

Cryptosporidiosis

1. DISEASE REPORTING

A. Purpose of Reporting and Surveillance

1. To identify outbreaks and potential sources of ongoing transmission.
2. To prevent further transmission from such sources.
3. To educate people about how to reduce their risk of transmission.

. Legal Reporting Requirements

1. Health care providers: notifiable to local health jurisdiction within 3 business days
2. Health care facilities: notifiable to local health jurisdiction within 3 business days
3. Laboratories: *Cryptosporidium* notifiable to local health jurisdiction within 2 business days. Specimen submission is on request only.
4. Local health jurisdiction: notifiable to the Washington State Department of Health Communicable Disease Epidemiology Section (CDES) within 7 days of case investigation completion or summary information required within 21 days

C. Local Health Jurisdiction Investigation Responsibilities

1. Begin investigation within 3 business days.
2. Investigate all reported cases of cryptosporidiosis. Administer appropriate infection control recommendations.
3. Report all *confirmed* and *probable* cases to CDES. Complete the cryptosporidiosis case report form (<http://www.doh.wa.gov/notify/forms/crypto.pdf>) and enter the data into the Public Health Issues Management System (PHIMS).

2. THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Cryptosporidium is a protozoan parasite. Most human illness is caused by two species: *C. hominis* which only infects humans and *C. parvum* which infects humans, cattle and other mammals. Other species in the genus *Cryptosporidium* rarely infect humans. *C. parvum* and *C. hominis* infections are generally epidemiologically and clinically indistinguishable, aside from the fact that the former are more likely to be cattle-related. These two species are rarely distinguished in the laboratory.

Infected animals and people can excrete large numbers of oocysts in stool (10^8 to 10^9 per bowel movement). Oocysts are immediately infective to other susceptible hosts. The infectious dose can be very low (less than 100). Oocysts are relatively hardy in the environment, and in the right conditions can survive for weeks or months. They are resistant to the typical concentrations of chlorine and other disinfectants commonly used for water treatment. They can be killed by heat (e.g., bringing water to a rolling boil), removed by adequate filtration, or inactivated by *prolonged* disinfection processes that in

practice may be difficult to achieve. For example, CDC recently increased their estimate for free chlorine contact time [CT] to kill *Cryptosporidium* species from 9600 to 15,300 mg-min/L—compared to 45 for *Giardia* or 1 for *Escherichia coli* O157 (MMWR 2008;57(06):151–2). Practically, that means that a pool contaminated with *Cryptosporidium* species may need to be closed for days, or in some cases drained and refilled.

B. Description of Illness

Persons with symptoms generally experience mild to severe watery diarrhea, usually accompanied by moderate to severe abdominal cramps. Nausea, vomiting, and low-grade fever are common. Illness can be intermittent and prolonged, lasting days to weeks in many patients. Infection can be severe and persistent in persons who are immunocompromised (e.g., chemotherapy, AIDS). Asymptomatic infections can also occur.

Cryptosporidiosis is rarely identified on a routine stool exam for parasites (O&P). Shedding may be intermittent, and, more importantly, special laboratory methods are usually required for detection. Thus, stool exams reported as negative for parasites should be interpreted with caution, particularly if there was no specific request for *Cryptosporidium* testing.

C. Cryptosporidiosis in Washington State

Since cryptosporidiosis became reportable in 2000, the number of reported cases has ranged between 60 and 140 cases per year. Small outbreaks of cryptosporidiosis in Washington have been associated with wells and recreational water facilities.

D. Reservoirs

A wide variety of mammals are hosts for this parasite, which is shed in feces. Young livestock, notably calves and lambs, are commonly infected and may excrete large numbers of oocysts. While many wild animals are infected with various species of *Cryptosporidium*, their importance as a source of human infection is not clear.

