EBOLA VIRUS DISEASE (EVD)
Report Immediately

✓DISEASE AND EPIDEMIOLOGY

Clinical Description:

The onset of clinical symptoms is sudden. Severe headache (50%-74%), arthralgias or myalgias (50%-79%), fever with or without chills (95%), anorexia (45%), and asthenia (85%-95%) occur early in the disease.

Gastrointestinal (GI) symptoms, including abdominal pain (65%), nausea and vomiting (68%-73%), and diarrhea (85%), soon follow. Evidence of mucous membrane involvement includes conjunctivitis (45%), odynophagia or dysphagia (57%), and bleeding from multiple sites in the GI tract. Bleeding from mucous membranes and puncture sites is reported in 40%-50% of patients.

A rash, which in survivors desquamates during convalescence, is seen in approximately 15% of patients. Terminally ill patients often are obtunded, anuric, tachypneic, normothermic, and in shock.

Although the mechanism is unclear, hiccups were noted in fatal cases of Ebola virus disease in both the 1976, and 1995 outbreaks in the DRC, and in the 2014 outbreak in West Africa.

Severe illness is associated with hypotension and shock, pneumonitis, pleural and pericardial effusions, hemorrhage, encephalopathy, seizures, coma, and death. Death usually occurs between 9-10 days after onset of symptoms. If case lives to day 14, chance of survival and full recovery increase dramatically.

Causative Agent:

Filoviruses: These are elongated RNA viruses. Filoviruses include Marburg and Ebola viruses. Ebola virus disease (EVD) is a zoonotic disease which results in a hemorrhagic syndrome in humans.

Differential Diagnosis:

In the absence of hospital or laboratory exposure these diseases have been acquired almost exclusively in rural areas. The recent (2013-2014) outbreak in West Africa, however, has occurred in cities, which may be contributing to difficulties with containment. Following an incubation period of 2 to 21 days, initial symptoms of EVD are usually systemic and compatible with influenza: fever, myalgias, headache, and sometimes sore throat. At this point, such symptoms in a returning traveller who has a history of travel to countries of West Africa currently experiencing Ebola outbreaks (Guinea, Liberia, Sierra Leone, and Mali) and 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 Ebola. 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: Influenza and other upper respiratory infectious agents, mononucleosis, Dengue fever, hepatitis A, and acute HIV infection.

Conjunctivitis, petechiae, and a morbilliform (measles-like) skin rash appear later and are more suggestive of a EVD. It should be noted that these symptoms do not occur until the second week of illness. At this point, a reasonable suspicion of EVD 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 Ebola. The additional signs of hemorrhage and shock are strongly suggestive of EVD.

Laboratory identification:

The Ebola Zaire Target 1 real-time reverse transcription polymerase chain reaction assay (EZ1 PCR assay) is for the presumptive detection of Ebola Zaire virus on specified instruments using whole blood from individuals who meet CDC's definition of persons under investigation for Ebola (PUIs). (For Utah-specific guidance on management of PUIs see http://health.utah.gov/epi/diseases/ebola/Utah_Ebola_PUI_manage.pdf.) The EZ1 assay is intended for use only on authorized platforms by laboratories designated by Department of Defense (DoD).Testing with the EZ1 assay should not be performed unless the individual has been exposed to or is at risk for exposure to Ebola Zaire virus or has signs and symptoms of infection with Ebola Zaire virus that meet clinical and epidemiologic criteria for testing suspect specimens.

Confirmatory testing of Ebola should be handled by the Centers for Disease Control and Prevention (CDC). These organisms can be identified via serology, PCR, and viral culture. These tests are typically done in a laboratory with higher biosafety level containment. The Utah Public Health Laboratory (UPHL) can arrange for shipping of specimens safety to the CDC. Click here for shipping instructions. Viremia peaks one week after onset of symptoms, with IgM developing 10 days post onset and IgG developing shortly thereafter.

Treatment:

No FDA-approved vaccine or specific treatment (e.g., antiviral drug) is available for Ebola.

Symptoms of Ebola and complications are treated as they appear. The following basic interventions, when used early, can significantly improve the chances of survival:

- Providing intravenous fluids and balancing electrolytes (body salts)
- Maintaining oxygen status and blood pressure
- Treating other infections if they occur
- Experimental vaccines and treatments for Ebola are under development, but they have not yet been fully tested for safety or effectiveness.
- Several investigational vaccines for prevention of Ebola virus infection are in development and are currently being evaluated in Phase I trials. In addition, Phase II trials are currently being planned in West Africa.
- Several investigational drugs as well as plasma from recovered Ebola patients have been used to treat patients with Ebola during the current outbreak, but no controlled clinical trials have been conducted to date.

