

TYPHOID and PARATYPHOID FEVERS

Based on the MoH Communicable Diseases Manual 2012-December 2017 ¹(March 2018 Table 1 Updated) ¹

Associated Documents

Case Report Form: *(Both diseases have the same Case Report Form)*
<Y:\CFS\ProtectionTeam\FinalDocs\NotifiableConditions\Typhoid\FormsStdLettersQuest>

Fact Sheet: *(Both diseases have the same Fact Sheet)*
[Information sheet available via EDMS Diseases page](#)

The Illness^{1,2}

Typhoid and the usually less severe paratyphoid fevers are systemic infections caused by *Salmonella* Typhi, and *Salmonella* Paratyphi A,B and C usually through ingestion of contaminated food or water. The acute illness is characterized by prolonged fever, headache, nausea, loss of appetite, and constipation or sometimes diarrhoea. Symptoms are often non-specific and clinically non-distinguishable from other febrile illnesses. However, clinical severity varies, and severe cases may lead to serious complications or even death (less common with paratyphoid fever). Disease occurs predominantly in association with poor sanitation and lack of clean drinking water. According to the recent estimates, approximately 21 million cases and 222 000 typhoid-related deaths occur annually worldwide and 6 million cases of paratyphoid occur.

Even after recovery from typhoid or paratyphoid, a small number of individuals develop the carrier state despite being healthy. These people can be a source of infection for others. The transmission of typhoid and paratyphoid in less-industrialized countries may be due to contaminated food or water. In some countries, shellfish taken from sewage-contaminated beds is an important route of infection. Where water quality is high, and water supplies chlorinated, transmission is more likely to occur via food contaminated by carriers handling food. Most cases of typhoid and paratyphoid fever notified in New Zealand are associated with overseas travel.

New Zealand Epidemiology³

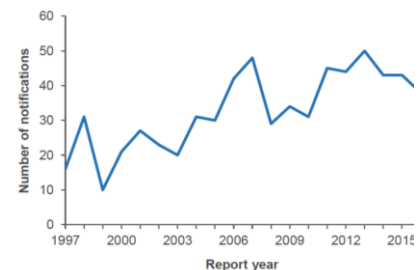
Most cases of typhoid and paratyphoid fever notified in New Zealand are associated with overseas travel. Chronic carriage of *Salmonella* Typhi may occur and act as a source of infection.

In 2016, 38 cases of typhoid fever were notified compared with 43 cases in 2015. The graph shows an increasing trend in the number of typhoid fever notifications from 1997 to 2013.

2016 summary:

- ◇ Most cases: 665 of cases in Counties Manukau and Auckland DHBs (13 +12 cases).
- ◇ Highest rates: in the 20–29 (1.7per 100,000) and 30–39 (1.4 per 100,000) age groups.
- ◇ Ethnicity: Pacific peoples (had the highest rates).
- ◇ Hospitalisation: 84% were hospitalised.
- ◇ Risk factors: 82% had travelled overseas The countries most commonly visited were India and Samoa.
- ◇ No outbreaks of typhoid fever were reported in 2016.

New Zealand typhoid notifications
1997 – 2016



CASE DEFINITION

Clinical description

Typhoid fever typically presents with insidious onset of fever, headache, malaise, anorexia, dry cough, relative bradycardia and hepatosplenomegaly (50 %). Less commonly, there may be rose spots on the trunk (30 percent of Caucasians), abdominal pain (20–40 percent), constipation (38 percent), diarrhoea (10 percent) and cerebral dysfunction.

