



Health, Healthy Living and Seniors

Public Health and Primary Health Care
Communicable Disease Control
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Re: Giardiasis Reporting and Case Investigation

Reporting of giardiasis (*Giardia lamblia*, also referred to as *Giardia intestinalis* or *Giardia duodenalis*) is as follows:

Laboratory:

- All positive laboratory results for *G. lamblia* are reportable to the Public Health Surveillance Unit by secure fax (204-948-3044).

Health Care Professional:

- Probable (clinical) cases of giardiasis are reportable to the Public Health Surveillance Unit using the *Clinical Notification of Reportable Diseases and Conditions* form (<http://www.gov.mb.ca/health/publichealth/cdc/protocol/form13.pdf>) ONLY if a positive lab result is not anticipated (e.g., poor or no specimen taken, person has recovered).
- Cooperation in Public Health investigation is appreciated.

Regional Public Health or First Nations Inuit Health Branch (FNIHB):

- Once the case has been referred to Regional Public Health or FNIHB, the *Communicable Disease Control Investigation Form* (www.gov.mb.ca/health/publichealth/cdc/protocol/form2.pdf) should be completed and returned to the Public Health Surveillance Unit by secure fax (204-948-3044).

Sincerely,

“Original Signed By”

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Public Health and Primary Health Care
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Giardiasis



Public Health Branch

1. Case Definition

1.1 Confirmed Case

Laboratory confirmation from stool, duodenal fluid or small biopsy specimen with or without clinical illness^a:

- Demonstration of *Giardia lamblia* trophozoites or cysts by microscopy
- OR
- Demonstration of *Giardia lamblia* antigen^b (1).

1.2 Probable Case

Clinical illness^a in a person who is epidemiologically linked to a confirmed case (1).

2. Reporting and Other Requirements

Laboratory:

- All positive laboratory results are reportable to the Public Health Surveillance Unit (204-948-3044 secure fax).

Health Care Professional:

- Probable cases are reportable to the Public Health Surveillance Unit (form available at: www.gov.mb.ca/health/publichealth/cdc/protocol/form2.pdf) ONLY if a positive lab result is not anticipated (e.g., poor or no specimen taken, person has recovered). Confirmed cases do not require reporting by health care professional as they will be reported to Manitoba Health by the laboratory.

3. Clinical Presentation/Natural History

Infection with *Giardia lamblia* is usually limited to the small intestine and biliary tract (2). Syndromes associated with *G. lamblia* infection include asymptomatic cyst passage, acute self-limited diarrhea and chronic diarrhea, malabsorption, and weight loss (3). Asymptomatic infection is common (2). Symptomatic giardiasis is characterized by

acute onset of diarrhea, abdominal cramps, bloating, and flatulence that may be accompanied by malaise, nausea and anorexia (3). Vomiting and fever are less common, and blood or mucus-tinged feces are rare (4). Initially, stools may be profuse and watery, but later they are commonly greasy and foul smelling and may float (3). The diarrheal syndrome usually lasts one to several weeks and may clear spontaneously (2). In children, anorexia combined with malabsorption can lead to significant weight loss, failure to thrive, and anemia (2). Unusual associations include urticaria, reactive arthritis, biliary tract disease, and gastric infection (3). Reinfection is common, particularly in children in endemic settings (3). Post-infectious gastrointestinal symptoms after acute giardiasis including lactose intolerance, abdominal pain, and fatigue have been reported and may be confused with relapse or reinfection (2, 5).

4. Etiology

Giardia lamblia (also referred to as *Giardia intestinalis* or *Giardia duodenalis*) is a flagellate protozoan that exists in trophozoite and cyst forms; the infective form is the cyst (2).

5. Epidemiology

5.1 Reservoir

Humans are the main reservoir of infection. *Giardia* can also infect dogs, cats, beavers, rodents, sheep, cattle, nonhuman primates, and other animals (2). *Giardia* cysts survive well in the environment, particularly in cold water (3, 6). Unfiltered stream and lake waters (where contamination by human and animal feces is possible) are a potential source of infection (7, 8).

^a Characterized by diarrhea, abdominal cramps, bloating, weight loss, fatigue or malabsorption (1).

^b Tests for detection of antigen in the stool are currently not available in Manitoba.

