

Typhoid

Signs and Symptoms	<ul style="list-style-type: none"> Systemic illness of variable severity with fever, anorexia, lethargy, malaise, headache, non-productive cough, abdominal pain, rose spots early in illness Vomiting and diarrhea may occur, particularly in children, or may be absent Constipation more common in adults than diarrhea Severe form with neurologic changes has highest mortality 	
Incubation	Typically 8-14 days, range 3-60 days	
Case classification	Clinical criteria: Common symptoms – sustained fever, headache, malaise, anorexia, constipation or diarrhea, nonproductive cough; illness can be mild or atypical. Asymptomatic carriage is not reported as a case. Serology is not case defining.	
	Confirmed: Clinically consistent with isolation of <i>S. Typhi</i> from blood, stool, or other clinical specimen	Probable: Clinically consistent with epi link to a laboratory confirmed case in an outbreak
Differential diagnosis	Abdominal abscess, appendicitis, brucellosis, dengue, influenza, leishmaniosis, malaria, rickettsial diseases, toxoplasmosis, tuberculosis, tularemia, typhus, diarrhea due to multiple agents	
Treatment	Depends on organism’s susceptibility. Multidrug resistance can occur. Options include fluoroquinolones (if susceptible), ceftriaxone, and azithromycin	
Duration	3-4 weeks or longer if untreated; chronic carriers occur	
Exposure	Human feces through contaminated food or water during travel (most non-industrialized areas, particularly Southeast Asia, Asia, Africa, Central America), contact with recent arrival	
Laboratory testing	<p>Local Health Jurisdiction (LHJ) and Office of Communicable Disease Epidemiology (CDE) arrange testing if patient is being treated – urgent</p> <ul style="list-style-type: none"> Washington State Public Health Laboratories (PHL) can identify <i>Salmonella</i> Typhi and other <i>Salmonella</i> isolates Best specimens: Stool in Cary Blair, blood culture <p><i>Specimen shipping (Section 4):</i></p> <ul style="list-style-type: none"> Hospital to keep all specimens cold, ship cold with Microbiology form https://www.medialab.com/dv/dl.aspx?d=1887088&dh=52b1a&u=69790&uh=0e2a1 Specimen Collection and Submission Instructions https://www.doh.wa.gov/Portals/1/Documents/5240/SCSI-Ent-SalmConf-V1.pdf 	
Public health actions URGENT	<ul style="list-style-type: none"> Obtain isolate for testing at PHL and CDC Interview for risk situation (e.g., exposed in Washington or another state) Exclude from sensitive occupation or setting After symptoms end, require three negative stools 24 hours apart 48hrs after antibiotics before returning to sensitive occupation or setting; older children may be allowed to return to school if excluded from food handling Exclude from any food preparation for others Identify those exposed to case and those sharing case’s exposure (e.g., travel companions) and test as needed If no source is found, investigate close contacts for a typhoid carrier <p><i>Infection Control:</i> standard precautions, contact precautions if infant or incontinent</p>	

Typhoid (“Enteric”) Fever

1. DISEASE REPORTING

A. Purpose of Reporting and Surveillance

1. To determine if there is a source of infection of public health concern (e.g., a food handler or commercially distributed food product) and to stop transmission from such a source.
2. To assess the risk of the infected person transmitting infection to others, and to prevent such transmission.
3. To identify other undiagnosed cases.

B. Legal Reporting Requirements

1. Health care providers and Health care facilities: notifiable to **local health jurisdiction** within 24 hours
2. Laboratories: *Salmonella* species including *S. Typhi* notifiable to **local health jurisdiction** within 24 hours; submission required – isolate or if no isolate specimen associated with a positive result, within 2 business days
3. Local health jurisdiction: notifiable to the Washington State Department of Health (DOH) Office of Communicable Disease Epidemiology (CDE) within 7 days of case investigation completion or summary information required within 21 days

C. Local Health Jurisdiction Investigation Responsibilities

1. Begin investigation upon receipt of notification.
2. Administer appropriate infection control recommendations (see Section 6A).
3. Ensure that labs forward the first isolate from each patient to the Washington State Public Health Laboratories (PHL).
4. Report all confirmed and probable cases to CDE. Complete the typhoid fever case report <https://www.doh.wa.gov/Portals/1/Documents/5100/210-050-ReportForm-Typhoid.pdf> and enter the data into the Washington Disease Reporting System (WDRS).
5. **Note: *S. Typhi* is reported through WDRS as Typhoid Fever and *S. Paratyphi* is reported through WDRS as Salmonellosis.**

2. THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agents

Typhoid fever is caused by *Salmonella* Typhi (full official designation is *S. enterica* subsp. *enterica* serovar Typhi). It is in group D, which includes non-typhoidal serotypes.

