Prince Edward Island
CANADA

Health and Wellness

Prince Edward Island Guidelines for the Management and Control of Salmonellosis

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Department of Health and Wellness

Chief Public Health Office

Contents

Case Definition [1]

Confirmed Case

Laboratory confirmation[a] of infection with or without clinical illness[*]:

- Isolation of *Salmonella* spp. (excluding *Salmonella* Typhi) from an appropriate clinical specimen (e.g., stool, blood, cerebrospinal fluid, rectal swab, deep tissue wounds, other sterile site, vomit, urine).

Probable Case[b]

- Clinical illness [*] in a person who is epidemiologically linked to a confirmed case.
  OR
- Detection of *Salmonella* spp. nucleic acid with or without clinical illness, in an appropriate clinical specimen (dependent on the test used), using a nucleic acid test (NAT), such as a polymerase chain reaction (PCR).

Note: Culture is required for public health and clinical management. Thus, culture must be performed on NAT-positive (NAT+) specimens to enable molecular typing (e.g., whole genome sequencing) for surveillance, outbreak detection and response, as per Canadian Public Health Laboratory Network (CPHLN) guidance. An isolate may also be required for antimicrobial susceptibility testing (AST) and/or antimicrobial resistance (AMR) predictions to guide clinical treatment and/or for AMR surveillance.

Note: NAT-positive (NAT+) and culture-negative (culture–) results would still be considered a probable case.

[*]Clinical illness may be characterized by the following signs or symptoms: Diarrhea, chills, headache, abdominal pain, nausea, fever and/or vomiting. The severity of illness may vary. While not considered clinical illness, asymptomatic infections may occur.

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[a] The use of culture independent diagnostic tests (CIDTs) in clinical settings as stand-alone tests for the direct detection of *Salmonella* in stool is increasing. Common CIDTs include antigen-based tests and molecular nucleic acid tests (NATs). Canada has used the terms NAT and PCR in their case definitions to exclude antigen-based CIDTs, which currently are not readily used or available for most enteric bacterial pathogens.
It is best practice to culture the NAT positive specimen as soon as possible, such as performing culture in the laboratory that generated the NAT positive signal. When a specimen is positive using a NAT, it is strongly advised to collect and document information on all culture results for the specimen.
(i.e., NAT+/culture+ **versus** NAT+/culture– **versus** NAT+/culture not done); this information is helpful to inform the development and implementation of CIDT and associated case definitions at the provincial, territorial, and national levels.

[b] Includes *S.* Paratyphi (paratyphoid fever). Probable case definitions are provided as guidelines to assist with case finding and public health management and are not for national notification purposes.

Refer to the Provincial Guide to Laboratory Services for current specimen collection and submission information.[2]

Reporting Requirements

Laboratories

The Provincial Laboratory shall in accordance with the Prince Edward Island *Public Health Act*[3], report all positive laboratory results by phone and mail, fax or electronic transfer as soon as the result is known to the Chief Public Health Officer (CPHO) (or designate).

Etiology

Salmonellosis is caused by gram-negative, non-spore-forming bacilli belonging to the *Enterobacteriaceae* family. About 2500 serotypes of *Salmonella* have been identified. The most common serotypes that cause human disease are divided among the O-antigen groups A through E. *Salmonella enteritidis* (serotype D) *and Salmonella typhimurium* (serotype B) are the most reported serotypes in many countries that maintain *Salmonella* surveillance.[4]

Clinical Presentation

Salmonellosis is a bacterial infection causing acute enterocolitis with a sudden onset of headache, fever, abdominal pain, diarrhea, nausea, and occasionally vomiting. Diarrhea is usually self-limiting and can last 4–7 days. Fever, if present, usually resolves in 48–72 hours. Dehydration may be a severe complication, especially in the very young and elderly. Septicemia and focal infections may develop, including meningitis, brain abscess and osteomyelitis. Reactive arthritis is an autoimmune condition associated with gastrointestinal infections such as *Salmonella*. Asymptomatic infections can occur. Invasive infection is more likely to occur in very young, very old or immunosuppressed individuals.

Diagnosis

Isolation of a diagnosis of *Salmonella* organisms in a culture from an appropriate clinical specimen is diagnostic.

Epidemiology

1. **Reservoir**

   The reservoirs for non-typhoidal *Salmonella* organisms include a wide range of wild and domestic animals, including birds, poultry (e.g., chicks), livestock (e.g., cattle), reptiles (e.g., turtles), amphibians (e.g., frogs), rodents (e.g., mice, hamsters), and household pets (e.g., dogs, cats, hedgehogs).

   In humans, convalescent carriers, mild or unrecognized cases may also serve as reservoirs.

