



Infectious Disease Epidemiology Section
Office of Public Health, Louisiana Dept of Health & Hospitals
(504) 219-4563 or 800-256-2748 (after-hours emergency)
www.infectiousdisease.dhh.louisiana.gov

Viral Hemorrhagic Fever (VHF)

Revised 02/22/2005

Epidemiology

The viral hemorrhagic fevers are a diverse group of illnesses caused by RNA viruses from four viral families. The *Arenaviridae* include the etiologic agents of Argentine, Bolivian, and Venezuelan hemorrhagic fevers, and Lassa fever. The *Bunyaviridae* include the members of the *Hantavirus* genus, the Congo-Crimean hemorrhagic fever virus from the *Nairovirus* genus, and the Rift Valley fever virus from the *Phlebovirus* genus; the *Filoviridae* include Ebola and Marburg viruses; and the *Flaviviridae* include dengue and yellow fever viruses. These viruses are spread in a variety of ways; some may be transmitted to humans through a respiratory portal of entry. Although evidence for weaponization does not exist for many of these viruses, they are included in this handbook because of their *potential* for aerosol dissemination or weaponization, or likelihood for confusion with similar agents that might be weaponized.

Because these viruses are so diverse and occur in different geographic locations endemically, their full history is beyond the scope of this handbook. However, there are some significant events that may provide insight into their possible importance as biological threat agents.

Arenaviridae: Argentine hemorrhagic fever (AHF), caused by the Junin virus, was first described in 1955 in corn harvesters. From 300 to 600 cases per year occur in areas of the Argentine pampas. Bolivian, Brazilian, and Venezuelan hemorrhagic fevers are caused by the related Machupo, Guanarito, and Sabia viruses. Lassa virus causes disease in West Africa. These viruses are transmitted from their rodent reservoirs to humans by the inhalation of dusts contaminated with rodent excreta.

Bunyaviridae: Congo-Crimean hemorrhagic fever (CCHF) is a tick-borne disease that occurs in the Crimea and in parts of Africa, Europe and Asia. It can also be spread by contact with infected animals, and in healthcare settings. Rift Valley fever (RVF) is a mosquito-borne disease that occurs in Africa. The hantaviruses are rodent-borne viruses with a wide geographic distribution. Hantaan and closely related viruses cause hemorrhagic fever with renal syndrome (HFRS), (also known as Korean hemorrhagic fever or epidemic hemorrhagic fever). This is the most common disease due to hantaviruses. It was described prior to WW II in Manchuria along the Amur River, among United Nations troops during the Korean conflict, and subsequently in Japan, China, and in the Russian Far East. Severe disease also occurs in some Balkan states, including Bosnia, Serbia and Greece. Nephropathia epidemica is a milder disease that occurs in Scandinavia and other parts of Europe, and is caused by strains carried by bank voles. In addition, newly described hantaviruses cause Hantavirus Pulmonary Syndrome (HPS) in the Americas. The hantaviruses are transmitted to humans by the inhalation of dusts contaminated with rodent excreta.

Filoviridae: Ebola hemorrhagic fever was first recognized in the western equatorial province of the Sudan and the nearby region of Zaire in 1976. A second outbreak occurred in Sudan in 1979, and in 1995 a large outbreak (316 cases) developed in Kikwit, Zaire, from a single index case. Subsequent epidemics have occurred in Gabon and the Ivory Coast. The African strains cause severe disease and death. It is not known why this disease appears infrequently. A related virus (Ebola Reston) was isolated from monkeys imported into the United States from the Philippines in 1989, and subsequently developed hemorrhagic fever. While subclinical infections occurred among exposed animal handlers, Ebola Reston has not been identified as a human pathogen. Marburg epidemics have occurred on six occasions: five times in Africa, and once in Europe. The first recognized outbreak occurred in Marburg, Germany, and Yugoslavia, among people exposed to African green monkeys, and resulted in 31 cases and 7 deaths. Filoviruses can be spread from human to human by direct contact with infected blood, secretions, organs, or semen. Ebola Reston apparently spread from monkey to monkey, and from monkeys to humans by the respiratory route. The natural reservoirs of the filoviruses are unknown.

Flaviviridae: Yellow fever and dengue are two mosquito-borne fevers that have great importance in the history of military campaigns and military medicine. Tick-borne flaviruses include the agents of Kyasanur Forest disease in India, and Omsk hemorrhagic fever in Siberia.

All of the VHF agents (except for dengue virus) are infectious by aerosol in the laboratory. These viruses could conceivably be used by an adversary as biological warfare agents, in view of their aerosol infectivity, and, for some viruses, high lethality.

Clinical Description

Signs and Symptoms: VHFs are febrile illnesses which can feature flushing of the face and chest, petechiae, bleeding, edema, hypotension, and shock. Malaise, myalgias, headache, vomiting, and diarrhea may occur in any of the hemorrhagic fevers.

The clinical syndrome that these viruses may cause is generally referred to as viral hemorrhagic fever, or VHF. The target organ in the VHF syndrome is the vascular bed; accordingly, the dominant clinical features are usually due to microvascular damage and changes in vascular permeability.

Not all infected patients develop VHF. There is both divergence and uncertainty about which host factors and viral strain characteristics might be responsible for the mechanisms of disease. For example, an immunopathogenic mechanism has been identified for dengue hemorrhagic fever, which usually occurs among patients previously infected with a heterologous dengue serotype. Antibody directed against the previous strain enhances uptake of dengue virus by circulating monocytes. These cells express viral antigens on their surfaces. Lysis of the infected monocytes by cytotoxic T-cell responses results in the release of pro-inflammatory cytokines, pro-coagulants, and anticoagulants, which in turn results in vascular injury and permeability, complement activation, and a systemic coagulopathy.

DIC has been implicated in Rift Valley, Marburg and Ebola fevers, but in most VHFs the etiology of the coagulopathy is multifactorial (e.g., hepatic damage, consumptive coagulopathy, and primary marrow injury to megakaryocytes).

Common symptoms are fever, myalgia, and prostration. Physical examination may reveal only conjunctival injection, mild hypotension, flushing, and petechial hemorrhages. Full-blown VHF

typically evolves to shock and generalized mucous membrane hemorrhage, and often is accompanied by evidence of pulmonary hematopoietic, and neurologic involvement. Renal insufficiency is proportional to cardiovascular compromise, except in HFRS, which features renal failure as an integral part of the disease process.

