

Paratyphoid Fever

Revision Dates

Case Definition	June 2013
Reporting Requirements	June 2013
Remainder of the Guideline (i.e., Etiology to References sections inclusive)	June 2013

Case Definition

Confirmed Case

Laboratory confirmation of infection with or without clinical illness^[1]:

- Isolation of *Salmonella paratyphi* A, B, or C from an appropriate clinical specimen (e.g., sterile site, deep tissue wounds, stool, vomit or urine)^[2].

Probable Case

Clinical illness^[1] in a person who is epidemiologically linked to a confirmed case.

Carrier

Individuals who continue to shed *Salmonella paratyphi* for one year or greater are considered to be carriers^[3]

^[1] 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.

^[2] Refer to the current [Provincial Laboratory for Public Health \(ProvLab\) Guide to Services](#) for specimen collection and submission information.

^[3] Alberta Health maintains a Typhoid/Paratyphoid Registry for purposes of monitoring carriers as they potentially pose a long term health risk for transmission of disease.

NOTE: *Salmonella paratyphi B var java* is considered a case of Salmonella (i.e., non-typhoidal) and should not be reported as Paratyphoid Fever.

Reporting Requirements

1. Physicians, Health Practitioners and others

Physicians, health practitioners, and others listed in Sections 22(1) or 22(2) of the *Public Health Act* shall notify the Medical Officer of Health (MOH) (or designate) of all confirmed and probable cases by the Fastest Means Possible (FMP) i.e., direct voice communication.

2. Laboratories

All laboratories, including regional laboratories and the ProvLab shall in accordance with Section 23 of the *Public Health Act*, report all positive laboratory results by FMP to the:

- Chief Medical Officer of Health (CMOH) (or designate),
- MOH (or designate) and
- Attending/ordering physician.

3. Alberta Health Services and First Nations and Inuit Health Branch (FNIHB)

- The MOH (or designate) shall notify the CMOH (or designate) of all confirmed and probable cases by FMP.
- The MOH (or designate) of the zone where the case currently resides shall forward the preliminary Notifiable Disease Report (NDR) of all confirmed and probable cases to the CMOH (or designate) within seven days (one week) of notification and the final NDR (amendments) within two weeks of notification.
- For out-of-zone reports, the MOH (or designate) first notified shall notify the MOH (or designate) of the zone where the client currently resides by FMP and immediately fax a copy of the positive laboratory report.
- For out-of-province and out-of-country reports, the following information should be forwarded to the CMOH (or designate) by FMP, including:
 - name,
 - date of birth,
 - out-of-province health care number,
 - out-of-province address and phone number,
 - attending physician (locally and out-of-province) and
 - positive laboratory report (faxed).

Etiology

Paratyphoid fever is caused by *Salmonella enterica* subsp. *enterica* serotype *S. paratyphi* A, *S. paratyphi* B (*S. schottmuelleri*) and *S. paratyphi* C (*S. hirschfeldii*).⁽¹⁾

Clinical Presentation

Paratyphoid is a systemic bacterial disease that presents with clinical symptoms similar to typhoid but generally less severe and shorter in duration. Symptoms include an insidious onset of fever, headache, malaise, anorexia, a non-productive cough in the early stages of the illness, a relative bradycardia and splenomegaly.⁽¹⁾ A transient, macular rash of rose-colored spots can occasionally be seen on the trunk.⁽²⁾ In adults, constipation is more often seen than diarrhea. Relapses can occur in approximately 3 – 4% of cases.