2. Transmission

Salmonella is a zoonotic disease. Food of animal origin is the predominant source of transmission to humans. Food sources include contaminated raw or undercooked egg/egg products, meat/meat products, unpasteurized milk/milk products, poultry/poultry products, and contaminated fruits and vegetables. Infection may occur from ingesting food contaminated by the feces of an infected animal or person. Cross-contamination can occur from a contaminated source to other foods or objects (e.g., utensils, equipment, kitchen surfaces) in the environment. Outbreaks have been linked to consuming fruits or vegetables contaminated in the kitchen or their growing environment. Drinking contaminated water is another vehicle of transmission.

Contact with animals (e.g., infected reptiles, amphibians, rodents, or other mammals) or their environments can lead to infection with *Salmonella*. The infection can be transmitted to farm animals through feeds and fertilizers made from contaminated meat scraps, tankage, fishmeal, and bones.

Person-to-person transmission through the fecal-oral route is also possible, especially when diarrhea is present.

3. Incubation Period

The incubation period is commonly 12–36 hours, ranging from 6–72 hours.[4] Longer incubation periods of up to 16 days have been documented and may be more common following low-dose ingestion of the organism.

4. Period of Communicability

Period of communicability lasts throughout the course of infection and can vary from several days to several weeks.

After symptoms resolve, the mean duration of carriage of non-typhoidal *Salmonella* in the stool is about 4–5 weeks. Chronic carriers in humans are rare. Depending on the serotype, about 1% of adults and 5% of children under five years continue to excrete *Salmonella* organisms for up to one year.

5. Host susceptibility

Susceptibility is general and is usually increased by pregnancy, achlorhydria (a condition in which production of gastric acid in the stomach is absent or low), antacid therapy, gastrointestinal surgery, prior or current antibiotic therapy, neoplastic disease, immunosuppressive therapy, and other debilitating conditions including malnutrition. Disease severity is related to serotype, number of organisms ingested, and host factors.

Occurrence

1. General

Salmonella is more extensively reported in North America and Europe, likely because of more frequent culturing and better reporting. The incidence is highest in infants and children younger than five years of age.

2. Canada

Salmonellosis is Canada's fourth most frequently reported food-related illness[5]. Many of these illnesses are sporadic cases, but some are part of outbreaks [5].

Salmonella was the most common pathogen reported to the National Enteric Surveillance Program (NESP) in 2019. The three most reported *Salmonella* serovars include *S. Enteritidis* being the most frequently reported, followed by *S. Typhimurium*, and *S. enterica* serotype I.

3. Prince Edward Island

The rate of *Salmonella* cases fluctuates from year to year in PEI and may range from 16-34 per year [6].

Control

1. Management of a case

- The CPHO is involved in the investigation of all *Salmonella* cases. Public Health Nursing, Health PEI, will follow up on all lab-confirmed cases, and environmental health officers may be consulted on cases as appropriate. The CPHO will provide advice on the management of cases.
- Notification of test results and prescription of treatment (if required) will be carried out by the primary health care provider.
- Information should be provided to the case about disease transmission and the appropriate infection prevention and control measures to be implemented to minimize the possibility of transmission, including strict hand hygiene, especially after using the washroom, changing diapers and before preparing/handling and serving food.
- Exclusion should be considered for symptomatic persons who are:
    - food handlers whose work involves
        - touching unwrapped food to be consumed raw or without further cooking and/or
        - handling equipment or utensils that touch unwrapped food to be consumed raw or without further cooking,
    - healthcare, daycare, or other staff who have contact through serving food with highly susceptible patients or persons in whom an intestinal infection would have particularly serious consequences,

    - involved in patient care or care of young children, elderly, or dependent persons,
    - children attending daycares or similar facilities who are diapered or unable to implement good standards of personal hygiene, and
    - older children or adults who are unable to implement good standards of personal hygiene (e.g., mentally, or physically challenged)
- Exclusion applies until at least 48 hours after normal stools have resumed or treatment with appropriate antibiotics has been completed.
- Advise the case about proper food handling practices and to refrain from preparing food for others for the duration of communicability.
- Asymptomatic individuals who are indicated in the above categories are generally not excluded from work or daycare.
- Contact precautions should be used in healthcare settings where children or adults have poor hygiene or incontinence that cannot be contained. Otherwise, routine practices are adequate.

