Ministry of Health

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

Infectious Disease Protocol

Appendix 1: Case Definitions and Disease-Specific Information

Disease: Hantavirus pulmonary syndrome

Effective: May 2022

Ontario

Hantavirus pulmonary syndrome

☒ 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

Laboratory confirmation of infection with clinically compatible signs and symptoms:

- Detection of Immunoglobulin M (IgM) antibodies or a significant (i.e., fourfold or greater) rise in hantavirus-specific Immunoglobulin G (IgG) antibody titres

OR

- Detection of hantavirus-specific nucleic acid amplification test (NAAT) in an appropriate clinical specimen

OR

- Detection of hantavirus antigen by immunohistochemistry

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).

Given the rarity and severity of this disease, one case should be considered an outbreak.

Clinical Information

Clinical Evidence

- A febrile illness (Temperature > 38.3˚ C [101˚ F] oral) requiring supplemental oxygen

AND

- Bilateral diffuse infiltrates (may resemble acute respiratory distress syndrome [ARDS])

AND

- Develops within 72 hours of hospitalization in a previously healthy person

OR

- Unexplained illness resulting in death plus an autopsy examination demonstrating non-cardiogenic pulmonary edema without an identifiable specific cause of death

Clinical Presentation

Hantavirus pulmonary syndrome (HPS) infection often presents as a "flu-like" illness, with fever, headache, myalgia, dizziness, nausea and other gastrointestinal symptoms. This is followed by cough, shortness of breath, and hypotension; pulmonary edema and deterioration of cardiopulmonary function may occur rapidly. Most cases show an elevated hematocrit, hypoalbuminemia, and thrombocytopenia. The case fatality rate is 35-50%.[1]

Laboratory Evidence

Laboratory Confirmation

Any of the following will constitute a confirmed case of Hantavirus pulmonary syndrome (HPS):

- Positive for hantavirus IgM antibodies
- Significant (i.e., fourfold or greater) rise in hantavirus IgG antibody titres
- Positive for hantavirus nucleic acid
- Positive for hantavirus antigen

Approved/Validated Tests

- Test for hantavirus IgM and IgG antibodies
- Nucleic acid amplification test (NAAT) for hantavirus
- Test for hantavirus antigen

Indications and Limitations

Not applicable

For further information about human diagnostic testing, contact the Public Health Ontario Laboratories.

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.

The following disease-specific information should also be obtained during case management:

- Exposure history, including travel and occupational history involving handling of rodents in the previous 6 weeks.

Supportive treatment for respiratory symptoms is under the direction of the attending health care provider. No specific treatment or cure.

Provide education about the illness and how to prevent exposure.

Contact Management

Not applicable unless exposed to a common source, then as above.

Outbreak Management

Given the rarity of this disease, one case should be considered an outbreak.

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. In addition, provide public health

management of outbreaks or clusters in order to identify the source of illness and stop the outbreak.

Outbreak management should focus on:

- Rodent control;
- Public education about rodent avoidance and control; and
- Surveillance for hantavirus infection in wild rodents.

Prevention and Control Measures

Personal Prevention Measures

Rodent control in and around the home is the primary strategy for preventing hantavirus infection:[1,2]

- Eliminate food sources available to rodents (*e.g.,* storing food meant for humans and animals in a manner that would protect it from rodents);
- Limit possible nesting sites; seal holes and other possible entrances for rodents and use "snap traps" and rodenticides;
- Do not sweep or vacuum rodent contaminated areas; use a wet mop or towel moistened with disinfectant. Disinfect rodent contaminated areas by spraying a disinfectant solution, e.g., diluted bleach (1:10);
- Wear gloves when cleaning rodent contaminated areas and perform hand hygiene after cleaning;
- Avoid inhalation of dust by using approved respirators when cleaning previously unoccupied areas; and
- Avoid wild rodents and direct contact with areas where there is evidence of rodents.

Infection Prevention and Control Strategies

In cases involving hospitalization, routine practices are recommended.[2]

Refer to the Provincial Infectious Diseases Advisory Committee (PIDAC) Routine

Practices and Additional Precautions in All Health Care Settings, 3rd Edition (or as current).

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

Disease Characteristics

Aetiologic Agent - Hantavirus is a virus in the family *Bunyaviridae.* More than 25 antigenically distinguishable viral species exist, each associated primarily with a single rodent species.[1]

The viruses associated with hantavirus pulmonary syndrome (HPS) in the Americas include: the Sin Nombre Virus (SNV) - a major cause of HPS in North America; Bayou virus, Black Creek Canal virus, Monongahela virus and New York virus are responsible for sporadic cases in Louisiana, Texas, Florida, New York and other areas of eastern United States. Andes, Oran, Laguna Negra, and Choclo viruses are associated with cases in South and Central America.[2]

Modes of Transmission - Infected rodents shed live virus in their saliva, feces and urine, with maximal virus concentration in the lungs.[1] Transmission primarily occurs through inhalation of aerosolized virus particles from rodent saliva, urine or feces; through the bites of infected rodents; and through direct contact of broken skin or mucous membrane with rodent excreta.[2] Indoor exposure in closed, poorly ventilated homes, vehicles and outbuildings with visible rodent infestation is particularly important.[1]

Incubation Period – Not completely defined, however most often it has been found to be approximately 2 weeks after exposure, with a range from a few days to 6 weeks.[1]

Period of Communicability - No person-to-person spread has been documented in North America. However, nosocomial and household transmission of Andes virus has been documented in Argentina and Chile, although it is believed to be rare and associated with direct contact.[1,4]

Reservoir - The major reservoir of Sin Nombre virus in North America is the deer

mouse, found primarily in rural and semi-rural areas, often in barns and old buildings. Antibodies against the virus have also been found in pack rats, chipmunks, and other rodents.[3]

Host Susceptibility and Resistance - All persons without prior infection are presumed to be susceptible. Protection and duration of immunity conferred by previous infection is unknown, but antibodies seem to persist for several years. Rural populations, cottagers and campers, and laboratory workers are most at risk in endemic areas.[1] Any indoor exposure in enclosed, poorly ventilated areas with a visible rodent infestation increases risk of infection.

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.

References

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2. Committee on Infectious Diseases, American Academy of Pediatrics. Section 3: Summaries of Infectious Diseases: Hantavirus Pulmonary Syndrome. 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. Drebot M, Artsob H, Werker D. Hantavirus pulmonary syndrome in Canada, 1989-1999. Canada Communicable Disease Report. 2000;26(8):65-9.
4. Drebot M, Jones S, Grolla A, Safronetz D, Strong J, Kobinger G, et al. Hantavirus pulmonary syndrome in Canada: An overview of clinical features, diagnostics, epidemiology and prevention. Canada Communicable Disease Report. 2015;41(6):124-31.
5. Health Protection and Promotion Act, R.S.O. 1990, Reg. 569, Reports, (2018). Available from: https://www.ontario.ca/laws/regulation/900569

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.