

Ebola Haemorrhagic Fever*

Created Dates

Case Definition	August 2014
Reporting Requirements	August 2014
Remainder of the Guideline (i.e., Etiology to References sections inclusive)	August 2014

Case Definition

Confirmed Case

Laboratory confirmation of Ebola virus infection using at least one of the methods below:^[1]

- Isolation and identification of virus from an appropriate clinical specimen (blood, serum, tissue, urine specimens or throat secretions)
- OR**
- Detection of virus-specific RNA by reverse-transcriptase PCR from an appropriate clinical specimen (e.g. blood, serum, tissue) using two independent targets or two independent samples
- OR**
- Demonstration of virus antigen in tissue (e.g. skin, liver or spleen) by immunohistochemical or immunofluorescent techniques AND another test e.g. PCR
- OR**
- Demonstration of specific IgM AND IgG antibody by EIA, immunofluorescent assay or Western Blot
- OR**
- Demonstration of a fourfold rise in IgG serum antibody by EIA, immunofluorescent assay or Western Blot from serial samples

Probable Case

Clinical illness^[2] with at least one of the following high-risk⁽¹⁾ exposures within the 21 days before the onset of symptoms:

- Percutaneous or mucous membrane exposure or direct skin contact with body fluids of a person with a confirmed or probable case of EVD without appropriate personal protective equipment
- OR**
- Laboratory processing of body fluids of probable or confirmed EVD cases without appropriate PPE or standard biosafety precautions
- OR**
- Participation in funeral rites or other direct exposure to human remains in the geographic area where the outbreak is occurring without appropriate PPE.

Suspect Case (Person Under Investigation)

A person with clinical illness^[2] not attributed to another medical condition AND at least one of the following epidemiologic risk factors within the 21 days before the onset of symptoms:

- Residence in or travel to an area where EVD transmission is active,
- Healthcare workers (HCWs)^[3] / personnel who have spent time in a setting where EVD patients are being assessed or cared for in an EVD-affected area who wore appropriate personal protective equipment (PPE) and adhered to appropriate infection prevention and control (IPC) measures (and with no known safety breaches),
- Other patients and visitors who spent time in a healthcare facility where EVD patients are being treated,
- Household members of an EVD patient without high-risk exposures as defined below,
- Laboratory processing of body fluids of probable or confirmed EVD cases with appropriate PPE or standard biosafety precautions and no safety breaches,
- Participation in funeral rites or other direct exposure to human remains in the geographic area where the outbreak is occurring with appropriate PPE and no safety breaches, or
- Persons who had direct unprotected contact with bats or primates from EVD-affected country.

^[1] Any testing related to suspected VHF should be carried out under level 4 containment facilities (NML) due to issues of security, expertise and personnel vaccination. Contact the Public Health Agency of Canada immediately using the 24-hour emergency line (1-800-545-7661), even in the event of a suspected case, in order to activate the ERAP program.

^[2] Clinical illness: an individual presenting with fever of greater than 38.6 degrees Celsius **AND** at least one of the following additional symptoms:

- malaise
- myalgia
- severe headache
- conjunctival injection
- pharyngitis
- abdominal pain
- vomiting, and
- diarrhoea that can be bloody
- bleeding not related to injury
- unexplained haemorrhage
- erythematous maculopapular rash on the trunk

^[3] Healthcare workers: defined as individuals who provide health care or support services, such as nurses, physicians, dentists, nurse practitioners, paramedics, some emergency first responders, allied health professionals, unregulated healthcare providers, clinical instructors and students, volunteers and housekeeping staff; have varying degrees of responsibility related to the health care they provide, depending on their level of education and their specific job/responsibilities.

* Denotes potential bioterrorism agent.

Reporting Requirements

1. Physicians

Physicians shall notify the Medical Officer of Health (MOH) (or designate) of all confirmed, probable and suspect cases by the fastest means possible (FMP) i.e., direct voice communication.

2. Laboratories

All laboratories, e.g., the National Microbiology Laboratory (NML) and the Provincial Laboratory for Public Health (ProvLab), shall report all positive laboratory results by FMP to the:

- Chief Medical Officer of health (CMOH) (or designate),
- MOH (or designate) and
- Attending/ordering physician.