	<p>If untreated, the illness may last for 3–4 weeks and be complicated by intestinal perforation (3–10 percent) or haemorrhage, death (12–30 percent) or relapse (up to 20 percent).</p> <p>Paratyphoid fever is a similar illness to typhoid fever, but the clinical manifestations tend to be milder, the duration is shorter, and the case-fatality rate is much lower. It often manifests as acute gastroenteritis.</p> <p>Note: <i>Salmonella</i> Paratyphi B var Java does not cause enteric fever and produces a less serious disease than other Typhi and Paratyphi variants.</p> <p>Reservoir Human cases, carriers and excretors for Typhi and Paratyphi A; human and possibly domestic animals for the other serovars.</p> <p>Incubation period</p> <ul style="list-style-type: none"> • Typhoid fever: From 3 to 90 days (usual range 8-14 days). • Paratyphoid fever: Usually 1–10 days but may be longer (up to about a month). <p>Transmission Ingestion of food and water contaminated by faeces and urine of patients or carriers. In New Zealand, food vectors have included shellfish taken from sewage-contaminated beds. In other countries, shellfish, raw fruits and vegetables, contaminated milk and milk products have been vectors. Flies may spread organisms to food. Large epidemics are most often related to faecal contamination of water supplies or street-vended foods. Person-to-person direct transmission is uncommon.</p> <p>Prevention Public health interventions to prevent typhoid and paratyphoid include:</p> <ul style="list-style-type: none"> • health education about personal hygiene, especially regarding hand-washing after toilet use and before food preparation • provision of a safe water supply • proper sanitation systems • excluding disease carriers from food handling • A vaccine is available, although it is not routinely recommended except for those who will have prolonged exposure to potentially contaminated food and water in high-risk areas.
Notification Procedure	
	<p>Attending medical practitioners or laboratories must immediately notify the local medical officer of health of suspected cases. Notification should not await confirmation.</p> <p>CASE CLASSIFICATION</p> <p>Under investigation: A case that has been notified, but information is not yet available to classify it as probable or confirmed.</p> <p>Probable: A clinically compatible illness that is either a contact of a confirmed case of the same disease or has had contact with the same common source – that is, is part of a common-source outbreak.</p> <p>Confirmed: A clinically compatible illness that is laboratory confirmed.</p> <p>Not a case: A case that has been investigated and subsequently found not to meet the case definition.</p>
Laboratory Testing	
	<p>Laboratory definitive evidence for a confirmed case requires isolation of <i>Salmonella</i> Typhi or <i>Salmonella</i> Paratyphi from a clinical specimen. <i>Salmonella</i> Paratyphi B var Java infections should still be notified as Salmonella cases rather than cases of Paratyphi.</p> <p>All isolates should be referred to Enteric Reference laboratory at ESR for further characterisation.</p>
Management of Case	
	Investigation

Obtain a detailed food history, a history of travel, exposure to untreated water or sewage or exposure to possible contacts with a similar illness.

- Action immediately. If notified after hours, contact the on-call MOoH.
- Almost all cases in NZ occur in recent travellers or immigrants, or occasionally in a family with an older carrier relative.
- Obtain a detailed food history, a history of travel, exposure to untreated water or sewage or exposure to possible contacts with a similar illness and complete the Case Report Form.
- Discuss infection control and exclusion criteria with the case.
- If an outbreak is suspected, contact the MOoH and refer to [Te Mana Ora Outbreak Guidelines](#).
- Advise TLA of case (but investigation is to be carried out by [Te Mana Ora](#) staff).

Restriction

- In a health care facility, only standard precautions: [Standard Precautions Policy and Staff Information – available via Infection Prevention and Control published documents list](#) are indicated in most cases; if the case is a child in nappies or incontinent, apply contact precautions for the duration of illness.
- Exclude chronic carriers from work if in a high-risk occupational group. For further details, refer to the exclusion and clearance criteria in Table 1 and for more details, Appendix 2 in this protocol.

For exclusion and clearance criteria refer to Table 1 below:

Table 1.⁴ Exclusion and clearance criteria for people at increased risk of transmitting an infection to others[‡]