Two companies, Tekmira and BioCryst Pharmaceuticals, have received funding from the DoD to develop potential drugs to treat Ebola. BioCryst, with NIH support, is working to develop an antiviral drug to treat Ebola; the first phase of (human) safety testing is expected to begin later this year.

Case fatality: Mortality rates following development of clinical disease range from 50-90% for EVD. Death usually occurs between 9-10 days after onset of symptoms. If a case lives to day 14, the chance of survival and full recovery increases dramatically.

Reservoir:

The natural reservoir host of Ebola viruses remains unknown. However, on the basis of available evidence and the nature of similar viruses, researchers believe that the virus is zoonotic (animal-borne), with bats being the most likely reservoir. Other mammals that can be affected include non-human primates and a small antelope species found in Africa. Once Ebola is established in human populations, person-to-person spread may occur.

Transmission:

Once a human has acquired infection with Ebola, transmission may occur from person-to-person through direct contact when that individual becomes symptomatic. Direct physical contact with infectious blood or secretions is thought to be required for transmission. Individuals can become infected through contact with infectious blood or with secretions (such as urine, vomitus, pus, stool (feces), semen, saliva, breast milk, and sweat) from a person who has developed signs or symptoms of illness, or from infected animals. The virus in blood and body fluids can enter another person's body through broken skin or unprotected mucous membranes in, for example, the eyes, nose, or mouth. Individuals have acquired Ebola through sexual contact. Transmission has also occurred through improper handling of a deceased person with Ebola virus.

Bedding or other objects may serve as a source of transmission. Exposure to objects (such as needles) that have been contaminated with infected secretions is another method of transmission.

Medical equipment that has not been properly cleaned or sterilized has been responsible for the spread of Ebola, and rarely, Ebola has been acquired by laboratory workers while manipulating specimens.

Individuals involved in the direct slaughter of infected animals may also become infected. There is potential for exposure when entering caves in endemic areas that are highly infested with bats.

The transmission risk of Ebola in the health care and laboratory setting is well documented. During the 1995 Ebola haemorrhagic fever outbreak in Kikwit (former Zaire, and now the Democratic Republic of the Congo), 25% of the cases were healthcare workers with a history of recent patient care. In the recent 2014 outbreak, numerous healthcare workers have been infected, and many have died.

Ebola is not easy to spread because people are only contagious when they have symptoms, and people with symptoms are likely to be too sick to travel or hide their symptoms.

Ebola virus can be killed with disinfectants, and the Environmental Protection Agency (EPA) has a list of such products that can be used in healthcare settings, institutional settings (schools, office buildings), and residential settings (http://www.epa.gov/oppad001/list-l-ebola-virus.html).

While available information suggests the virus may be found in several kinds of animals, it is not believed that pets (like dogs and cats) are at significant risk for Ebola. Only a few species of mammals (for example, humans, monkeys, and apes) have shown the ability to become infected with and spread Ebola virus.

Susceptibility:

Anyone not previously infected is susceptible; infection usually confers immunity in survivors.

Incubation period:

The incubation period for EVD ranges from 1–21 days, with an average of 8–10 days.

Period of communicability:

Infected individuals with Ebola are generally considered infectious once clinical symptoms begin. Individuals who have not developed symptoms are not contagious. In order for the virus to be transmitted, an individual must have direct contact with an individual who has begun experiencing symptoms.

Patients who survive continue to shed virus in blood and secretions for weeks to months. Ebola virus has been isolated from seminal fluid 61 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.

The virus may remain viable for a variable duration post-mortem, permitting transmission from recently deceased patients.

Epidemiology:

The first Ebola virus was discovered in 1976 near the Ebola River in what is now the Democratic Republic of the Congo. Since then, outbreaks have appeared sporadically in Africa. In May 1995, Ebola came to worldwide attention with an outbreak of Ebola virus near the city of Kikwik, Zaire. In 2014, the largest ever outbreak of Ebola occurred (and is still occurring). The 2014 outbreak has been widespread in the countries of Guinea, Liberia, and Sierra Leone in Western Africa. Other countries that have had Ebola cases linked to this outbreak include Mali, Nigeria, Senegal, Spain and the United States. As long as the 2014 Ebola outbreak is ongoing, the potential for cases to spread throughout the world will continue.

