

# Viral Hemorrhagic Fever

(Including but not Limited to Ebola, Marburg, Lassa, Machupo, Crimean Congo, Rift Valley, Junin, Sabia, and Guanarito Fevers)

## IMMEDIATELY REPORTABLE DISEASE

Per NJAC 8:57, health care providers and administrators shall immediately report **by telephone** confirmed and suspected cases of viral hemorrhagic fever to the health officer of the jurisdiction where the ill or infected person lives, or if unknown, wherein the diagnosis is made. The health officer (or designee) **must immediately institute the control measures listed below in section 6, “Controlling Further Spread,”** regardless of weekend, holiday, or evening schedules. A directory of local health departments in New Jersey is available at <http://www.nj.gov/health/lh/directory/lhdselectcounty.shtml>.

If the health officer is unavailable, the health care provider or administrator shall make the report to the Department by telephone to 609.826.5964, between 8:00 A.M. and 5:00 P.M. on non-holiday weekdays or to 609.392.2020 during all other days and hours.



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## 1 THE DISEASE AND ITS EPIDEMIOLOGY

### A. Etiologic Agent

Viral hemorrhagic fevers (VHFs) include numerous zoonotic diseases caused by different viruses, all of which cause a hemorrhagic syndrome in humans. VHFs are caused by filoviruses, arenaviruses, bunyaviruses, and flaviviruses and include diseases such as Ebola, Marburg, Lassa, Crimean Congo, and Rift Valley fever. Because of its extremely high case-fatality rate and the potential importation of the virus into the United States in nonhuman primates, Ebola hemorrhagic fever has been most publicized in the United States. VHFs have been recognized by the Centers for Disease Control and Prevention (CDC) as being among the top agents of concern for potential bioterrorist weapons.

VHF Disease	Virus Family	Primary Disease Occurrence*	Primary Disease Vector†
Argentine hemorrhagic fever	<i>Arenaviridae</i>	Argentina	Rodents
Machupo virus	<i>Arenaviridae</i>	Bolivia	Rodents
Crimean-Congo hemorrhagic fever	<i>Bunyaviridae</i>	Eastern Europe	Ticks
Ebola hemorrhagic fever	<i>Filoviridae</i>	Africa	Zoonotic
Hemorrhagic fever with renal syndrome	<i>Bunyaviridae</i>	Eastern Asia	Rodents
Hendra virus disease	<i>Paramyxoviridae</i>	Australia	Flying foxes
Kyasanur Forest disease	<i>Flaviviridae</i>	India	Small rodents
Lassa fever	<i>Arenaviridae</i>	West Africa	Rodents
Lymphocytic coriomeningitis	<i>Arenaviridae</i>	Worldwide	Rodents
Marburg hemorrhagic fever	<i>Filoviridae</i>	Africa	Zoonotic
Nipah virus encephalitis	<i>Paramyxoviridae</i>	Malaysia, Singapore	Bats (probable)
Omsk hemorrhagic fever	<i>Flaviviridae</i>	Western Siberia	Rodents
Rift Valley fever	<i>Bunyaviridae</i>	Africa	Mosquitoes
Sabia-associated hemorrhagic fever	<i>Arenaviridae</i>	Brazil	Rodents
Tick-borne encephalitis	<i>Flaviviridae</i>	Europe, Asia	Ticks
Venezuelan hemorrhagic fever	<i>Arenaviridae</i>	Venezuela	Rodents

\*Disease may occur elsewhere; location listed is most recently reported infection or where disease may be endemic in animal populations.

†Disease reservoir may differ from disease vector and most VHFs can occur through secondary transmission or direct person-to-person contact.