A carrier state may follow acute or mild illness and even subclinical infections. Persons with *S. Paratyphi* infections tend to become carriers less frequently than persons infected with *S. typhi*.⁽¹⁾

Diagnosis

The causative organisms can be isolated from the blood early in the disease, and from urine and feces after the first week. Bone marrow culture provides a greater sensitivity for bacteriological confirmation even in persons who have already received antibiotics.⁽¹⁾

Epidemiology

Reservoir

The reservoir for paratyphoid fever is humans and, rarely, domestic animals. Family contacts may be transient or permanent carriers and inadvertently spread infection⁽¹⁾

Transmission

Paratyphoid is transmitted through ingestion of food and/or water contaminated by urine or feces from infected cases or carriers. The infection is rarely spread by casual contact. Shellfish (particularly oysters) taken from sewage-contaminated beds; fruits and/or vegetables fertilized by night soil (human excrement) eaten raw; and contaminated milk/milk products (usually contaminated by hands of carriers) are important sources of infection to consider. Flies may also infect foods in which the organism can multiply to achieve an infective dose.⁽¹⁾

Incubation Period

The incubation period ranges from 1 – 10 days depending on the size of infecting dose and host factors.⁽¹⁾

Period of Communicability

The period of communicability lasts as long as the bacilli are present in the excreta. This usually begins from the first week after onset of illness and continues through convalescence and for a variable period thereafter (commonly 1 – 2 weeks for paratyphoid). Fewer people infected with paratyphoid fever become permanent carriers compared to those with typhoid fever.⁽¹⁾

Host Susceptibility

Susceptibility is general and is increased in persons with achlorhydria (a condition in which production of gastric acid in the stomach is absent or low, commonly because of treatment with acid suppression agents⁽³⁾). Relative specific immunity follows recovery from clinical illness or inapparent infection.⁽¹⁾

Occurrence

General

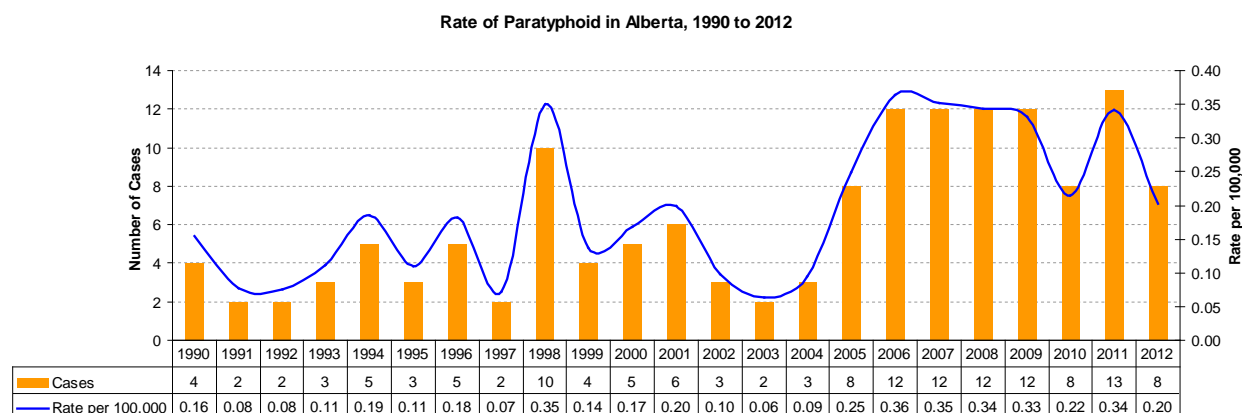
Worldwide occurrence. An estimated 6 million cases of paratyphoid fever occur worldwide annually and approximately 150 cases of paratyphoid fever are reported each year in the United States, most of which are in recent travellers. The risk of paratyphoid fever is increasing among travellers to southern and Southeast Asia. ⁽²⁾ Paratyphoid fever occurs sporadically or in limited outbreaks but is most likely under reported. ⁽¹⁾ The ratio of disease caused by *S. typhi* compared to that of *S. paratyphi* A and B is estimated to be about 4:1. ⁽¹⁾ Parts of China and Pakistan are reporting more cases caused by *S. paratyphi* than *S. typhi*. ⁽¹⁾