Ebola viruses are primarily found in Africa and a less severe serotype of EVD has been found in the Philippines. The vector is unknown, but infected bats and primates are thought to provide a link for spread to humans. Once established in humans, person-to-person spread may occur through direct contact with blood or secretions of an infected person.

It appears that outbreaks of EVD often follow uncommonly dry periods, when rainfall resumes and reaches unusually high levels.

A person may become infected in an area where a virus occurs naturally, and could spread the disease elsewhere through traveling to another area before symptoms begin. Because travel is now so common, outbreaks of viral hemorrhagic fever like EVD are becoming threats in places where they have rarely, or never, been seen before.

✓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.

Prevention:

To avoid infection with Ebola:

- Individuals should avoid traveling to areas with known outbreaks of EVD.
- Laboratory workers handling specimens suspected of containing Ebola virus must take appropriate biosafety precautions.
- Persons working with imported NHPs should know the signs of EVD in NHPs, and they should immediately report any cases of suspect or confirmed EVD in NHPs to the UDOH Bureau of Epidemiology.

Prevention measures within a healthcare setting:
Standard, contact, and droplet precautions are recommended for management of hospitalized patients with known or suspected Ebola hemorrhagic fever (Ebola HF), or EVD (See Table, Appendix A). Note that this guidance outlines only those measures that are specific for EVD; additional infection control measures might be warranted if an EVD patient has other conditions or illnesses for which other measures are indicated (e.g., tuberculosis, multi-drug resistant organisms, etc.).

Though these recommendations focus on the hospital setting, the recommendations for personal protective equipment (PPE) and environmental infection control measures are applicable to any healthcare setting. In this guidance healthcare personnel (HCP) refers to all persons, paid and unpaid, working in healthcare settings who have the potential for exposure to patients and/or to infectious materials, including body substances, contaminated medical supplies and equipment, contaminated environmental surfaces, or aerosols generated during certain medical procedures. HCP include, but are not limited to, physicians, nurses, nursing assistants, therapists, technicians, emergency medical service personnel, dental personnel, pharmacists, laboratory personnel, autopsy personnel, students and trainees, contractual personnel, home healthcare personnel, and persons not directly involved in patient care (e.g., clerical, dietary, house-keeping, laundry, security, maintenance, billing, chaplains, and volunteers) but potentially exposed to infectious agents that can be transmitted to and from HCP and patients. **This guidance is not intended to apply to persons outside of healthcare settings**.

As information becomes available, these recommendations will be re-evaluated and updated as needed. These recommendations are based upon available information (as of July 30, 2014) and the following considerations:

- High rate of morbidity and mortality among infected patients
- Risk of human-to-human transmission
- Lack of FDA-approved vaccine and therapeutics

For full details of standard, contact, and droplet precautions see 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Setting.

For information on symptoms of Ebola Hemorrhagic Fever, or EVD, infection and modes of transmission, see the CDC Ebola Hemorrhagic Fever Website.

Chemoprophylaxis:

There is no known treatment for EVD; only supportive care may be implemented for cases.

Vaccine:

None, but current studies are being conducted.

Isolation and quarantine requirements:

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

Isolation of patient during convalescence:
Virus may be excreted into the urine for weeks after recovery has begun. Disinfectant (e.g., household bleach) should be added to the toilet bowl prior to urinating or flushing for 6 weeks of convalescence, or until patient has a negative culture for the virus. The average toilet contains ~ 1 Gallon of water in the toilet bowl prior to flushing. Place 50 to 100 cc of bleach in the toilet prior to urinating. Wait 5 minutes, and then flush.

Postmortem:
If a patient dies, handling of the body should be minimal. The corpse should be wrapped in sealed, leak-proof material, not embalmed, and then cremated or buried promptly in a sealed casket.

✓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 EVD has been ordered.

2. A person with ALL of the following findings:
   - a fever ≥ 100.4°F;
   - one or more of the following clinical findings:
     - severe headache
     - muscle pain
     - chills