Pathogen/ Disease	Control	Cases		Contacts
		Exclusion	Micro Clearance	
<i>S. typhi</i> and <i>paratyphi</i>	Enteric precautions	Until symptom-free for 48 hours	None required	<p>If case is not considered to have acquired the infection overseas:</p> <p>1,2,3,4[‡]: exclude until two negative faecal samples have been provided at least 48 hours apart. All household and close contacts other than 1,2,3,4: collect two faecal samples provided at least 48 hours apart. No exclusion is necessary. Note: In an outbreak situation, for potential common-source contacts consider collecting one faecal sample.</p> <p>If case is considered to have acquired the infection overseas:</p> <p>Co-travelling and other close contacts from groups 1,2,3,4[‡]: exclude until two negative faecal samples have been provided at least 48 hours apart. Co-travelling and other close contacts other than 1,2,3,4: collect two faecal samples provided at least 48 hours apart. No exclusion is necessary.</p>
		1, 2, 3, 4 [‡] and school children also require clearance.	<p>1,2,3,4[‡] and school children*: three consecutive negative stools at least 48 hours apart after completing treatment with effective antibiotics. §</p> <p>If not treated with effective antibiotics, no earlier than 1 month after onset of symptoms.</p> <p>* Schoolchildren: until clearance criteria are satisfied or as decided by the medical officer of health. §</p> <p>Carriers, including chronic: a risk assessment should be carried out to consider safe arrangements for continuing work, or for alternative work, and for continuing need for strict hygiene both within household and at work.</p>	

					<p>Other contacts who are unlikely to have been exposed to same source: samples or exclusion not necessary. ⁵</p> <p>Carriers, including chronic: a risk assessment should be carried out to consider safe arrangements for continuing work, or for alternative work, and for continuing need for strict hygiene both within household and at work.</p>
<p>‡ Cases of most enteric disease should be considered infectious and should remain off work /school /preschool until 48 hours after symptoms have ceased. Certain individuals pose a greater risk of spreading infection and additional restriction/exclusion criteria may apply.</p> <p>NOTE: The Health (Infectious and Notifiable Diseases) Regulations 2016 do not contain any exclusionary powers for people at increased risk of transmitting an infection to others (groups 1-4 following). Instead the medical officers of health can resort to broader powers in Part 3A of the Health Act 1956, which include directions to cases and contacts to remain at home until no longer infectious.</p> <ol style="list-style-type: none"> 1. people whose work involves preparing or serving unwrapped food to be served raw or not subject to further heating (including visitors or contractors who could potentially affect food safety) 2. staff, inpatients and residents of health care, residential care, social care or early childhood facilities whose activities increase risk of transferring infection via the faecal-oral route 3. children under the age of 5 attending early childhood services/groups 4. other adults or children at higher risk of spreading the infection due to illness or disability. <ul style="list-style-type: none"> • If personal hygiene habits and hand washing facilities a concern, discuss with MOoH. • For further details, refer to Appendix 2 of this protocol and reference 4. <p>§ If a case is slow to clear:</p> <ul style="list-style-type: none"> – Discuss with MOoH and Infectious Disease physician (see Treatment below). – In the occupational situation, if the case is to return to work prior to a clearance (and when asymptomatic) he/she may do so if other duties can be found which do not involve the possibility of transmission of infection. – Consider personal hygiene habits and hand washing facilities in any cases allowed back to work/ school prior to a clearance. <p>Counselling</p> <ul style="list-style-type: none"> • Advise the case and their caregivers of the nature of the infection and its mode of transmission. • Educate about hygiene, especially hand cleaning. • Educate about hand and food hygiene. • A fact sheet is available: Via EDMS Diseases page. • Advise cases not in a high-risk employment or situation and school children to avoid such circumstances until cleared. • For carriers, a risk assessment should be carried out to consider safe arrangements for continuing work or alternative occupations and for continuing need for strict hygiene both within household and at work. <p>Treatment</p> <p>Enteric fever is usually treated with a single antibacterial drug. Antibiotic selection depends upon the severity of illness, local resistance patterns, whether oral medications are feasible, the clinical setting, and available resources.</p> <p>Treatment for carriage should follow discussion with a specialist microbiologist or Infectious Disease physician.¹</p>					