Canada

The incidence of paratyphoid remains very low in Canada. In 1999, *S. paratyphoid* infection was removed from the nationally notifiable disease list as a separate entity and was included under Salmonella infections. Laboratory confirmed isolations of enteric pathogens in Canada, including bacterial, viral and parasitic pathogens are reported on a weekly basis through the National Enteric Surveillance Program (NESP). There is a small possibility of duplicate isolates from patients being reported, however, efforts are made to keep this to a minimum and it is expected that the totals are very close to the number of actual cases. Between 2006 and 2010 there was an average of 106 *S. paratyphi* isolates reported to the NESP. The majority of isolates were identified as *S. paratyphi* A. ⁽⁴⁾

Alberta

The greatest risk of paratyphoid infection for Albertans appears to be travel to countries where sanitation is likely to be poor or sewage systems inadequate. Between 2000 and 2012, the number of cases of paratyphoid reported annually varied from two (2003) to 13 (2011) representing rates of 0.06 cases per 100,000 to 0.34 cases per 100,000 respectively. During this same period of time, 93/104 cases reported travel outside Canada (e.g., travelled to South Asia), an additional 6/104 cases reported recent immigration and for 5/104 cases there was no information available.



Source: Alberta Health Communicable Disease Reporting System (CDRS) June 2013 ⁽⁵⁾

Key Investigation

Single Case/Household Cluster

- Confirm the diagnosis
- Obtain a history of illness including the date of onset and signs and symptoms
- Identify any underlying medical conditions (e.g., decreased gastric acidity)

- Determine the occupation of the case (e.g., food handler, childcare facility worker, health care worker) and identify specific duties at work.
- If the case is a child, determine attendance at a childcare facility (e.g., daycare, dayhome) or other childcare site.
- Determine whether the case had any other type of institutional contact (e.g., long term care).
- Determine the possible source of infection taking into account the incubation period, reservoir, and mode of transmission. Assessment should include:
 - determining history of travel. **NOTE:** Additional specimens (e.g., urine for *S.typhi*/*S.paratyphi* +/- serology for schistosomiasis) may be indicated in special circumstances. Refer to Management of a Case.
 - determining history of residing in areas with poor sanitation including improper water treatment and sewage disposal (including recent immigration).
 - obtaining a detailed food history (including consumption of shellfish).
 - identifying any risk behaviours including lifestyle risks for infection (e.g., high risk sexual practices especially contact with feces).
 - determining any exposure (either household or non-household) to a confirmed case of paratyphoid.
 - identifying symptomatic household or other close contacts (e.g., travel companions or others) who had recently travelled to a developing country.
- Identify contacts who may have had exposure during the period that the case was infectious. Consider the following individuals when identifying contacts:
 - household contacts
 - recent travel companions (includes anyone who travelled with the case, who is likely to have been exposed to the same source of infection as the case, rather than someone who only travelled on the same plane/bus as the case)
 - other close, non-household contacts (e.g., sexual contacts, childcare site contacts).
- From the contacts identified above, identify individuals involved in sensitive occupations or situations (i.e., those who pose a higher risk of transmission to others). They would generally include:
 - 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. **NOTE:** Generally, food handlers who do not touch food, equipment or utensils in this way are not considered to pose a transmission risk however, circumstances for each case should be assessed on an individual basis.
 - healthcare workers providing direct patient care and persons involved in the care of young children, elderly, highly susceptible or dependent individuals.
 - children attending a childcare facility who are diapered or unable to implement good standards of personal hygiene.
 - any individual (child or adult) who is unable to implement good standards of personal hygiene (e.g., mentally or physically challenged).

Control

Management of a Case

- Provide information 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.

