

Ebola Virus Disease rev Jan 2016

BASIC EPIDEMIOLOGY

Infectious Agent

The infectious agent is Ebolavirus, in the family filoviridae. There are five identified Ebola virus species, four of which cause disease in humans: Zaire, Sudan, Taï Forest, and Bundibugyo.

Transmission

Ebola has been found in certain mammals (primates, bats) in Africa. It is thought that fruit bats of the Pteropodidae family are natural Ebola virus hosts. Ebola is introduced into the human population through close contact with the blood, secretions, organs or other bodily fluids of infected animals such as chimpanzees, gorillas, fruit bats, monkeys, forest antelope and porcupines found ill or dead or in the rainforest.

Once infection occurs in humans, there are several ways it can spread to others. Ebola is spread through direct contact (through broken skin, mucous membranes—eyes, nose, mouth, etc.) with

- blood or body fluids (including but not limited to urine, saliva, sweat, feces, vomit, breast milk, semen) of a person who is sick with Ebola
- objects contaminated with the virus (e.g., needles, syringes)

Risk is highest during the late stages of the illness when the patient is vomiting, having diarrhea, or hemorrhaging, and at death if unprotected contact with the corpse occurs. Post-mortem infection has been linked to the preparation of the body for burial and during burial rituals or funeral services.

Ebola is not spread through the air or water. It is not typically spread by food, however, in Africa it may be spread through handling bush meat (wild animals hunted for food).

Incubation Period

Usually 8-10 days after exposure (range 2-21 days)

Communicability

People with Ebola are not infectious until symptoms begin. They are infectious for the duration of the illness. The remains of people that have passed away while sick with Ebola are considered infectious and are a common source of infection in African outbreaks. Ebola virus has been detected in semen up to nine months after illness, and abstinence or condom use are recommended during this period after illness. Ebola virus has been detected in breast milk; unless the baby is already symptomatic for Ebola, breastfeeding should be avoided for eight weeks or until breast milk is PCR negative on 2 days.

Clinical Illness

Ebola virus disease (EVD) is a severe acute illness, usually with sudden onset of fever, malaise, muscle pain, severe headache, vomiting, diarrhea, abdominal pain, bruising and bleeding. Complications include liver damage, kidney damage, shock, and central nervous system complications. Recovery from Ebola depends on good supportive clinical care. Case fatality rates as high as 90 percent have been reported. Laboratory findings usually show lymphopenia, severe thrombocytopenia, and transaminase elevation (AST>ALT).

DEFINITIONS

Clinical Case Definition (frequently referred to as Person Under Investigation or PUI)

1. Fever and additional symptoms such as severe headache, muscle pain, vomiting, diarrhea, abdominal pain, or unexplained hemorrhage; AND
2. Epidemiologic risk factors within 21 days prior to the onset of symptoms, such as contact with blood or other body fluids or human remains of a patient known to have or suspected to have Ebola, residence in—or travel to—an area where Ebola transmission is active*, or direct handling of bats or non-human primates from disease-endemic areas.

Laboratory Confirmation

- RT-PCR for Ebola
- Virus isolation
- IgM ELISA
- Antigen-capture ELISA
- Immunohistochemistry

Case Classifications

- **Confirmed:** A clinically compatible illness that is laboratory confirmed
- **Suspect:** A clinically compatible illness that meets one or more of the following exposures within 21-days before onset of symptoms:
 - Contact with blood or other body fluids of a patient with EVD, OR
 - Residence in—or travel to—an EVD endemic area or area currently classified by CDC as experiencing an Ebola outbreak, OR
 - Handling EVD specimens in a laboratory setting, OR
 - Work in a laboratory that handles primates, bats, or rodents from endemic areas, OR
 - Exposure to semen or breast-milk of an individual who had EVD within the last 9 months.

Exposure Risk Levels

- **High risk** includes any of the following:
 - In any country
 - Percutaneous (e.g., needle stick) or mucous membrane exposure to blood or body fluids (including but not limited to feces, saliva, sweat, urine, vomit, and semen¹) from a person with Ebola who has symptoms
 - Direct contact with a person with Ebola who has symptoms, or the person's body fluids, **while not wearing appropriate personal protective equipment (PPE)**
 - Laboratory processing of blood or body fluids from a person with Ebola who has symptoms **while not wearing appropriate PPE or without using standard biosafety precautions**
 - Providing direct care to a person showing symptoms of Ebola in a household setting

¹ Ebola virus can be detected in semen for months after recovery from the disease. Unprotected contact with the semen of a person who has recently recovered from Ebola may constitute a potential risk for exposure. The period of risk is not yet defined.

