Ebola

Investigative Guidelines
April 7, 2021

Note: For evaluation of symptomatic persons under monitoring for Ebola, see Interim Monitoring Guidance for Local Public Health Authorities at:
www.oregon.gov/oha/PH/DISEASESCONDITIONS/DISEASESAZ/Documents/Ebola-InterimMonitoringGuidanceLPHA.pdf

For evaluation of a person with symptoms of viral hemorrhagic fever in the absence of a known Ebola outbreak or Ebola exposure, see Investigative Guidelines for Viral Hemorrhagic Fever at
www.oregon.gov/oha/PH/DISEASESCONDITIONS/COMMUNICABLEDISEASE/REPORTINGCOMMUNICABLEDISEASE/REPORTINGGUIDELINES/Documents/vhf.pdf

REPORT SUSPECTED CASES OF EBOLA VIRUS DISEASE IMMEDIATELY TO ACDP

1. DISEASE REPORTING

1.1 Purpose of Surveillance and Reporting

- To identify cases as early as possible to prevent transmission to others and improve health outcomes.
- To determine risk factors for spread of Ebola.

1.2 Laboratory and Physician Reporting Requirements

Laboratories and healthcare providers are required to report known or suspected cases of Ebola virus disease immediately (day or night) to the local public health authority (LPHA). If they cannot reach the LPHA promptly, they should call the Acute and Communicable Disease Prevention Section (ACDP) at 971-673-1111.

Laboratories and healthcare providers will be expected to work with ACDP and the Oregon State Public Health Laboratory (OSPHL) to complete the required paperwork and submit specimens for testing. The OSPHL can provide guidance about transporting specimens. (See §3.4.)

1.3 Local Public Health Authority (LPHA) Reporting and Follow-Up Responsibilities

1. Report all suspect (i.e., Person Under Investigation [PUI]) or confirmed cases of Ebola immediately to ACDP.

2. Begin investigation immediately. Enter case in Orpheus as “Ebola;” use the viral hemorrhagic fever case report form for case interview.

3. Consult with ACDP about patient isolation, protection of contacts (including healthcare personnel), public health response, testing, enhanced surveillance, contact investigation, and monitoring.

4. Educate and consult with local providers and facilities to promote compliance with isolation and infection control procedures in the care of case patients.

5. Notify ACDP immediately upon any anticipated transfer of the patient.

6. Ensure that all potentially exposed contacts are identified, contacted and educated, then monitored for 21 days after their last exposure to the case. See §5.0.

7. Enter details of the investigation and contact follow-up into Orpheus. Make sure to upload the interview form as an attachment and fill in all yellow boxes.

8. Consult with ACDP before closing case and contact investigation for each case.

1.4 State Public Health Division Responsibilities

1. Consult with LPHA, Tribal, and private sector health professionals concerning:

- isolation of cases and potential cases;
- protection of healthcare personnel;
- diagnostic evaluation and testing;
- required reporting and surveillance activities;
- contact identification and follow-up

2. Track inter-jurisdictional cases and contacts who move out of the county or State of Oregon jurisdiction.

3. Develop and maintain adequate information systems to provide needed case and contact surveillance; ensure adequacy of response activities.

4. Provide surge capacity if the Ebola outbreak and contact investigation overwhelm the resources of the LPHA.

5. Arrange consultation with infectious disease specialists and CDC as needed.

2. THE DISEASE AND ITS EPIDEMIOLOGY

2.1 Etiologic Agent

Ebola virus disease may or may not manifest as hemorrhagic fever. It is a rare and deadly infection of humans and nonhuman primates (monkeys, gorillas, and chimpanzees).

Ebola virus is a single-stranded RNA virus of the family *Filoviridae*, genus *Ebolavirus*. Six Ebola virus species have been identified. Four are known to cause disease in humans: Ebola virus (Zaire ebolavirus); Sudan virus; Taï Forest virus; and Bundibugyo virus. Reston virus has caused disease in non-human primates, but infected humans have been asymptomatic. Bombali virus has been found in bats but has not been associated with human illness.