- Routine practices should be adhered to for hospitalized patients. For hospitalized children or adults with poor hygiene habits or who have incontinence that cannot be contained, additional precautions (i.e., contact precautions) should be implemented. ⁽⁶⁾
- Advise the case to refrain from preparing food for others for the duration of the period of communicability.
- Exclude symptomatic and asymptomatic cases who are involved in sensitive occupations or situations as outlined above.
- See [Annex 1](#) for information on stool collection to demonstrate microbiological clearance for cases involved in sensitive occupations or situations.
- If the case is involved in sensitive occupations or situations AND has EVER travelled to or lived in a schistosomiasis endemic area (see <http://www.cdc.gov/parasites/schistosomiasis/epi.html> ⁽⁷⁾) and may have been exposed to schistosomiasis, urine for *S. typhi*/*S. paratyphi* +/- serology for schistosomiasis (depending on whether there is a recurrence of Salmonella bacteremia or bacteriuria) will need to be collected in addition to stools to demonstrate microbiological clearance. See [Annex 1](#).
 - If required, serology for schistosomiasis should be collected according to recommendations outlined in [Annex 1](#). Specimens collected before the recommended time frames, may yield false negative results ⁽⁸⁾.
- Exclusion would apply until:
 - two consecutive stool specimens collected from a confirmed case are reported as negative **AND** one urine culture for *S. paratyphi* is reported negative from a case who has EVER travelled to a schistosomiasis endemic country and may have been exposed to schistosomiasis.
 - stool specimens should be collected when stools have returned to normal and at least 21 days following completion of antibiotic and not less than 24 hours apart
 - if one or both stool samples are positive for *S. paratyphi*, continue submitting samples for testing at the specified intervals as outlined in [Annex 1](#).
 - if urine sample is positive for *S. paratyphi*, collect serology for schistosomiasis 8 weeks post exposure in areas where risk exists for infection with *S. japonicum*, *S. mansoni*, *S. mekongi* and *S. intercalatum* or 12 weeks post exposure in areas where risk exists for infection with *S. haematobium*. Specimens collected before this time, may yield false negative results ⁽⁸⁾. See [Annex 1](#).
 - if urine sample is positive for *S. paratyphi* and serology is positive for schistosomiasis, refer the case back to physician and advise physician to treat case concurrently for both infections, even if this means repeating antibiotic treatment. Refer to [Annex 1](#).
 - persons co-infected with schistosomiasis should be treated with paraziqualtel to eliminate possible carriage of salmonella bacteria (including *S. typhi* and *S. paratyphi*) by the schistosomes. ⁽¹⁾
 - If possible, consideration may be given to temporary redeployment away from activities that involve increased risk of transmission.
- Advise all other cases (i.e., those not involved in sensitive occupations or situations) to remain off work until they are free from diarrhea and other gastrointestinal symptoms and for 48 hours following resumption of normal stool. Continued public health surveillance is not required for these cases, however, follow-up with the personal physician for clearance of the organism is recommended. Persons not involved in sensitive occupations or situations present a minimal risk of spreading gastrointestinal pathogens if they are healthy and have normal, well formed stools.

Treatment

- Generally fluoroquinolones are effective for treatment in adults, however, antibiotic resistance has become a public health problem in many areas (especially Asia) and therefore, clinicians should consider local resistance patterns when choosing appropriate antimicrobials for treatment. ^(1,9,10) Consulting with an infectious diseases specialist may be appropriate.

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.
- Refer symptomatic contacts to their physician for assessment.
- Exclude symptomatic contacts involved in sensitive occupations or situations:
 - Two consecutive stool specimens are taken not less than 24 hours apart and are reported as negative prior to returning to work or back to their childcare facility.
 - If the contact had ongoing exposure to the case while the case was still communicable, a 3rd stool specimen must be submitted and reported as negative. This stool specimen should be collected after symptoms in the case have resolved.
- Exclude asymptomatic household contacts, travel companions and sexual contacts involved in sensitive occupations or situations until:
 - One stool specimen is reported as negative prior to returning to work or back to their childcare facility.
 - Consultation with the MOH is appropriate.
- If the contact had ongoing exposure to the case while the case was still communicable, a second stool specimen must be submitted and reported as negative. This stool specimen should be collected after symptoms in the case have resolved.
- See [Annex 2](#) for information on stool collection for contacts involved in sensitive occupations or situations.
- Public health follow-up is generally not required for contacts of a case who do not pose a higher risk of transmission to others (i.e., those not involved in sensitive occupations or situations), however, the circumstances should be considered individually. Stool samples may be requested to determine the source of the infection in the case.

