

Ontario Public Health Standards:
Requirements for Programs, Services and Accountability

Infectious Disease Protocol

Appendix 1: Case Definitions and Disease- Specific Information

**Disease: Hemorrhagic fevers
caused by: i) Ebola virus and
ii) Marburg virus, iii) Lassa Fever,
and (iv) Other viral causes
including bunyaviruses,
arenaviruses and flaviviruses**

Effective: May 2022

Hemorrhagic fevers caused by: i) Ebola virus and ii) Marburg virus, iii) Lassa Fever, and (iv) Other viral causes including bunyaviruses, arenaviruses and flaviviruses

Communicable

Virulent

[Health Protection and Promotion Act \(HPPA\)](#)

[Ontario Regulation \(O. Reg.\) 135/18 \(Designation of Diseases\)](#)

Provincial Reporting Requirements

Confirmed case

Probable case

As per Requirement #3 of the “Reporting of Infectious Diseases” section of the *Infectious Diseases Protocol, 2018* (or as current), the minimum data elements to be reported for each case are specified in the following:

- [O. Reg. 569](#) (Reports) under the HPPA;⁵
- The iPHIS User Guides published by Public Health Ontario (PHO); and
- Bulletins and directives issued by PHO.

Type of Surveillance

Case-by-case

Case Definition

Confirmed Case

A case with clinically compatible signs and symptoms and at least two of the hemorrhagic manifestations (See Clinical Evidence section)

AND

Laboratory confirmation of infection (See Laboratory Confirmation section)

Probable Case

A case with clinically compatible signs and symptoms and at least one of the hemorrhagic manifestations (See Clinical Evidence section)

AND

A history within the 3 weeks before onset of fever of one of the following:

- Travel in a specific area of a country where an outbreak of viral hemorrhagic fever (VHF) has recently occurred

OR

- An epidemiologic link with a confirmed and/or probable case of VHF

OR

- Direct contact with blood or other body fluids from a confirmed or probable case of VHF

OR

- Work in a laboratory that handles VHF virus specimens or in a facility that handles animals with VHF

Outbreak Case Definition

The outbreak case definition varies with the outbreak under investigation. Please refer to the *Infectious Diseases Protocol, 2018* (or as current) for guidance in developing an outbreak case definition as needed.

The outbreak case definitions are established to reflect the disease and circumstances of the outbreak under investigation. The outbreak case definitions should be developed for each individual outbreak based on its characteristics, reviewed during the course of the outbreak, and modified if necessary, to ensure that the majority of cases are captured by the definition. The case definitions should be created in consideration of the outbreak definitions.

Outbreak cases may be classified by levels of probability (*i.e.*, confirmed and/or probable).

Clinical Information

Clinical Evidence

Any 2 of the following hemorrhagic manifestations (from WHO recommended surveillance standards, 1999):

- hemorrhagic or purpuric rash
- epistaxis
- hematemesis
- hemoptysis
- blood in stools
- other hemorrhagic symptom and no known predisposing host factors for hemorrhagic manifestations

Signs and symptoms consistent with the following: Lassa, Junin, Machupo, Sabia, Guanarito (arenaviruses); Crimean Congo, Rift Valley fever (bunyaviruses); Ebola, Marburg (filoviruses); Dengue fever, Yellow fever, Omsk hemorrhagic fever, Kyasanur Forest Disease (flaviviruses).

Onset may be gradual or acute depending on the type of VHF, with fever, headache, malaise, sore throat, cough, nausea, vomiting, diarrhea, myalgia and chest and abdominal pain. Fever is persistent or spikes intermittently. Inflammation and exudation of the pharynx and conjunctivae are commonly observed.

A clinical consultation is necessary for diagnosis.