  - malaise
  - generalized myalgias and arthralgias
  - abdominal pain
  - anorexia
  - nausea
  - vomiting
  - Some patients have a rash (e.g., petechiae, purpura, ecchymoses), red eyes, hiccups, sore throat, chest pain, difficulty breathing, difficulty swallowing, and bleeding inside and outside the body
- 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 EVD without proper PPE or biosafety precautions
  - residence in—or travel within the past 3 weeks to—an Ebola affected area
  - work within the past 3 weeks in a laboratory that handles EVD specimens
  - work within the past 3 weeks in a laboratory that handles bats, rodents, or primates from Ebola affected or endemic areas
  - exposure within the past 3 weeks to semen from a confirmed acute or convalescent case of Ebola within 10 weeks of the person's onset of illness
  - had direct contact with a dead body (Ebola diagnosis not necessary) without appropriate PPE in a country with widespread Ebola transmission
  - had lived in the immediate household and provided direct care to an Ebola-infected individual.
  - took care of Ebola patients in a U.S. facility where another healthcare worker has been diagnosed with Ebola, or breaches in infection control practices have been identified

4. A person whose death certificate lists Ebola or EVD as a cause of death or a significant condition contributing to death.

Other recommended reporting procedures

- All cases (suspected or confirmed) of EVD should be reported.
- Reporting should be on-going and routine.
- Reporting should be immediate.

Any suspect or confirmed case of EVD, or of any potential exposure to an agent which could cause EVD, must be called to the UDOH Bureau of Epidemiology immediately at 1-888-EPI-UTAH.

Table of criteria to determine whether an EVD case should be reported to public health authorities.

Criterion	Reporting
Clinical Evidence	
fever (≥ 100.4°F)	N
severe headache	O
chills	O
malaise	O
generalized myaglias and arthralgias	O
abdominal pain	O
anorexia	O
vomiting	O
diarrhea	O
unexplained hemorrhage (bleeding or bruising not related to injury)	O
healthcare record contains a diagnosis of EVD	S
death certificate lists EVD as a cause of death or a significant condition contributing to death	S
Laboratory Evidence	
detection of EVD viral antigens in blood or tissues by ELISA	S*
EVD viral isolation in cell culture from blood or tissues	S*
detection of EVD-specific genetic sequence by RT-PCR from blood or tissues	S*
Detection of EVD 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 EVD within the past 3 weeks	O
residence in—or travel within the past 3 weeks to—a EVD affected area	O
work within the past 3 weeks in a laboratory that handles EVD specimens	O
work within the past 3 weeks in a laboratory that handles bats, rodents, or primates from endemic areas	O
exposure within the past 3 weeks to semen from a confirmed acute or convalescent EVD case within 10 weeks of the person's onset of illness	O
had direct contact with a dead body (Ebola diagnosis not necessary) without appropriate PPE in a country with widespread Ebola transmission	O
had lived in the immediate household and provided direct care to an	O

Ebola-infected individual.	
took care of Ebola patients in a U.S. facility where another healthcare worker has been diagnosed with Ebola, or breaches in infection control practices have been identified	O

Notes:
S = This criterion alone is sufficient to report 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 report 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 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).
* A requisition or order for any of the "S" or "N" laboratory tests is sufficient to meet the reporting criteria.

Case definition:

There is no formal CDC case definition for Ebola. The definition below is modified from one created for a 2009 CSTE position statement regarding viral hemorrhagic fevers in general:

Clinical presentation criteria:
An illness with acute onset, with the following clinical findings:

- ≥ 100.4 degrees F
  AND
- One or more of the following clinical findings:
  - Severe headache
  - Muscle pain
  - Chills
  - Malaise
  - Generalized myalgias and arthralgias
  - Abdominal pain
  - Anorexia
  - Nausea
  - Vomiting
  - Some patients have a rash (e.g., petechiae, purpura, ecchymoses), red eyes, hiccups, sore throat, chest pain, difficulty breathing, difficulty swallowing, and bleeding inside and outside the body

Laboratory criteria for diagnosis:
One or more of the following laboratory findings:

- Detection of Ebola viral antigens in blood by ELISA antigen detection
- Ebola viral isolation in cell culture for blood or tissues

- Detection of Ebola viral genes using reverse transcriptase with polymerase chain reaction amplification (RT-PCR) from blood or tissues
- Detection of Ebola viral antigens in tissues by immunohistochemistry

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 Ebola without proper PPE
- Residence in, or travel to, an Ebola-endemic or Ebola affected area
- Work within the past 3 weeks in a laboratory that handles Ebola specimens
- Work within the past 3 weeks in a laboratory that handles bats, rodents, or primates from Ebola endemic areas
- Exposure within the past 3 weeks to semen from a confirmed acute or convalescent case of Ebola who was within 10 weeks of symptom onset
- Direct contact with a dead body (Ebola diagnosis not necessary) without appropriate PPE in a country with widespread Ebola transmission
- Lived in the immediate household and provided direct care to an Ebola-infected individual.
- Took care of Ebola patients in a U.S. facility where another healthcare worker has been diagnosed with Ebola, or breaches in infection control practices have been identified

Case classifications:

Suspect: Case meets the clinical and epidemiologic linkage criteria.
Confirmed: Case meets the clinical and laboratory criteria.