2.2 Description of Illness

Though signs and symptoms vary, Ebola is usually characterized by abrupt onset of **fever, headache, myalgia and fatigue**. These early symptoms are not specific to Ebola, or fever may be absent in the presence of other symptoms (~15% in one study), leading to missed diagnosis of Ebola on initial presentation. The duration of illness can range from a few days to a couple of weeks. As the disease progresses, patients may develop profuse diarrhea, vomiting, petechiae, bruising, shock, and multi-organ dysfunction. Encephalopathy, hepatitis, tremors, and reduced white blood cell and platelet counts are common. Renal failure may occur. Mortality rates for Ebola have varied in different outbreaks but can be as high as 90%. Of eleven Ebola patients cared for in the U.S. during the 2014-2016 epidemic in West Africa, two (18%) died.

The differential diagnosis includes a variety of viral and bacterial diseases, including tropical infections: malaria, other viral hemorrhagic fevers (e.g., Lassa), typhoid, dengue, influenza, hepatitis, staphylococcal or other bacterial sepsis, toxic shock syndrome, rubella, and measles, among others. Non-infectious diseases that present with bleeding also must be excluded (e.g., hemolytic uremic syndrome, leukemia).

There is evidence for asymptomatic infection accompanied by low viral levels (detectable only in monocytes) and the development of Ebola-specific antibodies.

2.3 Reservoirs

The natural reservoir of Ebola virus remains unknown. However, researchers believe that the virus is animal-borne and that African fruit bats are the most likely reservoir. Humans, monkeys, apes, and duikers (a type of small antelope) are known to have been infected with the virus but are not considered reservoirs because mortality is high.

2.4 Sources and Routes of Transmission

Several outbreaks have been attributed to consumption of meat from an infected animal. Transmission of Ebola virus from person to person can result from direct contact with blood or other body fluids (including but not limited to urine, saliva, sweat, feces, vomitus, breast milk and semen) from infected persons or grossly contaminated fomites. Medical equipment that has not been properly cleaned or sterilized has been responsible for the spread of Ebola (notably, re-used hypodermic syringes). Rarely, laboratory workers have been infected through handling of specimens. Although a handful of studies have shown infection of animals via aerosols created in the laboratory, airborne transmission between persons has never been documented. Sexual transmission is also possible from some males who retain virus in their semen after recovery from infection. One study found that 9% of convalescent men tested positive for Ebolavirus in semen by PCR. Severe clinical presentation was associated with higher likelihood of persistence as was age $\geq$40 years. In two studies, persistence at one year ranged from 6% to 63%. To prevent sexual transmission, WHO recommends that males who have recovered from Ebola virus disease refrain from unprotected sex until after they have had two consecutive negative tests of semen for Ebola. If testing is not available, they are recommended to avoid unprotected sex for at least one year after onset of illness.

2.5 Incubation Period

2–21 days, with an average of 8–10 days.

2.6 Period of Communicability or Infectious Period

Ebola virus is not detectable in the serum of patients before onset of illness, and no Ebola infection has been reported in persons who had contact with a case only during the incubation period (that is, before onset of fever or symptoms). Viral load and risk for transmission appear to be greatest during the later stages of illness. Contaminated bedding, clothing and medical equipment may remain infectious for several days. In contrast to its virulence, Ebola is not highly transmissible; in the absence of efforts to prevent spread, one case is estimated to lead to between 1.5 and 2.5 additional cases.

2.7 Epidemiology

Because the natural reservoir host of Ebola is unknown, the manner by which the virus first appears in a human at the start of an outbreak is often unknown. However, researchers believe that the first patient frequently becomes infected through contact with an infected animal (e.g., by eating bush meat). It is also possible for Ebola outbreaks to result from sexual transmission of virus from a male who had previously recovered from Ebola. Outbreaks are sustained by person-to-person spread.

The 2014-16 outbreak in West Africa was the largest ever, perhaps because transmission was not limited to isolated, rural areas as has been typical in the past. Urban transmission, occurring in larger populations and higher densities, sustained the outbreak and strained surveillance and healthcare infrastructure.

In the U.S., healthcare personnel caring for Ebola patients will probably be at highest risk compared to the general population.

2.8 Treatment

There are currently two treatments approved by the U.S. Food and Drug Administration (FDA) to treat Ebola infection caused by the *Zaire ebolavirus*, Inmazeb and Ebanga. Both are monoclonal antibodies. It is not yet known if these medicines are effective in treating infections caused by Ebola species other than *Zaire ebolavirus*.

Treatment is otherwise supportive. The following basic interventions, when used early, can significantly improve the chances of survival:

- Provision of oral or intravenous (IV) fluids and electrolytes to replenish losses.
- Maintenance of oxygenation and blood pressure.
- Treatment of other infections that may occur.

