Ministry of Health

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

Infectious Diseases Protocol

Appendix 1: Case Definitions and Disease-Specific Information

Disease: Rabies

Effective: January 2026

Ontario

Rabies

☒ Communicable

☐ Virulent

Health Protection and Promotion Act (HPPA)[1]
Ontario Regulation (O. Reg.) 135/18 (Designation of Diseases)[2]

Provincial Reporting Requirements

☒ Confirmed case

☒ Probable case

As per Requirement #3 of the "Reporting of Infectious Diseases" section of the *Infectious Diseases Protocol, 2023* (or as current)[3], the minimum data elements to be reported for each case are specified in the following:

- O. Reg. 569 (Reports) under the HPPA;[4]
- 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

Laboratory confirmation of infection with clinically compatible signs and symptoms:

- Detection of viral antigen in an appropriate clinical specimen, preferably the brain or the nerves surrounding hair follicles in the nape of the neck, by immunofluorescence

OR

- Isolation of rabies virus from saliva, cerebrospinal fluid (CSF), or central nervous system tissue using cell culture or laboratory animal

OR

- Detection of rabies virus ribonucleic acid (RNA) in an appropriate clinical specimen (e.g., saliva)

Probable Case

Clinically compatible signs and symptoms with the following laboratory results:

- Detection of rabies-neutralizing antibody in the serum or CSF of an unvaccinated person who did not receive rabies immunoglobulin

Outbreak Case Definition

The outbreak case definition varies with the outbreak under investigation. Please refer to the *Infectious Diseases Protocol, 2023* (or as current)[3] 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 outbreak, and modified, if necessary, to ensure that most 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

After an individual is exposed to rabies, the virus must travel along peripheral nerves to reach the central nervous system (CNS) before it can cause the typical neurologic symptoms associated with the infection.[5] Clinically compatible signs and symptoms begin with a prodrome of fever and non-specific symptoms. There may also be sensory alterations, frequently around the site of exposure. Severe neurological disease typically results in anxiety, agitation, and delirium. As the disease progresses swallowing dysfunction is seen in most patients and there may be spasms of the respiratory muscles and generalized convulsions. Rabies is an acute encephalomyelitis that almost always progresses to coma or death within 10 days after the first symptom.

Clinical Presentation

During the incubation period after exposure, the person does not experience disease symptoms and the wound from the bite may heal. The prodrome begins when the virus enters the peripheral nerves and spinal cord and can last 2 – 10 days. The prodromal phase is characterized by fever and non-specific symptoms (such as malaise, myalgias and headache). The prodromal phase progresses to the acute neurological phase which typically begins with anxiety, agitation. and delirium.[6] Most cases of rabies present with a classic encephalitic rabies, which is characterized by:

- severe swallowing muscle spasms resulting in swallowing dysfunction,
- increased salivation,
- hydrophobia (fear of water),
- hyperactivity,
- leading to paralysis.[5]

Less commonly seen is paralytic rabies, which is characterized by ascending and progressive paralysis starting with the site of exposure. The typical hydrophobia and hyperactivity are not observed in paralytic rabies.

The acute neurological phase of the disease progresses to coma and almost always death.

Laboratory Evidence

Laboratory Confirmation

Any of the following will constitute a confirmed case of Rabies:

- Positive for rabies antigen
- Positive rabies virus culture
- Positive nucleic acid amplification test (NAAT) for rabies virus

Approved/Validated Tests

- Immunofluorescence test for rabies virus antigen
- Standard culture for rabies virus
- NAAT for rabies virus RNA
- Rabies virus neutralization test

Indications and Limitations

- Negative results do not rule out rabies infection because viral material may not be detectable (e.g., early in infection). CSF frequently remains negative.
- The presence of rabies virus-neutralizing antibodies can indicate an exposure to rabies virus antigen or passive immunization.
- Negative serological results do not rule out a rabies infection because antibody levels may not surpass the detection threshold (0.5 IU/mL) and seroconversion may occur very late during the course of infection.

- The sensitivity and specificity of serological tests may vary from laboratory to laboratory in spite of the application of international standards.
- Immunofluorescence test on unfixed brain tissue is the only recommended test for post-mortem diagnosis.

Human diagnostic testing

Rabies is suggested by a history of animal exposure, including direct contact, bite, scratch, or other potential exposure to saliva, and confirmed by recovery of virus from saliva and salivary gland, cerebrospinal fluid, or central nervous system tissue of an infected person. It can also be confirmed by direct immunofluorescence to detect viral antigen in brain tissue.[7,8]

Presumptive diagnosis may be based on serological tests.[9]

Boards of health are encouraged to notify Ministry of Health and Public Health Ontario when submitting human specimens for testing. Refer to the following resources for guidance on human specimen submission in Canada:

- For CSF and serum testing, contact the National Microbiology Laboratory (NML), Winnipeg, Manitoba: Rabies serum Neutralization Assay.[10]
- For saliva, nuchal skin biopsy and post-mortem brain tissue rabies testing, Contact the CFIA laboratory, Ottawa, Ontario: Rabies Testing at the CFIA: Human Specimens.[11]

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, 2023* (or as current)[3], 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.

