

2.14 Salmonellosis

Etiology

Salmonellosis is caused by gram negative non-spore forming bacilli belonging to the *Enterobacteriaceae* family. There are more than 2460 serotypes. The most common serotypes that cause human disease are divided among the O-antigen groups A through E. *Salmonella* serotype Typhimurium (serotype B) and *E. Salmonella* serotype Enteritidis (serotype D) are the most commonly reported human isolates.

Case Definition

Confirmed Case

Laboratory confirmation of infection with or without clinical illness:

- Isolation of *Salmonella sp.* (excluding *Salmonella* Typhi) from an appropriate clinical specimen (e.g. sterile site, deep tissue wounds, stool, vomit or urine)

Probable Case

Clinical illness¹⁰ in a person who is epidemiologically linked to a confirmed case

Clinical Presentation

Salmonella organisms can cause asymptomatic carriage, gastroenteritis, bacteremia and focal infections such as meningitis and osteomyelitis. The most common illness associated with a *Salmonella* infection is gastroenteritis, in which diarrhea, abdominal cramps, and fever are common manifestations. The site of infection usually is the small intestine but colitis can occur. The illness usually lasts 4 to 7 days and most people recover without treatment. The very young, the elderly and immunosuppressed persons are more at risk for complications.

Diagnosis

The diagnosis is made through the isolation of *Salmonella* from feces, rectal swabs or other body fluids. Freshly passed stool is preferred. For confirmation on laboratory specimens go to the public health laboratory web site www.publichealthlab.ca or call 709-777-6583.

Epidemiology

Occurrence

Salmonellosis occurs worldwide and it is generally considered a foodborne disease. There are over 2460 serotypes which cause human diseases but the two most common

¹⁰ Clinical illness is characterized by headache, diarrhea, abdominal pain, nausea, fever and sometimes vomiting. Asymptomatic infections may occur, and the organism may cause extra-intestinal infections.

serotypes recovered in Canada are *Salmonella Enteritidis* and *Salmonella Typhimurium*. It is estimated that only 1% of clinical cases are reported. From 2000 to 2004 rates of salmonellosis have ranged from 16.0 – 19.6/100,000 in Canada. In Newfoundland and Labrador during the same period the rate ranged from 5.4 -10.5/100,000. In 2015, 73 cases of salmonellosis were reported in NL.

Reservoir

Salmonella species are widely present in animal reservoirs including poultry, birds, reptiles, livestock, rodents, pets; such as iguanas, tortoises, turtles, dogs and cats; also humans.

Transmission

The major mode of transmission is fecal oral route. (i.e. ingestion of food or water contaminated with animal or human feces). Another source of transmission is food of animal origin, such as poultry, beef, eggs, and dairy products. Other food vehicles (e.g., fruits, vegetables, and bakery products) have been implicated in outbreaks, in which the food was contaminated by contact with an infected animal product or human. Other modes of transmission include ingestion of contaminated water; contact with infected reptiles or amphibians and possibly rodents; and exposure to contaminated medications, dyes, and medical instruments.

Incubation Period

The incubation period is from 6 to 72 hours, usually 12-36 hours.

Communicability

The risk of human-to-human transmission exists for the duration of fecal excretion of organisms.

Control Measures

Management of Case

Investigations

- Obtain a food history using the appropriate questionnaire to determine recent consumption of potential sources (e.g., undercooked poultry, eggs, dairy products, sprouts, etc.).
- Determine the possible source of infection taking into consideration the incubation period, reservoir, and mode of transmission.
- Identify history of residing in areas with poor sanitation including improper water treatment and sewage disposal and include recent immigration.
- If necessary, identify history of high risk sexual practices, especially contact with feces.
- Determine history of exposure to pets or farm animals that may harbor the disease.
- Assess for history of similar symptoms in other members of the household.
- Hold suspected contaminated food to prevent consumption and illness.
- Have suspected contaminated food destroyed.

Exclusion

- Exclusion (staying away from school or work) should be considered for symptomatic and asymptomatic cases 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, who, in 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).
- Advise the case of the work restrictions until the case has been symptom free for 48 hours.
- Reassignment to a low risk area may be used as an alternative to exclusion.