3. CASE DEFINITIONS, DIAGNOSIS AND LABORATORY SERVICES

3.1 Confirmed Case Definition

Confirmed Case: A person with acute onset of fever >40°C and one or more of the following: headache, muscle pain, vomiting, diarrhea, abdominal pain, bleeding not related to injury, or low platelet count, with evidence of Ebola virus infection based on

testing (most likely Polymerase Chain Reaction (PCR)) at a CDC-certified public health laboratory. (Other possible confirmatory tests include ELISA antigen detection, viral isolation, and detection of Ebola antigens in tissues by immuno-histochemistry.)

3.2 Suspect Case Definition

Suspect Case (a.k.a. PUI): A person without confirmatory laboratory evidence but with both consistent symptoms and risk factors as follows:

- Clinical criteria: fever ≥38°C (100.4°F) (or subjective fever), with severe headache, muscle pain, vomiting, diarrhea, abdominal pain, or unexplained hemorrhage; AND
- Epidemiologic risk factors during the 21 days before symptom onset:
  - Percutaneous or mucous membrane contact with blood or body fluids of a known or suspected Ebola patient. (**High risk**)
  - Direct contact with, or exposure to blood or other body fluids of a person with known or suspected Ebola (**High risk**)
  - Providing health care to a patient with known or suspected Ebola in an Ebola assessment or treatment hospital, a laboratory processing blood or body fluids of Ebola patients, or otherwise taking care of such a patient without appropriate PPE or standard biosafety precautions. (**High risk**)
  - Direct contact with or the occurrence of a breach in infection control precautions while handling the body of a person who is known or suspected to have died from Ebola, who died of an unknown cause after potential exposure to Ebola, or others who died in an Ebola outbreak area.* (**High risk**)
  - Household or other direct contact with an ill Ebola patient. (**High risk**)
  - Being within 3 feet of an Ebola patient for a prolonged period of time while not wearing recommended PPE.
  - Healthcare worker who touched and cared for an ill Ebola patient or body fluids from such a patient while using appropriate PPE.
  - Handling the body (while using appropriate infection prevention precautions) of a person who is known or suspected to have died from Ebola, who died of an unknown cause after potential exposure to Ebola, or others who died in an Ebola outbreak area.*
  - Residence in — or travel to or within — an area where Ebola transmission is active;* OR,
  - Direct handling or consumption of bats or non-human primates from disease-endemic areas.

3.3 Persons Under Monitoring (PUM)

An *asymptomatic* person with possible Ebola exposure, undergoing 21 days of monitoring, along with travel and work restrictions if applicable. (See pg. 2, *Working with People Who Are Monitoring for Ebola,* in Ebola*: Interim Monitoring Guidance for LPHAs*.)

* See https://wwwnc.cdc.gov/travel/notices for current list.

N.B. Use the *Oregon Ebola Algorithm: Evaluating Inquiries* to help determine case status and risk stratification. (See pg. 16, Ebola: *Interim Monitoring Guidance for LPHAs* referenced above.)

3.4 Services Available at the Oregon State Public Health Laboratory (OSPHL).

All Ebola virus testing at OSPHL must be pre-approved by the ACDP on-call epidemiologist. The OSPHL, in coordination with ACDP, will assist healthcare facilities to arrange testing.

OSPHL performs real-time reverse transcriptase polymerase chain reaction (rRT-PCR) testing for Ebola virus. Two specimens should be collected. One specimen will be tested at OSPHL and the second forwarded to CDC. Each specimen must be accompanied by a completed Virology/Immunology Test Request form, available at www.bitly.com/phl-forms. Complete specimen collection, handling, and transport details can be found on the OSPHL Lab Test Menu at www.healthoregon.org/labtests.

Specimens should be collected using appropriate precautions and personal protective equipment. CDC has provided Guidance for Collection, Transport and Submission of Specimens for Ebola Virus Testing.

4. CASE INVESTIGATION

Any potential case of Ebola is a special situation requiring close collaboration between ACDP and LPHA. Call ACDP as soon as possible at (971) 673-1111.