E. Modes of Transmission

Transmission is fecal-oral. Most recognized outbreaks to date have been waterborne. Risk factors for infection include:

1. Contact with infected persons (i.e., those in the same household or child care) or infected animals (e.g., young livestock)
2. Drinking fecally contaminated and inadequately treated water;
3. Ingesting fecally contaminated recreational water (rivers, lakes, etc.);
4. Eating food contaminated by animals or food handlers (rarely documented); and
5. Certain types of sexual contact (e.g., oral-anal contact).

F. Incubation Period

The incubation period ranges from approximately 2–12 days but is typically 5–8 days.

G. Period of Communicability

People are communicable as long as oocysts are being shed which is typically days to weeks. Shedding may persist after symptoms resolve, although the concentration of oocysts (and hence infectivity) soon declines.

H. Treatment

Nitazoxanide is approved by the FDA for treatment of diarrhea caused by *Cryptosporidium* species in people \geq 1 year old with healthy immune systems.

For additional information regarding nitazoxanide, see:

http://www.cdc.gov/parasites/crypto/health_professionals/tx.html

3. CASE DEFINITION

A. Clinical description

A gastrointestinal illness characterized by diarrhea, abdominal cramping, fever, nausea, vomiting and/or anorexia.

B. Laboratory criteria for diagnosis

Confirmed: the detection of *Cryptosporidium* organisms or DNA in stool, intestinal fluid, tissue samples, biopsy specimens, or other biological sample.

Probable: the detection of *Cryptosporidium* antigen by immunodiagnostic methods.

C. Case classification (2011)

Probable: a case that meets the clinical description and has probable criteria for laboratory diagnosis or that is epidemiologically linked to a confirmed case.

Confirmed: a case that meets the clinical description and the respective criteria for laboratory confirmation described above.

4. DIAGNOSIS AND LABORATORY SERVICES

A. Diagnosis

The diagnosis of cryptosporidiosis is commonly made by detection of organism in stool using special stains. Since *Cryptosporidium* are rarely detected by routine O&P (ova and parasite) stool examination, health care providers considering the diagnosis of *Cryptosporidium* infection should alert the laboratory so that specific staining procedures can be performed. Enzyme immunoassays (EIA) are also commonly used to diagnosis *Cryptosporidium*. Polymerase chain reaction (PCR) is not generally used for diagnostic purposes but can be used to determine the species. When available, species designation should be reported.

B. Tests Available at Washington State Public Health Laboratories (PHL)

PHL identifies *Cryptosporidium* in stool using a direct fluorescent antibody (DFA) test. Consult with Communicable Disease Epidemiology Section prior to submitting specimens.

C. Specimen Collection

To maximize the likelihood of detecting *Cryptosporidium*, three stool specimens should be collected 48 hours apart or over a 10-day period. Stool should be stored and transported either in Para Pac ULTRA ECOFIX™ or in one tube with 10% formalin and one tube with PVA. If the ECOFIX™ kit is being used, stool should be added to the collection kit until the fluid level reaches the red line marked on the outside of the tube. The kit should then be mixed and shipped at room temperature.

Specimens need to be shipped with a completed microbiology form (<http://www.doh.wa.gov/EHSPHL/PHL/Forms/Microbiology.pdf>). Note that PHL requires all clinical specimens have two patient identifiers, a name **and** a second identifier (e.g., date of birth) both on the specimen label and on the submission form. Due to laboratory accreditation standards, specimens will be rejected for testing if not properly identified. Also include specimen source and collection date.

5. ROUTINE CASE INVESTIGATION

Interview the case and others who may be able to provide pertinent information.

A. Evaluate the Diagnosis

Review the clinical presentation and laboratory results. Reports of asymptomatic persons do not require an investigation.

