



Health, Healthy Living and Seniors

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

Reporting of cryptosporidiosis (*Cryptosporidium* species) is as follows:

Laboratory:

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

Health Care Professional:

- Probable (clinical) cases of cryptosporidiosis 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”

Richard Baydack, PhD
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Public Health and Primary Health Care
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“Original Signed By”

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Cryptosporidiosis

1. Case Definition

1.1 Confirmed Case

Laboratory confirmation of infection from an appropriate clinical specimen (e.g., stool, intestinal fluid or small bowel biopsy) with or without clinical illness^a:

- Demonstration of *Cryptosporidium* oocysts
OR
- Detection of *Cryptosporidium* DNA
OR
- Demonstration of *Cryptosporidium* antigen by an approved method (e.g., enzyme immunoassay) (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).
- Clinical laboratories are required to submit only requested residual specimens from individuals who tested positive for *Cryptosporidium* to Cadham Provincial Laboratory (CPL) within seven days of request.

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

The major symptom is diarrhea, which may be profuse and watery, accompanied by cramping abdominal pain (2). General malaise, fever, anorexia, nausea and vomiting occur less often; however, diarrhea may be preceded by anorexia and vomiting in children (2). In immunocompetent individuals, symptoms may be intermittent but usually resolve within 30 days (2). The duration of illness in most cases is approximately five to 10 days (3). Asymptomatic infections are common and can be a source of infection for others (2). Disease severity depends on the host (concurrent infection, malnutrition, immunosuppression), agent (genotypic strain), and environmental (dose of exposure) factors (4). Immunocompromised individuals may experience prolonged severe diarrhea which may lead to malnutrition and weight loss (5). Disease can be life-threatening in some immunocompromised hosts (6). Clinical illness is more frequent and severe among the elderly (3). The main site of infection is the small intestine, although infection may be spread throughout the gastrointestinal tract and extra-intestinal sites (7).

Evidence is emerging that the clinical presentation may vary with infecting species (7). There is some evidence that illness is more severe in patients infected with *C. hominis* than those infected with *C. parvum* (8). Recurrence of intestinal symptoms after resolution of the acute stage of illness (for both *C. parvum* and *hominis*) may occur (9). *C. hominis* is associated with increased risk of non-intestinal postinfectious symptoms (e.g., joint pain) (9).

a Characterized by diarrhea (often profuse and watery), abdominal cramps, anorexia, fever, nausea, general malaise and vomiting.

4. Etiology

Cryptosporidium parvum and *C. hominis*, oocyst-forming, intracellular coccidian protozoa, are the two species most often associated with human infection (2, 5, 10-12). There are at least 16 established *Cryptosporidium* species (8).

5. Epidemiology

5.1 Reservoir

Humans, cattle and other domesticated and feral animals (2). *Cryptosporidium* does not multiply in foods; however, it can retain viability, and therefore infectivity, under moist and cool conditions for several months (13).

5.2 Transmission

Transmission is fecal-oral (2). Fecal-oral transmission can occur directly through person-to-person and animal-to-person routes or indirectly through environmental vehicles including water and food (7, 14, 15). The infectious dose is low, facilitating transmission from sources with low-grade contamination, such as recreational water (3). Oocysts can survive adverse environmental conditions for long periods of time (2) and are resistant to commonly used disinfectants (e.g., chlorine and chlorine derivatives) (2, 3, 16, 17). Outbreaks have been associated with day care centres, municipal drinking water and recreational water venues (e.g., swimming pools, waterslides, lakes) (2, 14, 15, 18-20), travel, and contact with farm animals (12, 15, 21). Outbreaks have also been reported in health care facilities (15). Transmission is associated with anal-genital sex (3). At least one study has suggested that sexual behaviour in men who have sex with men is a significant risk factor for cryptosporidial diarrhea (22).

5.3 Occurrence

General: Worldwide. In industrialized countries, prevalence of infection is less than 1% to 4.5% based on stool examination (2). Prevalence ranges from 3% to 20% in developing regions (2).

Infection is more common in children under two years of age (2, 7), animal handlers, travelers, men who have sex with men (MSM) and close personal contacts of infected individuals (families, health care and day care workers) (2). There is also an increased frequency of infection in patients with altered cellular immunity (3). Surveillance studies have indicated that males were more frequently infected than females; this could be related in part to the over-representation of HIV-infected patients who in at least one study were mainly male (23).

Canada: In 2010, 136 cases of *Cryptosporidium* were reported to the National Enteric Surveillance Program (NESP) (24). Of the cases reported, one was identified as being travel-associated (24). *Cryptosporidium* infections are not routinely reported to the provincial or central reference laboratories and are greatly under-represented in NESP (24).