**NOTE: Hantavirus pulmonary syndrome, yellow fever, and dengue hemorrhagic fever are VHF's covered in separate *Communicable Disease Manual* chapters.**

## **B. Clinical Description and Laboratory Diagnosis**

The onset of VHF is usually sudden, and the duration of illness can vary from a few days to a few weeks. Patients may present with a brief prodrome characterized by nonspecific signs and symptoms, including fever, headache, malaise, weakness, irritability, dizziness, muscle aches, nausea, and vomiting. As the clinical course progresses, signs and symptoms may include low blood pressure, sustained fever, sweats, rash, diarrhea, swelling around the eyes, and flushing and redness of the eyes. With severe illness, the patient becomes prostrate and may develop pain in the throat, chest, or abdomen, as well as petechiae and ecchymoses (bruises). In severe cases, bleeding may occur from mucous membranes (including nosebleeds and bleeding gums), and although the bleeding itself is rarely life-threatening, the patient will often go into shock. Encephalopathy, hepatitis, intention tremors, and reduced white blood cell and platelet levels are frequently seen, and renal failure may occur. The severity of clinical disease varies with the agent causing the illness and can range from mild to fatal; likewise, the case-fatality rate varies depending on the agent and strain, with mortality rates ranging from 10% to 90%.

## **C. Reservoirs**

Viruses associated with VHF's are zoonotic, meaning they naturally reside in an animal or arthropod host. Many wild and domestic animals, ticks, and mosquitoes are known to carry the VHF agents, although reservoirs have not been identified for all VHF agents. Rodents have been implicated as carriers for Lassa, Junin, Machupa, Guanarito, Crimean Congo, and Rift Valley fever viruses. Mosquitoes, ticks, and certain animals (rodents, foxes, hares, and birds) can carry bunyaviruses that can cause VHF. Ebola and Marburg hemorrhagic fever viruses can affect primates; however, because these infections are associated with rapid and fatal illness in these animals, they are not considered reservoirs.

## **D. Modes of Transmission**

The mode of transmission for a source case of VHF is usually animal-, tick-, or mosquito-to-human. Humans can become infected through contact with contaminated blood or secretions (such as urine or fecal matter) from infected animals, or through the bite of an infected tick or mosquito. Once a human has acquired VHF, transmission may occur person-to-person. VHF's that can be spread person-to-person include Ebola, Marburg, Lassa, and Crimean-Congo hemorrhagic fevers. Transmission can occur through direct contact with an infected person's blood or secretions, or through indirect contact with contaminated bedding or other fomites. In addition, medical equipment that has not been properly cleaned or sterilized has been responsible for the spread of VHF and, less frequently, cases have been acquired by laboratory workers manipulating specimens.

## E. Incubation Period

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

## F. Period of Communicability or Infectious Period

Infected individuals are generally considered infectious for a variable period preceding the onset of symptoms (range two days to three weeks, depending on the viral agent) and during the course of clinical symptoms. Virus may remain in the blood and secretions for months after an individual recovers. Contaminated bedding and medical equipment may remain infectious for several days.

## G. Epidemiology

VHFs occur naturally in different geographic regions throughout the world, depending on the host and agent. Most VHFs occur on the continents of Asia, Africa, and South America. Humans can become infected in an area where the virus occurs naturally by coming into contact with the host or a vector; also, the host or vector may be exported from its native habitat and pose a risk of infection in an area where the virus normally does not occur. In addition, humans infected in one region and traveling to another region can spread the virus from person to person or to another vector, such as native mosquito populations. Since international travel has been on the rise, VHFs have been identified in places where they have rarely or never been seen before.

Outbreaks of VHF, when they occur, tend to be sporadic. Outbreaks of Ebola hemorrhagic fever in imported nonhuman primates (NHPs) used for research have occurred in the United States. In one instance, individuals working with infected primates developed antibody to Ebola, suggesting exposure, but the individuals did not become clinically ill. There is speculation that this particular strain of Ebola virus (called Ebola Reston) may be unable to cause clinical disease in humans. In 2005, the CDC, in collaboration with the World Health Organization and in cooperation with the Ministry of Health in Angola, announced an outbreak of Marburg hemorrhagic fever in Uige Province of northern Angola. Notices regarding VHFs and international travel can be found on the CDC Traveler's Health Web site at <http://wwwn.cdc.gov/travel/>.

Although VHFs are rarely seen in the North American continent, New Jersey did have an imported case of Lassa fever in 2004. The case was identified in a traveler returning from Africa, where the infection was most likely acquired from contact with rodents. No secondary cases were identified.