3. Alberta Health Services and First Nations and Inuit Health Branch (FNIHB)

- The MOH (or designate) of the zone where the case currently resides shall notify the CMOH (or designate) of all confirmed, probable and suspect cases by the fastest means possible (FMP) i.e., direct voice communication.
- For in-zone Alberta resident cases:
 - The MOH (or designate) of the zone where the case currently resides shall forward the preliminary Public Health Agency of Canada's *Ebola Case Report Form* of all confirmed and probable and suspect cases to the CMOH (or designate) immediately upon notification.
 - Updated forms should be sent in to the CMOH (or designate) when more information becomes available.
 - The MOH (or designate) of the zone where the case currently resides shall forward the preliminary *Notifiable Disease Report* (NDR) all confirmed and probable cases to the CMOH (or designate) within one week of notification and the final NDR (amendment) within two weeks of notification.
- For out-of-zone Alberta resident cases
 - The MOH (or designate) first notified shall notify the MOH (or designate) of the zone where the client currently resides by mail, fax or electronic transfer and fax a copy of the positive laboratory report by the fastest means possible (FMP) i.e., direct voice communication.
- For out-of-province and out-of-country non-Alberta resident cases
 - For non-Alberta residents, where the infection was likely acquired within Alberta, the MOH (or designate) of the zone shall forward the preliminary NDR of all confirmed cases to the CMOH (or designate) within one week of notification and the final NDR (amendment) within two weeks of notification.
 - For non-Alberta residents, where the infection was likely acquired outside Alberta, the following information should be forwarded to the CMOH (or designate) by phone, fax or electronic transfer within 48 hours (two days) including:
 - name,
 - date of birth,
 - out-of-province health care number,
 - out-of-province address and phone number,
 - attending physician (locally and out-of-province) and
 - positive laboratory report (faxed).

4. Additional Reporting Requirements

- In the case of an exposure of concern (e.g. intentional release), the CMOH will notify the Alberta Security & Strategic Intelligence Support Team (ASSIST) Duty officer at 780-422-3787 and Alberta Health Emergency Preparedness on Call at ahweoc@gov.ab.ca.

Superseded

Etiology

Ebola haemorrhagic fever, also Ebola virus disease (EVD), is caused by *ebolavirus* and is a member of the Filoviridae family. There are five species of Ebola based on where it was discovered:⁽²⁻⁴⁾

- Zaire ebolavirus (EBOV),
- Sudan ebolavirus (SUDV),
- Tai Forest ebolavirus (TAFV),
- Bundibugyo ebolavirus (BDBV) and,
- Reston ebolavirus (RESTV).

Ebolavirus is not environmentally stable; however it can persist on inanimate surfaces for several weeks.^(5,6)

Clinical Presentation

EVD is a severe, acute viral illness that is characterized by abrupt onset of fever, malaise, myalgia, headache, vomiting, and diarrhea.^(7,8) Other symptoms that have been reported include chest pain, cough, pharyngitis, lymphadenopathy, photophobia, and conjunctival injection. Asymptomatic and subclinical cases have been reported.^(2,9-15) About 50% of cases develop a maculopapular rash on the trunk within 5 days of symptom onset. About 5–7 days after symptoms onset, 40–50% of cases will develop bleeding manifestations (e.g., mucous membrane hemorrhages, hematemesis, bloody diarrhea, oozing of blood at puncture sites).⁽¹⁶⁾

Central nervous system findings include psychosis, delirium, coma, seizures.^(2,9-15) Shock (with DIC and end-organ failure) often ensues during second week of illness. Massive bleeding occurs late in the clinical course in fatal cases. Other complications include illness-induced abortion among pregnant women, hearing loss, orchitis, pericarditis, suppurative parotitis, unilateral vision loss and migratory arthritis. If recovery doesn't occur then death will occur in 7–16 days due to multiple organ dysfunction syndrome.

The case fatality rate of EVD varies by species:⁽⁶⁾

- Ebola-Zaire, 60%–90%
- Ebola-Sudan, 41%–65%
- Ebola-Tai Forest, only one case who survived
- Ebola-Bundibugyo, 25% in one recognized outbreak
- Ebola-Reston, 0% (not known to cause clinical disease in humans)

Diagnosis

In order for the diagnosis of EVD infections to be confirmed, one or more of the following diagnostic markers must be present: (i) presence of virus-specific antibodies, (ii) presence of virus-specific RNA by RT-PCR, and (iii) isolation of virus.

Due to their potential biohazard risk, EVD infections are required to be manipulated at a containment level 4 facility (e.g., National Microbiology Laboratory, Winnipeg, Manitoba).