Clinical Presentation

Viral hemorrhagic fevers are associated with an acute onset of fever, severe illness and hemorrhagic symptoms including hemorrhagic or purpuric rash, epistaxis, hematemesis, hemoptysis, blood in stool and other hemorrhagic symptoms.²

In severe and fatal forms, the hemorrhagic diathesis is often accompanied by hepatic damage, renal failure, central nervous system (CNS) involvement and terminal shock with multi-organ dysfunction.³

In the case of dengue fever, clinical presentation is mild in comparison to dengue hemorrhagic fever. Warning signs of progression to severe dengue (of which dengue hemorrhagic fever is classified as a subset) include vomiting, severe abdominal pain, mucosal bleeding, difficulty breathing, signs of hypovolemic shock, and rapid decline in platelet count with an increase in hematocrit (hemoconcentration).³ Whereas cases of dengue hemorrhagic fever are reportable, cases of dengue fever without identified hemorrhagic manifestations are not reportable.

In cases of Lassa fever about 80% of human infections are mild or asymptomatic and the remaining have severe multisystem disease. Patients present with malaise, fever, headache, sore throat, cough, nausea, vomiting, diarrhea, myalgia, and chest and abdominal pain.³

Laboratory Evidence

Laboratory Confirmation

Any of the following will constitute laboratory confirmation:

- Isolation and identification of virus from an appropriate clinical specimen (e.g., blood, serum, tissue, urine specimens or throat secretions) (performed at the National Microbiology Laboratory);
- 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 **AND** confirmed by the National Microbiology Laboratory by nucleic acid testing or serology[†];

- Demonstration of virus antigen in tissue (e.g., skin, liver or spleen) by immunohistochemical or immunofluorescent techniques **AND** another test (e.g., PCR);
- Demonstration of specific IgM **AND** IgG antibody by EIA, immunofluorescent assay or Western Blot by the National Microbiology Laboratory or an approved WHO collaboration centre[†]
- Demonstration of a fourfold rise in IgG titre by EIA, immunofluorescent assay from an acute vs. a convalescent serum sample (performed at the National Microbiology Laboratory).

Approved/Validated Tests

- Culture
- NAAT (RT-PCR)
- Antigen detection
- IgM and IgG serology

Indications and Limitations

- Laboratory testing for pathogens causing VHF should be conducted in a reference laboratory using assays that are validated for clinical testing.

[†] For certain VHF pathogens (e.g., dengue), detection of a single nucleic acid target may be sufficient for laboratory confirmation and would be decided on an individual case basis, in discussion with the testing laboratory and clinical team involved in patient care.

[†] Serological methods vary across different VHF pathogens, and may include methods not listed above.

For further information about human diagnostic testing, contact the [Public Health Ontario Laboratories](#).

Note: Any testing related to suspect VHF should be carried out under level 4 containment facilities (National Microbiology Laboratory) due to issues of safety, security, expertise, and personnel vaccination.

Case Management

In addition to the requirements set out in the Requirement #2 of the “Management of Infectious Diseases – Sporadic Cases” and “Investigation and Management of Infectious Diseases Outbreaks” sections of the *Infectious Diseases Protocol, 2018* (or as current), the board of health shall investigate cases to determine the source of infection. Refer to Provincial Reporting Requirements above for relevant data to be collected during case investigation.

Clinical management of VHF and dengue hemorrhagic fever, in the latter especially if complicated by dengue shock syndrome, would be the responsibility of medical specialists such as infectious disease specialist.