## H. Bioterrorist Potential

VHFs are considered to be potential Category A bioterrorism agents. If acquired and properly disseminated, these viruses could cause a serious public health challenge in terms of ability to limit the numbers of casualties and control other repercussions from such an attack.

## **2 REPORTING CRITERIA AND LABORATORY TESTING SERVICES**

### **A. New Jersey Department of Health and Senior Services Case Definition**

#### **Clinical Description**

Specific signs and symptoms vary by the type of VHF, but initial signs and symptoms often include marked fever, fatigue, dizziness, muscle aches, loss of strength, and exhaustion. Patients with severe cases of VHF often show signs of bleeding under the skin, in internal organs, or from body orifices like the mouth, eyes, or ears. However, although they may bleed from many sites around the body, patients rarely die because of blood loss. Severely ill case-patients may also show shock, nervous system malfunction, coma, delirium, and seizures. Some types of VHF are associated with renal (kidney) failure.

#### **Laboratory Criteria for Diagnosis**

- Demonstration of virus or viral antigen by enzyme-linked immunosorbent assay (ELISA), polymerase chain reaction (PCR), and/or virus isolation, OR
- Presence of specific immunoglobulin M antibody in serum, OR
- Postmortem diagnosis through visualization of virus in skin or liver by PCR, immunohistochemistry (IHC) or virus isolation.

Laboratory confirmation is based on identifying the presence of specific antibodies in blood, serum, or organ homogenates; by detection of virus antigen in clinical specimen by PCR; and / or by virus isolation in cell culture. Laboratory studies represent an extreme biohazard and should be carried out only where protection against infection of the staff and community is available.

#### **Case Classification**

##### **CONFIRMED**

A clinically compatible case with laboratory confirmation

##### **PROBABLE**

Not used

##### **POSSIBLE (SUSPECT)**

Not used

### **B. Differences from CDC Case Definition**

There are no formal case surveillance definitions used by the CDC for VHF.

## 3 LABORATORY TESTING SERVICES AVAILABLE

The New Jersey Department of Health and Social Services (NJDHSS) Public Health and Environmental Laboratories (PHEL) does not provide testing for VHF.

Arrangements must be made through the Infectious and Zoonotic Diseases Program (IZDP) for PHEL to send appropriate sample types to the CDC for diagnostic testing. Contact IZDP immediately if VHF is suspected at 609.588.7500 during regular business hours or 609.392.2020 at night or on the weekend.

## 4 PURPOSE OF SURVEILLANCE AND REPORTING REQUIREMENTS

### A. Purpose of Surveillance and Reporting

- To identify potential sources of transmission that may exist in the United States (such as NHPs or laboratory specimens)
- To identify sources of transmission and geographical areas of risk outside of the United States
- To stop transmission from such sources and geographical areas
- To identify cases as early as possible to prevent transmission to other persons or animals
- To identify cases and clusters of human illness that may be associated with a bioterrorist event

### B. Laboratory Reporting Requirements

The New Jersey Administrative Code (NJAC 8:57-1.6) stipulates that laboratories report (by telephone, confidential fax, or over the Internet using the Communicable Disease Reporting and Surveillance System [CDRSS]) all cases of VHF to the local health officer having jurisdiction over the locality in which the patient lives or, if unknown, to the health officer in whose jurisdiction the healthcare provider requesting the laboratory examination is located. The report shall contain, at a minimum, the reporting laboratory's name, address, and telephone number; the age, date of birth, gender, race, ethnicity, home address, and telephone number of person tested; the test performed; the date of testing; the test results; and the healthcare provider's name and address.

**NOTE: Since the CDC is the principal testing laboratory for VHF in the United States, any laboratory-identified cases in New Jersey residents would be reported to NJDHSS by the CDC, and NJDHSS would, in turn, notify the health officer with jurisdiction over the community where the case-patient resides.**

### C. Healthcare Provider Reporting Requirements

The New Jersey Administrative Code (NJAC 8:57-1.4) stipulates that healthcare providers immediately report (by telephone, confidential fax, or in writing) all cases of VHF to the local health officer having jurisdiction over the locality in which the patient lives or, if unknown, to the health officer in whose jurisdiction the healthcare provider requesting the laboratory examination is located. The report shall contain the name of the disease; date of illness onset; and the name, age, date of birth, race, ethnicity, home address, and telephone number of the patient being reported. In addition, the report shall included the name, address, institution and telephone number of the reporting official, and other information as may be required by NJDHSS concerning a specific disease.

