

Appendix A: Disease-Specific Chapters

Chapter: Paratyphoid Fever

Effective: February 2019

Paratyphoid Fever

Communicable

Virulent

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

1.0 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.

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

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

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>

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

4.0 Epidemiology

4.1 Occurrence

Worldwide.² Paratyphoid fever is not known to be endemic in Ontario. Occurrence does not demonstrate the typical summer case counts noted for other enteric diseases because paratyphoid cases are almost always associated with travel to endemic regions of the world, such as South Asia, Indo-China and some developing countries.

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

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

4.3 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

4.4 Incubation Period

1 to 10 days.²

4.5 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

4.6 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

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);
- The iPHIS User Guides published by PHO; and
- Bulletins and directives issued by PHO.³

6.0 Prevention and Control Measures

6.1 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 and Long-Term Care’s food safety frequently asked questions available from:

<http://www.health.gov.on.ca/en/public/programs/publichealth/foodsafety/faq.aspx>

6.2 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 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.

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 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, available at: <https://www.oha.com/labour-relations-and-human-resources/health-and-safety/communicable-diseases-surveillance-protocols>

- If the patient is treated with another antibiotic or the antibiotic is unknown, 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.
- 1 negative urine sample from a confirmed case who has ever traveled to a schistosomiasis-endemic country and may have been exposed to schistosomiasis.

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

6.4 Management of Contacts

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,
- 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.)

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.

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) 2013 (or as current) for multi-jurisdictional foodborne outbreaks which require the response of more than two Parties (as defined in ON-FIORP) to carry out an investigation.

<http://health.gov.on.ca/en/pro/programs/publichealth/enviro/>

7.0 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>

[†] 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, available at: <https://www.oha.com/labour-relations-and-human-resources/health-and-safety/communicable-diseases-surveillance-protocols>

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. 5th ed. Toronto, ON: Queen's Printer for Ontario; 2017. Available from: <https://www.publichealthontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/PHIGuide.aspx>

8.0 Document History

Table 1: History of Revisions

Revision Date	Document Section	Description of Revisions
March 2017	General	New Template
March 2017	6.3 Management of Cases	“Enteric Diseases Surveillance Protocol for Ontario Hospitals” reference updated
March 2017	7.0 References	Updated
March 2017	9.0 Document History	Updated
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	3.1 Clinical Presentation	Second paragraph last sentence removed: “Peyer patches in the ileum can ulcerate with intestinal haemorrhage or perforation, especially late in untreated cases” and replaced with “Severity is influenced by factors such as strain virulence, quantity of inoculum ingested, duration of illness before treatment, and age.”

Revision Date	Document Section	Description of Revisions
February 2019	4.2 Reservoir	First sentence: “Humans, and questionably, domestic animals” replaced with “Exclusively humans for Paratyphi A; humans, and possibly, domestic animals for other serovars.”
February 2019	6.3 Management of Cases	Exclusion criteria, added last bullet: “1 negative urine sample from a confirmed case who has ever traveled to a schistosomiasis-endemic country and may have been exposed to schistosomiasis.”