Paratyphoid fever, a milder typhoid-like illness, can be caused by *S. Paratyphi* serotypes A, B, and C, most commonly B. However, the majority of *S. Paratyphi* B infections in Washington are caused by a strain called *S. Paratyphi* B variant L(+) tartrate(+) which causes gastroenteritis rather than paratyphoid fever.

B. Description of Illness

Typhoid ("enteric") fever differs from the more common kinds of salmonellosis. Vomiting and diarrhea may be absent, and constipation is frequently reported. Typhoid is a systemic illness so blood cultures are more likely to be positive than stool, particularly early in the infection, but should be repeated if negative for suspected cases. Bone marrow cultures increase diagnostic sensitivity. Serology is not definitive.

Initial symptoms may include fever, anorexia, lethargy, malaise, headache, non-productive cough, abdominal pain, and constipation. Diarrhea may develop, particularly in children under age one year. In endemic areas, mild infections are common. If the illness progresses, there is protracted fever and mental dullness. Many patients develop hepatosplenomegaly. Some cases develop a truncal salmon-colored macular rash ("rose spots"). Intestinal hemorrhage or perforation may occur and be life-threatening. Without treatment, illness may last 3 to 4 weeks and death rates range between 12% and 30%.

C. Typhoid Fever in Washington State

Typhoid fever is not endemic in Washington. In recent years, 4–22 cases were reported annually to DOH with most having recent travel to typhoid-endemic countries. Some investigations have implicated previously undetected asymptomatic household carriers.

D. Reservoirs and Chronic Carriage

Unlike other salmonellae, *S. Typhi* infect only humans; chronic carriers are important reservoirs. Approximately 5% of acute cases or asymptomatic infections become chronic carriers, defined as carriage extending beyond one year. The risk is highest for persons infected in middle age, particularly women with gall bladder abnormalities. Sanitation improvements over the past 50 years have greatly reduced the prevalence of chronic carriage in the United States. Most carriers in this country are now elderly or immigrants from risk areas including many countries in Southeast Asia, Asia, Africa, and Central America.

E. Modes of Transmission

Mainly consumption of food or water contaminated with feces from persons infected with *S. Typhi*. In endemic countries, disasters like floods can precipitate typhoid outbreaks.

F. Incubation Period

Typically 8–14 days, with a range of 3–60 days.

G. Period of Communicability

Communicable while organisms are excreted in the feces or urine, typically beginning one week after onset through convalescence and then for a variable period (permanently in a carrier state). Up to 10% of untreated cases excrete for 3 months after onset.

H. Treatment

Antibiotic therapy is useful in resolving signs and symptoms, and can be considered in an attempt to eliminate the carrier state. The choice of antibiotics is dependent on the susceptibility of the organism. Multidrug-resistant isolates of *S. Typhi* are common, particularly in Southeast Asia, including reduced susceptibility to fluoroquinolones.

Options include fluoroquinolones (for susceptible infections), ceftriaxone, and azithromycin. Mortality can be 20% without treatment.

3. CASE DEFINITIONS

A. Clinical Description

An illness caused by *S. Typhi* that is characterized by gradual onset of sustained fever, headache, malaise, anorexia, constipation or diarrhea, and nonproductive cough. However, mild and atypical infections occur. Carriage of *S. Typhi* may be prolonged.

B. Laboratory Criteria for Diagnosis

Isolation of *S. Typhi* from blood, stool or other clinical specimen

C. Case Definition (1997)

1. **Probable:** a clinically compatible case that is epidemiologically linked to a confirmed case in an outbreak
2. **Confirmed:** a clinically compatible case that is laboratory confirmed

NOTE: Isolation of *S. Typhi* is required for confirmation. Serologic evidence alone is not sufficient for diagnosis. Asymptomatic carriage should not be reported as typhoid fever.

