

2.16 Typhoid and Paratyphoid Fever

Etiology

Typhoid fever is caused by *Salmonella typhi*. At present, 107 types can be distinguished by phage typing, which is valuable in epidemiologic studies.

For paratyphoid fever, three bioserotypes of *S. enteritidis* are recognized: Paratyphi A, Paratyphi B (*S. schottmulleri*), and Paratyphi C (*S. hirschfeldii*). A number of phage types can be distinguished.

Case Definition

Confirmed Case

Clinical illness¹² with laboratory confirmation of infection:

- isolation of *Salmonella typhi* from an appropriate clinical specimen

Clinical Presentation

Typhoid is a systemic bacterial disease. Mild and inapparent illness may occur, especially in endemic areas. Infection is characterized by insidious onset of sustained fever, severe headaches, malaise, anorexia, a nonproductive cough (in the early stage of the illness), a relative bradycardia, and hepatosplenomegaly (50%). Approximately 30% of Caucasians will develop rose spots on the trunk. In adults, constipation is more common than diarrhea (10% to 38%). Only 20% to 40% of people will initially have abdominal pain. Nonspecific symptoms such as chills, diaphoresis, headache, anorexia, cough, weakness, sore throat, dizziness, and muscle pains are frequently present before the onset of fever. Psychosis and confusion occur in 5 to 10% of people. Seizures and coma are reported in less than 1% of those infected.

The usual case-fatality rate of 10% can be reduced to less than 1% with prompt treatment. Relapse occurs in 5% to 10% of untreated cases and is also common (15%–20%) following therapy with appropriate antibiotics.

Paratyphoid, like typhoid, is a systemic bacterial disease. The clinical manifestations tend to be milder, and the case-fatality rate is much lower. Ratio of disease caused by *Salmonella typhi* to that caused *S. paratyphi* is about 10:1. Relapses occur in approximately 3%–4% of cases.

A chronic carrier status is defined as persistence of the organism in stool for more than one year and occurs in 1% to 4% of cases. The carrier state may follow acute illness,

¹² Typhoid is characterized by insidious onset of sustained fever, headache, malaise, anorexia, splenomegaly, constipation or diarrhea, and nonproductive cough. Relative bradycardia and rose spots (less than 25% of individuals) may be seen. Atypical presentations occur and severity of illness varies.

mild or even subclinical infections. It is most common when individuals (especially women) are infected during middle age and in those with biliary tract abnormalities including gallstones.

Diagnosis

The etiologic organisms can be isolated from the blood early in the disease, and from feces after the first week. For confirmation on laboratory specimens go to the public health laboratory web site www.publichealthlab.ca or call 709-777-6583.

Epidemiology

Occurrence

Both diseases occur worldwide. They are endemic in many developing countries particularly Africa, Central and South America, and India. The incidence is extremely low in developed countries such as Canada. The risk to Canadians is during travel to endemic areas. An average of 139 cases of typhoid and 108 cases paratyphoid were reported in Canada annually between 2004 and 2006. There have been no cases reported in Newfoundland Labrador since 1991.

Reservoir

The reservoir for typhoid and paratyphoid fever is man; and rarely, domestic animals for paratyphoid fever.

Transmission

Typhoid and paratyphoid transmission occurs when food or water becomes contaminated with the feces and urine of infected individuals and carriers. Transmission can also take place if raw sewage contaminates seafood such as shellfish. The infection is rarely spread by casual contact.

Incubation Period

For typhoid, the incubation period is from three to 60 days (usual range is eight to 14 days) and depends on the size of the infecting dose and host factors. The incubation for paratyphoid fever period is one to ten days.

Communicability

The contagious period is most commonly from one week until the individual is recovered.

Case Measures

Management of Case

Investigations

- Obtain a food history including consumption of shellfish.
- Determine the possible source of infection taking into consideration the incubation period, reservoir, and mode of transmission.
- Determine history of travel.

- If necessary, determine history of high risk sexual practices especially contact with feces.
- Identify history of residing in areas with poor sanitation including improper water treatment and sewage disposal and include recent immigration.
- Determine immunization history.
- Identify underlying medical conditions i.e., decreased gastric acidity, HIV infection, organ transplants, and lymphoproliferative disease.
- Determine occupation and attendance at daycare or other type of institutional contact (e.g., continuing care facility).
- Identify symptomatic household members or other close contacts (e.g. travel companions) who have recently travelled to developing countries.
- When paratyphoid is diagnosed, determine ownership of tropical fish and tank.

Exclusion

Exclusion (staying away from school or work) should be considered for symptomatic and asymptomatic cases 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.
- Older children or adults who are unable to implement good standards of personal hygiene (e.g., mentally or physically challenged).

The specimens must be taken not earlier than one month after onset of illness, at least 48 hours after completion of antimicrobial therapy, and not less than 24 hours apart.

Treatment

- Supportive care and antibiotics are recommended.
- Short-term, high-dose corticosteroid treatment, combined with specific antibiotics and supportive care, clearly reduced mortality in critically ill patients.

Management of Contacts

All members of a travel group in which a case has been identified should be followed. Symptomatic contacts must be referred for medical evaluation. Information on the disease and infection prevention measures must be given to contacts. Contact precautions should be used for the duration of acute illness as well as with hospitalized children and adults who have poor hygiene or incontinence that cannot be contained. Otherwise, routine infection control precautions are adequate.

Management of Outbreaks

An outbreak management team should be established to direct and coordinate the investigation as well as 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

Prevention is based on access to safe water and proper sanitation as well as adherence to safe food handling practices.

The greatest risk for Canadians is when they travel to areas where this disease is endemic.

Advice to travelers

- Visit a travel clinic prior to traveling
- Emphasize the importance of hand hygiene
- Vaccine information
 - There are two vaccines for typhoid licensed in Canada
 - Vaccinate against typhoid if planning to visit rural areas in countries where typhoid is endemic or if they plan long term visits
 - Vaccines only provide 50 – 60% coverage
- Provide food and water precautions recommendations
 - Eat food served hot
 - Eat fruits and vegetables that have been cooked or peeled
 - Avoid road side food vendors
 - Drink bottled or boiled water

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

Public Health Agency of Canada. *Infectious substances - Salmonella enterica*. Office of Laboratory Security. Material Safety Data Sheet. March 2001. Retrieved June 3rd, 2013, from <http://www.phac-aspc.gc.ca/lab-bio/res/psds-ftss/salmonella-ent-eng.php>