Management of Chronic Carriers and their Contacts

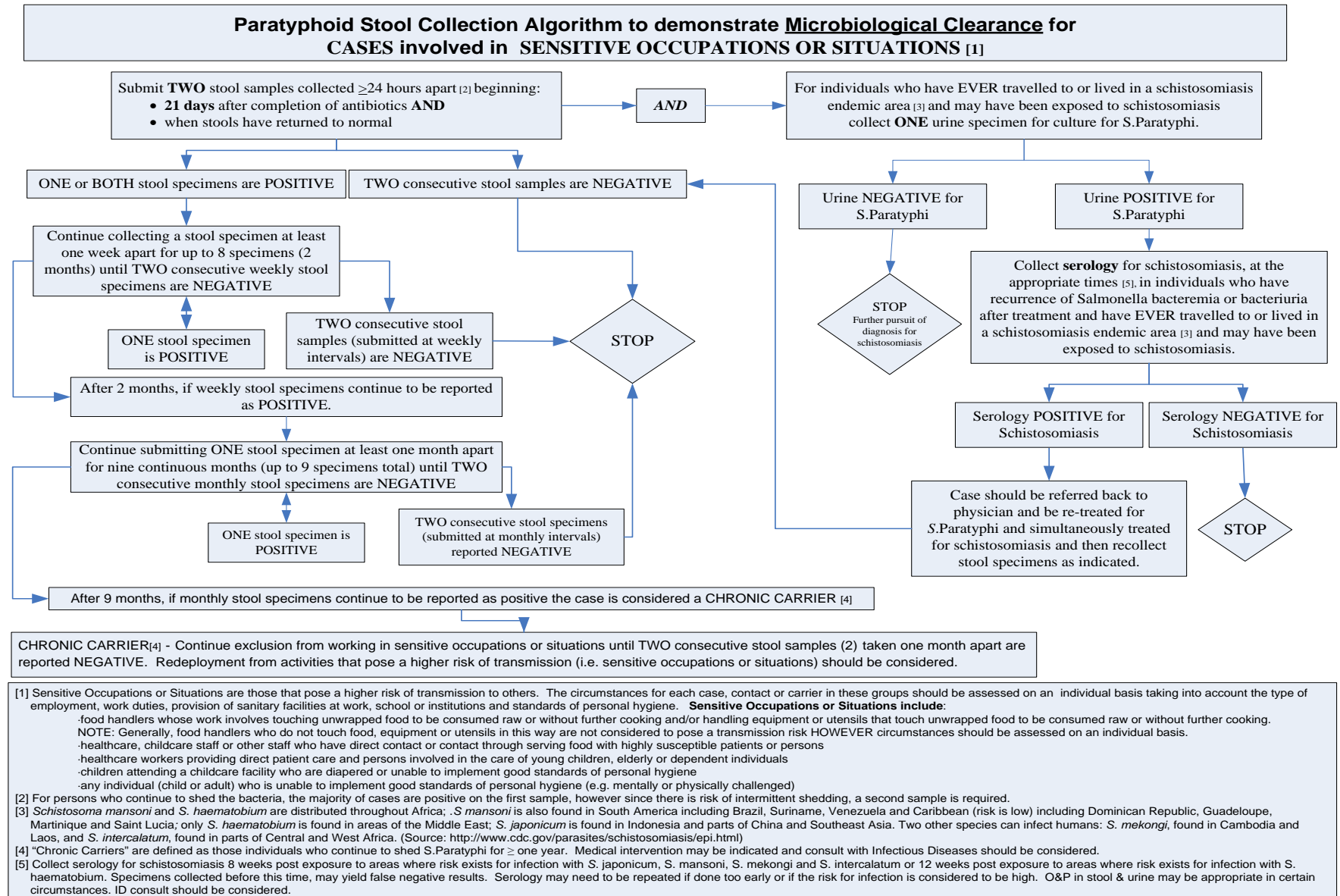
- Individuals who continue to shed *S. paratyphi* for one year or greater are considered carriers.
- Monitoring of carriers is maintained through the Alberta Health Typhoid/Paratyphoid Registry.
- Refer to [Annex 1](#) for details on continued stool testing for carriers.
- Medical intervention may be indicated for individuals who become carriers and consultation with infectious disease specialist should be considered.
- Exclude chronic carriers from activities that are involved in sensitive occupations or situations and continue submitting stool specimens as outlined in [Annex 1](#).
- If possible, consideration may be given to temporary redeployment of the carrier away from activities that involve increased risk of transmission.
- Contacts of carriers should be advised to seek prompt medical assessment and screening and notify public health if they become symptomatic.
- Exclude symptomatic contacts of carriers who are involved in sensitive occupations or situations until:
 - two consecutive stool specimens taken not less than 24 hours apart are reported as negative prior to returning to work or back to their childcare facility.
- Asymptomatic contacts of carriers are not excluded and no stool specimens are required.