In countries with widespread transmission or cases in urban settings with uncertain control measures*

- Direct contact with a dead body **while not wearing appropriate PPE**.

- **Some risk** includes any of the following:

In any country

- Being in close contact² with a person with Ebola who has symptoms **while not wearing appropriate PPE** (for example, in households, healthcare facilities, or community settings)

In countries with widespread transmission*

- Direct contact with a person with Ebola who has symptoms, or the person's body fluids, **while wearing appropriate PPE**
- Being in the patient-care area of an Ebola treatment unit
- Providing any direct patient care in non-Ebola healthcare settings

- Low (but not zero) risk includes any of the following:

In any country

- Brief direct contact (such as shaking hands) with a person in the early stages of Ebola, **while not wearing appropriate PPE**. Early signs can include fever, fatigue, or headache.
- Brief proximity with a person with Ebola who has symptoms (such as being in the same room, but not in close contact) **while not wearing appropriate PPE**
- Laboratory processing of blood or body fluids from a person with Ebola who has symptoms **while wearing appropriate PPE and using standard biosafety precautions**
- Traveling on an airplane with a person with Ebola who has symptoms and having had no identified **some** or **high** risk exposures

In countries with widespread transmission, cases in urban settings with uncertain control measures, or former widespread transmission and current, established control measures*

- Having been in one of these countries and having had no known exposures

In any country other than those with widespread transmission

- Direct contact with a person with Ebola who has symptoms, or the person's body fluids, while wearing appropriate PPE
- Being in the patient-care area of an Ebola treatment unit

² Close contact is defined as being within approximately 3 feet (1 meter) of a person with Ebola while the person was symptomatic for a prolonged period of time **while not using appropriate PPE**.

- **No identifiable risk** includes any of the following:
 - Laboratory processing of Ebola-containing specimens in a Biosafety Level 4 facility
 - Any contact with a person who isn't showing symptoms of Ebola, even if the person had potential exposure to Ebola virus
 - Contact with a person with Ebola before the person developed symptoms
 - Any potential exposure to Ebola virus that occurred **more than 21 days previously**
 - Having been in a country with Ebola cases, but **without** widespread transmission, cases in urban settings with uncertain control measures, or former widespread transmission and now established control measures, and not having had any other exposures
 - Having stayed on or very close to an airplane or ship (for example, to inspect the outside of the ship or plane or to load or unload supplies) during the entire time that the airplane or ship was in a country with widespread transmission or a country with cases in urban settings with uncertain control measures, **and** having had no direct contact with anyone from the community
 - Having had laboratory-confirmed Ebola and subsequently been determined by public health authorities to no longer be infectious (i.e., Ebola survivors)

* Current country classifications can be found at

<http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/distribution-map.html>

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should IMMEDIATELY investigate all reports of Ebola. Investigations should include an interview of the case or a surrogate to get a detailed exposure history. There are extensive guidelines, forms, and information <http://www.cdc.gov/Ebola> to assist with Ebola investigations. The current case investigation form is available at <http://www.dshs.state.tx.us/idcu/investigation/>.

The likelihood of an Ebola diagnosis depends on the current global situation. A case in the United States is highly unlikely if there is no Ebola circulating in Africa, although laboratory exposures may occur at any time. Testing for Ebola virus by RT-PCR should generally be performed for patients who have symptoms consistent with Ebola virus disease and have had an exposure that puts them at risk. In addition, they should be evaluated for other possible febrile diseases including those that are common in areas where the patient traveled or resided (e.g., malaria, typhoid, influenza).

Case Investigation Checklist

- Isolate patient.
- Implement standard, contact, and droplet precautions.
- Utilize appropriate PPE (<http://www.cdc.gov/vhf/ebola/healthcare-us/ppe/guidance.html>)
- Work with hospital to assure adequate PPE training and supervision is in place. To protect healthcare workers during care of a patient with EVD, healthcare facilities must provide onsite management and oversight on the safe use of PPE and implement administrative and environmental controls with continuous safety checks through direct observation of healthcare workers during the PPE donning and doffing processes.
- Assess PUI's risk factors.

