

## GIARDIASIS

Based on the MoH Communicable Diseases Control Manual 2012-December 2017 Update<sup>1</sup>

### Associated Documents

Case Report form:

[Y:\CFS\ProtectionTeam\FinalDocs\notifiableConditions\Giardiasis\FormsStdLettersQuest\C aseReportFormEnteric\\_Dec2017.pdf](Y:\CFS\ProtectionTeam\FinalDocs\notifiableConditions\Giardiasis\FormsStdLettersQuest\C aseReportFormEnteric_Dec2017.pdf)

Fact Sheet:

Manatū Hauora | Ministry of Health - <https://healthed.govt.nz/products/cryptosporidium-and-giardia>

[Te Mana Ora Outbreak Response Procedure](#) (access via policies and procedures intranet site)

Te Mana Ora Outbreak checklist – access via [Te Mana Ora Policies Procedures – CD - Outbreaks](#) intranet page

Other relevant outbreak documents – access via [Te Mana Ora Policies Procedures – CD - Outbreaks](#) intranet page

Te Whatu Ora Waitaha Infection Prevention and Control. R Barratt. Standard Precautions Policy (<http://www.cdhb.health.nz/Hospitals-Services/Health-Professionals/CDHB-Policies/Infection-Prevention-Control-Manual/Documents/Standard%20Precautions.pdf>)

NZ Communicable Diseases Control Manual 2012-December 2017, Appendices (1-3): <https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.tewhatuora.govt.nz%2Fassets%2Fpublications%2Fcommunicable-disease-manual-updates%2Fcommunicable-disease-control-manual-22dec22.docx&wdOrigin=BROWSELINK>

### The Illness<sup>2-5</sup>

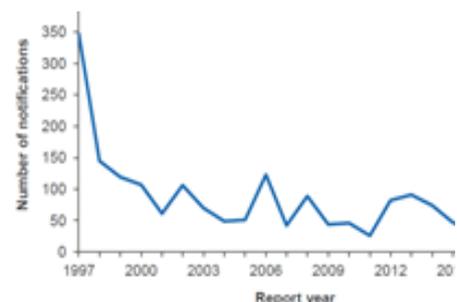
Giardia is a leading cause of human gastrointestinal illnesses globally and is the most commonly notified waterborne disease in New Zealand. The flagellate protozoan *Giardia intestinalis* (also known as known as *G lamblia* or *G. duodenalis*), is the most commonly identified intestinal parasite isolated worldwide. In the industrialized world, overall prevalence rates are 2-5% with Infection more common in children. Humans and animals including pets harbour the organism although the genotypes that infect dogs are different from those that infect humans. Infection may be asymptomatic or cause acute or chronic diarrhoea. Other symptoms of acute giardiasis include, malaise, foul-smelling faeces, abdominal cramps, bloating, flatulence, and nausea. Vomiting occurs less commonly and fever occasionally. Partially protective immunity develops following infection.

The organism is common in water from environmental sources and is associated with unsanitary conditions. Outbreaks occur in institutions and particularly day care centres. The cysts are resistant to chlorine, especially in cold waters. Waterborne outbreaks are common in some countries.

#### Epidemiology in New Zealand

The average annual incidence in New Zealand of around 41 per 100,000 is one of the highest among the industrialised countries. Children aged 1-4 years have the highest notification rates. Rates are high in persons living in rural areas particularly in children under five years, those drinking water from unreticulated supplies and travellers either within New Zealand or overseas. Other risk groups for giardiasis include children in nappies and their households, children attending day care centres, immunocompromised individuals and patients with hypochlorhydria or cystic fibrosis. Ingestion

NZ Giardiasis notifications 1997 - 2016



of as few as 10 *Giardia* cysts may be sufficient to cause infection.

The MELAA ethnic group (78.4 per 100,000) had the highest notification rate for giardiasis, followed by the European or Other ethnic group (41.4 per 100,000). Hospitalisation status was recorded for 1068 (66.0%) cases, of which 47 (4.4%) were hospitalised.

In New Zealand in 2016, 45 giardiasis outbreaks were reported involving 238 cases.

**CASE DEFINITION**

**Clinical description**  
An illness characterised by diarrhoea, abdominal cramps, bloating, flatulence, nausea, weight loss and malabsorption. The infection may be asymptomatic. Given the remitting/relapsing and variable nature of symptoms, the individual does not need to have compatible symptoms at the time of presentation but must have had a clinically-consistent illness in order to meet the case definition.

**Reservoir**  
Humans are the primary reservoir but wild and domestic animals such as cats, dogs and cattle can carry the infection.