Apart from epidemiologic and intelligence information, some distinctive clinical features may suggest a specific etiologic agent. While hepatic involvement is common among the VHFs, a clinical picture dominated by jaundice and other features of hepatitis is only seen in some cases of Rift Valley fever, Congo-Crimean, Marburg, and Ebola HFs, and yellow fever. Kyasanur Forest disease and Omsk hemorrhagic fever are notable for pulmonary involvement, and a biphasic illness with subsequent CNS manifestations. Among the arenavirus infections, Lassa fever can cause severe peripheral edema due to capillary leak, but hemorrhage is uncommon, while hemorrhage is commonly caused by the South American arenaviruses. Severe hemorrhage and nosocomial transmission are typical for Congo-Crimean HF. Retinitis is commonly seen in Rift Valley fever, and hearing loss is common among Lassa fever survivors.

Because of their worldwide occurrence, additional consideration should be given to hantavirus infections. Classic HFRS has a severe course that progresses sequentially from fever through hemorrhage, shock, renal failure, and polyuria. Nephropathia endemica features prominent fever, myalgia, abdominal pain, and oliguria, without shock or severe hemorrhagic manifestations. North American cases of Hantavirus Pulmonary Syndrome (HPS) due to the Sin Nombre virus lack hemorrhagic manifestations and renal failure, but nevertheless carry a very high mortality due to rapidly progressive and severe pulmonary capillary leak, which presents as ARDS. These syndromes may overlap. Subclinical or clinical pulmonary edema may occur in HFRS and nephropathia endemica, while HFRS has complicated HPS due to South American hantaviruses and the Bayou and Black Creek Canal viruses in North America.

Mortality may be substantial, ranging from 0.2% percent for nephropathia endemica, to 50 to 90 percent among Ebola victims.

Diagnosis: Definitive diagnosis rests on specific virologic techniques. Significant numbers of military personnel with a hemorrhagic fever syndrome should suggest the diagnosis of a viral hemorrhagic fever.

A detailed travel history and a high index of suspicion are essential in making the diagnosis of VHF. Patients with arenavirus or hantavirus infections often recall having seen rodents during the presumed incubation period, but since the viruses are spread to man by aerosolized excreta or environmental contamination, actual contact with the reservoir is not necessary. Large mosquito populations are common during Rift Valley fever or flavivirus transmission, but a history of mosquito bite is too common to be of diagnostic importance, whereas tick bites or nosocomial exposure are of some significance in suspecting Congo-Crimean HF. Large numbers of military personnel presenting with VHF manifestations in the same geographic area over a short time period should lead treating medical care providers to suspect either a natural outbreak in an endemic setting, or possibly a biowarfare attack, particularly if this type of disease does not occur naturally in the local area.

VHF should be suspected in any patient presenting with a severe febrile illness and evidence of vascular involvement (postural hypotension, petechiae, easy bleeding, flushing of face and chest, non-dependent edema) who has traveled to an area where the virus is known to occur, or where intelligence information suggests a biological warfare threat. Symptoms and signs suggesting additional organ system involvement are common (headache, photophobia, pharyngitis, cough,

nausea or vomiting, diarrhea, constipation, abdominal pain, hyperesthesia, dizziness, confusion, tremor), but usually do not dominate the picture with the exceptions listed above under “Clinical Features.” A positive tourniquet test has been particularly useful in dengue hemorrhagic fever, but should be sought in other hemorrhagic fevers as well.

The clinical laboratory can be very helpful. Thrombocytopenia (exception: Lassa) and leukopenia (exceptions: Lassa, Hantaan, and some severe CCHF cases) are the rule. Proteinuria and/or hematuria are common, and their presence is the rule for Argentine HF, Bolivian HF, and HFRS. High AST elevation correlates with severity of Lassa fever, and jaundice is a poor prognostic sign in yellow fever.

In most geographic areas, the major item in the differential diagnosis is malaria. It must be borne in mind that parasitemia in patients partially immune to malaria does not prove that symptoms are due to malaria. Other items in the differential may include typhoid fever, nontyphoidal salmonellosis, leptospirosis, rickettsial infections, shigellosis, relapsing fever, fulminant hepatitis, and meningococcemia. Additional illnesses which could mimic VHF include acute leukemia, lupus erythematosus, idiopathic or thrombotic thrombocytopenic purpura, hemolytic uremic syndrome and the multiple causes of disseminated intravascular coagulation.

Definitive diagnosis in an individual case rests on specific virologic diagnosis. Most patients have readily detectable viremia at presentation (exception: hantaviral infections). Rapid enzyme immunoassays can detect viral antigens in acute sera from patients with Argentine HF, Lassa fever, Rift Valley fever, Congo-Crimean HF, and yellow fever. Lassa- and Hantaan-specific IgM often are detectable during the acute illness. Diagnosis by virus cultivation and identification will require 3 to 10 days or longer. With the exception of dengue, specialized microbiologic containment is required for safe handling of these viruses. Appropriate precautions should be observed in collection, handling, shipping, and processing of diagnostic samples. Both the Centers for Disease Control and Prevention (CDC, Atlanta, Georgia) and the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID, Frederick, Maryland) have diagnostic laboratories functioning at the highest (BL-4 or P-4) containment level.

SURVEILLANCE

Viral Hemorrhagic Fevers (VHFs) are all reportable conditions. They should be reported immediately by phone because of concern about bioterrorism as a cause.

Treatment

Intensive supportive care may be required. Antiviral therapy with ribavirin may be useful in several of these infections (Available only as IND under protocol). Convalescent plasma may be effective in Argentine hemorrhagic fever (Available only as IND under protocol).

General principles of supportive care apply to hemodynamic, hematologic, pulmonary, and neurologic manifestations of VHF, regardless of the specific etiologic agent. Only intensive care will save the most severely ill patients. Health care providers employing vigorous fluid resuscitation of hypotensive patients must be mindful of the propensity of some VHFs (e.g., HFRS) for pulmonary capillary leak. Pressor agents are frequently required. The use of intravascular devices and invasive hemodynamic monitoring must be carefully considered in the context of potential benefit versus the risk of hemorrhage. Restlessness, confusion, myalgia, and hyperesthesia should be managed by conservative measures, and the judicious use of sedatives

and analgesics. Secondary infections may occur as with any patient undergoing intensive care utilizing invasive procedures and devices, such as intravenous lines and indwelling catheters.

The management of clinical bleeding should follow the same principles as for any patient with a systemic coagulopathy, assisted by coagulation studies. Intramuscular injections, aspirin and other anticoagulant drugs should be avoided.