Criterion	Confirmed	Suspected
Clinical Evidence		
Fever ($\geq$ 100.4°F)	N	N
Severe headache	O	O
Chills	O	O
Malaise	O	O
Generalized myaglias and arthralgias	O	O
Abdominal pain	O	O
Anorexia	O	O
Vomiting	O	O
Diarrhea	O	O
Unexplained hemorrhage (bleeding or bruising not related to injury)	O	O
Healthcare record contains a diagnosis of EVD	O	O

Death certificate lists EVD as a cause of death or a significant condition contributing to death	O	O
Laboratory Evidence		
Detection of EVD viral antigens in blood or tissues by ELISA	S	
EVD viral isolation in cell culture from blood or tissues	S	
Detection of EVD-specific genetic sequence by RT-PCR from blood or tissues	S	
Detection of EVD 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 EVD within the past 3 weeks		O
Residence in—or travel within the past 3 weeks to—a EVD affected area		O
Work within the past 3 weeks in a laboratory that handles EVD specimens		O
Work within the past 3 weeks in a laboratory that handles bats, rodents, or primates from endemic areas		O
Exposure within the past 3 weeks to semen from a confirmed acute or convalescent EVD case within 10 weeks of the person's onset of illness		O
Direct contact with a dead body (Ebola diagnosis not necessary) without appropriate PPE in a country with widespread Ebola transmission		O
Lived in the immediate household and provided direct care to an Ebola-infected individual.		O
Took care of Ebola patients in a U.S. facility where another healthcare worker has been diagnosed with Ebola, or breaches in infection control practices have been identified		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).

Clinical Description
Common Clinical Features of Ebola HF, or EVD

Disease	Incubation Period	Case Fatality	Characteristic Features
Ebola HF	2-21 days	25%-90%	--Most fatal of all Hemmoraghic Fevers. --Weight loss. --Exhaustion and loss of strength. --A maculopapular (a lesion with a broad base) rash is common --Post infection events have included hepatitis, uveitis and orchitis.

Specific Clinical Findings

Disease	Ebola HF and Marburg HF
haemorrhage	++
thrombocytopenia [1]	+++
leukocyte count [2]	data not available
rash	+++
icterus[3]	++
renal disease	
pulmonary disease	+
tremor[4] dysarthria[5]	
encephalopathy[6]	++
deafness	+
eye lesions	Retinitis

[1]abnormally low number of platelets in the circulating blood

[2]white blood cell count

[3]jaundice

[4]shaking

[5]difficulty speaking and pronouncing words due to problems with the muscles used for speaking

[6]disease of the brain

+occasional or mild

++commonly seen and may be severe

+++characteristic

Laboratory Criteria for Viral Hemorrhagic Fevers, including Ebola

Diagnostic Test	Samples required	Preparation & Storage	Shipping	Viruses to be confirmed
ELISA (Serology) Detects: • Viral antigen • IgM and IgG antibody	Whole blood***** Serum or plasma Acute and convalescent******	Freeze or refrigerate (as cold as possible)	Frozen on dry ice or ice packs or both********	Ebola
PCR Detects: DNA, RNA (genetic material) from virus	Whole blood or clot******* Tissues (fresh frozen) Serum/plasma	Refrigerate or Freeze	Frozen on dry ice or ice packs or both********	Ebola Lassa
Immunohisto-chemistry (liver) Detects: Viral antigen in cells	Liver biopsy from fatal cases	Fix in formalin (can be stored up to 6 weeks)	Room temperature (Do not freeze)	Ebola Lassa
Immunohisto-chemistry (skin) Detects: Viral antigen in cells	Skin biopsy from fatal cases (any site)	Fix in formalin (can be stored up to 6 weeks)	Room temperature (Do not freeze)	Ebola
Immunohisto-chemistry (other tissues) Detects: Viral antigen in cells	Tissue biopsy from fatal cases (other tissues, spleen, lung, heart, kidney)	Fix in formalin (can be stored up to 6 weeks)	Room temperature (Do not freeze)	**Possible detection** of Ebola

***** Whole blood can be used for enzyme-linked immunosorbent assay (ELISA) and may be frozen. Do not centrifuge suspected Ebola specimens because this increases risk to the lab worker. If serum specimens have already been prepared these can be used. Place specimens in plastic tubes for shipping and storage and be sure that the tubes are sealed and properly labeled.
****** Collect acute-phase specimen when patient is admitted to hospital or diagnosed as suspected case and collect convalescent-phase specimen at death or when discharged from the hospital.
******* Whole blood or tissue is preferred, although serum or plasma may provide results.
******** Use both ice packs and dry ice to provide best results. If dry ice or ice packs are not available, sample may be shipped at room temperature and still provide valid results in most cases.