Management of Contacts	
	<p>Identify contacts for investigation, restriction and counselling as appropriate.</p> <p>Definition</p> <ul style="list-style-type: none"> All those with unprotected household or other close contact with a case during the period of communicability or who have been exposed to the same contaminated food or water. This includes all members of a travel group associated with an identified case. A symptomatic contact is to be managed as a case. <p>Investigation</p> <ul style="list-style-type: none"> All close contacts require two negative faecal specimens. Contacts can either be referred to their GP for faecal tests or Te Mana Ora can arrange. <p>Restriction</p> <p>Refer to the exclusion and clearance criteria in Table 1 and Appendix 2 in this protocol. For further details refer to reference 4.</p> <p>Counselling</p> <ul style="list-style-type: none"> Advise contacts of the nature of the infection, its mode of transmission, the incubation period and symptoms. Advise contacts to seek early medical attention if symptoms develop. Educate about hygiene, especially hand cleaning. A fact sheet is available: Via EDMS Diseases page.
Other Control Measures	
	<p>Identification of source</p> <ul style="list-style-type: none"> Check for other cases in the community or at-risk groups. Investigate potential food or water sources of infection in all cases. If indicated, check water supply for microbiological contamination and compliance with the latest New Zealand drinking-water standards (Ministry of Health 2008).⁶ If a water supply is involved, liaise with the local territorial authority to inform the public. Advise on the need to boil water. <p>Disinfection</p> <ul style="list-style-type: none"> Clean and disinfect surfaces and articles soiled with faeces or urine. For further details, refer to Appendix 1 in this protocol and see reference 7. Discuss with MOoH regarding possible consultation with an Infection Control nurse. <p>Health education</p> <ul style="list-style-type: none"> Educate the public about safe food preparation and personal hygiene (refer to Appendix 3 in this protocol and see reference 8). In early childhood services or other institutional situations, ensure satisfactory facilities and practices regarding hand cleaning, nappy changing, toilet use and toilet training, preparation and handling of food, and the cleaning of sleeping areas, toys and other surfaces.
Reporting	
	<ul style="list-style-type: none"> Ensure complete case information is entered into EpiSurv. If a cluster of cases occurs, contact the Ministry of Health Communicable Diseases Team and outbreak liaison staff at ESR, and complete the Outbreak Report Form. If an outbreak, write a report. Liaise with the environmental health officer of the local territorial authority where food premises are thought to be involved. Liaise with the Ministry for Primary Industries if a contaminated commercial food source is thought to be involved. Attach typing report to case file. Ensure serotyping updated on EpiSurv. File. <p><i>Appendix 1 next page</i></p>

Appendix 1

Extract from the MoH Communicable Disease Control Manual 2012 - December 2017: Appendix1: Disinfection⁷

Disinfection and cleaning the environment

Diseases that are notifiable have public health implications. Therefore, decontamination of the environment is recommended when cross-infection from the source is possible. Disinfection is also indicated for contamination with y resistant bacteria.

Concurrent disinfection is the application of disinfection measures as soon as possible after the discharge of infectious material from the body of an infected person, or after articles have been soiled with such infectious discharges.

Personal protective equipment (PPE) must be used during environmental disinfection to prevent self-contamination.

Procedures

Disposable items: Any items that can be disposed of should be categorised as in NZS 4304:2002 New Zealand Waste Standard and disposed of.

Solid surfaces and/or equipment (including children's toys): Before disinfection, solid surfaces and/or equipment should be cleaned with detergent and dried. Before disinfection chemicals are applied, it should be established that they are fit for purpose a clear process on how to use them and manufacturer's recommendations are followed

Source: Ministry of Health. 2009. *Guidelines for the Management of Norovirus Outbreaks in Hospitals and Elderly Care Institutions*. Wellington: Ministry of Health.

Appendix 2

Extract from the MoH Communicable Disease Control Manual 2012 - December 2017: Appendix 2: Enteric Disease⁴

Exclusion/Restriction

Cases of most enteric disease should be considered infectious and should remain off work/school until 48 hours after symptoms have ceased. Certain individuals pose a greater risk of spreading infection and additional restriction/exclusion criteria may apply. Microbiological clearance may be required for individuals infected with/exposed to certain pathogens.