**Incubation period**  
Usually 3–25 days or longer; median 7–10 days.

**Mode of transmission**  
Transmission occurs from ingestion of faecally contaminated food or drinking-water, swallowing recreational water (for example, swimming and wading pools, streams and lakes), exposure to faecally contaminated environmental surfaces, and person to person by the faecal-oral route.

**Period of communicability**  
Throughout the entire period of infection, often months.

**Susceptibility:** Asymptomatic carrier rate is high; infection is frequently self limited.

**Prevention:** The rate of giardiasis may be reduced by targeting prevention messages to parents with children less than five years especially those in rural areas, persons intending to travel overseas and improving the quality of drinking water in rural areas.

**Notification Procedure**

Attending medical practitioners or laboratories must immediately notify the local medical officer of health of cases of probable or confirmed giardiasis.

**CASE CLASSIFICATION**

**Under investigation:** A case that has been notified, but information is not yet available to classify it as probable or confirmed.

**Probable:** A clinically compatible illness that either is a contact of a confirmed case of giardiasis or has had contact with the same common source – that is, is part of a common-source outbreak.

**Confirmed:** A clinically compatible illness that is laboratory confirmed.

**Not a case:** A case that has been investigated and subsequently found not to meet the case definition.

**Possible notification to WorkSafe**  
Refer to Reporting section, page 5.

## Laboratory Testing

**Laboratory definitive evidence for a confirmed case requires** at least one of the following from an appropriate gastrointestinal clinical specimen:

- giardia antigen detection by either:
  - detection of direct fluorescence using monoclonal antibodies
  - detection of antigens using a rapid antigen test
  - enzyme immunoassay
- detection of giardia nucleic acid
- visualisation by direct microscopy detection of giardia cysts or trophozoites.

## Management of Case

### Investigation

**If case known to be high risk** (for transmitting the infection to others – refer to Table 1 below)

- If known that case is a food handler or other person in high risk category, administer questionnaire by telephone and post out disease information on day of notification. Otherwise refer to table below for Christchurch, Timaru and Greymouth responses.

*{Note: The letter accompanying the questionnaire mentions that if the case is a child, the letter and disease information are to accompany the child if he/she stays in another household, up to 2 weeks after the diarrhoea stops.}*

### If risk category of case not known

#### **Christchurch**

- Post questionnaire to case with covering letter, disease information and self-addressed envelope within 1-2 working days.
- If the case lives in the Selwyn, Kaikoura or Waimakariri District Council areas, fax or email details to the appropriate Local Authority EHO for follow-up.

#### **Timaru and Greymouth**

- Post questionnaire to case with covering letter, information pamphlet and self-addressed envelope within 1-2 working days.

- Investigate further and obtain a more detailed history if there is an outbreak or if the case is in a high-risk occupation or attends an early childhood service. Ensure symptomatic persons submit faecal samples for testing for *Giardia* spp.
- Sporadic cases: review returned questionnaire and follow-up or investigate as appropriate, eg. if:
  - ◊ case has been swimming in pool while symptomatic, have there been other cases associated with the pool?
  - ◊ Has there been more than one case from same source/situation, for instance at a preschool?
  - ◊ Has the case attended a farm visit as part of a group?
- 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.

**Outbreak: It is the responsibility of all Communicable Diseases staff** to be vigilant regarding any increased incidence of giardiasis. Such an increase is to be promptly reported to the MOH. Refer to:

- ◊ [Te Mana Ora Outbreak Response Procedure](#) (access via policies and procedures intranet site)
- ◊ Te Mana Ora Outbreak checklist – access via [Policies Procedures – CD - Outbreaks](#) intranet page
- ◊ as well as other relevant documents: - access via [Policies Procedures – CD - Outbreaks](#) intranet page

- ◊ Organise faecal screening (through ESR) of symptomatic persons involved in the event or associated with the facility. These persons are to be managed as cases until results are known.
- Amongst other possibilities, consider water as a possible source and check the supply,
- In a community outbreak consider implications for swimming pools and if necessary;
  - 1) ask GPs to advise patients with gastroenteritis not to swim in a pool until two weeks after diarrhoea stops.
  - 2) provide media releases with the same advice as 1).
  - 3) liaise with swimming pools to ensure adequate signage and appropriate management of faecal accidents.

**Restriction and Clearance**

- In any health care facility, only standard precautions (<http://www.cdhb.health.nz/Hospitals-Services/Health-Professionals/CDHB-Policies/Infection-Prevention-Control-Manual/Documents/Standard%20Precautions.pdf>) are indicated in most cases.
- If the case is a child in nappies or incontinent, apply contact precautions for the duration of illness.
- Cases should not use public swimming pools for 2 weeks after symptoms have resolved.
- Refer to Table 1 for exclusion and clearance criteria.