Investigate all persons exposed to potentially rabid animals to determine source of infection and conduct risk assessment for rabies transmission and refer exposed persons to their health care provider. Provide rabies post-exposure prophylaxis to requesting physician if indicated.

Refer to the *Rabies Prevention and Control Protocol, 2023* (or as current), and for the management of persons exposed to potentially rabid animals.[12]

The following disease-specific information may also be obtained during the investigation:

- Determine the possible source including animal involved;
- Identify other persons and animals exposed to the source animal;
- Note the type of exposure (bite, scratch, or other);
- Note the geographic location of exposure, and
- Determine the immunization status of animal (if possible).

If the disease is traced to imported or domesticated animals, contact the Ontario Ministry of Agriculture, Food and Agribusiness (OMAFA).

For rabies cases, death is invariably the outcome once onset of clinical signs is evident.

Contact Management

While there have been no documented cases of human-to-human rabies transmission except for those attributed to organ and tissue transplantation, the precautionary principle should be applied to manage individuals with potential exposure to a case, given the severity of rabies infection.[13] When assessing exposures, the stability and viability of the virus, duration, and type of contact should be considered to determine recommendations for Post Exposure Prophylaxis (PEP) administration.

When managing a human rabies case, a contact includes any individual who may have been exposed to the infectious fluids or tissues of a confirmed human case. Boards of health shall conduct contact tracing to identify exposures during the 14 days prior to the onset of symptoms.

Types of exposures considered as a contact include:

- direct exposure of mucous membranes (e.g., eyes, mouth) or non-intact skin to infectious body fluids of the case
- direct contact with a case's body tissue and fluids, such as saliva, tears, and neural tissue[14]
- organ and corneal transplants from the infected individual

Additional guidance is available in the Pathogen Safety Data Sheet: Infectious Substances – Rabies (2011),[15] or as current. Public Health Ontario and the Ministry of Health are available for consultations, as required.

Household and Close Contact Exposures

A comprehensive risk assessment must be conducted for household and close contacts to determine PEP administration.

Healthcare Exposures

Healthcare workers (HCW) should be educated about the potential hazard of infection from contact with body fluids and body tissues. Blood, feces, and urine are considered non-infectious bodily fluids, while tears are considered a theoretical but low risk bodily fluid.[16] Exposures within a healthcare setting will differ; however, close contact exposures still need to be assessed to determine who should be recommended to receive PEP.

Refer to the Infection Control Strategies section for information on how to reduce transmission and protect HCWs.

Animal Exposures

Any potentially exposed domestic mammals should be assessed by a veterinarian, including dogs, cats, horses, rabbits, rodents or similar, from inside or outside the household, that may have had face-to-face contact or shared food with the patient. Requests for consultations with the OMAFA can be submitted by the veterinarians using a Rabies Response Request Form.[17]

Post Exposure Prophylaxis

Based on the risk assessment conducted by the local board of health, if an individual is deemed to be a close contact of a probable or confirmed case, they should be offered PEP as soon as possible.

Rabies PEP can be safely offered to pregnant individuals or individuals who are breastfeeding, if they were exposed to rabies.[13] If a child is born to a probable or known rabies case, PEP administration will need to be determined in conjunction with the Ministry of Health and Public Health Ontario to ensure PEP safety and efficacy.

Consultation with the Ministry and Public Health Ontario is welcome, for any other questions or concerns regarding PEP use.

Outbreak Management

Please see the *Infectious Diseases Protocol, 2023* (or as current)[3] for the public health management of outbreaks or clusters in order to identify the source of illness, manage the outbreak and limit secondary spread.

A single case of rabies in a person constitutes an outbreak and should be managed with urgency to identify other persons exposed to the same source or that came into contact with infected body fluids belonging to the case.

Prevention and Control Measures

Personal Prevention Measures

Preventative measures:[7]

- Avoid contact with stray, wild, sick, dead or strangely acting animals;
- Promote immunization of cats, dogs, horses, ferrets, cow, bull, calf or sheep against rabies as defined in Regulation 567: *Rabies Immunization*,[18]
- Promote the reporting of aggressive animals, or animals that have bitten people, to the local board of health;
- Individuals who are at high risk of exposure such as veterinarians, wildlife and park personnel, or travellers to areas where rabies is endemic, should receive pre-exposure immunization;
- People should not try to capture bats found in their house and should bat proof their homes; and
- Wash animal bite wounds immediately with soap and clean running water and seek medical attention promptly.

