Ebola Virus Disease

BASIC EPIDEMIOLOGY

Infectious Agent
The infectious agent is Ebolavirus, in the family filoviridae. There are six identified Ebola virus species, four of which cause disease in humans: Zaire, Sudan, Taï Forest, and Bundibugyo. Reston can cause disease in non-human primates and pigs, and it is unknown if Bombali can cause disease in humans.

Transmission
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 Ebola can spread to others, including 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, breastmilk, 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. It is also not typically spread by water or food except through handling or consumption of contaminated 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 postmortem remains of people that have passed away while sick with Ebola are considered infectious and are a common source of infection in outbreaks. Ebola virus has been detected in some body fluids of Ebola virus disease (EVD) survivors. Ebola virus genetic material has been detected in semen up to several years after illness, and abstinence or condom use is recommended unless semen is PCR negative on two consecutive tests. Ebola virus has been detected in breast milk, and it is best for a mother who has recently survived EVD not to breastfeed if she has other safe ways to feed her baby. Where available, testing of breastmilk for the presence of Ebola virus genetic material can help to guide decisions about when breastfeeding can be safely resumed.

Clinical Illness
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 the quality and timing of 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

Laboratory Confirmation

- RT-PCR for Ebola virus from blood or tissues, **OR**
- Ebola virus isolation in culture from blood or tissues, **OR**
- Ebola virus antigen-capture ELISA, **OR**
- Detection of Ebola virus antigen in tissues by Immunohistochemistry

Clinical Criteria

An illness with acute onset with **ALL** of the following clinical findings:

- A fever ≥100°F
- One or more of the following clinical features:
  - Severe headache
  - Muscle pain
  - Fatigue
  - Erythematous maculopapular rash on the trunk with fine desquamation 3–4 days after rash onset
  - Vomiting
  - Diarrhea
  - Abdominal pain
  - Bleeding not related to injury
  - Thrombocytopenia

Case Classifications

- **Confirmed**: A person that meets laboratory criteria
- Suspect (clinical case definition or Person Under Investigation (PUI)): A person that meets clinical criteria **AND** one or more of the following epidemiologic risk factors within 21 days before onset of symptoms:
  - Direct contact with blood or other body fluids of a person who is sick with or has died from EVD, **OR**
  - Direct contact with objects (such as needles and syringes) contaminated with body fluids from a person sick with EVD or the body of a person who died from EVD, **OR**
  - Work in a laboratory that handles, or direct contact with primates or bats from an Ebola virus endemic area or area with active transmission, **OR**
  - Sexual exposure to semen of a confirmed acute or clinically recovered case of EVD, or exposure to breast-milk of an individual who had EVD, **OR**
  - Work in a laboratory that handles EVD specimens, **OR**
  - Residence in - or travel to - an EVD endemic area or area of active transmission .

Exposure Risk Levels

Exposure risk levels can be found in the Texas Department of State Health Services Ebola Monitoring Guidance.

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. Guidelines, forms, and other sources of information are available through http:/www.cdc.gov/Ebola to assist with Ebola investigations. The current case investigation form is available at http://www.dshs.texas.gov/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 are no current Ebola outbreak occurring, although laboratory exposures may occur at any time. Monitoring of all travelers returning from an Ebola outbreak area should occur for 21 days following the date of departure, and the level of monitoring will depend on

risk exposures identified during their risk assessment. Contact EAIDU for traveler monitoring guidance, and review CDC guidance at: https://www.cdc.gov/quarantine/interim-guidance-risk-assessment-ebola.html

Testing for Ebola virus by RT-PCR should only be performed for patients with symptoms consistent with EVD and who have an epidemiologic risk factor or exposure that puts them at risk. Additionally, they should be evaluated for other possible febrile illnesses, including those that are common in areas where the patient traveled or resided (e.g., malaria, typhoid, influenza, dengue, etc.).

Case Investigation Checklist

- ☐ Isolate patient in a single patient room containing a private bathroom with the door closed.
- ☐ Implement standard, contact, and droplet precautions.
- ☐ Utilize appropriate PPE (http://www.cdc.gov/vhf/ebola/healthcare-us/ppe/guidance.html)
- ☐ Work with the 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 Person Under Investigation's (PUI's) epidemiological risk factors.
- ☐ Contact EAIDU for consultation on symptoms, epidemiological risk factors, and preliminary lab findings to consider lab testing for Ebola virus. EAIDU will coordinate the required consultation with CDC for test approval.
- ☐ Consider observation for progression of symptoms while testing and treating for alternative diagnoses, 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 epidemiological risk factors and EVD symptoms 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 risk levels, which can be found in the Texas Department of State Health Services Monitoring Guidance.
    - 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. This information may need to be relayed to CDC.
    - 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, Marburg virus, other viral hemorrhagic fevers, or other infectious diseases consistent with the patient's symptoms.