Manitoba: In 2011, 19 cases of cryptosporidiosis were reported to Manitoba Health. For 2000-2011 inclusive, 536 cases were reported with the annual incidence rate varying from 1.5 to 8.6 per 100,000 population. For 2000-2011, the highest number of cases (204) was reported in the 5-19 year age group.

5.4 Incubation Period

The average incubation period is seven days, but ranges from one to 12 days (2).

5.6 Susceptibility and Resistance

Immunocompetent individuals may have asymptomatic infections or self-limited symptomatic infections (2). Adults and children can have multiple episodes of cryptosporidiosis, indicating that acquired immunity to *Cryptosporidium* infection is short-lived or incomplete (7, 11). Children in developing countries are vulnerable to persistent infection because of the independent and synergistic effects of immune naïveté, malnutrition, and HIV infection (25).

5.7 Period of Communicability

Oocysts are excreted in stool from the onset of symptoms until several weeks after resolution of symptoms and remain infectious in the environment for two to six months or longer if the environment is moist (2). In immunocompetent people, oocyst shedding usually ceases within two weeks of symptom resolution (2). In immunocompromised people, the period of oocyst shedding can continue for months (5).

6. Laboratory Diagnosis

Three stool specimens should be collected on three separate days at least 24 hours apart, but within a 7-10 day time interval. Diagnosis is generally made by identification of oocysts in fecal smears or intestinal biopsy sections. Because shedding can be intermittent, at least three stool specimens should be examined before considering test results to be negative.

New and more sensitive enzyme immunoassay (EIA)-based methods for direct antigen detection in stool have recently become available, but are not routinely available in Manitoba.

7. Key Investigations for Public Health Response

- History
 - Child care facility contact;
 - Recreational water contact;
 - Animal contact including farm or companion animals, petting zoos;
 - Similar illness in household or other close contact; and
 - Travel history.
- Determine if there is a common vehicle responsible for other cases such as contaminated drinking water or food. The medical lead for contaminated drinking water issues is the regional Medical Officer of Health. 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 Public Health Inspector recreational water specialist can be contacted at 204-945-0835.

- Microscopic examination of feces in symptomatic contacts (2).

8. Control

8.1 Case Management

Treatment:

- Specific therapy is generally not indicated in immunocompetent individuals (5).
- Fluid and electrolyte replacement with oral rehydration solutions or intravenous fluids may be required (2).
- If the patient is taking immunosuppressive drugs, consultation with the physician treating the immunosuppression is recommended to determine if these drugs can be stopped or the dose reduced while the patient is ill with cryptosporidiosis (2, 26).
- In patients co-infected with human immunodeficiency virus (HIV), improvement in CD4+ T-lymphocyte levels associated with antiretroviral therapy can lead to symptom resolution and cessation of oocyst shedding (5, 6).
- There is some evidence that a three day course of nitazoxanide treatment reduces the duration of both diarrhea and oocyst shedding in immunocompetent individuals (27-29). In Canada, nitazoxanide is only available through Health Canada's Special Access Program at <http://www.hc-sc.gc.ca/dhp-mps/acces/drugs-droques/index-eng.php>.

Infection Control Measures:

- Refer to page 84 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>.
- *Cryptosporidium* is not killed by alcohol gels and hand sanitizers (30).

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, and avoid close contact with anyone with a weakened immune system (4).
- Exclusion of symptomatic individuals from food handling and from direct care of hospitalized and institutionalized patients until asymptomatic (2). Stress proper hand washing (2).
- Exclusion of symptomatic children and child care facility workers who work directly with children from child care settings until diarrhea has resolved (2, 5).
- It is recommended that infected persons do not use recreational water venues (e.g., swimming pools, wading pools, whirlpools) until two weeks after resolution of symptoms (5, 20, 31).
- If waterborne transmission is suspected, large volume water sampling filters can be used to look for oocysts in the water (2).

8.2 Contact Management

- Microscopic examination of feces in symptomatic contacts (2).
- Education on preventive measures should occur (refer to Section 8.4 below).

8.3 Outbreak Management

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 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 provincial Public Health 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

- *Cryptosporidium* is not killed by alcohol gels and hand sanitizers so these materials are of little use in controlling an outbreak (30).
- Education on preventive measures should occur (refer to Section 8.4 below).

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 (5).
- Exclusion of symptomatic individuals from food handling and from direct care of hospitalized and institutionalized patients until asymptomatic (2).
- Exclusion of symptomatic children and child care facility workers who work directly with children from child care settings until diarrhea has resolved (2, 5).
- Adoption by water utilities of improved disinfection technologies that inactivate *Cryptosporidium* (14).
- Documentation and remediation following fecal accidents in pools is an essential component in a strategy to reduce the spread of recreational water illnesses (20).

- Drinking water can be decontaminated by boiling [the time of boiling is dependent on altitude (one minute at sea level)] (5) or by filtration with a $\leq 1\mu\text{m}$ pore size (3).

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