For more information on case management of Ebola refer to [Public Health Management of Ebola Virus Disease in Ontario](#) (2019, or as current)

Contact Management

In rare cases person-person bloodborne transmission of dengue is possible, through a transfusion of infected blood, organs, or other tissues within the approximately 7-day viremia in infected persons or through vertical transmission if the mother is acutely ill around the time of delivery. However, contacts of dengue hemorrhagic fever are not at-risk of person-person transmission. This is because progression to severe dengue occurs in the late febrile stage, around the time of defervescence.³

For Ebola, Marburg and Lassa fever contacts include: people living with, caring for, testing laboratory specimens from or having close/intimate contact with the case, in the three weeks after the onset of illness.³ Establish close surveillance of contacts including taking body temperature twice daily for three weeks after last exposure

and if temperature above 38.3 °C or 101 °F, hospitalize immediately while following the infection prevention and control measures described above. Determine contacts place of residence during 3 weeks prior to onset and search for unreported or undiagnosed cases.³

For more information on management of contacts of a case of Ebola refer to Public Health Management of Ebola Virus Disease in Ontario (2019, or as current)

Outbreak Management

Please see the *Infectious Diseases Protocol, 2018* (or as current) for the public health management of outbreaks or clusters in order to identify the source of illness, manage the outbreak and limit secondary spread.

Given the severity and rarity of hemorrhagic fevers, a single confirmed case constitutes an outbreak.

For more information on enhanced monitoring, extraordinary measures, and situational awareness based on the context of an Ebola outbreak that is declared outside of Canada refer to Public Health Management of Ebola Virus Disease in Ontario (2019, or as current)

Prevention and Control Measures

Personal Prevention Measures

The PHAC recommends travelers in areas with Ebola avoid direct contact with blood or bodily fluids of a person or corpse infected with the Ebola virus. Also, avoid contact with or handling an animal suspected of having Ebola hemorrhagic fever.⁶

Check [travel health notices](#) for specific recommendations:

Basic personal measures to prevent mosquito bites are strongly recommended in terms of dengue/dengue hemorrhagic fever prevention.³

Infection Prevention and Control Strategies

Public Health response will be under the direction of provincial and federal

jurisdiction.

Refer to [PHO's website](#) to search for the most up-to-date information on Infection Prevention and Control (IPAC).

For Lassa fever additional strategies include:

- Strict droplet and contact precautions for hospitalized cases and negative pressure room with door closed and airborne precautions if case has pneumonia.³

Disease Characteristics

Aetiologic Agent - Viruses from several distinct families can cause viral hemorrhagic fever (VHF). They are all ribonucleic acid (RNA) viruses, and are all enveloped in a fatty lipid coating. The Ebola and Marburg viruses, are two antigenically distinct **filoviruses**. In Africa, 4 different subtypes of the Ebola virus have been associated with human illness. Members of other viral families causing VHF include **bunyaviruses** (hantaviruses, Crimean Congo hemorrhagic fever viruses, Rift Valley fever virus), **arenaviruses** (Lassa virus, Lujo virus, Guanarito, Machupo, Junin, and Sabia viruses) and **flaviviruses** (Yellow Fever virus, Dengue virus, Kyasanur Forest virus, Omsk virus).¹

Modes of Transmission - Filovirus infection is believed to occur from inadvertent exposure to infected bat excreta or saliva following entry into roosting areas. Nonhuman primates, especially gorillas and chimpanzees, and other wild animals may become infected from bat contact and serve as intermediate hosts that transmit filoviruses to humans through contact with their blood and bodily fluids, usually associated with hunting and butchering.⁴

For Ebola and Marburg, person to person transmission occurs by direct contact with infected blood, urine, vomit, diarrhea, secretions, organs or semen. Risk is highest during the late stages of illness when the infected person is vomiting, having diarrhea or haemorrhaging and post-mortem contact with bodily fluids. Risk during the asymptomatic incubation period is low.³ Filoviruses are not spread through the air or by water.⁴ Nosocomial infections have been frequent; virtually all patients who

acquired infection from contaminated syringes and needles have died.³

For dengue hemorrhagic fever, no direct person to person spread; persons are infective for mosquitoes (principally *Aedes Aegypti*, similar to the malaria cycle) from shortly before the febrile period to the end thereof, usually 3-5 days. The mosquito becomes infective 8-12 days after the viremic blood-meal and remains so for life.³