The investigational antiviral drug ribavirin is available via compassionate use protocols for therapy of Lassa fever, HFRS, Congo-Crimean HF, and Rift Valley fever. Separate Phase III efficacy trials have indicated that parenteral ribavirin reduces morbidity in HFRS, and lowers both the morbidity and mortality of Lassa fever. In the HFRS field trial, treatment was effective if begun within the first 4 days of fever, and continued for a 7 day course. A compassionate use protocol, utilizing intravenous ribavirin as a treatment for Lassa fever, is sponsored by the CDC. Doses are slightly different, and continued for a 10 day course; treatment is most effective if begun within 7 days of onset. The only significant side effect of ribavirin is a modest anemia due to a reversible inhibition of erythropoiesis, and mild hemolysis. Although ribavirin is teratogenic in laboratory animals, the potential benefits must be weighed against the potential risks to pregnant women with grave illness due to one of these VHFs. Safety in infants and children has not been established. Ribavirin has poor *in vitro* and *in vivo* activity against the filoviruses (Ebola and Marburg) and the flaviviruses (dengue, yellow fever, Omsk HF and Kyasanur Forest Disease).

Argentine HF responds to therapy with 2 or more units of convalescent plasma containing adequate amounts of neutralizing antibody and given within 8 days of onset. This therapy is investigational, and available only under protocol.

Caase Definition

Since VHF has multiple disease etiologies no single case definition is available.

Prophylaxis

Prophylaxis: The only licensed VHF vaccine is yellow fever vaccine. Prophylactic ribavirin may be effective for Lassa fever, Rift Valley fever, CCHF, and possibly HFRS (Available only as IND under protocol).

The only licensed vaccine available for any of the hemorrhagic fever viruses is yellow fever vaccine, which is mandatory for travelers to endemic areas of Africa and South America. Argentine hemorrhagic fever vaccine is a live, attenuated, investigational vaccine developed at USAMRIID, which has proved efficacious both in an animal model and in a field trial in South America, and seems to protect against Bolivian hemorrhagic fever as well. Both inactivated and live-attenuated Rift Valley fever vaccines are currently under investigation. An investigational vaccinia-vectored Hantaan vaccine is offered to laboratory workers at USAMRIID. There are currently no vaccines for the other VHF agents available for human use in the United States.

Persons with percutaneous or mucocutaneous exposure to blood, body fluids, secretions, or excretions from a patient with suspected VHF should immediately wash the affected skin surfaces with soap and water. Mucous membranes should be irrigated with copious amounts of water or saline.

Close personal contacts or medical personnel exposed to blood or secretions from VHF patients (particularly Lassa fever, CCHF, and filoviral diseases) should be monitored for symptoms, fever and other signs during the established incubation period. A DoD compassionate use protocol exists for prophylactic administration of oral ribavirin to high risk contacts (direct exposure to body fluids) of Congo-Crimean HF patients. A similar post-exposure prophylaxis strategy has been suggested for high contacts of Lassa fever patients. Most patients will tolerate this dose well, but patients should be under surveillance for breakthrough disease (especially after drug cessation) or adverse drug effects (principally anemia).

Prevention

Contact isolation, with the addition of a surgical mask and eye protection for those coming within three feet of the patient, is indicated for suspected or proven Lassa fever, CCHF, or filovirus infections. Respiratory protection should be upgraded to airborne isolation, including the use of a fit-tested HEPA filtered respirator, a battery powered air purifying respirator, or a positive pressure supplied air respirator, if patients with the above conditions have prominent cough, vomiting, diarrhea, or hemorrhage. Decontamination is accomplished with hypochlorite or phenolic disinfectants.

These viruses pose special challenges for hospital infection control. With the exception of dengue (virus present, but no secondary infection hazard) and hantaviruses (infectious virus not present in blood or excreta at the time of clinical presentation), VHF patients generally have significant quantities of virus in blood and often other secretions. Special caution must be exercised in handling sharps, needles, and other potential sources of parenteral exposure. Strict adherence to standard precautions will prevent nosocomial transmission of most VHFs.

Lassa, Congo-Crimean HF, Ebola, and Marburg viruses may be particularly prone to aerosol nosocomial spread. Secondary infections among contacts and medical personnel who were not parenterally exposed are well documented. Sometimes this occurred when the acute hemorrhagic disease (as seen in CCHF) mimicked a surgical emergency such as a bleeding gastric ulcer, with subsequent exposure and secondary spread among emergency and operating room personnel. Therefore, when one of these diseases is suspected, additional management measures are indicated. The patient should be hospitalized in a private room. An adjoining anteroom for putting on and removing protective barriers, storage of supplies, and decontamination of laboratory specimen containers, should be used if available. A room with non-recirculated air under negative pressure is advised for patients with significant cough, hemorrhage, or diarrhea. It may be wise to place the patient in such a room initially, to avoid having to transport the patient in the event of clinical deterioration. All persons entering the room should wear gloves and gowns (contact isolation). In addition, face shields or surgical masks and eye protection are indicated for those coming within three feet of the patient. Respiratory protection should be upgraded to airborne isolation, including the use of a fit-tested HEPA filtered respirator, a battery powered air purifying respirator, or a positive pressure supplied air respirator, if patients with the above conditions have prominent cough, vomiting, diarrhea, or hemorrhage. Caution should be exercised in evaluating and treating the patient with suspected VHF. Over-reaction on the part of health care providers is inappropriate and detrimental to both patient and staff, but it is prudent to provide as rigorous isolation measures as feasible.

Laboratory specimens should be double-bagged, and the exterior of the outer bag decontaminated prior to transport to the laboratory. Excreta and other contaminated materials should be autoclaved, or decontaminated by the liberal application of hypochlorite or phenolic disinfectants.

Clinical laboratory personnel are also at risk for exposure, and should employ a biosafety cabinet (if available) and barrier precautions when handling specimens.

No carrier state has been observed for any VHF, but excretion of virus in urine (e.g., Lassa fever) or semen (e.g., Argentine hemorrhagic fever) may occur during convalescence. Should the patient die, there should be minimal handling of the body, with sealing of the corpse in leak-proof material for prompt burial or cremation

Infectious Disease Epidemiology: Epidemiologic Response Checklist

Consultation/ Confirmation

- Discuss bioterrorism event definitions with key public health personnel (health officer, communicable disease control staff, laboratorians, etc.)

