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: Paratyphoid Fever

Effective: May 2022

Ontario

Paratyphoid Fever

☒ 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;[3]
- The iPHIS User Guides published by Public Health Ontario (PHO); and
- Bulletins and directives issued by PHO.

Note: *Salmonella* Paratyphi B variant Java should be reported as a case of Salmonellosis, not Paratyphoid fever.

Type of Surveillance

Case-by-case

Case Definition

Confirmed Case

Laboratory confirmation of infection with or without clinically compatible signs and symptoms:

- Isolation of *Salmonella* Paratyphi A, B, or C (excluding *S.* Paratyphi B variant

Java) from an appropriate clinical specimen (e.g., sterile site, blood, stool, urine)

Probable Case

- Clinically compatible signs and symptoms in a person with an epidemiologic link to a laboratory-confirmed case

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

Clinically compatible signs and symptoms are characterized by insidious onset of sustained fever, headache, malaise, anorexia, relative bradycardia, constipation or diarrhea.

Clinical Presentation

Paratyphoid fever is a systemic bacterial disease which usually presents with fever, headache, and malaise. Other symptoms may include anorexia, constipation, which is more common than diarrhea, bradycardia, non-productive cough, enlargement of spleen, and rose spots on trunk, visible in 25% of light-skinned patients.[2]

The clinical picture varies from mild illness with low-grade fever to severe clinical disease with abdominal discomfort and multiple complications. Severity is influenced by factors such as strain virulence, quantity of inoculum ingested, duration of illness before treatment, and age.[2]

Laboratory Evidence

Laboratory Confirmation

The following will constitute a confirmed case of paratyphoid fever:

- Positive *S.* Paratyphi A, B, or C culture (excluding *S.* Paratyphi B variant Java)

Approved/Validated Tests

- Standard culture for *S.* Paratyphi A, B, or C
- Serotyping for O, H and K antigens

Indications and Limitations

- Further typing (e.g., serotype, pulsed field gel electrophoresis (PFGE), or whole genome sequencing (WGS)) may be conducted as appropriate to support linkage between cases.

Note: blood may be positive as early as the first week of illness; feces and urine after the first week.[2]

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.

In addition, the following disease-specific information may be collected:

- History of out-of-province or international travel, or close contact with a recent traveler/visitor to an endemic country. Include earliest and latest exposure dates, and
- Food history for the 10-day period prior to symptom onset.

Identify close contacts (see definition below).

Educate the case about transmission of infection and proper hand hygiene.

Treatment with antibiotics and follow up is under the direction of the attending health care provider. Where possible, physicians should be encouraged to request antibiotic sensitivity testing due to resistant strains. Note any treatment prescribed including name of medication, dose, and duration of treatment, start and finish dates.

The following exclusion criteria were adopted from the British Columbia Centre for Disease Control (BC CDC).[4]

Exclusion Criteria:

Exclude all cases (regardless of symptoms) of *S.* Paratyphi from food handling, healthcare[*] and daycare activities until provision of:

- 3 consecutive negative stool samples collected at least 48 hours apart AND
- at least 48 hours after completion of antibiotic treatment (for ciprofloxacin) OR
- at least 2 weeks after completion of antibiotic treatment (for ceftriaxone and azithromycin).[4]
- If the patient is treated with another antibiotic or the antibiotic is unknown,

[*] If the healthcare setting is a hospital, use the "Enteric Diseases Surveillance Protocol for Ontario Hospitals" (OHA and OMA Joint Communicable Diseases Surveillance Protocols Committee, 2017 or as current) for exclusion.

discuss with the attending clinician.

- If case was treated while traveling and the appropriate medication may not have been prescribed, the case should be referred to a physician for assessment. Sampling should only commence after the appropriate treatment is completed.

Collection of stool samples:[4]

- Submit 3 stool samples at least 48 hours apart. If all 3 samples are negative, end exclusion.
- If any of the 3 samples are positive, continue sampling at least 48 hours apart for a maximum of 3 more samples. If 3 consecutive samples are negative, end exclusion.
- If 3 consecutive negative stool samples (after 6 samples collected) cannot be achieved, the confirmed case is classified as an excreter (see below).

Excreter:

- A confirmed case who continues to excrete *S.* Paratyphi after 6 stool samples are collected, at least 48 hours apart, and at least 48 hours to 2 weeks (see above) after completion of antibiotic treatment to which the pathogen is known to be sensitive.
- If an excreter is identified, an assessment is required to determine the risk of transmitting the pathogen further.[4]

Cases not working in or attending high risk settings:

S. Paratyphi infections can lead to an excreter state. While no exclusion is necessary, public health should educate *S.* Paratyphi cases and their physician about the availability of testing to ensure clearance of the organism. Personal hygiene practices should be emphasized.[4]

Contact Management

Close contacts include any members of a travel party to endemic regions, household members, and sexual partners.

Investigate close contacts:

- Note any symptoms, onset, and severity.
- Determine susceptibility of contact including immune status, medical status and other risk factors.
- Identify those involved in high risk activities or settings.