Epidemiology

Reservoir

The natural reservoir of *ebolavirus* is thought to be forest-dwelling fruit bats as viral RNA has been found in 3 bat species in central Africa.⁽⁸⁾ Bats are also a likely candidate as a reservoir because the virus has been shown to be non-lethal to them. Four of the five subtypes in Africa have been

found in animal hosts native to Africa. The fifth subtype, Ebola-Reston, is more likely associated with an animal host (pig, primate) from the Philippines.⁽¹⁷⁾

Transmission^(8,18)

- The first patient tends to become infected through contact with the blood, secretions, organs or other bodily fluids of an infected animal.
- Further transmission can happen several ways:
 - Person-to-person transmission via direct contact with the blood, secretions, organs or other bodily fluids of infected people.
 - Indirect contact via objects, such as needles, that have been contaminated with infected secretions.
 - Burial ceremonies where mourners have direct contact with the body of the deceased person can also play a role in the transmission of Ebola.⁽¹⁸⁾
 - The data on formal aerosol experiments leave no doubt that Ebola are stable and infectious in small-particle aerosols, and experience of transmission between experimental animals in the laboratory supports this.^(19,20) However, if this mode of spread has occurred in any previous outbreak setting, it was very minor or not reported.

Incubation Period

Symptoms take between 2 to 21 days to appear, usually 4 to 9 days.^(4,21)

Period of Communicability

The risk of transmission during the incubation period is low.⁽⁸⁾ A case is not considered infectious prior to the development of symptoms.⁽²²⁾ Risk is highest during the late stages of illness when the patient is vomiting, having diarrhea or hemorrhaging (allowing the virus to leave the body), and during funerals with unprotected body preparation.^(8,23)

Ebolavirus RNA has been found in semen 101 days after illness onset⁽¹⁵⁾, although it was not possible to isolate (culture) the virus. Virus has been isolated in seminal fluid up to 82 days after illness onset.⁽²⁴⁾

Host Susceptibility

All ages are susceptible.⁽⁸⁾ Case mortality tends to be higher in pregnant women, younger children, individuals with pre-existing immunodeficiencies and certain gene alleles (B*67 and B*15).^(6,25,26) Many fatalities are also due to dehydration caused by gastric symptoms.⁽²⁷⁾

It is not known why some people recover from EVD while others do not. Low levels of baseline seropositivity have been shown in outbreak areas (indicating prior immunity) and cross-reactivity between different ebola subtypes has been documented.^(28,29)

Occurrence

General

EVD occurs mainly in areas surrounding rainforests in central Africa.⁽⁴⁾ There has been a number of outbreaks in several African countries over the past few decades, some are notable for their high mortality rates. Beginning in March 2014, an outbreak of Ebola has been reported in several Western African countries and it is the largest outbreak since Ebola was first identified in 1976.⁽¹⁸⁾

Canada

EVD is nationally notifiable in Canada. There have never been any cases reported in Canada.

Alberta

EVD is notifiable in Alberta. There have never been any cases reported in Alberta.

Key Investigation

Single case/cluster

- Confirm that the diagnosis meets the Alberta Health case definition.
- Review clinical presentation and history to determine possible source of infection of the case.
- Investigate possible exposures during the 21 days before onset, including a history of:⁽³⁰⁾
 - Residence in or travel to an area where EVD transmission is active,
 - HCWs / personnel who have spent time in a setting where EVD patients are being assessed or cared for in an EVD-affected area,
 - Household members of an EVD patient ,
 - Other patients and visitors who spent time in a healthcare facility where EVD patients are being treated,
 - Laboratory processing of body fluids of probable or confirmed EVD cases,
 - Participation in funeral rites or other direct exposure to human remains in the geographic area where the outbreak,
 - Persons who had direct contact with bats, primates or other wild animals from EVD-affected country.^(4,6)
 - Work in a laboratory setting.
 - Use of medical or cosmetic products that may have used porcine sub-products from the Philippines:⁽⁶⁾
 - For example: pig heart valves are used in the Philippines for transplant purposes; pig placental products are used in a number of cosmetic products in the Philippines.
- Identify Close Contacts of the case of EVD:
 - A Close Contact is defined as an individual with one or more of the following high risk exposures:⁽³⁰⁾
 - who has provided care to the patient (including a health care worker, family member, funeral worker, or volunteer), or who has had other close physical contact with the patient or deceased body, that may have resulted in unprotected exposure to blood or body fluids from the patient directly or indirectly through contaminated surfaces or equipment;
 - OR**
 - who has worked in a laboratory handling specimens from EVD patients and may have had unprotected exposure to these specimens through the course of their work.
- **Note:** *If the individual, when first identified, is found to have clinical evidence of EVD illness that developed within 21 days following the last close contact with the case, the individual should be managed as a probable case.*