Laboratory Confirmation

- Identify point of contact (POC) at appropriate state public health laboratory in a potential bioterrorist event

Notification

- Establish local notification network to be activated in case of a possible bioterrorist event; disseminate contact information and notification protocol
- Establish relationships with local Office of Emergency Preparedness and FBI contacts to be notified in a suspected bioterrorist event and maintain up-to-date contact information

Coordination

- Establish Epidemiologic Response as a part of local Incident Command System
- Identify personnel available for epidemiologic investigation and perform inventory of skills and duties
- Establish contacts at regional and Parrish health units identify potential personnel resources available for epidemiologic “mutual aid”
- Establish contacts at the local FBI office for coordination with epidemiologic/ criminal Investigation

Communication

- Identify epidemiologic investigation spokesperson and Public Information Officer (PIO)
- Establish communication protocol to be implemented during an epidemiologic investigation between PIO and epidemiologic investigation spokesperson
- Establish a plan for rapid dissemination of information to key individuals: FAX, Email, website on the internet (if capability exists)

Epidemiologic Investigation

A. Case Finding

- Establish plans/ capacity to receive a large number of incoming telephone calls
- Develop telephone intake form
- Identify individuals available to perform telephone intake duties
- Identify potential reporting sources (persons/ facilities) to receive case definition
- Establish a plan for rapid dissemination of case definition to potential reporting sources

B. Case Interviews

- Obtain appropriate case investigation questionnaires
- Identify personnel available to conduct case interviews
- Establish a protocol for training case interviewers
- Obtain template outbreak disease-specific investigation questionnaires

C. Data Analysis

- Obtain template database for data entry
- Assure Epi Info software is installed on data entry computers
- Identify personnel available for data entry
- Identify personnel with skills to perform descriptive and analytic epidemiologic analysis
- Develop/ obtain data analysis plan
- Develop/ obtain outbreak investigation monitoring tool

Contact Tracing

- Establish a system for locating contacts and familiarize personnel with contact tracing protocol(s)
- Obtain Contact Tracing Forms
- Obtain contact management algorithms for diseases that are communicable from person-to-person
- Obtain treatment/ prophylaxis guidelines
- Develop local drug and vaccine distribution plan
- Establish a system for daily monitoring of all contacts under surveillance

Public Health Recommendations

- Obtain treatment and prophylaxis recommendations for bioterrorist threat agents
- Develop or obtain bioterrorist disease-specific fact sheets
- Establish contact with key health care providers/ facilities and establish protocol for rapid dissemination of recommendations regarding treatment, prophylaxis, personal protective equipment, infection control, and isolation/ quarantine

Consultation / Confirmation

- Disease scenario meets the bioterrorist event definition

Laboratory Confirmation

- Lab specimens are en route to the local public health laboratory/ Laboratory Response Network

Notification

- Department of Health and Human Services
- State Medical Officer
- (225)342-3417 (regular business hours)
- (800)990-5366 pin 6710 (pager for evenings, weekends, holidays)
- State Epidemiologist (504)458-5428 Mobile
- Public Health Lab (504)568-5371
- Public Health Lab Pager (800)538-5388
- OPH Regional Offices (Internal Notification Network)
- Louisiana EOC (225)-925-7500
- Louisiana State Police (800)469-4828 (Crisis Management Center)

Coordination

- Epidemiology personnel identified for investigation
- Additional epidemiology personnel support requested (From other regions) Investigation activities coordinated with FBI

Communication

- Epidemiology investigation spokesperson identified
- Communication protocol established between epidemiologic investigation spokesperson and Public Information Officer (PIO)

Epidemiologic Investigation

- Hypothesis-generating interviews conducted
- Preliminary epidemiologic curve generated
- Case definition established

A. Case finding

- Telephone hotline established
- Telephone intake form distributed
- Case definition disseminated to potential reporting sources
 - Hospitals
 - Physicians
 - Laboratories
 - EMS
 - Coroner
 - Media

B. Case interviews

- Interviewers trained
- Uniform multi-jurisdictional outbreak investigation form(s) obtained

C. Data Analysis

- Uniform multi-jurisdictional database template for data entry obtained
- Epidemiologic curve generated
- Cases line-listed
- Case descriptive epidemiology completed
 - Age
 - Gender
 - Illness onset
 - Clinical profile
 - % Laboratory confirmed
 - Hospitalization rate
 - Case fatality rate
 - Case geographic distribution mapped (GIS mapping if available)
 - Analytic epidemiology completed
 - Disease risk factors identified
 - Mode of transmission identified
 - Source of transmission identified

- Population at continued risk identified

Contact Tracing

- Contact tracing forms distributed
- Health education materials available
- Contact management triage algorithm reviewed with staff
- Treatment/ prophylaxis guidelines available
- Treatment/ prophylaxis distribution plan in place
- System in place for locating contacts
- Tracking system in place to monitor contacts' trends/ gaps