5.2 Transmission

Transmission is fecal-oral through direct person-to-person contact or indirect through ingestion of fecally contaminated water or food (2, 9). The role that domestic animals and wildlife play in the zoonotic transmission of *Giardia* is not clear (6). The infectious dose is small, facilitating person-to-person transmission among individuals in crowded conditions where hygiene practices may be suboptimal (10). Sexual transmission has been reported among men who have sex with men engaging in oral-anal sex (4, 8, 10). Outbreaks resulting from person-to-person transmission occur in child care centers or institutional care settings where staff and family members in contact with infected children or adults become infected (2, 11). Outbreaks have also been associated with contaminated drinking and recreational water supplies, and less commonly with food and food handlers (2, 7, 9, 12, 13). Large outbreaks with extensive secondary spread have been reported (14).

5.3 Occurrence

General: Children are infected more frequently than adults (7). The prevalence rate in temperate climates is 2-10 % in adults and 25% in children, whereas in tropical countries, 50-80% of people are carriers (15). Prevalence is higher in areas of poor sanitation, with insufficient water treatment facilities (16) and in institutions with children not yet toilet-trained, including child care centers (7, 8). Travelers who acquire *Giardia* have often visited countries in the Indian subcontinent for a month or longer (3). *Giardia lamblia* is the most commonly identified intestinal parasite in the United States and Canada (15).

Canada: In 2011, 632 cases of *Giardia* were reported to the National Enteric Surveillance Program (NESP) (17). Of the cases reported, 48 were travel-associated (17). The number of isolates reported to NESP is only a subset of laboratory isolations within the reporting province and may not accurately reflect the incidence of disease provincially or nationally (17). *Giardia* represented 25% of travel-acquired enteric infections reported to NESP in 2011(17).

Manitoba: In 2011, 105 cases of *Giardia lamblia* were reported to Manitoba Health. For 2000-2011 inclusive, 1,622 cases were reported with the annual incidence varying from 8.4 to 16.0 per 100,000 population. For 2000-2011, the highest number of cases (540) was reported in the 20-44 year age group.

5.4 Incubation Period

Usually 3-25 days or longer, median 7-10 days (7).

5.5 Host Susceptibility and Resistance

The asymptomatic carrier rate is high (7). Humoral immunodeficiency predisposes to chronic symptomatic *Giardia* infection (2). Increased susceptibility to giardiasis has also been seen in patients with previous gastric surgery or reduced gastric acidity (3). Breast-feeding protects infants from symptomatic giardiasis (3, 10).

5.6 Period of Communicability

Giardiasis is communicable as long as the infected person excretes cysts (2), often for months (7).

6. Laboratory Diagnosis

Diagnosis is made by observation of *Giardia lamblia* organisms in stool or trophozoites in duodenal contents. Because *Giardia* infection is often asymptomatic, identification of *G. lamblia* does not necessarily indicate that it is the cause of illness. *Giardia* cysts can be excreted intermittently; multiple stool collections (i.e., three stool specimens collected on separate days) increase test sensitivity. Tests for detection of antigen in the stool are currently not available in Manitoba.

7. Key Investigations for Public Health Response

- History
 - Child care facility contact;
 - Drinking water supply;
 - Recreational water contact;
 - Similar illness in household or other close contact;

- Animal contact including farm or companion animals, petting zoos;
 - Wilderness exposure;
 - Personal hygiene (e.g., washing hands after defecation and before food handling);
 - Travel history, especially to an endemic area; and
 - Sexual risk factors (e.g., oral-anal contact)
- Determine if there is a common vehicle responsible for other giardiasis cases such as contaminated drinking water or food. The public health lead for contaminated drinking water issues is the regional Medical Officer of Health with assistance from public health inspectors (PHIs). Drinking water sampling would be undertaken by the Office of Drinking Water with assistance from public health inspectors. Public health inspectors are responsible for the investigation of contaminated recreational water. The PHI recreational water specialist can be contacted at 204-945-0835.
 - Microscopic examination of feces in symptomatic contacts (7).

8. Control

8.1 Management of Cases

Treatment:

- Some infections are self-limited and treatment is not indicated (2). Dehydration and electrolyte abnormalities should be corrected if present (2).
- Metronidazole, tinidazole and nitazoxanide are preferred for first line treatment (2, 9, 15,18). Metronidazole and tinidazole are contraindicated in the first trimester of pregnancy (4, 7, 9). Infectious disease consultation is recommended for treatment of giardiasis during pregnancy and lactation (4). In Canada, tinidazole and nitazoxanide are only available through Health Canada's Special Access Program at <http://www.hc-sc.gc.ca/dhp-mps/acces/drugs-drogués/index-eng.php>.
- Alternatives include paromomycin, furazolidone, quinacrine and albendazole (3, 9, 19); however,

only paromomycin is commercially available in Canada.