4.1 Isolation and Initial Evaluation of Suspected Case of Ebola: First responder responsibilities

If called about a suspected Ebola case, recommend that the following be done immediately. In the unlikely event that this person is not already known to public health as a PUM, collect

- demographic information,
- contact info, including phone numbers, e-mail etc. for any family members or close friends who are with the patient,
- clinical data, including date of symptom onset and relevant symptoms,
- travel history in the 21 days prior to symptom onset, with travel dates and airlines, if available,
- potential exposures to Ebola, as outlined in §3.2 above.

For PUMs, who are already known to the public health system:

- contact the LPHA for the predetermined medical health plan
- follow the medical plan as appropriate

If patient is in a healthcare setting:

- isolate the patient in a separate room with a private bathroom and close the door (unless the patient's condition requires ongoing monitoring). If the patient is in an emergency department with an "open" patient area, place the person in a bay, and close the curtains. If a clinic, isolate the patient in an exam room.
- contact the hospital infection preventionist or clinic manager and activate the Ebola preparedness plan.

If patient is in a home or community setting:

- Isolate the patient in a room by himself or herself with the door closed as much as possible. Family and friends should avoid direct contact with the ill person and should not share the same bathroom.
- LPHA to arrange evaluation of the patient to determine if Ebola is in the differential and if transport to a hospital is indicated. Consider the health officer or EMS medical director as possible options for medical evaluation.
- Guidance for medical professional who will evaluate patient: Before approaching the patient, don standard, contact, and droplet PPE (face shield, impermeable gown, double gloves, and surgical mask; a fit-tested respirator or powered air-purifying respirator may be substituted for the surgical mask). At a distance of ≥6 feet, query the patient or proxy to confirm whether or not the patient has symptoms consistent with Ebola and risk factors for it, using Ebola Algorithm: Evaluating Inquiries (See pg. 16, Ebola: *Interim Monitoring Guidance for LPHAs*).

If, based on assessment, the person meets criteria as a Person Under Investigation.

- Determine if the patient requires immediate life-saving care. If so, contact local Emergency Medical Services to arrange prompt in-the-field resuscitation using appropriate PPE, and transport to the nearest facility that can provide the services required to stabilize the patient. Contact ACDP as soon as possible to coordinate further assessment, testing and care.
- If the person does not require immediate, life-saving care:
  - Work with ACDP, healthcare facilities in your area, and Legacy Good Samaritan Bio-containment Unit to begin preparations for in-patient assessment and care.
  - Contact an emergency medical services agency that has trained for and agreed to handle transport of suspect Ebola patients. If there is no EMS agency in your area that handles transport, work with ACDP to arrange safe, timely transport to the healthcare facility that will perform the assessment.

4.2 Contact Tracing

Identify all potentially exposed persons (people who had direct contact with the ill patient or his or her body fluids, since symptom onset) for subsequent monitoring.

- Document all activities of the case patient between onset of symptoms and discharge from the hospital. This may be difficult if the case patient has died or is unresponsive. Interview the case, next of kin, and friends or others you can identify who have had recent contact. Document any travel during the time the case patient

was symptomatic, as well as congregate activities likely to result in direct contact, and close contacts identified. If you talk to a case-patient in person, wear appropriate PPE. See §5.4.

- Document all household members, others with whom case has had mucous membrane, blood (e.g., via needle-sharing), sexual, other body-fluid-associated or prolonged face-to-face contact; and all healthcare personnel who have cared for the patient.
- Identify and document any laboratory workers who have handled the specimens without appropriate PPE or laboratory biosafety precautions.

Interview each contact using the PUM interview questionnaire and use the *Contacts* Tab in Orpheus to record essential information about all above-identified contacts. The PUM questionnaire is available in Ebola: *Interim Monitoring Guidance for Local* Public Health Authorities. Record the case in Orpheus – Disease: "Ebola". Document primary physician and referral hospital as well as emergency or alternate contact information.

4.3 Completion of Case Report Form

Use the Viral Hemorrhagic Fever Case Report Form to collect needed clinical information.

When completed, upload this document to Orpheus and notify the ACDP Epi on-call that this has been done.

5. CONTROLLING FURTHER SPREAD

5.1 Monitoring of Potentially Exposed Persons

To establish monitoring for the people you have identified as contacts of the suspect or confirmed Ebola case patient, follow the procedures outlined in *Interim Monitoring Guidance for Local Health Departments*.