**Table 1.<sup>6</sup> Exclusion and clearance criteria for people at increased risk of transmitting an infection to others\***

Pathogen	Exclusion* and Clearance	Contacts
<b>Giardiasis</b>	<ul style="list-style-type: none"> <li>- Exclude 1,2,3,4 (below) until symptom free for 48 hours</li> <li>- Clearance not required.</li> </ul>	No exclusion or clearance criteria required for any close contacts. Should avoid swimming pools for 2 weeks after symptom free.

\* **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.

**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.

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.

- For further details, refer to Appendix 2 of this protocol and reference 6.

**Treatment**

- Refer to UpToDate.<sup>7</sup> Maintain fluid and electrolyte balance.

**Counselling**

- Advise the case and their caregivers of the nature of the infection and its mode of transmission. If case is a child, ask if he/she stays in any household other than that given at the time of notification and if so, ensure advice accompanies the child when he/she moves.
- A fact sheet is available at:  
<https://healthed.govt.nz/products/cryptosporidium-and-giardia>

- Case to be advised not to share bath water with others while symptomatic and until 2 weeks after diarrhoea stops.
- Educate about hygiene, especially hand cleaning.
- In early childhood centres or other institutional situations provide instruction in good hygiene practice including hand washing routines, nappy changing routines and correct use and storage of cleaning equipment.
- Hand washing is better prevention than disinfection of toys or general surfaces.

**Management of Contacts**

**Definition**

All people who have had close physical contact (for example, household) with a symptomatic case or who have been exposed to the same water, food or other material suspected to be the source of infection.

**Investigation**

- Investigate contacts who are symptomatic by faecal culture and manage as cases until the results are known.
- Sporadic case: symptomatic contacts to be advised to consult GP and have faecal tests.  
Outbreak: organise faecal screening through ESR of symptomatic persons.

**Restriction**

Contacts do not need to be excluded from work, school or other activities unless symptoms develop.

**Prophylaxis**

Not applicable.

**Counselling**

- Advise all contacts of the incubation period and typical symptoms of giardiasis, and to seek early medical attention if symptoms develop.
- Educate about hygiene.
- If a water supply is involved liaise with the TLA and Regional council to inform the public
- A fact sheet is available at:  
<https://health.govt.nz/products/cryptosporidium-and-giardia>

**Disinfection**

- Refer to Drinking Water Standards of NZ 2008 if water supply implicated as possible source.

**Other Control Measures**

**Identification of source**

- Investigate potential food and water sources of infection only if there is a cluster of cases or an apparent epidemiological link. Consider checking for other cases in the community.
- Liaise with the Drinking Water team as necessary on case-by-case basis.
- If indicated, check water supply for microbiological contamination and compliance with the latest New Zealand drinking-water standards (Ministry of Health 2008). If a water supply is involved, the MOH will liaise with the local territorial authority to inform the public.
- Liaise with the local territorial authority staff to investigate potential water or pool sources of infection and to ensure appropriate remedial action.
- Advise on the need to boil water.

**Disinfection**

Clean and disinfect surfaces and articles soiled with faeces. For more details, see Appendix 1 and reference 8

**Health education**

- Consider a media release and direct communication with relevant early childhood services, schools and health professionals to encourage prompt reporting of symptoms and requesting people with infectious diarrhoea not to swim in a pool until two weeks after diarrhoea stops.

	<ul style="list-style-type: none"> <li>• In communicating with doctors, include recommendations regarding diagnosis and infection control.</li> <li>• If a water supply is involved, liaise with the local territorial authority to inform the public. Advise on the need to boil water.</li> <li>• Educate the public about safe food preparation (refer to NZ Communicable Diseases Control Manual 2022, Appendix 3: Patient Information <a href="https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.tewhatauora.govt.nz%2Fassets%2Fpublications%2FCommunicable-Disease-Manual-Updates%2Fcommunicable-disease-control-manual-22dec22.docx&amp;wdOrigin=BROWSELINK">https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.tewhatauora.govt.nz%2Fassets%2Fpublications%2FCommunicable-Disease-Manual-Updates%2Fcommunicable-disease-control-manual-22dec22.docx&amp;wdOrigin=BROWSELINK</a><sup>9</sup>)</li> <li>• Hand-cleaning facilities should be available and used after contact with animals. Young children should be supervised during contact with animals and during hand cleaning. Food-related activities should be separated from areas that house animals.</li> <li>• 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 cleaning of sleeping areas, toys and other surfaces.</li> <li>• Domestic animals with diarrhoea should be taken to a vet for assessment and treatment.</li> </ul>
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**Reporting**