- If symptoms recur, a detailed exposure history and repeat stool testing should be obtained to determine the cause (e.g., lactose intolerance, reinfection, drug resistance) (2).
- Treatment of asymptomatic infected persons generally is not recommended (2). Possible exceptions to prevent transmission are carriers in households of patients with hypogammaglobulinemia or cystic fibrosis (2).

Infection Control Measures:

- Refer to page 87 of the Manitoba Health document *Routine Practices and Additional Precautions: Preventing the Transmission of Infection in Health Care* available at: <http://www.gov.mb.ca/health/publichealth/cdc/docs/ipc/rpap.pdf>.

Public Health Measures:

- Infected individuals should wash their hands frequently for a minimum of 20 seconds using friction with **soap and running water**, especially before preparing food or after going to the toilet.
- Exclusion of symptomatic individuals from food handling and from direct care of hospitalized and institutionalized patients until diarrhea has resolved. Symptomatic children and child care facility workers who work directly with children should be excluded from child care settings until diarrhea has resolved (2, 12). Stress proper hand hygiene.
- Infected persons should not use recreational water venues (e.g., swimming pools, wading pools, whirlpools) until two weeks after resolution of symptoms (2).
- Education on preventive measures should be provided to cases and their contacts (refer to Section 8.4 below).

8.2 Management of Contacts

- Symptomatic contacts should seek medical attention and should have stool specimens taken. If *Giardia* is identified, refer to *Management of Cases* above.

8.3 Management of Outbreaks

An outbreak is defined as the occurrence of case(s) in a particular area and period of time in excess of the expected number of cases.

- Outbreaks should be investigated to identify a common source of infection and prevent further exposure to that source. The extent of the investigation will depend upon the number of cases, the likely source of contamination and other relevant factors.
- Refer to the *Enteric Illness Protocol* available at: www.gov.mb.ca/health/publichealth/cdc/protocol/enteric.pdf.
- Public notification may be appropriate and will depend on the number of cases, the likely source of contamination and other factors. The level of notification will usually be at the discretion of regional Public Health and/or the provincial Public Health Branch for local outbreaks but may be at the discretion of the Federal Government for nationally linked foodborne outbreaks as per *Canada's Foodborne Illness Outbreak Response Protocol (FIORP) 2010: To guide a multijurisdictional response* available at: www.phac-aspc.gc.ca/zoono/fiorp-pritioa/index-eng.php.
- Education on preventive measures should occur (refer to Section 8.4 below).
- Exclusion as per Section 8.1, "Management of Cases" above.
- In child care facility outbreaks, all symptomatic children, child care providers and family members infected with *Giardia intestinalis* should be treated (2). Treatment or exclusion of asymptomatic carriers is not effective for outbreak control and is not recommended (2).

8.4 Preventive Measures

- Public education in personal hygiene. All individuals should wash hands well for a minimum of 20 seconds using friction with **soap and running water**:
 - Before preparing, serving, or eating food;
 - After using or cleaning the toilet or assisting someone else with using the toilet;

- After changing a diaper;
 - After caring for someone who is ill with diarrhea, and
 - After handling an animal or its waste (12).
- Avoiding drinking untreated water from lakes, rivers, springs, ponds, streams, or shallow wells (12). Water should be heated to a rolling boil for at least one minute to destroy *Giardia* cysts (12, 20). If boiling is not possible, 2 to 4 drops of household bleach or 0.5 ml of 2% tincture of iodine can be added to each litre of water and the water can be held for 20 minutes before drinking (longer if water is cold or turbid) (7). Filtration with a pore size of $\leq 1.0 \mu\text{m}$ is effective for removal of *Giardia* cysts (3, 9, 21).
 - Avoiding eating uncooked foods while traveling in countries with poor water treatment and food sanitation (12).
 - Early recognition and treatment of cases in child care facilities to prevent spread to the community (11).
 - Exclusion of children with diarrhea from child care settings until the diarrhea has stopped (12).
 - People with diarrhea caused by *Giardia* species should not use recreational water venues (e.g., swimming pools, water slides) for two weeks after symptoms resolve (2).
 - Concentrations of chlorine used in water treatment do not kill *Giardia* cysts (7, 8, 16). In addition to chlorination, public water supplies should also undergo flocculation, sedimentation and filtration (3). Filtration is really the only method that guarantees cyst removal (22).
 - Watershed management to control both sewage inputs and the populations of aquatic mammals in the vicinity of water intakes (6) and adherence to drinking water regulations and well placement (13).
 - Proper management of fecal accidents in recreational water facilities (14).
 - Sexual transmission of *Giardia* may be decreased by avoidance of oral-anal and oral-genital sex (3, 9).