Treatment

- Rehydration and electrolyte replacement should be provided.
- Antibiotic treatment may be recommended by a physician. Antibiotic therapy may be recommended for:
 - individuals with severe disease,
 - individuals with systemic illness including septicemia,
 - the very young (< two months), elderly, and debilitated persons,
 - individuals with cardiac valvular or endovascular abnormalities,
 - persons with HIV, and
 - individuals with other immunocompromised states.
- The use of antibiotics is often not effective in eradicating the carriage of Salmonella if anatomic abnormalities (i.e., biliary or kidney stones) are present.

Management of Contacts

- Symptomatic contacts must be referred for investigation. Investigation of contacts should include stool cultures of any household contacts who are involved in food handling, direct patient care, or care of young children or elderly people in institutional settings.
- Contacts should be given information on disease transmission and appropriate personal hygiene.

Management of Outbreaks

An outbreak management team should be established to address infection prevention and control measures. If the outbreak is limited to one region the region is responsible to

manage the outbreak; if more than one region is involved the outbreak will be managed by the province or in consultation with the province.

Education and Preventive Measures

- Educate the public about good sanitation and personal hygiene
- Food establishments should ensure compliance with the *Food Premises Regulations*.
- Follow the clean, separate, cook and chill rules
 - Clean: wash hands and surfaces often
 - Wash hands before and after handling food and after using the bathroom, changing diapers, and handling pets.
 - Wash utensils, cutting boards, dishes, and countertops after preparing each food item and before you go on to the next item
 - Separate: Don't cross-contaminate
 - Separate raw meat, poultry, and seafood from other foods in the grocery shopping cart and in the refrigerator.
 - Always wash cutting boards, dishes, countertops, and utensils after they come in contact with raw meat, poultry, and seafood.
 - Never place cooked food on a plate that previously held raw meat, poultry, or seafood
 - Cook: Cook to safe temperatures
 - Use a clean food thermometer when measuring the internal temperature of meat, poultry, casseroles, and other foods to make sure they have reached a safe minimum internal temperature
 - Do not eat or drink foods containing raw eggs, or unpasteurized milk
 - Chill: Refrigerate promptly
 - Keep food safe at home, refrigerate promptly and properly. Refrigerate or freeze perishables, prepared foods, and leftovers within 2 hours (1 hour if temperatures are above 90 °F)
 - Freezers should register 0 °F or below and refrigerators 40 °F or below
 - Thaw food in the refrigerator, in cold water, or in the microwave. Foods should not be thawed at room temperature
 - Foods thawed in the microwave or in cold water must be cooked to a safe minimum internal temperature before refrigerating
 - Marinate foods in the refrigerator
 - Divide large amounts of leftovers into shallow containers for quick cooling in the refrigerator
 - Don't pack the refrigerator. Cool air must circulate to keep food safe
- Provide a fact sheet available at
http://www.health.gov.nl.ca/health/publichealth/envhealth/Salmonellosis_Food_Safety_Jan_2011.pdf

Reporting Requirements and Procedures

- The laboratory (hospital or public health laboratories) report case/s to the attending physician, the Chief Medical Officer of Health and the Medical Officers of Health (MOH)
- The MOH office will notify, as required, local physicians, nurse practitioners, environmental health officers, community health nurses, communicable disease control nurses (CDCNs) and infection control practitioners (ICP), in the particular region as required for follow-up and case investigation.
- EHO will conduct an investigation of the case under the direction of the MOH and provide case details as per the food history.
- CDCN enters the case details into the electronic reporting system and uses the CNPHI tool, if indicated, for alerts or outbreak summaries

Provincial Disease Control

- Reports the aggregate case data to Public Health Agency of Canada
- Provides an analysis of the case/s with reports in the Quarterly Communicable Disease Report (CDR), also posted on the Public Health website
- Coordinates the response if an outbreak across RHAs (CMOH will likely coordinate an outbreak across RHAs with input from disease control and environmental health.)

References

Foodborne Pathogenic Microorganisms and Natural Toxins – Salmonellosis spp. US Food and Drug Administration Centre for Food Safety and Applied Nutrition. Bad Bug Book. January 1992. Retrieved June 3rd, 2013, from <http://www.fda.gov/downloads/Food/FoodSafety/FoodborneIllness/FoodborneIllnessFoodbornePathogensNaturalToxins/BadBugBook/UCM297627.pdf>