The key criteria are:

- the decision to exclude any worker is based on individual risk assessment. As a general rule, any worker with symptoms of gastrointestinal infection (diarrhoea and/or vomiting) should remain off work until clinical recovery and stools have returned to normal (where the causative pathogen has not been identified). Where the pathogen has been identified, specific criteria are summarised in Table 2.4
- the overriding prerequisite for fitness to return to work is strict adherence to personal hygiene, whether symptomatic or not.

The circumstances of each case, carrier or contact should be considered and factors such as their type of employment, availability of toilet and hand washing facilities at work, school or institution and standards of personal hygiene taken into account. For example, a carrier may be relocated temporarily to a role that does not pose an infectious risk.

Pathogen specific exclusion criteria for people at increased risk of transmitting an infection to others

Pathogen specific exclusion (restricting criteria for people from work, school or an early childhood service and for subsequent clearance are summarised in Table 2.4. Additional information is also included in the table for the following groups:

1. people whose work involves preparing or serving unwrapped food to be served raw or not subject to further heating (including visitors or contractors who could potentially affect food safety)
2. staff, inpatients and residents of health care, residential care, social care or early childhood facilities whose activities increase risk of transferring infection via the faecal-oral route
3. children under the age of 5 attending early childhood services/groups
4. other adults or children at higher risk of spreading the infection due to illness or disability.

The Health (Infectious and Notifiable Diseases) Regulations 2016 do not contain any exclusionary powers or incubation periods for infectious children, or for high risk occupational groups such as people who work with children or food handlers. Instead the medical officers of health can resort to broader powers in Part 3A of the Health Act 1956, which include directions to cases and contacts to remain at home until no longer infectious. This Manual contains the recommended exclusion periods for specific diseases (Refer:

Table 2.4). There is guidance published about the 2016 regulations and Part 3A of the Health Act in www.health.govt.nz/our-work/diseases-and-conditions/notifiable-diseases/summary-infectious-disease-management-under-health-act-1956

The legislation is principles based. In this context this means that medical officer of health must weigh protection of public health (the paramount consideration) with the following principles: trying voluntary means first if likely to be effective, choosing a proportionate, and the least restrictive measure required in the circumstances, fully informing the case or contact of the steps to be taken and clinical implications, treating them with dignity and respect for their bodily integrity and taking account of their special circumstances and vulnerabilities, and applying the measures no longer than is necessary (sections 92A to 92H).

Under Part 3A a medical officer of health can direct a case or a contact to stay home (section 92I(4)(b) or 92J(4)(b)). This is when the officer believes on reasonable grounds that the case or contact poses a public health risk (as defined in the s2 Act). The direction must specify duration.

Alternatively, in the context of attendance at an educational institution, if the officer believes the infection risk is unlikely to be effectively managed by directing the case or contact, he or she can approach the head and direct them to direct the case or contact to remain at home. In serious cases, the medical officer of health can also direct the head to close the institution or part of it (s 92L).

Medical officers of health have no powers to direct closure of premises or places where people congregate, other than educational institutions. If a medical officer of health needs to manage a public health risk by excluding infectious people from certain occupations, public pools, campsites, concerts and other public environments, he or she can use directions to the individuals concerned – to stay away from a certain place, or not to associate with certain people.

The Ministry for Primary Industries has powers to close commercial food premises. In contrast, medical officer of health powers focus on the risk the person poses.

Note that while there are provisions that apply to early childhood service workers, there are no provisions for health care workers – instead, advice should be provided to employers in terms of the Health and Safety at Work Act 2015.

Employers may decide to implement more stringent exclusion/restriction criteria in response to their own or their customers' requirements.

Appendix 3

Extract from the MoH Communicable Disease Control Manual 2012 - December 2017 Appendix 3: Patient Information⁸

Health education resources

Pamphlets, posters and other resources available from the Ministry of Health at www.healthed.govt.nz.