References

- Public Health Agency of Canada. Case Definitions for Communicable Diseases under National Surveillance. *Canada Communicable Disease Report CCDR* 2009; 35S2: 1-123.
- American Academy of Pediatrics. *Giardia intestinalis* (formerly *Giardia lamblia* and *Giardia duodenalis*) Infections (Giardiasis) . In: Pickering LK ed. *Redbook 2012 Report of the Committee on Infectious Diseases 29th ed.* Elk Grove Village, IL: American Academy of Pediatrics, 2012; 333-335.
- Hill DR and Nash TE. *Giardia lamblia*. In: Mandell GL, Bennett JE, Dolin R eds. *Principles and Practice of Infectious Diseases 7th ed.* Elsevier, Philadelphia, 2010.
- Gardner TB and Hill DR. Treatment of Giardiasis. *Clinical Microbiology Reviews* 2001; 14(1): 114-128.
- Wensaas KA, Langeland N and Rortveit G. Post-infectious gastrointestinal symptoms after acute Giardiasis. A 1-year follow-up in general practice. *Family Practice* 2010; 27:255-259.
- Health Canada. Guidelines for Canadian Drinking Water Quality. Enteric Protozoa: *Giardia* and *Cryptosporidium*. January 2012. Available at: http://www.hc-sc.gc.ca/ewh-semt/alt_formats/pdf/pubs/water-eau/protozoa/protozoa-eng.pdf .
- Heymann David L. Giardiasis (*Giardia enteritis*). In: *Control of Communicable Diseases Manual 19th ed*, American Public Health Association, Washington, 2008; 258-260.
- Wolfe M. Giardiasis. *Clinical Microbiology Reviews* 1992; 5(1): 93-100.
- Huang DB and White AC. An Updated Review on *Cryptosporidium* and *Giardia*. *Gastroenterol Clin N Am* 2006; 35: 291-314.
- Muhsen K and Levine MM. A Systematic Review and Meta-analysis of the Association Between *Giardia lamblia* and Endemic Pediatric Diarrhea in Developing Countries. *Clinical Infectious Diseases* 2012; 55 (S4): S271-93.
- Polis MA, Tuazon CU, Alling DW and Talmanis E. Transmission of *Giardia lamblia* from a Day Care Center to the Community. *American Journal of Public Health* 1986; 76 (9):1142-1144.
- Centers for Disease Control and Prevention. Cryptosporidiosis Surveillance – United States, 2009-2010 and Giardiasis Surveillance – United States, 2009-2010. *Morbidity and Mortality Weekly Report MMWR* 2012; 61(5): 1-23.
- Daly ER, Roy SJ, Blaney DD *et al.* Outbreak of giardiasis associated with a community drinking-water source. *Epidemiol. Infect.* 2010; 138: 491-500.
- Katz DE, Heisey-Grove D Beach M *et al.* Prolonged outbreak of giardiasis with two modes of transmission. *Epidemiol. Infect.* 2006; 134: 935-941.
- Public Health Agency of Canada. *Giardia lamblia* Pathogen Safety Data Sheet – Infectious Substances. Available at: <http://www.phac-aspc.gc.ca/lab-bio/res/psds-ftss/giardia-lambliia-eng.php> .
- Ortega YR and Adam RD. *Giardia*: Overview and Update. *Clinical Infectious Diseases* 1997; 25: 545-50.
- Public Health Agency of Canada. National Enteric Surveillance Program (NESP) Annual Summary 2011.
- Centers for Disease Control and Prevention. *Giardia* Treatment. Available at: <http://www.cdc.gov/parasites/giardia/treatment.html> .
- Solaymani-Mohammadi S, Genkinger JM, Loffredo CA and Singer SM. A Meta-analysis of the Effectiveness of Albendazole Compared with Metronidazole as Treatments for Infections with *Giardia duodenalis*. *PLOS Neglected Tropical Diseases* 2010; 4(5): e682. Available at: <http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0030758/> .

20. Health Canada. Environmental and Workplace Health. *Giardia* and *Cryptosporidium* in Drinking Water. Available at:
http://hc-sc.gc.ca/ewh-scmt/pubs/water-eau/giardia_cryptosporidium-eng.php .
21. Centers for Disease Control and Prevention. A Guide to Water Filters. Available at:
http://www.cdc.gov/parasites/crypto/gen_info/filters.html .
22. Lane S and Lloyd D. Current Trends in Research into the Waterborne Parasite *Giardia*. *Clinical Reviews in Microbiology* 2002; 28 (2): 123-147.