### D. Health Officer's Reporting and Follow-Up Responsibilities

The New Jersey Administrative Code (NJAC 8:57-1.7) stipulates that each local health officer must immediately report the occurrence of any case of VHF from a laboratory or healthcare provider to the NJDHSS IZDP. Although a report can be mailed or filed electronically over the Internet using the confidential and secure CDRSS, notification must be first made immediately by telephone.

## 5 CASE INVESTIGATION

### A. Investigation Guidelines

- 1) **The most important thing a local health officer can do if he/she learns of a suspect or confirmed case of VHF, or any potential exposure to an agent that could cause VHF, is to call the NJDHSS IZDP immediately, any time of the day or night.** The IZDP phone number is 609.588.7500 during business hours and 609.392.2020 after business hours and on weekends and holidays.
- 2) The NJDHSS IZDP will direct the case investigation of New Jersey residents in conjunction with the CDC. If a bioterrorist event is suspected, NJDHSS and other authorities will work closely with the local health officer and provide instructions/information on how to proceed.
- 3) Following immediate notification of the NJDHSS IZDP, the local health officer may be asked to assist in investigating any patient living within the community, including gathering the following:
  - a) The patient's name, age, address, phone number, status (hospitalized, at home, deceased), and parent/guardian information, if applicable.
  - b) The name and phone number of the hospital where the patient is or was hospitalized.
  - c) The name and phone number of the patient's attending physician.
  - d) The name and phone number of the infection control official at the hospital.
  - e) If the patient was seen by a healthcare provider before hospitalization, or seen at more than one hospital, these names and phone numbers of these facilities will be needed as well.
- 4) The local health officer(s) may be asked to assist in completing the CDS-1 reporting form, which can be found online at <http://www.state.nj.us/health/forms/cds-1.pdf> Most of the

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information required on the form can be obtained from the healthcare provider or the medical record. Use the following guidelines in completing the form:

- a) Record VHF as the disease being reported, with detailed information about the suspected agent (e.g., Ebola, Lassa, Marburg).
  - b) Record the patient's demographic information.
  - c) Record the date of symptom onset, symptoms, date of diagnosis, hospitalization information (if applicable), and outcome of disease (e.g., recovered, died).
  - d) Exposure history: Use the incubation period range for VHF (2 to 21 days, average 5 to 10 days). Specifically, focus on the period beginning a minimum of two days prior to the patient's onset date back to no more than 16 days before onset for travel history; determine the date(s) and geographic area(s) traveled to by the patient to identify where he/she may have become infected.
  - e) Complete the important "history of travel" section to indicate where EHF was acquired. If unsure, check "Unknown."
  - f) Include any additional comments regarding the patient.
  - g) If several unsuccessful attempts to obtain patient information have been made (e.g., the patient or healthcare provider does not return calls or respond to a letter, or the patient refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as is possible. Please note on the form the reason why it could not be filled out completely.
  - h) Enter the information from the CDS-1 form, and any additional information obtained during the course of the investigation, into CDRSS.
- 5) Institution of disease control measures is an integral part of case investigation. It is the local health officer's responsibility to understand and, if necessary, institute the control guidelines listed below in section 6.

### B. Entry into CDRSS

The mandatory fields in CDRSS include disease, last name, county, municipality, gender, race, ethnicity, case status, and report status.

The following table can be used as a quick reference guide to determine which CDRSS fields need to be completed for accurate and complete reporting of VHF. The "Tab" column includes the tabs that appear along the top of the CDRSS screen. The "Required Information" column provides detailed explanations of what data should be entered.

CDRSS Screen	Required Information
Patient Info	Enter the disease name ("EBOLA," "LASSA FEVER," "MARBURG," or "VHF-NOT EBOLA, LASSA, MARBURG"), patient demographic information, illness onset date, and the date the case was reported to the local health department (LHD).

