

Cryptosporidiosis



Case Definition

Confirmed Case: Clinically compatible illness (see below), plus one of the following:

- demonstration of *C. parvum* oocysts in stool;
- demonstration of *C. parvum* in intestinal fluid or small-bowel biopsy specimens;
- demonstration of *C. parvum* antigen in stool by a specific immunodiagnostic test, e.g., ELISA (not done routinely in Manitoba).

Clinical Case: A clinically compatible case that is epidemiologically linked to a confirmed case.

Reporting Requirements

- All positive tests for *C. parvum* are reportable by laboratory.
- All cases of cryptosporidiosis are reportable by attending health care professional.

Clinical Presentation/Natural History

Cryptosporidiosis is a parasitic infection of medical and veterinary importance. It affects primarily epithelial cells of the gastrointestinal and biliary tracts of humans, as well as over 45 different vertebrate species, including poultry and other birds, fish, reptiles, small mammals (rodents, cats, dogs) and large mammals (particularly cattle and sheep). Asymptomatic infections are relatively uncommon, but may constitute a source of infection for others. The major symptom in humans is diarrhea, which may be profuse and watery, and may be preceded by anorexia and vomiting in children. The diarrhea is often associated with cramping abdominal pain. General malaise, fever, anorexia, nausea and vomiting in adults occur less often. Symptoms often wax and wane, but remit in fewer than 30 days in most immunologically intact people. Immunodeficient people, especially patients with HIV infection, may be unable to clear the parasite, and the disease often has a prolonged and fulminant clinical course contributing to death.

Etiology

Cryptosporidium parvum, a coccidian protozoan, is the species associated with human infection.

Epidemiology

Reservoir: Humans, cattle and other domestic animals, and occasionally wild animals.

Transmission: The route for *C. parvum* is fecal-oral, including person-to-person, animal-to-person, waterborne and foodborne transmission. The parasite infects intestinal epithelial cells, multiplies asexually and then follows a sexual cycle resulting in oocysts that pass in the feces where they can survive under adverse environmental conditions for long periods of time. Oocysts are highly resistant to chemical disinfectants used to purify drinking water. One or more autoinfectious cycles may occur in humans.

Occurrence:

General: Worldwide. In developed regions such as North America and Europe, prevalence of infection has been found in less than 1% to 4.5% of persons surveyed by stool examination. In developing countries, the prevalence is significantly higher, ranging from 3-20%. Children under six years of age, animal handlers, travellers, men who have sex with men and close personal contacts of infected individuals (families, healthcare and daycare workers) are most likely to be infected. More than a dozen outbreaks have been reported in day-care centres around the world. Outbreaks have also been associated with drinking water (including at least three major outbreaks involving public water supplies in the United States), with bathing in contaminated swimming pools and lakes and with drinking unpasteurized apple cider that had been contaminated with cow manure.

Manitoba: Twenty-six cases of cryptosporidiosis were reported in 1999.

Incubation Period: The incubation period is not precisely known, but one to 12 days is the general range, with an average of about seven days.

Susceptibility and Resistance: Persons with intact immune function usually have asymptomatic or self-limited symptomatic infections; it is not clear whether re-infection and latent infection with re-activation can occur. Persons with impaired immunity generally clear their infections if and when the causes of immunosuppression (including malnutrition or intercurrent viral infections such as measles) are removed.

In persons with AIDS, even though the clinical course may vary and asymptomatic periods may occur, the infection may persist throughout the illness. Approximately 2% of AIDS patients are probably infected with cryptosporidiosis when AIDS is diagnosed and hospital experience indicates that 10-20% develop infection during their illness.

Period of Communicability: Oocysts, the infectious components of the parasite's life cycle, appear in stool at the onset of symptoms and are infectious immediately upon excretion. Oocysts continue to be excreted in the stool for several weeks after symptoms resolve; outside the body, they may remain infective for two to six months in a moist environment.

Diagnosis

Diagnosis is generally made by identification of oocysts in fecal smears or of life-cycle stages of the parasites in intestinal biopsy sections. New and more sensitive immuno-based ELISA assays for direct antigen detection in stool have recently become available, but are not routinely available in Manitoba. Infection with this organism is not easily detected unless looked for specifically. Serologic assays may be helpful in epidemiological studies, but when the antibody first appears and how long it lasts after infection are not known.

Key Investigations

- History of contact with cattle or domestic animals, including visits to farms or petting zoos.
- Stool testing of symptomatic contacts.
- If waterborne transmission is suspected, large-volume water sampling filters can be employed to look for oocysts in water or sewage. EnviroTest has an alternate test methodology that does not require large volumes of water, but is expensive. Although increased output of oocysts in sewage does not indicate definitively what the source of infection, a community outbreak large enough to cause increased output of oocytes in sewage would most likely be caused by a contaminated water supply.
- Search for a common vehicle such as water, raw milk or other potentially contaminated food or drink.

Control

Management of Cases:

- No treatment other than rehydration, when indicated, has been proven effective; administration of passive antibodies and antibiotics is under study. If the person is taking immunosuppressive drugs, these should be stopped or reduced if possible.
- For hospitalized persons, routine precautions should be employed in the handling of feces, vomitus and contaminated clothing and bed linen.
- Symptomatic persons should be excluded from food handling and from direct care of patients. They may return to work when asymptomatic, but proper handwashing should be stressed.

Management of Contacts:

- Microscopic examination of feces of symptomatic household members and other symptomatic contacts should be undertaken.

Management of Environment:

- Boiling drinking water supplies for one minute is effective against *C. parvum*. Chemical disinfectants are not effective against oocysts. Only filters capable of removing particles 0.1-1.0 µm. in diameter should be considered.
- In communities with modern and adequate sewage disposal systems, feces may be discharged directly into sewers without preliminary disinfection.

Management of Outbreaks:

- Investigate clustered cases in an area or institution to determine source of infection and mode of transmission; if a common source is identified, institute applicable prevention measures.
- Control of person-to-person or animal-to-person transmission requires special emphasis on personal cleanliness and sanitary disposal of feces.

Preventive Measures:

- Increasingly, large urban centres are investing in water filtering plants to filter drinking water to remove oocysts. This has not yet occurred in Winnipeg, but is under consideration.
- Public education in personal hygiene.
- Disposal of feces in a sanitary manner; careful handling of animal or human excreta.
- Careful handwashing by persons in contact with calves and other animals with diarrhea.
- Removal of infected persons from jobs that require handling of food until asymptomatic.
- Exclusion of children with diarrhea from day-care facilities until diarrhea stops.
- Immunocompromised persons may choose to routinely drink boiled water to minimize their risk.