4. DIAGNOSIS AND LABORATORY SERVICES

A. Laboratory Diagnosis

Typhoid fever is diagnosed by isolation of *S. Typhi* from blood, stool, urine or other clinical specimens including bone marrow.

B. Tests Available at Washington State Public Health Laboratories (PHL)

Laboratories in Washington are required to submit all *Salmonella* isolates to PHL for confirmation, serotyping, and pulsed-field gel electrophoresis (PFGE).

Stool and blood culturing for *S. Typhi* and follow-up cultures to evaluate a carrier state can also be done at PHL if these services are unavailable locally. Contact Office of Communicable Disease Epidemiology (206-418-5500) for approval prior to submitting specimens for culture.

Note that PHL require all clinical specimens have two patient identifiers, a name **and** a second identifier (e.g., date of birth) both on the specimen label and on the submission form. Due to laboratory accreditation standards, specimens will be rejected for testing if not properly identified. Also include specimen source and collection date.

C. Specimen Collection

Use a sterile applicator swab to collect stool for culture, insert the swab into Cary-Blair transport medium, push the cap on tightly, label the tube with two identifiers (e.g., name and date of birth), and mail immediately. For details of specimen requirements see: <https://www.doh.wa.gov/Portals/1/Documents/5240/SCSI-Ent-SalmConf-V1.pdf>

Isolates and stool specimens need to be shipped with a completed microbiology form: <https://www.medialab.com/dv/dl.aspx?d=1887088&dh=52b1a&u=69790&uh=0e2a1>

5. ROUTINE CASE INVESTIGATION

Interview the case and others who may be able to provide pertinent information.

A. Identify Potential Sources of Infection

Ask about potential exposures during the 3–60 days before onset, including:

1. Any contacts or household members with a similar illness. Obtain the name, phone number or address and clinical information of the ill person. Anyone meeting the probable case definition should be reported and investigated in the same manner as a confirmed case.
2. Travel outside Washington or the United States, or contact with others who have traveled outside the United States. Determine dates and locations of travel.

If the patient did not travel to a typhoid endemic area during the incubation period, consider culturing contacts who may be carriers in attempt to determine the source of infection, particularly elderly or immigrant contacts who prepared food.

3. Source(s) of drinking water at home, work, travel, and any vocational or recreational pursuit, including water from streams, rivers or lakes (obtain travel locations and dates).
4. Restaurant meals. Obtain the name of the restaurant, and date and location of the meal.
5. Public gathering where food was consumed. Obtain the date, location, and event sponsor.
6. Attendance or employment at a child care facility by the case or a household member.

B. Identify Contacts Who Work in Sensitive Occupations

Determine if any household member or close contact attends or works at a child care facility; or works as a food handler or health care worker. If so, see Section 6.

1. Household and other close contacts should not work as food handlers, or in child care, residential care, or health care settings or attend child care, until they have at least 2 consecutive negative stool cultures taken at least 24 hours apart. These contacts can then return to work or child care but should have stool cultures performed weekly until the case is no longer excreting *S. Typhi* or the contact with the case is discontinued.
2. All symptomatic household members and other close contacts should be encouraged to seek medical attention from their regular providers. Stool cultures should be requested through medical providers or arranged by local health jurisdictions.
3. Any contact found to be *S. Typhi* culture positive should be managed as a new case.
4. Educate all contacts about transmission routes, symptoms, and effective hand washing, particularly after using the toilet, changing diapers, and before preparing or eating food.
5. Consider vaccination for household contacts of chronic carriers.

C. Environmental Evaluation

If the source of infection is associated with a child care facility, restaurant, dairy, or public drinking water supply; or, if the case attends, or works at a child care facility or works as a food handler, health care provider, or residential care provider; see Section 6.

D. Case Management

Routine follow-up cultures to detect chronic carriage are indicated for all persons newly diagnosed with typhoid fever, regardless of the need for work or child care restrictions.