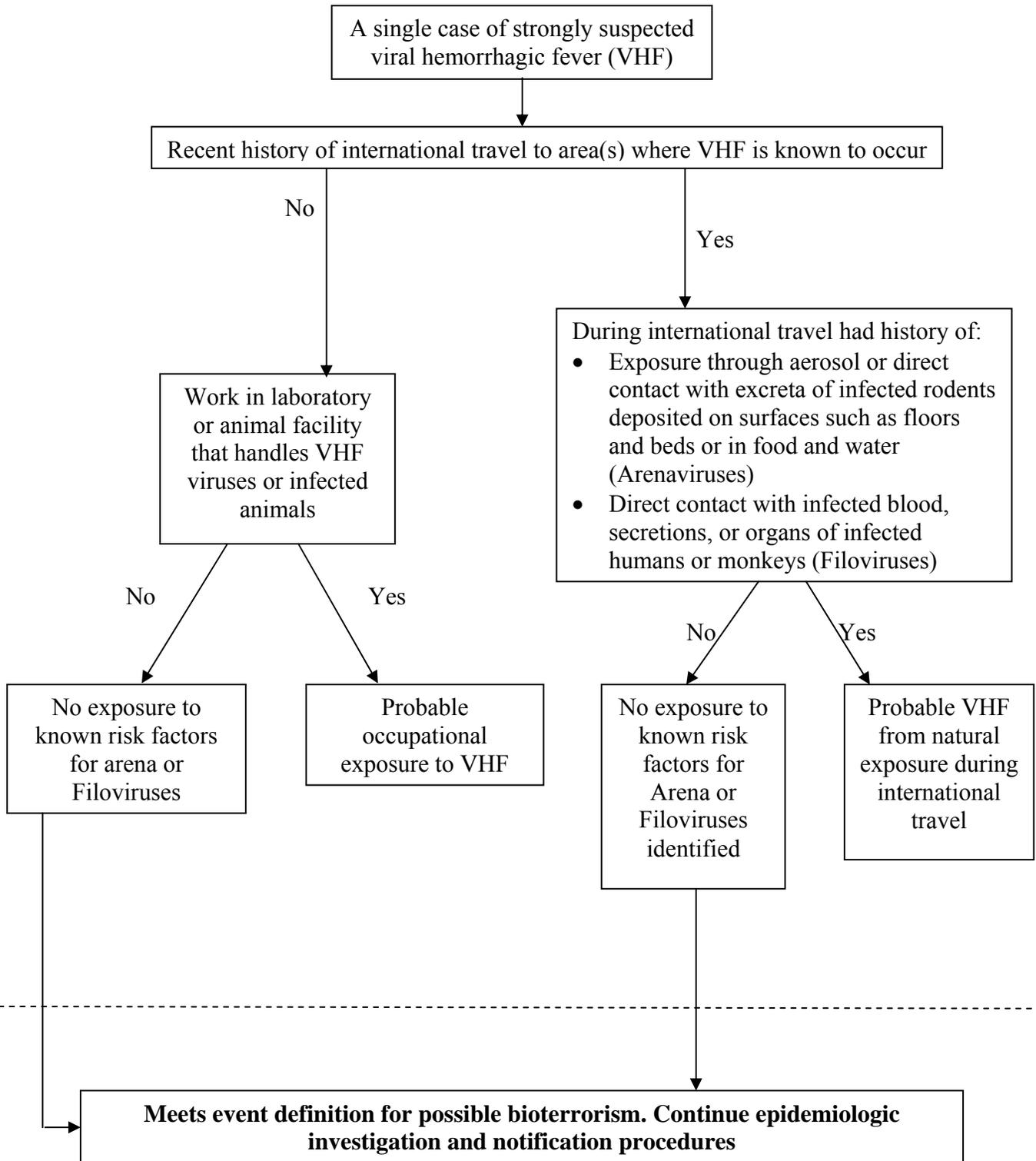
Laboratory

- Establish point of contact (POC) at appropriate Level A and/ or Level B public health laboratory to refer queries regarding specimen packaging, storage and shipping guidelines in a potential bioterrorist event [See Laboratory Section's Bioterrorism Plan]

Public Health Recommendations

- See Medical Response Section Bioterrorism Plan

Viral Hemorrhagic Fever Investigation Algorithm



Viral Hemorrhagic Fever

Case investigation form

ID NUMBER: _____

INTERVIEWER: _____ JOB TITLE: _____

DATE OF INTERVIEW: ____/____/____

PERSON INTERVIEWED: Patient Other

IF OTHER, NAME OF PERSON _____

TELEPHONE _____ - _____ - _____

DESCRIBE RELATIONSHIP _____

DEMOGRAPHIC INFORMATION

LAST NAME: _____ FIRST NAME: _____

DRIVER LICENCE OR SOCIAL SECURITY NUMBER (Circle one): _____

SEX: Male Female DATE OF BIRTH: ____/____/____ AGE ____

RACE: White Black Asian Other, specify _____ Unknown

ETHNICITY: Hispanic Non-Hispanic Unknown

HOME PHONE: () _____ - _____ WORK/OTHER PHONE: () _____ - _____

HOME ADDRESS STREET: _____

CITY: _____ STATE: _____ ZIP: _____

EMPLOYED: Yes No Unknown

BRIEF DESCRIPTION OF JOB: _____

SCHOOL/PLACE OF EMPLOYMENT: _____

DEPARTMENT _____ FLOOR: _____ ROOM: _____

WORK/SCHOOL ADDRESS: STREET: _____ CITY: _____

STATE: _____ ZIP: _____

ARE YOU A:

- LAB WORKER/TECHNICIAN: Yes No Unknown
- TAXIDERMIST: Yes No Unknown
- VETERINARIAN: Yes No Unknown
- FARMER: Yes No Unknown
- ABATTOIR: Yes No Unknown
- BUTCHER: Yes No Unknown
- OTHER FOOD PREPERATION: Yes No Unknown

HOBBY:

- Do you work with fibers/wool/animal skin/or other animal product? Yes No Unknown
- Have you been camping in past two months? Yes No Unknown
- Have you stayed in cabins in the past two months? Yes No Unknown
- Have you been hunting? Yes No Unknown
- Have you skinned or dressed and animal? Yes No Unknown
- Have you had an animal stuffed or mounted? Yes No Unknown

HOW MANY PEOPLE RESIDE IN THE SAME HOUSEHOLD? _____

LIST NAME(S), AGE(S), AND RELATIONSHIPS (use additional pages if necessary):

	PERSON 1	PERSON 2	PERSON 3	PERSON 4	PERSON 5	PERSON 6
Name						
Age						
Relationship						

HOUSEHOLD PETS:

Does your household have any pets (indoor or outdoor)? Yes No Unknown

If so what type of pet: _____

Have any of the pets been ill or died recently? Yes No Unknown

If so describe: _____

CLINICAL INFORMATION (as documented in admission history of medical record or from case/proxy interview)

CHIEF COMPLAINT: _____

DATE OF ILLNESS ONSET: ____/____/____

Briefly summarize History of Present Illness:

SIGNS AND SYMPTOMS

- Cough Yes No Unknown
- If yes, sputm production Yes No Unknown
- If yes, any blood Yes No Unknown
- Chest Pain Yes No Unknown
- Shortness of breath Yes No Unknown
- Stridor or wheezing Yes No Unknown
- Cyanosis Yes No Unknown
- Conjunctivitis Yes No Unknown
- Tender or enlarged lymph nodes Yes No Unknown
- Fever Yes No Unknown

If yes, Maximum temperature _____ oF
Antipyretics taken Yes No Unknown

- Headache Yes No Unknown
- Stiff neck Yes No Unknown
- Muscle aches Yes No Unknown
- Fatigue Yes No Unknown
- Joint pains Yes No Unknown
- Altered mental status Yes No Unknown
- Unconscious/unresponsive Yes No Unknown
- Sore throat Yes No Unknown
- Nausea Yes No Unknown
- Diarrhea Yes No Unknown
- Vomiting Yes No Unknown
- Rash Yes No Unknown

If yes, describe: _____
Other Symptom or abnormality: _____

PAST MEDICAL HISTORY:

Do you have a regular physician? Yes No Unknown
If yes, Name: _____ Phone Number: (____) _____ - _____

Are you allergic to any medications? Yes No Unknown
If yes, list: _____

Are you currently taking any medication: Yes No Unknown
If yes, list: _____

Have you had any wound or lesion in the past several months?
 Yes No Unknown

If yes, where: _____ Appearance: _____

- Hypertension Yes No Unknown
- Neurologic Condition Yes No Unknown
- Diabetes Yes No Unknown
- Cardiac disease Yes No Unknown
- Seizures Yes No Unknown

