

Appendix A: Disease-Specific Chapters

Chapter: Rabies

Effective: February 2019

Rabies

Communicable

Virulent

**Health Protection and Promotion Act:
O. Reg. 135/18 (Designation of Diseases)**

1.0 Aetiologic Agent

Rabies disease is caused by the rabies virus; a ribonucleic acid (RNA) virus classified in the *Rhabdoviridae* family, from the genus *Lyssavirus*.^{1,2}

2.0 Case Definition

2.1 Surveillance Case Definition

Refer to [Appendix B](#) for Case Definitions.

2.2 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).

3.0 Identification

3.1 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. Onset of clinical symptoms is generally heralded by a sense of apprehension and excitability with headache, fever, malaise and indefinite sensory changes and pain at the site of the bite.¹ The excitation phase that follows is characterized by hypertension, increased salivation and swallowing dysfunction (hydrophobia). This may be followed by generalized paralysis.³ The acute neurological phase of the disease is characterized by

encephalomyelitis that almost always progresses to coma or death, often due to cardiac failure, if no medical intervention is given.¹

3.2 Diagnosis

See [Appendix B](#) for diagnostic criteria relevant to the Case Definitions.

For further information about human diagnostic testing, contact the Public Health Ontario Laboratories or refer to the Public Health Ontario Laboratory Services webpage: <http://www.publichealthontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/default.aspx>

Rabies is suggested by a history of animal exposure and or bite 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.^{1,4}

Presumptive diagnosis may be based on serological tests.²

4.0 Epidemiology

4.1 Occurrence

Rabies occurs worldwide, and continues to be a serious problem in India, Asia and Africa. Worldwide, there is an estimated 55,000 deaths each year, almost all in developing countries.¹ The disease is underreported worldwide, in part due to misdiagnosis.¹ In the United States and Canada, rabies most commonly involves raccoons, skunks, foxes, and bats.⁵ In Canada and the USA, oral immunization of free-ranging wild terrestrial carnivores has helped to control rabies over large areas.¹

Human rabies infection is very rare in Canada. Since reporting began in 1924, a total of 25 people in six provinces have died of rabies in Canada.⁴ The last reported cases of domestically acquired human rabies occurred in 2007 in Alberta, 2003 in BC and in 2000 in Quebec, all from bat rabies strain.⁵ A travel-related case of human rabies case was reported in Ontario in 2012, which was the result of exposure to the rabies virus in a traveller returning from the Dominican Republic.

Please refer to Public Health Ontario's (PHO) Reportable Disease Trends in Ontario reporting tool and other reports for the most up-to-date information on infectious disease trends in Ontario.

<http://www.publichealthontario.ca/en/DataAndAnalytics/Pages/DataReports.aspx>

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

4.2 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.⁵ In Canada, the canine variant of rabies virus has been eliminated primarily through vaccination programs.⁴

4.3 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.⁴ Person to person transmission is theoretically possible but rare and not well documented.¹ Airborne spread has been demonstrated in caves where bats roost and in laboratory settings, but this occurs very rarely.¹ Transmission through transplantation of corneas, solid organs and blood vessels from undiagnosed human rabies cases has occurred.^{1,2}

4.4 Incubation Period

Usually 3-8 weeks; very rarely as short as a few days or as long as several years.¹ 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.¹

4.5 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.¹ Wildlife rabies reservoir species may shed virus for much longer periods of time, and are not considered to have a defined period of communicability.

4.6 Host Susceptibility and Resistance

All mammals are susceptible to rabies.¹

5.0 Reporting Requirements

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:

- *Ontario Regulation 569 (Reports)* under the *Health Protection and Promotion Act (HPPA)*;⁶
- The iPHIS User Guides published by PHO; and
- Bulletins and directives issued by PHO.

6.0 Prevention and Control Measures

6.1 Personal Prevention Measures

Preventative measures:¹

- Avoid contact with stray, wild, sick, dead or strangely acting animals;
- Promote immunization of cats and dogs against rabies;
- 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;
- Individual 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.