For Lassa fever, primarily through aerosol or direct contact with excreta of infected rodents deposited on surfaces such as floors, beds or in food and water. It can also be spread person to person through sexual contact and in hospitals from infected persons' pharyngeal secretions, blood, or urine or from contaminated needles, or in laboratory accidents.³

Incubation Period:

- **Ebola and Marburg virus diseases:** Probably 5 to 15 days.³
- **Dengue:** From 3-14 days, commonly 4-7 days.³
- **Lassa:** Commonly 6-21 days.³

Period of Communicability - Ebola and Marburg are communicable as long as blood and secretions contain virus. Ebola virus was isolated from seminal fluid on the 61st day after onset of illness in a laboratory acquired case.³

For dengue hemorrhagic fever, patients are infective for mosquitoes during their period of viremia, from shortly before, until the end of the febrile period. The mosquito becomes infective 8-12 days after the viremic blood-meal and remains so for life.³ There is no person-person transmission of dengue hemorrhagic fever.

For Lassa fever, person to person spread may theoretically occur during the acute febrile phase when virus is present in secretions and excretions. Virus can be excreted in urine for 3-9 weeks from onset of illness and can be spread by sexual contact through semen for up to 3 months after infection.³

Reservoir - Fruit bats in Africa are believed to be the reservoir for Ebola and Marburg infections. Forest-dwelling fruit bats, multiple species are the source of Ebola viruses and cave-dwelling fruit bats, specifically the *Rousettus aegyptiacus* species are believed to be the reservoir for Marburg viruses.³

For dengue fever, in tropical urban centres, a cycle between humans and *Aedes Aegypti* mosquito sustains the viruses. It is also thought that in South-East Asia and West African forest the reservoir for the viruses is a monkey/mosquito cycle.³

For Lassa fever, rodents in the genus *Mastomys*, in Africa, are the reservoir.³

Host Susceptibility and Resistance - All ages are susceptible.³

Recovery from infection with one dengue virus serotype provides lifelong homologous immunity but only short-term protection against other serotypes and may exacerbate disease upon subsequent infections potentially leading to dengue hemorrhagic fever (as opposed to dengue fever).³

Please refer to [PHO's Reportable Disease Trends in Ontario reporting tool](#) for the most up-to-date information on infectious disease trends in Ontario.

For additional national and international epidemiological information, please refer to the Public Health Agency of Canada and the World Health Organization.

Comments

- Contact PHO immediately even in the event of a probable case.
- Travel history information is essential in the identification of possible cases.

References

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Case Definition Sources

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Document History

Revision Date	Document Section	Description of Revisions
April 2022	Entire Document	New template. Appendix A and B merged. No material content changes.
April 2022	Epidemiology: Occurrence section	Removed.
April 2022	ICD Codes	Removed.
August 2019	Clinical Presentation	Added warning signs of progression to severe dengue/dengue hemorrhagic fever.
August 2019	Period of Communicability	Addition of "hemorrhagic fever" to dengue to clarify that statement refers to dengue hemorrhagic fever.
August 2019	Management of Cases	Added: "For more information on case management of Ebola refer to the following document: <ul style="list-style-type: none"> Public Health Management of Ebola Virus Disease in Ontario (2019, or as current)"

Revision Date	Document Section	Description of Revisions
August 2019	Management of Contacts	<p>Revised section to clarify modes of transmission and management of contacts of dengue vs. dengue hemorrhagic fever.</p> <p>Added: "For more information on management of contacts of a case of Ebola refer to the following document:</p> <ul style="list-style-type: none"> • Public Health Management of Ebola Virus Disease in Ontario (2019, or as current)"
August 2019	Management of Outbreaks	<p>Added: "For more information on enhanced monitoring, extraordinary measures, and situational awareness based on the context of an Ebola outbreak that is declared outside of Canada refer to the following document:</p> <ul style="list-style-type: none"> • Public Health Management of Ebola Virus Disease in Ontario (2019, or as current)"