Infection Prevention and Control Strategies

HCW should be provided education and training on Routine Practices including how to perform a point-of-care risk assessment, the use of personal protective equipment (PPE) and Additional Precautions.

Probable and confirmed cases presenting to or being admitted at a healthcare setting (e.g., hospital or doctor's office), are to be cared for using Routine Practices. A point of care risk assessment should be completed at each interaction with the patient to inform the selection of PPE (gloves, gowns, medical masks, and eye protection) to protect non-intact skin and mucosal sites (i.e., eyes, nose, mouth).

HCWs should also follow Airborne Precautions during aerosol-generating medical procedures (AGMPs) such as intubation, suction, and autopsy.[19] For more information, please refer to the Provincial Infectious Disease Advisory Committee (PIDAC)'s Routine Practices and Additional Precautions in All Healthcare Settings, 3rd Edition (or as current).[20]

It is recommended that the number of staff that interact with the individual is limited, as much as possible. There is no risk of rabies transmission from contaminated linens.[13] Healthcare facilities can follow their organizational policies for handling soiled linens per usual practice.

Articles (e.g., patient care items) soiled with body fluids or tissue should be cleaned and disinfected as soon as possible or discarded as biohazardous waste.[19] Cleaning and disinfection should follow the recommendations provided in PIDAC document, Best Practices for Environmental Cleaning for Prevention and Control of Infections (2018).[21]

Post-Mortem:

The virus can survive in the body, post-mortem for several days to weeks after death, depending on the storage temperature of the body.[21] For example, the virus was observed to be viable for 3 days post-mortem in rabid mice stored at room temperature (25°C-35°C) while the length of viability increased to 18 days if they were stored at 4°C.[22]

The body of a case should follow the same disposal procedure as with other infectious diseases.[14] Conducting an autopsy or the embalming of the body must follow the precautions listed in this section as well as follow the recommendations of the Bereavement Authority of Ontario. The body of the deceased individual should be allowed to be buried or cremated as per the individual's religious practices or preferences.[14]

Disease Characteristics

Aetiologic Agent - Rabies disease is caused by the rabies virus; a ribonucleic acid (RNA) virus classified in the *Rhabdoviridae* family, from the genus *Lyssavirus*.[7,9]

Modes of Transmission - Rabies is primarily a disease of animals but can be transmitted to humans through the saliva of infected animals through bites, scratches, or other contact with either breaks in the skin or mucosal membranes.[8] Person to person transmission is theoretically possible but rare and not well documented.[7] Airborne spread has been demonstrated in caves where bats roost and in laboratory settings, but this occurs very rarely.[7] Transmission through transplantation of corneas, solid organs and blood vessels from undiagnosed human rabies cases has occurred.[7,9] A theoretical but low risk of transmission can exist from tears as well.

Incubation Period – Usually 3-8 weeks; very rarely as short as a few days or as long as several years.[7] The incubation period depends on wound severity, wound site in relation to nerve supply and distance from the brain, the amount and strain of virus, protection provided by clothing and other factors such as adequate wound cleansing.[7]

Period of Communicability - Rabid animals are infectious only from the time the virus reaches the salivary glands and up until death. Death in species other than rabies reservoir species usually occurs within one week of onset of clinical signs. Different species may shed virus in saliva for different lengths of time prior to onset of clinical signs. Defined periods of communicability in animal hosts are reliably known for domesticated dogs, cats and ferrets, which may shed virus in saliva for up to 10 days prior to the onset of clinical signs. Other mammals (including humans) may shed virus in saliva for up to 14 days prior to the onset of clinical signs.[7] Wildlife rabies reservoir species may shed virus for much longer periods of time and are not considered to have a defined period of communicability.

Reservoir - Rabies is a disease of mammals, both domestic and wild. In Canada and the US, foxes, skunks, raccoons and bats may be reservoirs capable of transmitting infection to dogs, cats, livestock and people.[8] In Canada, the canine variant of rabies virus has been eliminated primarily through vaccination programs.[8]

Host Susceptibility and Resistance - All mammals are susceptible to rabies.[7]

Please refer to PHO's Infectious Disease Data for the most up-to-date information on infectious disease trends in Ontario.[24]

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

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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.
January 2026	Case Definition	Probable case definition updated to match national case definition
	Laboratory testing	Updates to the human diagnostic testing information.
	Contact Management & Infection Prevention and Control Strategies	Expanded contact management of human rabies cases and IPAC strategies for healthcare settings.