- Contact EAIDB for consultation on symptoms, risk factors, and preliminary lab findings to consider lab testing. EAIDB will coordinate the required consultation with CDC for test approval.
- Consider observation for progression of symptoms while testing and treating for alternative diagnosis such as malaria prior to testing.
- Arrange for testing of PUI as needed.
- Identify all close contacts of PUI during infectious period. Contact tracing should begin as soon as a person with risk factors presents for medical evaluation.
- A list should be kept of all persons who are in proximity of the patient at the health care facility including time, location, and type of contact.
- If positive for Ebola
 - Identify and prioritize Ebola contacts based on the exposure levels outlined above.
 - Arrange for symptom monitoring for 21 days for all contacts and possible quarantine of high risk contacts.
 - If patient traveled while possibly infectious, collect information about travel.
 - Consider a press release and/or a health alert.
 - Facilitate transfer to a specialized Ebola treatment center.
- If negative for Ebola and symptoms persist, consider testing travelers to endemic areas for Lassa fever and Marburg virus.

Control Measures

- Evaluate level of exposure of household members and pets to determine level of risk and whether they should be quarantined during the monitoring period.
- Arrange for environmental cleaning of the residence.
- Monitor Contacts - Asymptomatic individuals who have had a possible exposure to Ebola should be monitored so that they can be isolated if signs or symptoms occur; additional restrictions such as quarantine, do not board orders, or restriction letters may also be required, depending upon the type of exposure. For all high, some, and low risk contacts:
 - Make an initial contact to assess level of risk, give LHD contact information, establish an emergency plan for medical evaluation including transportation and medical facility, provide training as needed in use of thermometer and reporting procedures, and establish a reporting method.
 - Monitor for symptoms for 21 days after exposure.
 - For high risk contacts, symptom monitoring should be done twice daily in person by health department staff. For some risk contacts, monitoring should be done twice daily and some form of direct visualization should be utilized. For low risk contacts arrangements should be made to receive daily reports of twice daily self-monitoring results.
- In-person monitoring visits
 - Visit and monitor the contact at a pre-arranged location. Call the contact shortly prior to the in-person visit to ensure they will be at pre-determined location and inquire of their health (feverish, overall general health).
 - If the contact indicates they are experiencing signs or symptoms suggestive of EVD³, obtain a temperature reading over the phone.

³ Symptoms of EVD include fever, severe headache, muscle pain, weakness, diarrhea, vomiting, abdominal (stomach) pain, unexplained hemorrhage or bruising

- If the contact does not report a fever ($\geq 100^{\circ}\text{F}^4$), continue with the in-person check.
- If the contact reports a fever ($\geq 100^{\circ}\text{F}$), **do not** conduct an in-person visit. Make arrangements for enhanced frequency of monitoring or for a medical evaluation if needed.
- During in-person visits, avoid making physical contact with the person under surveillance. Attempt to maintain a distance of 3 feet.
- Inquire about any presence or absence of specific symptoms that are associated with EVD and observe whether or not they appear ill. Visually confirm the thermometer temperature reading.
- Although an in-person visit by a healthcare provider or public health personnel is preferred and recommended, the contact may also be observed via a video conferencing method such as Skype or FaceTime. If video conferencing will be utilized, thermometer reading must be visually confirmed.
- Arrange for medical evaluation as needed
 - When monitoring is initiated, identify an assessment hospital to utilize if needed and communicate with them to assure they are prepared. (<http://www.cdc.gov/vhf/ebola/healthcare-us/preparing/assessment-hospitals.html>).
 - Create a transport plan to utilize if the contact is unable to transport themselves to the medical facility.
 - If EMS has or will be contacted, assure that they are advised of the Ebola exposure history.
 - Communicate with the medical facility prior to arrival to arrange entry, isolation, and assure appropriate PPE and standard, contact, and droplet precautions are utilized.
- If a contact reports one or more symptoms (not including fever), inquire about possible explanations for the symptom. In addition, it is recommended that a physician or other medical provider conduct a follow-up call to confirm the underlying explanation for the symptom.
- If no alternative cause or diagnosis is provided for the reported symptom, arrange for a medical evaluation.
- If the contact exhibits symptoms indicative of EVD, the contact is now classified as a “Person Under Investigation” and therefore appropriate PPE is needed. Limit contact and consider the following PPE to minimize further exposure:
 - Gown (fluid resistant or impermeable)
 - Facemask
 - Eye protection (goggles or face shield)
 - Gloves
- Persons at high risk may need to be placed under quarantine to ensure no further transmission occurs.

Outreach Activities

- Coordinate with DSHS and your PIO (Public Information Office) to issue a health alert to all area providers, hospitals, and urgent care clinics.
 - Describe situation.
 - Provide instructions on PPE.