Control

Management/Treatment of a Case

- Strict contact and droplet precautions apply until the infected person is no longer capable of transmitting the disease. Airborne precautions apply when performing aerosol-generating medical procedures (AGMP). Potential AGMPs include:⁽³¹⁾
 - Endotracheal intubation,
 - Bronchoscopy,
 - Airway suctioning,
 - Positive pressure ventilation via face mask,
 - High frequency oscillatory ventilation,
 - Central line insertion, or
 - Diagnostic sputum induction.
- No antiviral treatment has been shown to be effective against EVD.⁽⁸⁾
- Supportive care, including maintenance of fluid and electrolytes, mechanical ventilation, dialysis and treatment of secondary infections, is important for all VHFs.⁽³²⁾
- Anticoagulant therapies, aspirin, non-steroidal anti-inflammatory medications, and intramuscular injections are contraindicated.⁽³²⁾

Deceased Cases^(33,34)

- Contact with deceased persons with EVD should be as limited as possible.
 - When bodies are bagged at the scene of death, surface decontamination of the corpse-containing body bags is required before transport.
 - Bodies can be transported and stored (refrigerated) in impermeable bags (double-bagging is preferable), after wiping visible soiling on outer bag surfaces with 0.5% hypochlorite solution.
 - Routine precautions should be implemented.
- Deceased persons infected with EVD should not be sprayed, washed or embalmed.
 - Cremation is preferable. If that is not possible, the person should be buried directly in a sealed container (e.g., a hermetically sealed casket) to decrease the risk of pathogen transmission.^(18,34)
- Autopsies: aerosol-generating procedures (such as bone sawing) should be avoided during autopsies if possible. Otherwise, HEPA-filtered masks and negative-pressure rooms should be used.^(35,36)

Management of a Contact

- Post-exposure prophylaxis does not exist for contacts exposed to EVD in the absence of clinical illness.^(2,37)
- Contacts who are not close contacts (e.g., HCW who adhered to recommended IPC measures) should:⁽³⁰⁾
 - Daily self-monitor for EVD symptoms and fever $\geq 101^{\circ}\text{F}$ (38.6°C) orally for 21 days following last contact.
- **Close Contacts** should be placed under active public health surveillance:^(18,30)
 - Actively monitor (call the contact) daily for fever $\geq 101^{\circ}\text{F}$ (38.6°C) orally and symptoms suggestive of EVD.
 - Surveillance should be continued for 21 days after the last exposure.
 - Contacts should be advised to:
 - Self-monitor for fever twice daily, and
 - Refrain from taking antipyretic medication during the monitoring period if possible to prevent false negative readings.

- Immediately self-isolate and contact zonal public health if symptoms suggestive of EVD develop or a temperature of $\geq 101^{\circ}\text{F}$ (38.6°C) orally occurs.

Airline Travel ⁽³⁸⁾

- No evidence has been found (or been reported) for the transmission of EVD in airplanes.
- Long-distance travelers (e.g. between continents) infected while visiting affected areas could arrive while incubating the disease and develop symptoms compatible with EVD after arrival.
- The risk assessment of possible transmission of EVD on an aircraft should be undertaken on a case-by-case basis through discussion between the OCMOH and the MOH.
 - This should take into account information on the index case status, the epidemic situation of the country where the index case most likely acquired the infection, the possible exposure of the index case and how long the event has been detected after the flight.
- It is recommended that passenger trace back be undertaken only if the index case had symptoms during the flight and the flight was within 21 days after potential exposure;
 - The trace back should only be done after confirmation of the infected passenger.
 - Passengers and crew with direct contact, seat neighbours (+/- 1 seat), crew and cleaning personnel of the section of the plane where the infected passenger was seated should be included in the trace back, even if exposure to body fluids was not reported.⁽²¹⁾

Preventive Measures

- There is no vaccine currently licensed for the prevention of EVD.
- Educate convalescing cases on the following:
 - Protection during sexual intercourse is recommended or should be avoided for at least 15 weeks after recover or until semen can be shown to be free of the virus.⁽³⁰⁾
- Educate close contacts of cases on the following:⁽³⁰⁾
 - Abstaining from travelling is recommended during the 21 day monitoring period in order to facilitate daily contact with public health authorities conducting active surveillance and access to health care in an appropriate setting should it be required.
- Educate travelers to foreign countries on the following:
 - Signs and symptoms of EVD.
 - What to do if considering travel abroad: [PHAC Travel Health Notices](#)

Resources:

- Alberta Health: [Ebola](#)
- Alberta Health Services (AHS): [Ebola](#)
- Public Health Agency of Canada (PHAC): [Ebola](#)
- Centers for Disease Control and Prevention (CDC): [Ebola](#)
- World Health Organization (WHO): [Ebola](#)

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