Other Pulmonary Disease Yes No Unknown

If yes, describe: _____

Malignancy Yes No Unknown

If yes, specify type: _____

Currently on treatment: Yes No Unknown

HIV infection Yes No Unknown

Currently pregnant Yes No Unknown

Other immunocompromising condition (e.g., renal failure, cirrhosis, chronic steroid use)

Yes No Unknown

If yes, specify disease or drug therapy: _____

Other underlying condition(s):

Prescription medications:

SOCIAL HISTORY:

Current alcohol abuse: Yes No Unknown

Past alcohol abuse: Yes No Unknown

Current injection drug use: Yes No Unknown

Past injection drug use: Yes No Unknown

Current smoker: Yes No Unknown

Former smoker: Yes No Unknown

Other illicit drug use: Yes No Unknown

If yes, specify: _____

HOSPITAL INFORMATION:

HOSPITALIZED: Yes No

NAME OF HOSPITAL:

DATE OF ADMISSION: ___/___/___ DATE OF DISCHARGE ___/___/___

ATTENDING PHYSICIAN:

LAST NAME: _____ FIRST NAME: _____

Office Telephone: () ___ - ___ Pager: () ___ - ___ Fax: () ___ - ___

MEDICAL RECORD ABSTRACTION :

MEDICAL RECORD NUMBER: _____

HOSPITAL NAME: _____

WARD/ROOM NUMBER: _____

ADMISSION DIAGNOSIS(ES): 1) _____

2) _____

3) _____

PHYSICAL EXAM:

Admission Vital Signs:

Temp: ____ (Oral / Rectal F / C) Heart Rate: _____ Resp. Rate: _____ B/P: ____ / ____

Mental Status: Normal Abnormal Not Noted

If abnormal, describe: _____

Respiratory status: Normal spontaneous Respiratory distress Ventilatory support

If abnormal, check all that apply:

Rales Stridor/wheezin Decreased or absent

Other (specify: _____)

Skin: Normal Abnormal Not Noted

If abnormal, check all that apply:

Edema Chest wall edema Cyanosis Erythema

Petechiae Sloughing/necrosis Purpura Rash

If rash present, describe type and location on body : _____

Other abnormal physical findings (describe): _____

DIAGNOSTIC STUDIES:

Test	Results of tests done on Admission (___/___/___)	Abnormal test result at any time (specify date mm/dd/yyyy)
Hemoglobin (Hb)		(___/___/___)
Hematocrit (HCT)		(___/___/___)
Platelet (plt)		(___/___/___)
Total white blood cell (WBC)		(___/___/___)
WBC differential:		(___/___/___)
% granulocytes (PMNs)		(___/___/___)
% bands		(___/___/___)
% lymphocytes		(___/___/___)
Renal function: BUN/Cr		(___/___/___)
Liver enzymes: ALT/AST		(___/___/___)
Blood cultures:	<input type="checkbox"/> positive (specify _____) <input type="checkbox"/> negative <input type="checkbox"/> pending <input type="checkbox"/> not done (___/___/___)	<input type="checkbox"/> positive (specify _____) <input type="checkbox"/> negative <input type="checkbox"/> pending <input type="checkbox"/> not done (___/___/___)

Test	Results of tests done on Admission (___/___/___)	Abnormal test result at any time (specify date mm/dd/yy)
Respiratory secretions:	<input type="checkbox"/> expectorated sputum <input type="checkbox"/> induced sputum <input type="checkbox"/> bronchial alveolar lavage (BAL)	<input type="checkbox"/> expectorated sputum <input type="checkbox"/> induced sputum <input type="checkbox"/> bronchial alveolar lavage (BAL)
Specimen Type:	<input type="checkbox"/> tracheal aspirate	<input type="checkbox"/> tracheal aspirate (___/___/___)
Respiratory secretions:	<input type="checkbox"/> PMNs <input type="checkbox"/> epithelial cells	<input type="checkbox"/> PMNs <input type="checkbox"/> epithelial cells
Gram Stain (Check all that apply)	<input type="checkbox"/> gram positive cocci <input type="checkbox"/> gram negative cocci <input type="checkbox"/> gram positive rods <input type="checkbox"/> gram negative coccobacilli <input type="checkbox"/> gram negative rods <input type="checkbox"/> gram negative rods with bipolar staining (safety pins) <input type="checkbox"/> other _____	<input type="checkbox"/> gram positive cocci <input type="checkbox"/> gram negative cocci <input type="checkbox"/> gram positive rods <input type="checkbox"/> gram negative coccobacilli <input type="checkbox"/> gram negative rods <input type="checkbox"/> gram negative rods with bipolar staining (safety pins) <input type="checkbox"/> other _____ (___/___/___)
Respiratory secretions analysis: Bacterial culture	<input type="checkbox"/> positive (specify _____) <input type="checkbox"/> negative <input type="checkbox"/> pending <input type="checkbox"/> not done	<input type="checkbox"/> positive (specify _____) <input type="checkbox"/> negative <input type="checkbox"/> pending <input type="checkbox"/> not done (___/___/___)
Respiratory secretions analysis: Viral culture	<input type="checkbox"/> positive (specify _____) <input type="checkbox"/> negative <input type="checkbox"/> pending <input type="checkbox"/> not done	<input type="checkbox"/> positive (specify _____) <input type="checkbox"/> negative <input type="checkbox"/> pending <input type="checkbox"/> not done (___/___/___)
Respiratory secretions analysis: Influenza antigen	<input type="checkbox"/> positive <input type="checkbox"/> negative <input type="checkbox"/> pending <input type="checkbox"/> not done	<input type="checkbox"/> positive <input type="checkbox"/> negative <input type="checkbox"/> pending <input type="checkbox"/> not done (___/___/___)
Respiratory secretions: Other test (e.g., DFA, PCR, etc)		(___/___/___)
Chest radiograph	<input type="checkbox"/> normal <input type="checkbox"/> unilateral, lobar/consolidation <input type="checkbox"/> bilateral, lobar/consolidation <input type="checkbox"/> interstitial infiltrates <input type="checkbox"/> widened mediastinum <input type="checkbox"/> pleural effusion <input type="checkbox"/> other _____	<input type="checkbox"/> normal <input type="checkbox"/> unilateral, lobar/consolidation <input type="checkbox"/> bilateral, lobar/consolidation <input type="checkbox"/> interstitial infiltrates <input type="checkbox"/> widened mediastinum <input type="checkbox"/> pleural effusion <input type="checkbox"/> other _____ (___/___/___)
Legionella urine antigen	<input type="checkbox"/> positive <input type="checkbox"/> negative <input type="checkbox"/> pending <input type="checkbox"/> not done	<input type="checkbox"/> positive <input type="checkbox"/> negative <input type="checkbox"/> pending <input type="checkbox"/> not done (___/___/___)