Case Investigation Process:

1. Following immediate notification of the UDOH, the LHD may be asked to assist in investigating any case living within their community, 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 Ebola form in UT-NEDSS and include the following information:
   a. Record the case's demographic information.
   b. Accurately record clinical information including "Ebola" as the disease being investigated, 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 Ebola (2−21 days). Specifically, focus on the period beginning a minimum of 2 days 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.
3. Specimen Collection, Transport, Testing, and Submission for Patients with Suspected Infection with Ebola Virus Disease

Specimen Collection/Submission

UDOH Bureau of Epidemiology must be consulted regarding patients suspected of having EVD before any specimens are tested and sent to CDC. UPHL can conduct presumptive testing for EVD using the Ebola Zaire Target 1 real-time reverse transcription polymerase chain reaction assay (EZ1 PCR assay). This test is for the presumptive detection of Ebola Zaire virus on specified instruments using whole blood from individuals who meet CDC's definition of persons under investigation for Ebola (PUIs). **Report suspect cases to public health (UDOH or LHD) immediately.**

Specimens should be taken as soon as possible after a symptomatic patient reports to a healthcare facility and is suspected of having an Ebola exposure. If the first test is

negative, a second test should be performed at 72 hours after the onset of symptoms to rule out Ebola. All positive EZ1 assay results must be confirmed by the CDC.

Please complete each of the steps outlined in the document titled "Submitting Sample to CDC for Patients with Suspected Infection with Ebola Virus."

Specimens collected for EVD testing should be packaged and shipped without attempting to open collection tubes or aliquot specimens. Specimens for shipment should be packaged following the basic triple packaging system which consists of a primary receptacle (a sealable specimen bag) wrapped with absorbent material, secondary receptacle (watertight, leak-proof), and an outer shipping package.

Outbreaks:

One case of Ebola in Utah is considered an outbreak, as this disease has never been seen in the United States. A source of infection, such as travel to a geographical region where a known outbreak of Ebola is occurring, should be sought, and applicable preventive or control measures should be instituted.

Identification of case contacts:

Identify all other potentially exposed persons immediately.

Utah management categories for case contacts or persons under active monitoring:

A contact is defined as a person who has been exposed to an infected person (specifically, to an infected person's secretions, excretions, or tissues) from the patient's onset of illness until 3 weeks after onset. Persons under active monitoring are individuals who have traveled to an Ebola affected area, or have cared for an Ebola patient either in the U.S or in an Ebola affected country.

Persons under active monitoring or contacts may be subdivided into five levels of risk:

1. Category A

Risk Level: High

Exposures include persons that:

- Had exposure to the blood or body fluids (including but not limited to feces, saliva, sweat, urine, vomit, and semen) of an Ebola-infected individual without appropriate PPE or biosafety precautions.
    - Exposures can occur through direct skin contact, needle sticks, or mucous membrane exposures (splashes to eyes, nose, or mouth).
    - Persons at risk include, but are not limited to, healthcare workers, laboratorians, friends/family, airport screeners, decontamination crews, or contact tracers.
- Had direct contact with a dead body (Ebola diagnosis not necessary) without appropriate PPE in a country with widespread Ebola transmission.
- Had lived in the immediate household and provided direct care to an Ebola-infected individual.
- Took care of Ebola patients in a U.S. facility where another healthcare worker has been diagnosed with Ebola, or breaches in infection control practices have been identified.

2. Category B

Risk Level: Some

Exposures include persons that:

- Had close contact (being within 3 feet for ≥ 2 hours), but not direct contact, with an Ebola-infected individual, in a setting with direct patient care (household or healthcare) without wearing PPE.
    - Persons at risk include, but are not limited to, healthcare workers with no direct patient contact, epidemiologists, or contact tracers.
- Had direct contact with an Ebola-infected individual while wearing PPE in a country with widespread Ebola transmission (i.e. unidentified or inadvertent exposure in the healthcare setting is likely).