1. Any person infected with *S. Typhi* should be supervised by the local health jurisdiction (LHJ) until there are three consecutive negative stool cultures (and urine cultures in persons with schistosomiasis). After symptoms end, specimens should be collected at least 24 hours apart and at least 48 hours after completing antibiotics.
2. If *S. Typhi* is isolated from any of the three stools, the LHJ should continue supervision until three consecutive stool cultures are negative.
3. While under LHJ supervision, persons excreting *S. Typhi*:
 - Should not work as food handlers, child care or residential care provider, or health care workers, or attend child care;
 - Should notify the LHJ at once of any change in address or occupation;
 - Should notify the LHJ at once of any suggestive illness among household members or other personal contacts.

Persons who excrete the organism for a prolonged period can consider antibiotic treatment in an attempt to eliminate the carrier state.

E. Infection Control Recommendations

1. Hospitalized patients should be cared for using standard precautions. Contact precautions should be used for diapered or incontinent persons for the duration of the illness or to control institutional outbreaks.
2. Educate the case regarding effective hand washing, particularly after using the toilet, changing diapers, and before preparing or eating food. The importance of proper hygiene must be stressed, as excretion of the organism may persist for several weeks or longer.
3. **School Restrictions:** Depending on evaluation of personal hygiene and behavior, the local health jurisdiction may allow children five years of age or older with *S. Typhi* infections to return to school and other group settings but not participate in food handling until they have 3 consecutive negative stool cultures. **See Section 6.**
4. **Work or Child Care Restrictions:** Persons infected with *S. Typhi* may not work as food handlers, or in child care, residential care, or health care settings, or attend child care facilities until they have 3 consecutive negative stool cultures (see section 5.D) and the daycare should be investigated as described in **Section 6.**

NOTE: *S. Paratyphi* infection is reported as salmonellosis. However, Office of Communicable Disease Epidemiology recommends excluding persons infected with *S. Paratyphi* presenting with paratyphoid fever from sensitive occupations until 2 consecutive negative stool cultures taken at least 24 hours. Otherwise, follow the salmonellosis guideline for persons infected with *S. Paratyphi*
<https://www.doh.wa.gov/Portals/1/Documents/5100/420-035-Guideline-Salmonellosis.pdf>

F. Management of Other Persons Exposed

If the case acquired the infection while traveling, members of the travel groups should be followed for symptoms. Travel companions having symptoms consistent with typhoid fever should be referred to their provider. Local health jurisdictions can consider culturing the stool of asymptomatic travel companions.

6. MANAGING SPECIAL SITUATIONS

A. Case Attends or Works at a Child Care Facility:

Investigate as below if the patient did not travel to a typhoid endemic area during the incubation period, or if the patient attended the facility after onset of symptoms.

1. Exclude cases from work or attendance at child care facilities.
2. Interview the operator and inspect the facility including the written attendance records to identify other possible cases among staff or attendees during the previous two months. Note: [WAC 170-295-3030](#) specifies that the operator keep a log of illnesses.
3. Review food handling, hand washing techniques, toileting and diaper changing practices with the operator and staff.
4. Collect stool specimens from any staff member or child who is currently symptomatic or who had symptoms consistent with typhoid fever during the prior two months. In some circumstances, stool cultures may also be indicated for asymptomatic staff and children.
5. If a potential exists for typhoid exposure within the child care facility, parents of children in the same child care group as a typhoid case should be notified. Day care operators are required to notify these parents that their child was exposed to a communicable disease through a letter or posted notification [WAC 170-295-3030](#). The local health jurisdiction may use this notification as an opportunity to ask parents about symptoms in their child and add the following elements to the notification:
 - Children should be monitored carefully for a syndrome of sustained fever, headache, malaise, anorexia, constipation or diarrhea, and nonproductive cough.
 - Medical care should be sought if a child becomes ill with these symptoms and the provider informed that a case of typhoid fever occurred among the child's contacts.
 - The daycare operator or local health jurisdiction (LHJ) should be notified should symptoms occur.
 - A symptomatic child should not be brought to the daycare facility or placed in any other group of children.
 - Information on the illness and how transmission can be prevented.
6. Instruct the operator to notify the LHJ immediately if new cases suggestive of typhoid fever occur.
7. Follow-up with the child care center to ensure that surveillance and appropriate prevention measures are being carried out. Manage newly symptomatic children as outlined above.