These contacts should be seen by their health care providers and screened for illness (that is, stool specimens taken for testing).

Symptomatic Contact:

Exclude symptomatic contacts from food handling, healthcare[†] and daycare activities until provision of:

- 2 consecutive negative stool samples collected at least 48 hours apart, and
- If any sample is positive, exclude as per confirmed case.[4]

Asymptomatic Contact:

- Exclusion of an asymptomatic contact who traveled with a case until 2 negative stool samples taken at least 48 hours apart.[4]
- No exclusion required for asymptomatic contacts who did not travel with a case. (If the source of illness in the case is unclear, consider testing contacts to identify the source.)

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,

---

[†] If the healthcare setting is a hospital, use the "Enteric Diseases Surveillance Protocol for Ontario Hospitals" (OHA and OMA Joint Communicable Diseases Surveillance Protocols Committee, 2017 or as current) for exclusion.

manage the outbreak and limit secondary spread.

Two or more cases linked by time, common exposure, and/or place is suggestive of an outbreak.

For more information regarding specimen collection and testing, please see the Public Health Inspector's Guide to the Environmental Microbiology Laboratory Testing (2017, or as current).[5]

Refer to Ontario's Foodborne Illness Outbreak Response Protocol (ON-FIORP) 2020 (or as current) for multi-jurisdictional foodborne outbreaks which require the response of more than two Partners (as defined in ON-FIORP) to carry out an investigation.

Prevention and Control Measures

Personal Prevention Measures

Prevention measures:

- Education on proper hygiene, especially hand washing after defecation and before food preparation and eating;
- Practice food and water precautions while travelling in endemic areas: avoid consumption of unpasteurized milk and raw or undercooked shellfish, particularly shellfish harvested from water contaminated with human waste, wash fresh produce before cutting or consuming and thoroughly cook all food derived from animal sources;
- Shellfish should be boiled or steamed for at least 10 minutes before consumption; and
- Travellers should be referred to travel clinics to assess their personal risk and appropriate preventive measures.[2]

For more food safety prevention measures, please see the Ministry of Health's (ministry) food safety "Frequently Asked Questions".

Infection Prevention and Control Strategies

If hospitalized, routine practices and contact precautions are recommended.[1]

Properly implemented exclusion requirements can contribute to the prevention and control of secondary cases. Exclusion criteria are detailed below.

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

Disease Characteristics

Aetiologic Agent - Paratyphoid fever may be caused by *Salmonella enterica* serovars Paratyphi A, B, and C (commonly *S.* Paratyphi).[1]

Note: *Salmonella* Paratyphi B variant Java should be reported as a case of Salmonellosis, not Paratyphoid fever.

Modes of Transmission - Transmitted by the fecal-oral route through the ingestion of food and water contaminated by feces and urine of cases and carriers. Common sources include contaminated milk and milk products, raw fruit and vegetables, and shellfish harvested from contaminated water. Flies may be vectors.[2]

Incubation Period – 1 to 10 days.[2]

Period of Communicability - Communicable as long as organisms are excreted, which is from the appearance of prodromal symptoms, throughout illness, and for periods of up to two weeks after onset.[2]

Reservoir - Exclusively humans for Paratyphi A; humans, and possibly, domestic animals for other serovars. Family contacts may be transient or permanent carriers. A carrier state may follow acute illness, mild illness, or even sub-clinical infections. The chronic carrier state is most common among persons infected during middle age, especially women, and they frequently have biliary tract abnormalities including gallstones. A chronic urinary carrier state may occur in individuals with schistosomiasis or kidney stones.[2]

Host Susceptibility and Resistance - Susceptibility is general and is increased in individuals with gastric achlorhydria and possibly in those who are HIV positive.

Relative specific immunity follows recovery from clinical disease and inapparent infection.[2]

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

1. Committee on Infectious Diseases, American Academy of Pediatrics. Section 3: Summaries of Infectious Diseases: *Salmonella* Infections. 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.
2. Heymann DL, editor. Control of Communicable Diseases Manual. 20 ed. Washington, D.C: American Public Health Association; 2015.
3. Health Protection and Promotion Act, R.S.O. 1990, Reg. 569, Reports, (2018). Available from: https://www.ontario.ca/laws/regulation/900569
4. BC Centre for Disease Control. Communicable Disease Control - Enteric Cases and their Contacts: Exclusion from High Risk Settings (May 2013). Vancouver, BC: Provincial Health Services Authority; 2013. Available from: http://www.bccdc.ca/health-professionals/clinical-resources/communicable-disease-control-manual/communicable-disease-control
5. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Public Health Inspector's Guide to Environmental Microbiology Laboratory Testing. Evergreen ed. Toronto, ON: Queen's Printer for Ontario; 2021. Available from: https://www.publichealthontario.ca/-/media/Documents/Lab/phi-guide.pdf?sc_lang=en

Case Definition Sources

Heymann DL, editor. Control of communicable diseases manual. 20th ed. Washington, DC: American Public Health Association; 2015.

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.