3. Category C

Risk Level: Low

Exposures include persons that:

- Had close contact (being within 3 feet for ≥ 2 hours), but not direct contact, with an Ebola-infected individual, in a setting without direct patient care (waiting room, airport, community) without wearing PPE.
    - Persons at risk include, but are not limited to, healthcare workers with no direct patient contact, epidemiologists, contact tracers, or airport screeners.
- Had direct contact with an Ebola-infected individual while wearing PPE in a country without widespread Ebola transmission (e.g., the United States) (i.e. unidentified or inadvertent exposure in the healthcare setting is unlikely).
- Traveled on an airplane with an Ebola-infected individual, and were within 3 feet of the person (verified through airline records).

4. Category D

Risk Level: Low

Exposures include persons that:

- Had been in a country with widespread Ebola transmission within the previous 21 days, but have had no known exposure to Ebola.
- Had been in the same room as an Ebola-infected individual for a <2 hours, without direct contact.
- Had brief skin contact (e.g. shaking hands) with an Ebola-infected individual when the person was believed to be not very contagious (i.e. very limited symptoms in the first few days of illness).
- Traveled on an airplane with an Ebola-infected individual, but were not within 3 feet of the person (verified through airline records).
- Had close contact (being within 3 feet for ≥ 2 hours), but not direct contact, with an Ebola-infected individual, while wearing PPE.
    - Persons at risk include, but are not limited to, healthcare workers with no direct patient contact, epidemiologists, contact tracers, or airport screeners.
- Handled the blood or body fluids of an Ebola-infected individual in the laboratory setting with appropriate PPE or biosafety precautions.

- Served on an environmental decontamination crew that handled materials contaminated with the blood or body fluids of an Ebola-infected individual while wearing appropriate PPE.
- Had direct contact with a dead body (Ebola diagnosis not necessary) with appropriate PPE in a country with widespread Ebola transmission.

5. Category E

Risk Level: None

Exposures include persons that:

- Had contact with an asymptomatic person who had contact with an Ebola-infected individual.
- Had contact with an Ebola-infected individual BEFORE they developed symptoms.
- Had been in a country with widespread Ebola transmission MORE than 21 days ago.
- Had been in a country with no widespread Ebola transmission (e.g., the United States), and had no other exposures to the Ebola virus.

Any close or high-risk contact that develops a temperature of 100.4 degrees F any other symptoms of illness, should be immediately isolated and treated as Ebola.

Monitoring is not indicated for routine occupational contact with patients in situations where the diagnosis has been considered and appropriate isolation precautions implemented.

For more information regarding the Monitoring and Movement of Persons with Ebola Virus Disease Exposure see http://www.cdc.gov/vhf/ebola/hcp/monitoring-and-movement-of-persons-with-exposure.html.

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APPENDIX A

Key Components of Standard, Contact, and Droplet Precautions Recommended for Prevention of EHF Transmission in U.S. Hospitals

Component	Recommendation	Comments
Patient Placement	• Single patient room (containing a private bathroom) with the door closed • Facilities should maintain a log of all persons entering the patient's room	• Consider posting personnel at the patient's door to ensure appropriate and consistent use of PPE by all persons entering the patient room
Personal Protective Equipment (PPE)	• Guidance on Personal Protective Equipment To Be Used by Healthcare Workers During Management of Patients with Ebola Virus Disease in U.S. Hospitals, Including Procedures for Putting On (Donning) and Removing (Doffing)	
Patient Care Equipment	• Dedicated medical equipment (preferably disposable, when possible) should be used for the provision of patient care • All non-dedicated, non-disposable medical equipment used for patient care should be cleaned and disinfected according to manufacturer's instructions and hospital policies	
Patient Care Considerations	• Limit the use of needles and other sharps as much as possible • Phlebotomy, procedures, and laboratory testing should be limited to the minimum necessary for essential diagnostic evaluation and medical care • All needles and sharps should be handled with extreme care and disposed in puncture-proof, sealed	