B. Case is a Food Handler or a Commercial Food Source is Suspected

1. Exclude cases from work as a food handler.
2. Conduct an environmental evaluation of the facility. Determine if any of the facility staff have had any illness suggestive of typhoid within the past two months by interviewing the operator, reviewing worker attendance records, and interviewing workers as indicated. Ask about any complaints of illness from patrons during the past two months.
3. Collect a stool specimen for culture from any facility employee with a suspicious illness within the past two months. Symptomatic employees should be excluded until symptoms consistent with typhoid have resolved and a negative stool culture has been obtained. Stool cultures may also be indicated for asymptomatic staff, depending on circumstances.

C. Food Served at a Public Gathering Suspected

1. Determine if anyone who prepared food for the gathering had any symptoms suggestive of typhoid within the previous two months. Find out if any other food preparers or attendees became ill after the gathering.
2. Collect a stool specimen for culture from any food handlers with suggestive histories.
3. The extent of further investigation depends on circumstances.

D. Case Works at a Health Care or Residential Care Facility

1. Exclude cases from work in direct patient care.
2. Consult with the Infection Control Practitioner at the facility. Determine if there has been any unusual incidence of illness suggestive of typhoid within the past two months. If so, investigate further to identify possible common-source outbreaks or any continuing sources of exposure.
3. If indicated, conduct an environmental evaluation of the facility.
4. The extent of further investigation depends on circumstances.

7. ROUTINE PREVENTION**A. Vaccine Recommendations**

Two vaccines are currently licensed in the United States to prevent typhoid fever: an oral live vaccine (Vivotif) and an injectable polysaccharide vaccine (TyphimVi). Typhoid vaccine is not routinely recommended in this country other than for the following groups:

- Travelers to areas in which there is a recognized risk of exposure to *S. Typhi*;
- Persons with ongoing exposure (e.g., household contact) to a documented *S. Typhi* carrier;
- Microbiology laboratorians who work frequently with *S. Typhi*.

Efficacy of these vaccines ranges from 50–80%. Vaccination should not be a substitute for careful selection of food and drink during travel or proper handling of specimens and cultures in a laboratory. Typhoid vaccines do not protect against *S. Paratyphi* infection. For more information about typhoid fever vaccines see current recommendations from the Centers for Disease Control and Prevention (CDC):

<https://wwwnc.cdc.gov/travel/yellowbook/2018/infectious-diseases-related-to-travel/typhoid-paratyphoid-fever>

B. Prevention Recommendations

Source: <https://www.cdc.gov/typhoid-fever/index.html>

Typhoid fever is common in most parts of the world except industrialized regions such as the United States, Canada, Western Europe, Australia, and Japan. Therefore, travelers to the developing world should take precautions. Travelers from the United States to Asia, Africa, and Latin America have been especially at risk. While in typhoid endemic areas, people should follow the general rule, “Boil it, cook it, peel it, or forget it” and:

- Drink bottled water or bring water to a rolling boil for one minute before drinking. Bottled carbonated water is safer than uncarbonated bottled water.
- Ask for drinks without ice unless the ice is made from bottled or boiled water. Avoid popsicles and flavored ices that may have been made with contaminated water.
- Eat foods that have been thoroughly cooked and that are still hot and steaming.
- Avoid raw vegetables and fruits that cannot be peeled. Vegetables like lettuce are easily contaminated and are very hard to wash well.
- Peel raw fruits or vegetables immediately before eating. (Wash hands with soap first.) Do not eat the peelings.
- Avoid foods and beverages from street vendors. It is difficult for food to be kept clean on the street, and many travelers get sick from food bought from street vendors.
- Discuss vaccination options with your doctor or travel clinic before departure.

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UPDATES

January 2011: The Legal Reporting Requirements section has been revised to reflect the 2011 Notifiable Conditions Rule revision.

July 2016: Front page added, combined Section 5 (Routine Case Investigation) and Section 6 (Controlling Further Spread)

May 2018: Clarified exclusion testing requirements.

December 2022: For 2023 WAC revision combined provider and facility reporting requirement, updated laboratory submission (Section 1B)

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