Risk of person-to-person transmission is highest during the latter stages of illness. **Patients should wear a surgical mask and be covered with a sheet during transportation.** In fatal cases, handling of corpses should be minimized. Contaminated environmental surfaces should be cleaned with routine hospital-approved disinfectants or with 0.5% sodium hypochlorite (1 part household bleach and 9 parts water).

**Resource Links:** <http://bt.cdc.gov/agent/vhf/>  
<http://www.upmc-biosecurity.org/pages/agents/vhf.html>