2. Treatment of a case [4]

- *Salmonella* gastroenteritis is usually a self-limiting disease and therapy is generally directed to the replacement of fluids and electrolyte balance.
- Antibiotics are generally not indicated for the treatment of uncomplicated non-typhoidal *Salmonella* infections as they do not shorten the duration of diarrheal illness and can prolong the duration of fecal excretion of the organism.
- Antibiotics may not clear the carrier state and may lead to resistant strains or more severe infections.
- Antimicrobial therapy, however, should be considered for:
    - Individuals with severe illness such as those with severe diarrhea, continued/high fever, or manifestations of extra-intestinal infections AND individuals at risk for invasive disease such as the very young (< 3 months), the elderly, debilitated and those who are immunocompromised.
    - Fluoroquinolones (e.g., ciprofloxacin) is highly effective but not approved for children.
    - Ampicillin or amoxicillin may be used for children.
    - For treatment of serious *Salmonella* infection in children, consult the Infectious Disease Consultant or Pediatrics.
- Antimicrobial resistance is variable. Therefore, antibiotics, if indicated, should be prescribed based on sensitivity testing.

3. Management of contacts

- Provide information about disease transmission and appropriate infection prevention and control measures. Stress the measures that need to be taken to minimize possible fecal-oral transmission, including strict hand hygiene, especially after using the washroom, changing diapers, and before eating and preparing/handling foods.
- Contacts should be instructed about disease transmission, appropriate personal hygiene, routine practices, and contact precautions.
- A physician should assess symptomatic contacts.
- Contacts who are symptomatic may be excluded from daycare or similar facilities or occupations involving food handling, patient care, or care of young, elderly or dependent persons.
- Asymptomatic contacts, in general, are not excluded from work or daycare; however, they should monitor themselves for gastrointestinal symptoms, maintain good hand hygiene and food handling practices, seek medical attention if symptoms develop. If symptoms develop, exclusions will apply as for a case.

4. Preventative measures

- Educate the public, including food handlers, about:
  - Thoroughly cooking eggs, poultry (processed breaded chicken products) and other foods of animal origin
  - Avoiding cross-contamination of food, keeping uncooked meats separate from produce, cooked foods, and ready-to-eat foods; thoroughly washing hands, cutting boards, counters, knives, and other utensils after handling uncooked foods
  - The possible dangers of consuming raw or undercooked eggs (e.g., eggs 'over easy' or 'sunny side up', eggnogs, homemade ice cream, foods with hidden raw egg such as hollandaise sauce) and using dirty or cracked eggs
  - Fully thawing frozen foods before cooking
  - Storing foods at appropriate temperatures, ensuring hot foods remain hot and cold foods remain cold
  - Thoroughly washing fruits and vegetables
  - Avoiding raw or undercooked sprouts
  - Avoiding raw or unpasteurized milk or other dairy products
  - Proper food handling practices, equipment handling and strict personal hygiene
  - The possible risks of *salmonella* infection from certain animals/pets, including reptiles (e.g., turtles, snakes, and lizards), amphibians (e.g., frogs and toads), and poultry (e.g., chicks, chickens, ducks, ducklings, geese, turkeys). Also, pocket pets (e.g., guinea pigs and rodents like hamsters), dogs, cats, birds, horses, and other farm animals (e.g., goats, calves, sheep) can carry and pass *Salmonella* to people

- Encouraging good hand washing after handling animals or pet foods/treats and after cleaning pet enclosures
- The risks of infection associated with *Salmonella* pathogens that may be found in aquariums
- Measures to reduce fecal-oral transmission, such as strict hand hygiene practices, the sanitary disposal of feces and careful hand washing after caring for diapered children, after using the washroom and before handling, preparing or eating food
- The risks of sexual practices that permit fecal-oral contact

References

1. Public Health Agency of Canada. (2023, December). National case definition: Salmonellosis. https://www.canada.ca/en/public-health/services/diseases/salmonellosis-salmonella/health-professionals/national-case-definition.html
2. Prince Edward Island Laboratory Services. (2022, August) https://www.princeedwardisland.ca/en/information/health-pei/laboratory-services
3. Public Health Act of Prince Edward Island. Legislative Assembly of PEI. May 2022 https://www.princeedwardisland.ca/sites/default/files/legislation/p-30-1-public_health_act.pdf
4. Heymann, David L. (2015). Control of Communicable Diseases Manual 20th Edition. Washington: American Public Health Association.
5. Public Health Agency of Canada (2016, July). Yearly food-borne illness estimates for Canada. https://www.canada.ca/en/public-health/services/food-borne-illness-canada/yearly-food-borne-illness-estimates-canada.html
6. CPHO Report 2016. Health for All Islanders, Promote, Prevent, Protect: PEI Chief Public Health Officer's Report 2016.
7. Government of Alberta. Salmonella Infections Guideline 2014. [Online] August 2017. https://open.alberta.ca/publications/salmonellosis