	<ul style="list-style-type: none"> <li>• Ensure complete case information is entered into EpiSurv.</li> <li>• Where food/food businesses are thought to be involved inform the Ministry for Primary Industries.</li> <li>• 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.</li> <li>• If suspected that the infection was acquired at work, complete the WorkSafe notification form 'Notifications under sections 197 and 199 of the Health and Safety at Work Act 2015, Notifications by Medical Officers of Health' (paper copies are kept in the office).</li> <li>• If an outbreak, write report for Outbreak Report File, available at: <a href="Y:\CFS\ProtectionTeam\FinalDocs\notifiableconditions\Giardiasis\Outbreaks">Y:\CFS\ProtectionTeam\FinalDocs\notifiableconditions\Giardiasis\Outbreaks</a>.</li> <li>• File.</li> </ul>
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**Appendix 1**

Extract from the MoH Communicable Disease Control Manual 2012 - December 2017: Appendix 1: Disinfection<sup>8</sup>

	<p><b>Disinfection and cleaning the environment</b> 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.</p> <p>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.</p> <p>Personal protective equipment (PPE) must be used during environmental disinfection to prevent self-contamination.</p> <p><b>Procedures</b> <b>Disposable items:</b> Any items that can be disposed of should be categorised as in NZS 4304:2002 New Zealand Waste Standard and disposed of.</p> <p><b>Solid surfaces and/or equipment (including children's toys):</b> 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</p> <p>Source: Ministry of Health. 2009. <i>Guidelines for the Management of Norovirus Outbreaks in Hospitals and Elderly Care Institutions</i>. Wellington: Ministry of Health.</p>
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## Appendix 2

Extract from the MoH Communicable Disease Control Manual 2012 - December 2017 Appendix 2: Enteric Disease<sup>6</sup>

### 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](http://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 Information<sup>9</sup>

#### Health education resources

Pamphlets, posters and other resources available from the Ministry of Health at [www.healthed.govt.nz](http://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](http://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](http://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 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](http://www.mpi.govt.nz/food-safety/food-safety-for-consumers).

### References and further information

1. NZ Communicable Diseases Control Manual 2022, Giardiasis:  
<https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.tewhatuor.a.govt.nz%2Fassets%2FPublications%2FCommunicable-Disease-Manual-Updates%2Fcommunicable-disease-control-manual-22dec22.docx&wdOrigin=BROWSELINK>

2. Giardiasis, (Gastroenterology), Medscape.  
<http://emedicine.medscape.com/article/176718-overview>
3. UpToDate, Giardiasis  
[https://www.uptodate.com/contents/giardiasis-epidemiology-clinical-manifestations-and-diagnosis?search=giardiasis&source=search\\_result&selectedTitle=2~100&usage\\_type=default&display\\_rank=2](https://www.uptodate.com/contents/giardiasis-epidemiology-clinical-manifestations-and-diagnosis?search=giardiasis&source=search_result&selectedTitle=2~100&usage_type=default&display_rank=2)
4. Epidemiology of Giardia infection in New Zealand and the risk in children  
Hoque, ME. Thesis (PhD--Community Health)--University of Auckland, 2003.  
<https://researchspace.auckland.ac.nz/handle/2292/3127>
5. ESR, Notifiable Disease in New Zealand, Annual report 2016.  
[https://surv.esr.cri.nz/PDF\\_surveillance/AnnualRpt/AnnualSurv/2016/2016AnnualNDReportFinal.pdf](https://surv.esr.cri.nz/PDF_surveillance/AnnualRpt/AnnualSurv/2016/2016AnnualNDReportFinal.pdf)
6. NZ Communicable Diseases Control Manual 2012 – December 2017, Appendix 2: Enteric disease  
<http://www.health.govt.nz/system/files/documents/publications/cd-manual-appendix-2-dec17.pdf>
7. UpToDate, Giardiasis  
[https://www.uptodate.com/contents/giardiasis-treatment-and-prevention?search=giardiasis%20treatment&source=search\\_result&selectedTitle=1~100&usage\\_type=default&display\\_rank=1](https://www.uptodate.com/contents/giardiasis-treatment-and-prevention?search=giardiasis%20treatment&source=search_result&selectedTitle=1~100&usage_type=default&display_rank=1)
8. NZ Communicable Diseases Control Manual 2012 – December 2017, Appendix 1: Disinfection  
<http://www.health.govt.nz/system/files/documents/publications/cd-manual-appendix-1-dec17.pdf>
9. NZ Communicable Diseases Control Manual 2022, Appendix 3: Patient education  
<https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.tewhator.a.govt.nz%2Fassets%2FPublications%2FCommunicable-Disease-Manual-Updates%2Fcommunicable-disease-control-manual-22dec22.docx&wdOrigin=BROWSELINK>

**Further information**

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>

MPI/ESR microbiological data sheet, Giardiasis:  
<Y:\CFS\ProtectionTeam\FinalDocs\Admin\OnCall\DocsOnLaptops\MicroDataSheets>