B. Identify Source of Infection

Ask about possible exposures in the 2 to 12 days before onset, including:

1. Contact with any acquaintances or household member with a similar illness (anyone meeting the probable case definition should be reported and investigated in the same manner as a confirmed case);
2. Attendance or work at a child care facility by the case or a household member;
3. Source(s) of drinking water, including water at home and work, as well as streams, lakes or other untreated sources;
4. Recreational water exposures: lakes, rivers, swimming pools, water slides, etc.;
5. Travel outside the area;
6. Contact with livestock and other animals;
7. Consumption of high-risk foods (e.g., raw milk or raw milk products)

C. Identify Potentially Exposed Persons

Collect the name, age, and phone number of contacts with a similar illness. These people should be investigated as probable cases.

D. Environmental Evaluation

Conduct an environmental evaluation if an ongoing source of exposure is suspected, such as a recreational water venue, drinking water system or child care facility.

6. CONTROLLING FURTHER SPREAD

A. Infection Control Recommendations / Case Management

1. Hospitalized patients should be cared for using standard precautions. In addition, contact precautions should be used for diapered or incontinent persons for the duration of illness or to control institutional outbreaks.
2. Educate regarding modes of transmission and ways to prevent transmission to others.
 - a. Practice good personal hygiene, including effective hand washing, particularly after using the toilet, changing diapers, and before preparing or eating food. The importance of proper hygiene must be stressed, as excretion of the organism may persist for several weeks. Alcohol-based hand sanitizers are not effective against *Cryptosporidium*.
 - b. Do not enter public recreational water (e.g., pools, fountains, lakes) until 2 weeks after resolution of diarrhea.
 - c. Avoid sexual practices that might result in oral exposure to stool (e.g., oral-anal contact).
 - d. While symptomatic with diarrhea, avoid close contact with anyone who has a weakened immune system.
3. School Restrictions: Children should not attend school as long as they have diarrhea.
4. Work or Child Care Restrictions: Persons should not work as food handlers, child care or health care workers, or attend child care as long as they have diarrhea.
5. If a suspected source of infection is identified and has the potential for transmitting infection to a defined population (e.g., contaminated well, infected animal), advise those individuals on measures to avoid exposure.

B. Contact Management

A symptomatic contact who meets the probable case definition should be investigated as a case.

C. Environmental Measures

An environmental evaluation is appropriate if an ongoing source of exposure is identified, such as a recreational water venue or drinking water system. Given that *Cryptosporidium* oocysts are resistant to chlorine, alternative sterilization methods are required for disinfecting pools, drinking water, and environmental surfaces.

If an animal venue such as a petting zoo is suspected, consult the Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2007: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5605a1.htm>.

7. MANAGING SPECIAL SITUATIONS

A. Case Attends or Works at a Child Care Facility

1. Exclude persons with cryptosporidiosis until the diarrhea has resolved.

1. If the center cares for diapered children, interview the operator and inspect attendance records to identify suspect cases among other children or staff during the preceding month. Note: WAC 170-295-3030 specifies that the operator keep a log of illnesses.
2. If an outbreak is suspected:
 - Facilitate collection stool specimens for examination from all symptomatic staff members, attendees, and family members who have a diarrheal illness consistent with cryptosporidiosis.
 - Exclude all symptomatic persons from the child care until diarrhea resolves. Testing and exclusion of asymptomatic carriers, even in the setting of a child care outbreak, is generally not recommended.
 - Instruct the operator and staff about proper food handling and hand washing after diaper changing or bathroom use, and the importance of keeping diaper changing areas away from food preparation areas. Alcohol gels and hand sanitizers do not kill *Cryptosporidium*.
 - Instruct the operator regarding environmental sanitation, particularly in diaper changing areas. No disinfectant is guaranteed to be completely effective against *Cryptosporidium*. However, hydrogen peroxide is more effective than standard bleach solutions.
 - Instruct the child care operator to call the local health jurisdiction immediately if new cases of diarrhea occur.
 - Follow-up with the child care center to ensure that surveillance and appropriate prevention measures are being carried out. Manage newly symptomatic children as outlined above.