Food safety practices

The Ministry for Primary Industries

The Ministry for Primary Industries (MPI) leads New Zealand's food system, ensuring the food we produce is safe and protecting the health and wellbeing of consumers. MPI is responsible for legislation covering food for sale on the New Zealand market, primary processing of animal products and official assurances related to the export of animal and plant products and the controls surrounding registration and use of agricultural compounds and veterinary medicines. MPI is the New Zealand competent authority for imports and exports of food and food-related products.

MPI contact information: www.mpi.govt.nz/contact-us

Food safety practices in preparing and cooking a hangi: He whakatairanga i nga ahuatanga mahi mo te tunu hangi:

www.mpi.govt.nz/food-safety/community-food/marae-food-safety

Safe food preparation – key messages

Educate the public about safe food preparation.

- Avoid working with food when you:
 - are unwell especially with a gastro infection
 - have open skin sores, boils or abscesses.
- Clean your hands thoroughly after using the toilet or changing nappies or other incontinent products for others and before and after preparing food.
- Wash raw vegetables and fruits thoroughly before juicing them or eating them fresh.
- Cook meat thoroughly before eating.
- Cook eggs and egg products properly. Avoid eating raw, incompletely cooked eggs or using dirty or cracked eggs.
- Keep hot food hot between cooking and eating it.
- Wash hands, utensils and chopping boards in hot, soapy water after handling uncooked food.

- Keep raw meat, poultry and fish separate from and below other foodstuffs so that any raw meat juice does not contaminate other foods stuffs especially ready-to-eat foods.
- Cover all stored food.
- Cover and put uneaten, cooked food in the refrigerator within 1 hour of cooking.
- Defrost food by placing it on the lower shelves of a refrigerator (if raw meat place on bottom shelf to avoid raw meat juice contaminating other foods) or use a microwave oven according to defrosting instructions. Avoid defrosting food at room temperature.
- Thoroughly reheat (until internally steaming or piping hot, at least 70°C) leftover or ready-to-eat foods before eating.
- Strictly follow use-by and best-before dates on refrigerated foods.

Find out more about how to prepare and store food safely and when you need to take extra care with some types of food at www.mpi.govt.nz/food-safety/food-safety-for-consumers.

References and further information

1. NZ Communicable Diseases Control Manual 2012-December 2017, March 2018 Update (Table 1)
<https://www.health.govt.nz/system/files/documents/publications/communicable-disease-control-manual-may18-v3.pdf>
2. WHO, Immunization, Vaccines and Biologicals, Vaccines and diseases, Typhoid (edited):
<http://www.who.int/immunization/diseases/typhoid/en/>
3. ESR, Notifiable Diseases In New Zealand Annual Report 2016
https://surv.esr.cri.nz/PDF_surveillance/AnnualRpt/AnnualSurv/2016/2016AnnualINDReportFinal.pdf
4. MoH Communicable Disease Control Manual December 2017 Update, Appendix2: Enteric Disease.
<http://www.health.govt.nz/system/files/documents/publications/cd-manual-appendix-2-dec17.pdf>
5. Treatment and prevention of enteric fever (Typhoid and Paratyphoid fevers): UpToDate (Accessed 29/3/2018)
https://www.uptodate.com/contents/treatment-and-prevention-of-enteric-typhoid-and-paratyphoid-fever?search=TYPHOID%20TREATMENT&source=search_result&selectedTitle=1~106&usage_type=default&display_rank=1
6. Ministry of Health. 2008. Drinking-water Standards for New Zealand 2005 (Revised 2008)
<http://www.health.govt.nz/publication/drinking-water-standards-new-zealand-2005-revised-2008-0>
7. MoH Communicable Disease Control Manual December 2017 Update Appendix 1: Disinfection
<http://www.health.govt.nz/system/files/documents/publications/cd-manual-appendix-1-dec17.pdf>
8. MoH Communicable Disease Control Manual December 2017 Update Appendix 3: Patient Information <http://www.health.govt.nz/system/files/documents/publications/cd-manual-appendix-3-dec17.pdf>

Updates

9 August 2023: MOsH have agreed to require all high risk contacts to provide two negative faecal samples 48hrs apart, regardless of whether case was considered to have acquired their infection at home or overseas. Changes marked in blue.