Component	Recommendation	Comments
	containers	
Aerosol Generating Procedures (AGPs)	• Avoid AGPs for patients with EVD. • If performing AGPs, use a combination of measures to reduce exposures from aerosol-generating procedures when performed on Ebola HF patients. • Visitors should not be present during aerosol-generating procedures. • Limiting the number of HCP present during the procedure to only those essential for patient-care and support. • Conduct the procedures in a private room and ideally in an Airborne Infection Isolation Room (AIIR) when feasible. Room doors should be kept closed during the procedure except when entering or leaving the room, and entry and exit should be minimized during and shortly after the procedure. • HCP should wear appropriate PPE during aerosol generating procedures. • Conduct environmental surface cleaning following procedures (see section below on environmental infection control).	• Although there are limited data available to definitively define a list of AGPs, procedures that are usually included are Bilevel Positive Airway Pressure (BiPAP), bronchoscopy, sputum induction, intubation and extubation, and open suctioning of airways. • Because of the potential risk to individuals reprocessing reusable respirators, disposable filtering face piece respirators are preferred.
Hand Hygiene	• HCP should perform hand hygiene frequently, including before and after all patient contact, contact with potentially infectious material, and before putting on and upon removal of PPE, including gloves. • Healthcare facilities should ensure that supplies for performing hand hygiene are available.	• Hand hygiene in healthcare settings can be performed by washing with soap and water or using alcohol-based hand rubs. If hands are visibly soiled, use soap and water, not alcohol-based hand rubs.
Environmental	• Interim Guidance for Environmental	• Interim Guidance

Component	Recommendation	Comments
Infection Control	Infection Control in Hospitals for Ebola Virus	for Environmental Infection Control in Hospitals for Ebola Virus
Safe Injection practices	• Facilities should follow safe injection practices as specified under Standard Precautions.	• Any injection equipment or parenteral medication container that enters the patient treatment area should be dedicated to that patient and disposed of at the point of use.
Duration of Infection Control Precautions	• Duration of precautions should be determined on a case-by-case basis, in conjunction with local, state, and federal health authorities.	• Factors that should be considered include, but are not limited to: presence of symptoms related to Ebola HF, date symptoms resolved, other conditions that would require specific precautions (e.g., tuberculosis, *Clostridium difficile*) and available laboratory information
Monitoring and Management of Potentially Exposed Personnel	• Facilities should develop policies for monitoring and management of potentially exposed HCP • Facilities should develop sick leave policies for HCP that are non-	

Component	Recommendation	Comments
	punitive, flexible and consistent with public health guidance o Ensure that all HCP, including staff who are not directly employed by the healthcare facility but provide essential daily services, are aware of the sick leave policies. • Persons with percutaneous or mucocutaneous exposures to blood, body fluids, secretions, or excretions from a patient with suspected Ebola HF should o Stop working and immediately wash the affected skin surfaces with soap and water. Mucous membranes (e.g., conjunctiva) should be irrigated with copious amounts of water or eyewash solution o Immediately contact occupational health/supervisor for assessment and access to postexposure management services for all appropriate pathogens (e.g., Human Immunodeficiency Virus, Hepatitis C, etc.) • HCP who develop sudden onset of fever, intense weakness or muscle pains, vomiting, diarrhea, or any signs of hemorrhage after an unprotected exposure (i.e. not wearing recommended PPE at the time of patient contact or through direct contact to blood or body fluids) to a patient with Ebola HF should o Not report to work or should immediately stop working o Notify their supervisor	

Component	Recommendation	Comments
	○ Seek prompt medical evaluation and testing ○ Notify local and state health departments ○ Comply with work exclusion until they are deemed no longer infectious to others • For asymptomatic HCP who had an unprotected exposure (i.e. not wearing recommended PPE at the time of patient contact or through direct contact to blood or body fluids) to a patient with Ebola HF ○ Should receive medical evaluation and follow-up care including fever monitoring twice daily for 21 days after the last known exposure. ○ Hospitals should consider policies ensuring twice daily contact with exposed personnel to discuss potential symptoms and document fever checks ○ May continue to work while receiving twice daily fever checks, based upon hospital policy and discussion with local, state, and federal public health authorities.	
Monitoring, Management, and Training of Visitors	• Avoid entry of visitors into the patient's room ○ Exceptions may be considered on a case by case basis for those who are essential for the patient's wellbeing. • Establish procedures for monitoring managing and training visitors. • Visits should be scheduled and controlled to allow for: ○ Screening for Ebola HF (e.g., fever and other symptoms)	• Visitors who have been in contact with the Ebola HF patient before and during hospitalization are a possible source of EHF for other patients, visitors, and staff.

Component	Recommendation	Comments
	before entering or upon arrival to the hospital o Evaluating risk to the health of the visitor and ability to comply with precautions o providing instruction, before entry into the patient care area on hand hygiene, limiting surfaces touched, and use of PPE according to the current facility policy while in the patient's room o Visitor movement within the facility should be restricted to the patient care area and an immediately adjacent waiting area.	