Control Measures

- ☐ Evaluate level of exposure of household members to exposure risk level and whether they should be quarantined during the 21-day monitoring period.
- ☐ Arrange for environmental cleaning of the residence. (https://www.cdc.gov/vhf/ebola/prevention/cleaning-us-homes.html)
- ☐ 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. Local EMS should be notified of anyone that is being monitored. For all high, some, and low risk contacts:

- Follow up with all contacts and determine exposure risk level. Provide contact information for LHD to individual, 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 exposure risk level contacts, symptom monitoring should be performed in-person (direct active monitoring) twice daily by health department staff. Persons at high exposure risk may need to be placed under quarantine. For some and low exposure risk level contacts, monitoring guidance will be provided at the time of the incident.

- In-person monitoring visits

  This section provides guidance for in-person monitoring. Guidance for other types of monitoring and frequency of monitoring will be provided at the time of the incident.
  - 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 EVD[1], obtain a temperature reading over the phone.
  - If the contact does not report a fever (≥ 100°F[2]), continue with the in-person check.
  - If the contact reports a fever (≥ 100°F), **do not** conduct an in-person visit. Arrange 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 at least 3 feet.
  - Inquire about any presence or absence of specific symptoms that are associated with EVD and observe whether they appear ill. Visually confirm the thermometer temperature reading, but do not handle or touch the thermometer.
  - 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 HIPAA-approved video conferencing platform. 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. For hospital guidance, please see CDC's website.

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

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

- Create a transport plan to utilize if the contact is unable to transport themselves to the medical facility.
- Ensure that EMS has been informed of the contact that is being monitored for Ebola.
- Communicate with the medical facility prior to arrival to arrange entry, isolation, and ensure 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 consultation/evaluation.
- If the contact exhibits symptoms indicative of EVD, the contact is now classified as a "Person Under Investigation" Do not enter the contact's home. Call your local health authority. Appropriate PPE is now needed. Limit contact. If contact is necessary, consider the following:
  - For PUIs who are clinically stable and do not have bleeding, vomiting, and diarrhea, AND will not require invasive or aerosol-generating procedures (e.g., intubation, suctioning, active resuscitation), use (at a minimum):
    - Single-use (disposable) fluid-resistant gown that extends to at least mid-calf or single-use (disposable) fluid-resistant coveralls without integrated hood
    - Single-use (disposable) full face shield
    - Single-use (disposable) facemask
    - Single-use (disposable) gloves with extended cuffs. Two pairs of gloves should be worn. At a minimum, outer gloves should have extended cuffs.
  - For patients who are exhibiting obvious bleeding, vomiting, and diarrhea, OR are not clinically stable, OR will require invasive or aerosol-generating procedures (e.g., intubation, suctioning, active resuscitation), OR are a confirmed Ebola patient, use:
    - Impermeable gown or coverall
    - Respiratory and eye protection (either a PAPR or a disposable, NIOSH-certified N- 95 respirator in combination with a single-use surgical hood extending to shoulders and single-use full face shield)
    - Single-use examination gloves with extended cuffs
    - Single-use boot covers
    - Single-use apron
  - References: https://www.cdc.gov/vhf/ebola/healthcare-us/ppe/guidance-clinically-stable-puis.html, https://www.cdc.gov/vhf/ebola/healthcare-us/ppe/guidance.html

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 the use of PPE.
  - 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 the police department, EMS, 911, and anyone else who might be called upon to interact or 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 (3 days without symptoms, ability to perform activities of daily living, and one negative PCR result 72 hours or more after symptom onset).

If Ebola testing is performed, a PUI may be released from isolation if a specimen collected 72 hours or more after symptom onset is PCR negative. If Ebola testing is not performed, a PUI may be released from isolation, in certain circumstances, after consultation with public health.

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 Unit (EAIDU) **at (512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Call DSHS EAIDU immediately when an Ebola investigation is being conducted or considered.
- Enter the case into NBS and submit an NBS notification on all **confirmed** and **suspect** cases.
  - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
  - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
  - For positives, enter an investigation in NBS and create a notification the same day or, iflab 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 Austin LRN-B, and 5 regional LRN-B laboratories (Lubbock, San Antonio, Dallas, Tyler, Houston) offer Ebola PCR testing. Approval from an EAIDU epidemiologist and the CDC are required BEFORE submitting specimens for testing. https://www.dshs.texas.gov/lab/eprLRNcontact.shtm

Specimen Collection

- Collect two purple top EDTA **plastic** tubes of blood with a minimum volume of 4 ml 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 EAIDU.

Submission Form

The submission form information and instructions included here are specific for the DSHS laboratory in Austin. Each LRN laboratory may have their own submission form and instructions, so request this information from the laboratory to which you are sending specimens.

- 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.
- For DSHS lab, prior to shipment, fax a copy to (512) 776-7431 Attn: BioThreat Team or send via secure email to dshsLRN@dshs.texas.gov
- 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 EAIDU 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 2º - 8º 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. EAIDU 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: BioThreat Team (512) 689-5537 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.texas.gov):
  - Method of delivery
  - Estimated time of arrival
  - Tracking number for the package or courier phone number

Causes for Rejection:

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

REVISION HISTORY

December 2021

- Edited Basic Epidemiology and Definitions

March 2021

- Edited All Sections