- Public health follow-up is generally not required for contacts of a carrier who do not pose a higher risk of transmission to others (i.e., those not involved in sensitive occupations or situations), however, stool samples may be requested to determine the source of the infection in the case.

General Preventive Measures

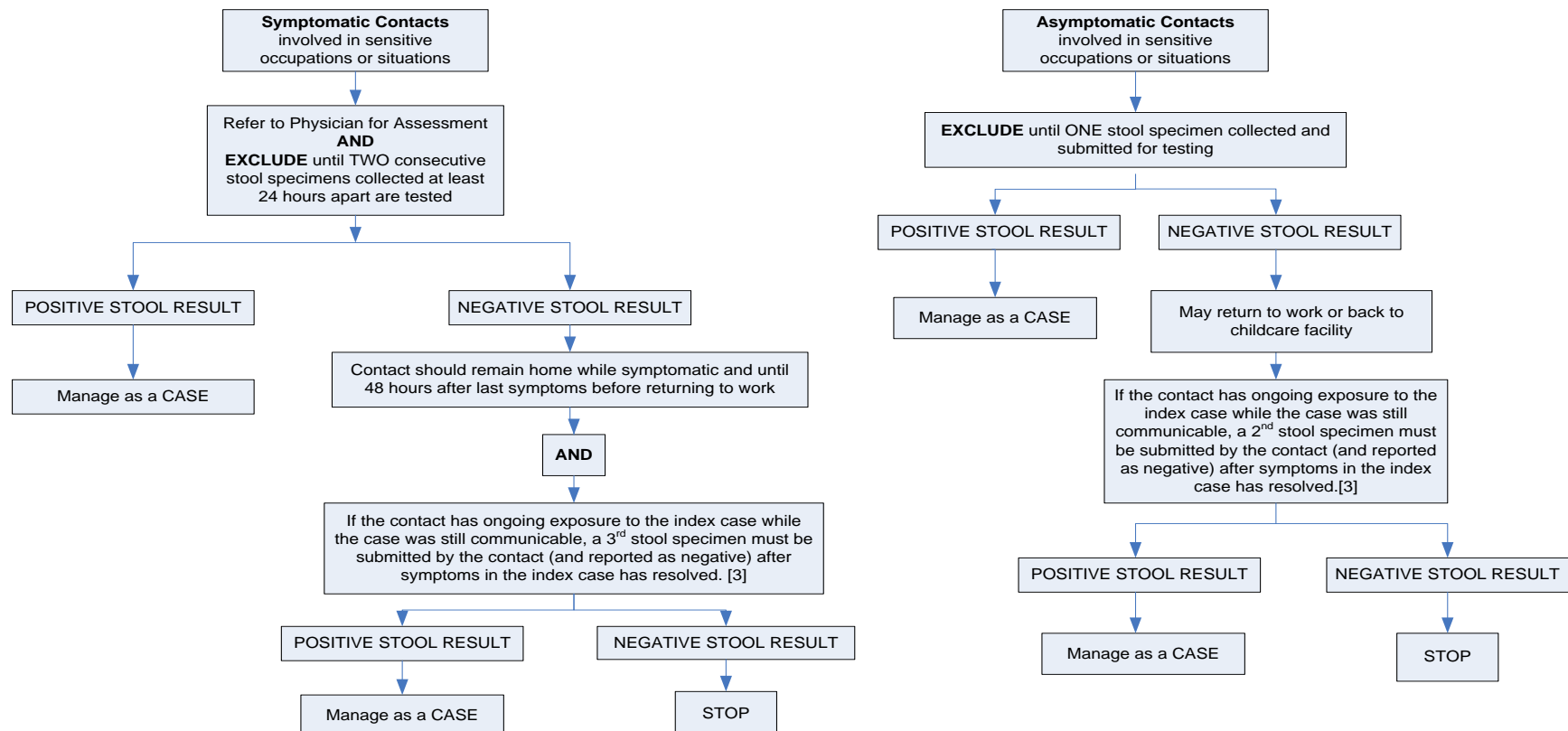
- Educate the public regarding the need for:
 - thorough hand washing especially after using the washroom, changing diapers, and before eating and preparing/handling foods
 - sanitary disposal of feces
 - hygienic food preparation and food and equipment handling practices
- Encourage all travelers to seek travel advice before visiting areas of high prevalence of disease and emphasize the importance of good sanitation, proper arrangements for safe water supplies and scrupulous personal hygiene while travelling.
- Reinforce information about boiling or steaming shellfish for at least 10 minutes before serving.
- There is currently no vaccine to protect against paratyphoid fever.