6.2 Infection Prevention and Control Strategies

Use routine practices for hospitalized cases for the duration of illness.²

Contact with salivary secretions or tears of a human case should be avoided, and immediate attendants responsible for the care of a human case should be warned of the potential hazard of infection from saliva.¹

Refer to PHO's website at www.publichealthontario.ca to search for the most up-to-date information on Infection Prevention and Control.

6.3 Management of Cases

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 Section 5: 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. 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, 2018* (or as current), and for the management of persons exposed to potentially rabid animals.⁷

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 Rural Affairs (OMAFRA).

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

6.4 Management of Contacts

In hospital, health care workers should be educated about the potential hazard of infection from saliva, and the use of personal protective equipment to avoid exposure.

If indicated, refer to the *Management of Potential Rabies Exposures Guideline, 2018* (or as current) document for post exposure prophylaxis information.⁸

6.5 Management of Outbreaks

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.

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.

7.0 References

1. Heymann DL, editor. *Control of Communicable Diseases Manual*. 20 ed. Washington, D.C: American Public Health Association; 2015.
2. Committee on Infectious Diseases, American Academy of Pediatrics. Section 3: Summaries of Infectious Diseases: Rabies. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, editors. *Red Book: 2018 Report of the Committee on Infectious Diseases*. 31 ed. Itasca, IL: American Academy of Pediatrics; 2018.
3. Acha P, Szyfres B. *Zoonoses and Communicable Diseases Common to Man and Animals*. Vol. 2. 3 ed. Washington, DC: Pan American Health Organization; 2003.
4. Government of Canada. Rabies [Internet]. Ottawa, ON: Her Majesty the Queen in Right of Canada; 2018 [updated March 8, 2018; cited July 23, 2018]. Available from: <https://www.canada.ca/en/public-health/services/diseases/rabies.html>
5. National Advisory Committee on Immunization, Public Health Agency of Canada. Part 4- Active Vaccines: Rabies Vaccine. 2015. In: *Canadian Immunization Guide* [Internet]. Ottawa, ON: Her Majesty the Queen in Right of Canada, [cited

July 23, 2018]. Available from: <https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-4-active-vaccines/page-18-rabies-vaccine.html>

6. Health Protection and Promotion Act, R.S.O. 1990, Reg. 569, Reports, (2018). Available from: <https://www.ontario.ca/laws/regulation/900569>
7. Ontario, Ministry of Health and Long-Term Care. Rabies Prevention and Control Protocol, 2018. Toronto, ON: Queen's Printer for Ontario; 2018. Available from: http://www.health.gov.on.ca/en/pro/programs/publichealth/oph_standards/protocolsguidelines.aspx
8. Ontario, Ministry of Health and Long-Term Care. Management of Potential Rabies Exposures Guideline, 2018. Toronto, ON: Queen's Printer for Ontario; 2018. Available from: http://www.health.gov.on.ca/en/pro/programs/publichealth/oph_standards/protocolsguidelines.aspx

8.0 Document History

Table 1: History of Revisions

Revision Date	Document Section	Description of Revisions
February 2019	General	Minor revisions were made to support the regulation change to Diseases of Public Health Significance. Common text included in all Disease Specific chapters: Surveillance Case Definition, Outbreak Case Definition, Diagnosis, Reporting Requirements, Management of Cases, and Management of Outbreaks. The epidemiology section and references were updated and Section 8.0 Additional Resources was deleted.
February 2019	4.1 Occurrence	Entire section revised.
February 2019	4.4 Incubation Period	Incubation period updated from “usually 3-8 weeks; rarely as short as 9 days or as long as 7 years” to “usually 3-8 weeks; very rarely as short as a few days or as long as several years”.
February 2019	4.5 Period of Communicability	Entire section revised.

Revision Date	Document Section	Description of Revisions
February 2019	4.6 Host Susceptibility and Resistance	Second paragraph removed: “Humans appear to be more resistant to infection as evidenced in a study where 40% of untreated individuals bitten by proven rabid animals developed the disease”.
February 2019	6.2 Infection Prevention and Control Strategies	Added sentence: “Contact with salivary secretions or tears of a human case should be avoided, and immediate attendants responsible for the care of a human case should be warned of the potential hazard of infection from saliva.”