4 Texas Administrative Code definition of fever (Title 25, §97.1-15)

- List symptoms and risk factors to look for.
- Instruct on what to do if a PUI is identified.
- Contact all entities likely to have or that have had an exposure (e.g., if patient took bus while sick, or if contacts all attend church).
 - Describe situation.
 - Allay concerns.
 - List symptoms to look for and what to do if anyone with symptoms are identified.
 - Elicit additional contacts, if appropriate.
- Prepare media statements and FAQs.
- Have a 24/7 phone for providers to call
- Inform PD, EMS, 911, and anyone else that might called to care for PUIs.
 - Describe situation.
 - Provide instructions on PPE.
 - List symptoms and risk factors to look for.
 - Instruct on what to do if a PUI is identified.

Exclusion

Patients with Ebola will not be released from isolation until they are no longer considered infectious (symptom resolution and two negative PCR results).

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Any confirmed or clinically suspected cases of Ebola are required to be reported **immediately** to the local or regional health department or the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Branch (EAIDB) at **(800) 252-8239 or (512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- Call DSHS EAIDB immediately when an Ebola investigation is being conducted or considered. Enter all Ebola PUIs who are tested for Ebola in NBS regardless of whether they are confirmed or ruled out.
 - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
 - For positives, enter an investigation in NBS and create a notification the same day or, if lab test is completed after-hours, the next day.
 - In comments describe symptoms, risk factors, and test reason
 - A notification can be sent as soon as the lab testing is completed. Additional information from the investigation may be entered upon completing the investigation.

LABORATORY PROCEDURES

Testing for Ebola is only available at select laboratories in the US. The CDC, Texas DSHS, and some LRN laboratories offer Ebola PCR testing. Approval from an EAIDB epidemiologist and the CDC Emergency Operations Center are required BEFORE submitting specimens for testing. The unique CDC PUI number should be referenced on all communication related to the sample.

Specimen Collection

- Collect two purple top EDTA **plastic** tubes of blood with a minimum volume of 4 mLs each.
- Do not submit specimens in glass containers or in heparinized tubes.
- It is not necessary to separate and remove serum or plasma from the primary collection container.
- Write the patient's name and another identifier such as date of birth or social security number on the collection tube.
- Specimens should be immediately stored at 2-8°C or transported immediately.
- Specimens other than blood may be submitted upon consult with EAIDB.

Submission Form

- Use DSHS Laboratory G-27A form for specimen submission.
- Make sure the patient's name and date of birth or social security number match exactly what is written on the transport tubes.
- Fill in the date of collection, date of onset, and diagnosis/symptoms.
- Check the box for Other: and write Ebola.
- Write the unique CDC PUI number on the form. (This number is obtained during the EAIDB consult with CDC.)
- For DSHS lab, prior to shipment, fax a copy to 512-776-7431 Attn: Biothreat Team or send via secure email to dshsLRN@dshs.state.tx.us.
- Include a copy with the specimen.

Specimen Shipping

- The DSHS lab will NOT accept specimens for Ebola testing that are not pre-approved. You must contact EAIDB prior to submission. It will be determined at that time whether a specimen needs to be sent directly to CDC simultaneously or whether the LRN laboratory will send one.
- The testing lab must be contacted prior to shipment to arrange receipt and testing of specimen. For the DSHS lab, call the Biothreat team's 24/7 number, 512-689-5537.
- Regions should provide coordination for testing at other LRN laboratories as needed.
- Transport temperature: Keep at 2° - 8° C
- Do not ship any other specimens with Ebola specimens.
- Ship specimens via overnight delivery on cold packs. Couriers are strongly recommended for submission to the DSHS lab. EAIDB can help arrange courier transportation if necessary.
- For the DSHS Laboratory, ship specimens to:
Laboratory Services Section, MC-1947
Texas Department of State Health Services
Attn. Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

- The following must be provided to the laboratory by phone or email (DSHS Biothreat team at 512-689-5537 or dshsLRN@dshs.state.tx.us):
 - Method of delivery
 - Estimated time of arrival
 - Tracking number for the package or courier phone number

Causes for Rejection:

- **Testing not approved by EAIDB and CDC**
- Missing or discrepant information on form/specimen.

UPDATES

- Updated time period of the detection of Ebola virus in semen under Basic Epidemiology
- Edited Confirmed and removed Probable from Case Classification
- Updated High, Some, and Low risk and added No identifiable risk in Exposure Risk Levels
- Edited CDC link under Definitions