ANNEX 1



ANNEX 2

Paratyphoid Stool Collection Algorithm for CONTACTS [1] who are involved in SENSITIVE OCCUPATIONS or SITUATIONS [2]



[1] Contacts include: household contacts, travel companions, other close non-household contacts (e.g. sexual contacts, children and childcare workers in a childcare facility)

[2] Sensitive Occupations or Situations are those that pose a higher risk of transmission to others. The circumstances for each case, contact or carrier in these groups should be assessed on an individual basis taking into account the type of employment, work duties, provision of sanitary facilities at work, school or institutions and standards of personal hygiene. **Sensitive Occupations or Situations include:**

- 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. NOTE: Generally, food handlers who do not touch food, equipment or utensils in this way are not considered to pose a transmission risk HOWEVER circumstances should be assessed on an individual basis.
- healthcare, childcare staff or other staff who have direct contact or contact through serving food with highly susceptible patients or persons
- healthcare workers providing direct patient care and persons involved in the care of young children, elderly or dependent individuals
- children attending a childcare facility who are diapered or unable to implement good standards of personal hygiene
- any individual (child or adult) who is unable to implement good standards of personal hygiene (e.g. mentally or physically challenged)

[3] This additional specimen collection would ensure that the contact, who had ongoing exposure while the case was communicable, did not become subsequently infected.

References

- (1) Heymann DL editor. Control of Communicable Diseases Manual. 19th ed. Washington, D.C.: American Public Health Association; 2008.
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- (3) Dr. S. Houston. Personal Communication. 2013 January.
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- (6) Public Health Agency of Canada. Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care. Can Comm Dis Rep 1999;25S4.
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- (8) Dr. K. Kowaleska-Grochowska. Personal Communication. 2013 June.
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- (10) Effa EE, Lassi ZS, Critchley JA, Garner P, Sinclair D, Olliaro PL, et al. Fluoroquinolones for treating typhoid and paratyphoid fever (enteric fever). Cochrane Database Syst Rev 2011 Oct 5;(10):CD004530. doi(10):CD004530.