Test	Results of tests done on Admission (___/___/___)	Abnormal test result at any time (specify date mm/dd/yy)
Other pertinent study results (e.g., chest CT, pleural fluid)		(___/___/___)
Other pertinent study results (e.g., toxin assays)		(___/___/___)

PULMONOLOGY CONSULTED: Yes No Unknown

Date of Exam: ___/___/___

Name of neurologist: Last Name _____ First Name _____

Telephone or beeper number () _____ - _____

INFECTIOUS DISEASE CONSULT: Yes No Unknown

Date of Exam: ___/___/___

Name of ID physician: Last Name _____ First Name _____

Telephone or beeper number () _____ - _____

HOSPITAL COURSE:

A. antibiotics: Yes No Unknown

If yes, check all that apply:

- | | |
|--|---|
| <input type="checkbox"/> Amoxicillin | <input type="checkbox"/> Cefuroxime (Ceftin) |
| <input type="checkbox"/> Ampicillin | <input type="checkbox"/> Cefalexin (Keflex, Keftab) |
| <input type="checkbox"/> Ampicillin and sulbactam (Unasyn) | <input type="checkbox"/> Ciprofloxacin (Cipro) |
| <input type="checkbox"/> Augmentin (amoxicillin and clavulanate) | <input type="checkbox"/> Clarithromycin (Biaxin) |
| <input type="checkbox"/> Azithromycin (Zithromax) | <input type="checkbox"/> Doxycycline (Doryx, Vibramycin) |
| <input type="checkbox"/> Cefazolin (Ancef, Kefzol) | <input type="checkbox"/> Erythromycin (E-Mycin, Ery-Tab, Eryc) |
| <input type="checkbox"/> Cefepime (Maxipime) | <input type="checkbox"/> Gentamicin (Garamycin) |
| <input type="checkbox"/> Cefixime (Suprax) | <input type="checkbox"/> Levofloxacin (Levaquin) |
| <input type="checkbox"/> Cefotentan (Cefotan) | <input type="checkbox"/> Nafcillin |
| <input type="checkbox"/> Cefotaxime (Claforan) | <input type="checkbox"/> Ofloxacin (Floxin) |
| <input type="checkbox"/> Cefoxitin (Mefoxin) | <input type="checkbox"/> Streptomycin |
| <input type="checkbox"/> Ceftazidime (Fortaz, Tazicef, Tazidime) | <input type="checkbox"/> Ticarcillin and clavulanate (timentin) |
| <input type="checkbox"/> Ceftizoxime (Cefizox) | <input type="checkbox"/> Trimethaprim-sulfamethoxazole (Bactrim, Cotrim, TMP/SMX) |
| <input type="checkbox"/> Ceftriaxone (Rocephin) | <input type="checkbox"/> Vancomycin (Vancocin) |
| <input type="checkbox"/> other _____ | |

B. antivirals : Yes No Unknown

If yes, check all that apply:

- Acyclovir (Zovirax)
- Amantadine (Symmetrel)
- Oseltamivir (Tamiflu)
- Rimantidine (Flumadine)
- Zanamivir (Relenza)
- other _____

C. Did patient require intensive care: Yes No Unknown

If patient was admitted to Intensive Care Unit:

a. Length of stay in ICU, in days: _____

b . Was patient on mechanical ventilation: Yes No Unknown

WORKING OR DISCHARGE DIAGNOSIS(ES) :

- 1) _____
- 2) _____
- 3) _____

OUTCOME:

- Recovered/discharged
- Died
- Still in hospital: improving ? worsening ?

ADDITIONAL COMMENTS:

Risk Exposure Questions

The following questions pertain to the 2 week period prior to the onset of your illness/symptoms:

Occupation (provide information for all jobs/ volunteer duties)

1. Please briefly describe your job/ volunteer duties: _____

2. Does your job involve contact with the public? : Yes No

If "Yes", specify _____

3. Does anyone else at your workplace have similar symptoms?

Yes No Unknown

If "Yes", name and approximate date on onset (if known) _____

Knowledge of Other Ill Persons

4. Do you know of other people with similar symptoms? : Yes No Unknown
 (If Yes, please complete the following questions)

Name of ill Person	AGE	Sex	Address	Phone	Date of Onset	Relation To you	Did they seek Medical care? Where	Diagnosis

Travel*

*Travel is defined as staying overnight (or longer) at somewhere other than the usual residence

8. Have you traveled anywhere in the last two weeks? : Yes No Unknown

Dates of Travel: ___/___/___ to ___/___/___

Method of Transportation for Travel: _____

Where Did You Stay? _____

Purpose of Travel? _____

Did You Do Any Sightseeing on your trip? : Yes No

If yes, specify: _____

Did Anyone Travel With You? : Yes No

If yes, specify: _____

Are they ill with similar symptoms? : Yes No Unknown

If yes, specify: _____

Information for Additional Trips during the past two weeks:

Public Functions/Venues (during 2 weeks prior to symptom onset)

Category	Y/ N/ U	Description of Activity	Location of Activity	Date of Activity	Time of Activity (start, end)	Others ill? (Y/N/U)
9. Airports						
10. Beaches						
11. Bars/Clubs						
12. Campgrounds						
13. Carnivals/Circus						
14. Casinos						
15. Family Planning Clinics						
16. Government Office Building						
17. Gym/Workout Facilities						
18. Meetings or Conferences						
19. Movie Theater						
20. Museums						
21. Parks						
22. Parties (including Raves, Prom, etc)						
23. Performing Arts (ie Concert, Theater, Opera)						
24. Picnics						
25. Political Events (including Rallies)						
26. Religious Gatherings						
27. Shopping Malls						
28. Sporting Event						
29. Street Festivals, Flea Markets, Parades						
30. Tourist Attractions (ie French Quarter, Aquarium)						

Transportation

Have you used the following types of transportation in the 2 weeks prior to onset?