CDRSS Screen	Required Information
<b>Clinical Status</b>	Enter any treatment that the patient received and record the names of the medical facilities and physician(s) involved in the patient’s care. If the patient received care from two or more hospitals or healthcare providers, be sure that all are entered so the case can be accessed by other jurisdictions.
<b>Signs/Symptoms</b>	Check appropriate boxes for signs and symptoms and indicate their onset date. Make every effort to get complete information by interviewing the physician, nurse, or office manager abstracting medical information from the patient’s chart, or the patient. Also, information regarding the resolution of signs and symptoms should be entered.
<b>Risk Factors</b>	Enter complete information about risk factors including, but not limited to, travel history and exposure to vectors (primates, rodents, mosquitoes). Be sure to document any risk factors up to 30 days prior to symptom onset.
<b>Contact Tracing</b>	Use this screen to enter information about close contacts. Record the contact’s name, age, and relationship to the patient. Each contact may be entered separately by clicking on “FIND CONTACT BY NAME,” or a narrative note may be written in the “COMMENTS” box.
<b>Case Comments</b>	Enter general comments (i.e., information that is not discretely captured by a specific topic screen or drop-down menu) in the “COMMENTS” section. <b>NOTE:</b> Select pieces of information entered in the “COMMENTS” section CANNOT be automatically exported when generating reports. Therefore, whenever possible, record information about the case in the fields that have been designated to capture this information; information included in these fields CAN be automatically exported when generating reports.
<b>Epidemiology</b>	Information regarding epidemiology is not required for this disease.
<b>Case Classification Report Status</b>	<p>Case Classification options are “REPORT UNDER INVESTIGATION (RUI),” “CONFIRMED,” “PROBABLE,” “POSSIBLE,” and “NOT A CASE.”</p> <ul style="list-style-type: none"> <li>• All cases entered by NJDHSS will be assigned a case status of “REPORT UNDER INVESTIGATION (RUI).”</li> <li>• Cases still under investigation by the LHD should be assigned a case status of “REPORT UNDER INVESTIGATION (RUI).”</li> </ul>

CDRSS Screen	Required Information
	<ul style="list-style-type: none"> <li>• Upon completion of the investigation, the LHD should assign a case status on the basis of the surveillance case definition (options include “CONFIRMED,” “PROBABLE,” “POSSIBLE,” and “NOT A CASE”).</li> </ul> <p>Report status options are: “PENDING,” “LHD OPEN,” “LHD REVIEW,” “LHD CLOSED,” “DELETE,” “REOPENED,” “DHSS OPEN,” “DHSS REVIEW,” and “DHSS APPROVED.”</p> <ul style="list-style-type: none"> <li>• Cases entered by NJDHSS will be assigned a report status of “PENDING.”</li> <li>• Once the LHD begins investigating a case, the report status should be changed to “LHD OPEN.”</li> <li>• The “LHD REVIEW” option can be used if the LHD has a person who reviews the case before it is closed (e.g., health officer or director of nursing).</li> <li>• Once the LHD investigation is complete and all the data are entered into CDRSS, the LHD should change the report status to “LHD CLOSED.”</li> <li>• “LHD CLOSED” cases will be reviewed by DHSS and be assigned one of the DHSS-specific report status categories. If additional information is needed on a particular case, the report status will be changed to “REOPENED” and the LHD will be notified by e-mail. Cases that are “DHSS APPROVED” cannot be edited by LHD staff (see section 5C below).</li> </ul> <p>If a case is inappropriately entered (e.g., a different reportable disease or condition was erroneously entered as a case of VHF) the case should be assigned a report status of “DELETE.” A report status of “DELETE” should NOT be used if a reported case of VHF simply does not meet case definition.</p>

**C. Other Reporting/Investigation Issues**

1. Case report forms, including the CDS-1, DO NOT need to be mailed to NJDHSS as long as mandatory fields indicated in section 5B are completed.
2. Once an LHD completes its investigation and assigns a report status of “LHD CLOSED,” NJDHSS will review the case. NJDHSS will approve the case by changing the report status to “DHSS APPROVED.” At this time, the case will be submitted to the CDC and the case will be locked for editing. If additional information is received after a case has been assigned a status of “DHSS APPROVED,” an LHD will need to contact NJDHSS to reopen the case. This should be done only if the additional information changes the case status of the report.