For additional information, see: <http://www.cdc.gov/parasites/crypto/daycare/index.html>

B. Contaminated Swimming Pools

Fecal accidents in pools pose a risk to other bathers. Loose fecal matter oozing out from the diaper of a toddler with an infection is much less likely to be detected than visible formed stool.

For additional information regarding responding to fecal accidents in pools, see: <http://www.cdc.gov/healthywater/pdf/swimming/pools/fecal-incident-response-recommendations.pdf>

8. ROUTINE PREVENTION

A. Immunization Recommendations: None

B. Prevention Recommendations (see: <http://www.cdc.gov/parasites/crypto/>)

1. Practice good hygiene.

- a. Wash hands thoroughly with soap and water after using the toilet, before handling or eating food, after changing a diaper or assisting with toileting, after touching something that could be contaminated (such as a trash can, cleaning cloth, drain, or soil), and after handling animals or their toys, leashes, or feces.

- b. Assist or visually supervise young children and other people you are caring for with hand washing as needed.
- c. Shower with soap and water before entering recreational water. Wash thoroughly, especially rectal and genital areas, with soap and water before entering swimming water, water parks, or other public bathing areas.
- d. Wash hands thoroughly after contact with animals, particularly young livestock or animals with diarrhea.
- e. Keep *Cryptosporidium* organisms and other germs out of pools, hot tubs, lakes, rivers, the ocean, etc. by taking the following steps:
 - o Protect others by not swimming if you are experiencing diarrhea and for 2 weeks after your diarrhea stops. This is essential for children in diapers.
 - o Take children on frequent bathroom breaks or check their diapers often.
 - o Change diapers in the bathroom or a diaper-changing area.

2. Avoid water that might be contaminated.

- a. Do not drink untreated water from shallow wells, lakes, rivers, springs, ponds, and streams.
- b. Do not drink untreated water or use ice made from untreated water during community-wide outbreaks of disease caused by contaminated drinking water.
- c. Do not swallow recreational water. For more information on recreational water-related illness, visit CDC's Health Swimming website (<http://www.cdc.gov/healthywater/swimming/>).
- d. Do not drink untreated water or use ice made from untreated drinking water in countries where the water supply might be unsafe. For information on traveler's health and cryptosporidiosis, visit CDC's Yellow Book. <http://wwwnc.cdc.gov/travel/yellowbook/2010/chapter-5/cryptosporidiosis.aspx>
- e. Obtain recommendations on safe drinking water sources if severe flooding occurs. Shallow private well in flooded areas may need to be checked before use.

3. If you are unable to avoid using or drinking water that might be contaminated, then you can make the water safer to drink by doing one of the following:

- a. Heat the water to a rolling boil for at least 1 minute (at altitudes greater than 6,562 feet [$>2,000$ meters], boil water for 3 minutes).
OR
- b. Use a filter that has an absolute pore size of 1 micron or smaller, or one that has been NSF rated for "cyst removal". For information on choosing a water filter, see CDC's Fact Sheet: A Guide to Water Filters (http://www.cdc.gov/parasites/crypto/gen_info/filters.html).

- c. Chemical treatments (e.g., chlorine, iodine) are often not effective for preventing cryptosporidiosis and are not recommended.

4. Avoid food that might be contaminated.

- a. Use safe, uncontaminated water to wash all food that is to be eaten raw.
- b. Wash and/or peel all raw vegetables and fruits before eating.
- c. Avoid eating uncooked foods when traveling in countries with minimal water treatment and sanitation systems.

5. Avoid fecal exposure during sexual activity. This is especially important while experiencing diarrhea caused by cryptosporidiosis.

- a. Use a barrier during oral-anal sex.
- b. Wash hands immediately after handling a condom used during anal sex or after touching the anus or rectal area.

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UPDATES

January 2011:

The Legal Reporting Requirements section has been revised to reflect the 2011 Notifiable Conditions Rule revision.

Case classifications and laboratory criteria revised in accordance with 2011 CSTE case definitions.