31. Bus/Streetcar: Yes No Unknown

Frequency of this type of transportation: Daily Weekly Occasionally Rarely

Bus Number: _____ Origin: _____

Any connections? Yes No (Specify: Location _____ Bus# _____)

Company Providing Transportation: _____ Destination: _____

32. Train: Yes No Unknown

Frequency of this type of transportation: Daily Weekly Occasionally Rarely

Route Number: _____ Origin: _____

Any connections? Yes No (Specify: Location _____ Route # _____)

Company Providing Transportation: _____ Destination: _____

33. Airplane: Yes No Unknown

Frequency of this type of transportation: Daily Weekly Occasionally Rarely

Flight Number: _____ Origin: _____

Any connections? Yes No (Specify: Location _____ Flight # _____)

Company Providing Transportation: _____ Destination: _____

34. Ship/Boat/Ferry: Yes No Unknown

Frequency of this type of transportation: Daily Weekly Occasionally Rarely

Ferry Number: _____ Origin: _____

Any connections? Yes No (Specify: Location _____ Ferry # _____)

Company Providing Transportation: _____ Destination: _____

35. Van Pool/Shuttle: Yes No Unknown

Frequency of this type of transportation: Daily Weekly Occasionally Rarely

Route Number: _____ Origin: _____

Any connections? Yes No (Specify: Location _____ Route # _____)

Company Providing Transportation: _____ Destination: _____

Food & Beverage

36. During the 2 weeks before your illness, did you eat at any of the following *food establishments or private gatherings with food or beverages*?

Food Establishment	Y/ N/ U	Name of Establishment	Location of Meal	Date of Meal	Time of Meal (start, end)	Food and Drink items consumed	Others ill? (Y/N/U)
Cafeteria at School, hospital, or other							
Casino or mall food court							
Grocery Store or Corner Store							
Concert, movie, or other entertainment							
Dinner party, birthday party or other celebration							
Gas station or convenience store							
Plane, boat, train, or other							
Picnic, Barbecue, Crawfish boil, or potluck							
Outdoor farmers market, festival, or swap meet							
Restaurant, fast-food, or deli							
Sporting event or snack bar							
Street vended food							
Other food establishment							
Other Private Gathering							

37. During the 2 weeks before your illness, did you consume any free *food samples* from.....?

Grocery store Yes No Unknown

Race/competition Yes No Unknown

Public gathering? Yes No Unknown

Private gathering? Yes No Unknown

If "YES" for any in question #37, provide date, time, location and list of food items consumed:

Date/Time: _____

Location (Name and Address): _____

Food/drink consumed: _____

Others also ill? Yes No Unknown

(explain): _____

38. During the 2 weeks before your illness, did you consume any of the following **products**?

Vitamins Yes . No Unknown

Specify (Include Brand Name): _____

Herbal remedies Yes . No Unknown

Specify (Include Brand Name): _____

Diet Aids Yes . No Unknown

Specify (Include Brand Name): _____

Nutritional Supplements Yes . No Unknown

Specify (Include Brand Name): _____

Other Ingested non-food Yes . No Unknown

Specify (Include Brand Name): _____

39. During the 2 weeks before your illness, did you consume any unpasteurized products (ie milk, cheese, fruit juices)? Yes . No Unknown

If yes, specify name of item: _____

Date/Time: _____

Location (Name and Address): _____

Others also ill?: Yes . No Unknown

(explain): _____

40. During the 2 weeks before your illness, did you purchase food from any internet grocers?

Yes . No Unknown

If yes, specify date / time of delivery: _____ Store/Site: _____

Items purchased: _____

41. During the 2 weeks before your illness, did you purchase any mail order food? Yes . No

Unknown

If yes, specify date/time of delivery: _____

Store purchased from: _____ Items

purchased: _____

42. Please check the routine sources for drinking water (check all that apply):

Community or Municipal

Well (shared)

Well (private family)

Bottled water (Specify Brand: _____)

Other (Specify: _____)

Aerosolized water

43. During the 2 weeks prior to illness, did you consume water from any of the following sources (check all that apply):

- Wells
- Lakes
- Streams
- Springs
- Ponds
- Creeks
- Rivers
- Sewage-contaminated water
- Street-vended beverages (Made with water or ice and sold by street vendors)
- Ice prepared w/ unfiltered water (Made with water that is not from a municipal water supply or that is not bottled or boiled)
- Unpasteurized milk
- Other (Specify: _____)

If "YES" for any in question #43, provide date, time, location and type of water consumed:

Date/Time: _____

Location (Name and Address): _____

Type of water consumed: _____

Others also ill?: Yes . No Unknown

(explain): _____

44. During the 2 weeks prior to illness, did you engage in any of the following recreational activities (check all that apply):

- Swimming in public pools (e.g., community, municipal, hotel, motel, club, etc)
- Swimming in kiddie/wading pools
- Swimming in sewage-contaminated water
- Swimming in fresh water, lakes, ponds, creeks, rivers, springs, sea, ocean, bay (please circle)
- Wave pools ? Water parks ? Waterslides ? Surfing
- Rafting ? Boating ? Hot tubs (non-private) ? Whirlpools (non-private)
- Jacuzzis (non-private) ? Other (Specify: _____)

If "YES" for any in question #44, provide date, time, location and type of activity:

Date/Time: _____

Location (Name and Address): _____

Type of water consumed: _____

Others also ill?: Yes . No Unknown

(explain): _____

45. During the 2 weeks prior to illness, were you exposed to aerosolized water from any of the following non-private (i.e., used in hospitals, malls, etc) sources (check all that apply):

- Air conditioning at public places
- Respiratory devices
- Vaporizers
- Humidifiers
- Misters
- Other (please explain) _____
- Whirlpool spas
- Hot tub
- Spa baths
- Creek and ponds
- Decorative fountains

If "YES" for any in question #45, provide date, time, and location of exposure to aerosolized water:

Date/Time: _____

Location (Name and Address): _____

Explanation of aerosolized water: _____

Others also ill: Yes . No Unknown

(explain): _____

Recreation (Activities that are not related to work)

46. In the past two weeks, did you participate in any outdoor activities?

Yes . No Unknown

(If "yes", list all activities and provide locations)

47. Do you recall any insect or tick bites during these outdoor activities?

Yes . No Unknown

(If "yes", list all activities and provide locations of activities)

48. Did you participate in other indoor recreational activities (i.e. clubs, crafts, etc that did not occur in a private home)?

Yes . No Unknown

(List all activities and provide location)

Vectors

49. Do you recall any insect or tick bites in the last 2 weeks?

Yes No Unknown

Date(s) of bite(s): _____ Bitten by: Mosquito

Tick Flea Fly Other:

Where were you when you were bitten? _____

50. Have you had any contact with wild or domestic animals, including pets?

Yes No Unknown

Type of Animal: _____

Explain nature of contact: _____

Is / was the animal ill recently; Yes No Unknown

If yes please describe the animal's symptoms:

Date / Time of contact: _____

Location of contact: _____

51. To your knowledge, have you been exposed to rodents/rodent droppings in the last 2 weeks?

Yes No Unknown

If yes, explain type of exposure: _____

Date/Time of exposure: _____

Location where exposure occurred: _____