# 6 CONTROLLING FURTHER SPREAD

## A. Isolation and Quarantine Requirements (NJAC 8:57-1.10)

### Minimum Period of Isolation of Patient

Patients should be isolated until they are clinically well, and then monitored. Because blood and secretions may contain virus for up to several months, patients must be educated and monitored for infectiousness. Negative semen or vaginal secretion cultures should be obtained from patients before they resume sexual activity.

### Minimum Period of Quarantine of Contacts

See section 6B directly below.

## B. Protection of Contacts of a Case

There is no role for immunization or prophylaxis in the management of persons exposed to blood, body fluids, secretions, or excretion from a patient with suspected VHF. Healthcare workers and other contacts of known or suspected cases of VHF should practice standard, contact, and droplet (including respiratory) precautions to reduce the likelihood of VHF transmission. Individuals who have had any contact with infectious patients should be monitored by their healthcare provider for the maximum incubation period for the specific agent. For further information, consult the “Interim Guidance for Managing Patients with Suspected Viral Hemorrhagic Fever in U.S. Hospitals” on the CDC’s Web site at [http://www.cdc.gov/ncidod/dhqp/bp\\_vhf\\_interimGuidance.html](http://www.cdc.gov/ncidod/dhqp/bp_vhf_interimGuidance.html).

## C. Managing Special Situations

### Reported Incidence Is Higher Than Usual/Outbreak Suspected

If an outbreak is suspected, the primary investigation will be handled by NJDHSS in conjunction with the CDC. A source of infection, such as travel to a geographical region where a known outbreak of VHF is occurring, will be sought and applicable preventive or control measures will be instituted. NJDHSS can determine a course of action to prevent further cases and can perform surveillance for cases involving multiple jurisdictions that would be difficult to identify at a local level. The LHD may be asked to assist in the investigation to help determine the source of infection and to implement any necessary control measures.

**NOTE: If a bioterrorist event is suspected, NJDHSS and other response authorities will work closely with local health officers and provide instructions/information on how to proceed.**

## D. Preventive Measures

### Environmental Measures

Because blood, body fluids, secretions, and excretions may be infectious, it is important for all potentially contaminated surfaces, linens, and clothing to be cleaned and disinfected using standard infection control procedures. For example, potentially contaminated surfaces should be cleaned using a U.S. Environmental Protection Agency-registered hospital disinfectant or a 1:100 diluted solution of household bleach. Soiled linens should be placed in clearly labeled leak-proof bags at the site of use, transported directly to the laundry area, and laundered following routine healthcare laundry procedures. For additional information about environmental cleaning and disinfectant and infection control, refer to the CDC document on VHF and infection control in hospital settings at [http://www.cdc.gov/ncidod/dhqp/bp\\_vhf\\_interimGuidance.html](http://www.cdc.gov/ncidod/dhqp/bp_vhf_interimGuidance.html).

### Personal Preventive Measures/Education

- It is important that healthcare providers follow standard, contact, and droplet (including respiratory) precautions while managing suspect and confirmed cases of VHF.
- Vaccines are not available for most VHFs, with the exception of yellow fever and Argentine hemorrhagic fever. As such, avoid traveling to areas with known outbreaks of VHF.
- Laboratory workers handling specimens suspected of containing the agents of VHF must take appropriate precautions.
- Persons working with imported NHPs should know the signs of VHF in NHPs and **immediately report** any cases of suspect or confirmed VHF in NHPs to NJDHSS.

## Additional Information

Additional information is available at the CDC VHF website at <http://www.cdc.gov/ncidod/diseases/virlfvr/virlfvr.htm>.

Additional information is available at the CDC bioterrorism website at <http://www.bt.cdc.gov/agent/VHF/>.

Additional travel-related information is available at the CDC's Travelers' Health website at <http://wwwn.cdc.gov/travel/>.

Additional information can be found on the World Health Organization website at <http://www.who.int>.

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