5.2 Isolation of Ebola Patient

Those with Ebola are considered infectious throughout their symptomatic illness, although viral loads appear to be lower during the first day or two of illness, then typically increase by day 8 or 9. Confirmed and suspect Ebola cases must be isolated throughout their clinical course, and all persons caring for them must observe strict infection prevention precautions. (See §5.4.) Patients with confirmed Ebola should wear a respiratory mask and body suit when transported.

Virus has been found in semen a year or more after onset of Ebola disease. Males who have recovered from Ebola are advised to refrain from unprotected sexual activity until two consecutive semen tests are negative.

5.3 Vaccines and Antiviral Prophylaxis

Ervebo is an FDA-licensed vaccine against *Zaire Ebolavirus*. ACIP recommends pre-exposure vaccination for adults aged ≥18 years who are at high risk for occupational exposure to Ebola species *Zaire* because they are responding to an Ebola outbreak, providing direct care at federally designated Ebola treatment centers in the U.S., or

working as laboratorians or other staff at biosafety level 4 facilities in the United States. Recommendations for use of Ervebo in other settings will be considered by ACIP in the future. The vaccine is also used in outbreak response to vaccinate a "ring" of close contacts to an identified case, as well as the contacts of each identified contact. There is no medication currently licensed for antiviral prophylaxis.

5.4 Environmental Measures and Infection Control

For most current infection control recommendations, see:
www.cdc.gov/vhf/ebola.healthcare-us/hospitals/infection-control.html

Personal Protective Barrier Precaution: Healthcare professionals are at risk for Ebola from accidental percutaneous and mucous membrane exposures to blood and body fluids. Rigorous attention to protocol for donning and doffing recommended personal protective equipment (PPE) is of paramount importance. See current CDC recommendations regarding selection and use of PPE for Ebola patients at *www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html*. Briefly:

- Make sure that hospital staff are trained and have been tested in the appropriate donning, doffing and use of currently recommended PPE prior to caring for suspected or confirmed Ebola patients.
- Institute 2-on-1 patient care buddy system having a trained healthcare professional observe the caregiver, using a checklist, to ensure both adequate care and personal protection in the patient room.
- Use N-95 (or better) respiratory protection with face shield, or powered air-purifying respirator (PAPR), whichever staff are trained and comfortable using.
- Make sure all skin is covered before entry into patient room.
- Frequently disinfect gloves during care; decontaminate at each step of doffing

6. MANAGING SPECIAL SITUATIONS

Domestic animal exposure. Dogs should be quarantined at home for 21 days. If not feasible, send the dog(s) to animal services with a specific isolation set up. The USDA can provide trailer transportation to the quarantine facility. Serological testing may be done. Animal will be confined. Consult with ACDP's State public health veterinarian for specific recommendations. Cats, birds, fish, and reptiles do not appear to be at any risk. Pet chimpanzees, monkeys, etc. are another matter, and should be euthanized or quarantined.

Mortuary and Burial Services. Contact with bodies of deceased Ebola patients poses a high risk for transmission. For recommendations regarding the handling of bodies of deceased Ebola patients, see *www.cdc.gov/vhf/ebola/healthcare-us/hospitals/handling-human-remains.html*.

7. RESOURCES

Additional resources regarding Ebola recognition, diagnosis, and management can be found at:
www.cdc.gov/vhf/ebola.

8. REFERENCES

1. CDC. Ebola virus disease: Clinician Resources: https://www.cdc.gov/vhf/ebola/clinicians/index.html
2. World Health Organization. Ebola Virus Disease. https://www.who.int/news-room/fact-sheets/detail/ebola-virus-disease
3. CDC. Use of Ebola vaccine: Recommendations of the ACIP, U.S., 2020 https://www.cdc.gov/mmwr/volumes/70/rr/rr7001a1.htm
4. World Health Organization. Ebola vaccines. https://www.who.int/westernpacific/news/q-a-detail/ebola-vaccines

UPDATE LOG

April 2021: Updated to reflect current CDC guidance. Updated links, references, and info on sexual transmission. Lab section updated to reflect availability of Ebola testing at OSPHL. Treatment and vaccine info added. Minor edits for clarity (Leman).

May 2019: Put in new Word Template (Byster).

2015: Updated to reflect current CDC guidance and Oregon Public Health Division planning regarding evaluation, transport, and assessment of suspect Ebola patients. (Leman, Fisher)

2014: Created; adapted from Viral Hemorrhagic Fever (Fisher, Cieslak, Buser)