

Cryptosporidiosis

Investigative Guidelines

January 2019

REPORT WITHIN 1 WORKING DAY

1. DISEASE REPORTING

1.1 Purpose of Reporting and Surveillance

1. To identify potential outbreaks and community sources of infection (e.g., a swimming pool, public water supply or child care facility) and to minimize further transmission.
2. To reduce the risk of person-to-person transmission from recognized cases.

1.2 Laboratory and Physician Reporting Requirements

Laboratories, physicians and others providing health care must report confirmed or suspected cases to the Local Health Department (LHD) and physicians are required to report within one working day of identification or diagnosis.

1.3 Local Health Department Reporting and Follow-Up Responsibilities

1. Report all confirmed and presumptive (but not suspect) cases (see definitions below) to the Oregon Public Health Division (PHD) by the end of the calendar week of initial physician or lab report. Enter information into Orpheus as the investigation occurs. See §3 for case definitions.
2. Interview all confirmed and presumptive cases.
3. Identify significant contacts and educate them about the signs and symptoms of illness. Consider testing in private laboratories or offer testing at the Oregon State Public Health Laboratory (OSPHL), as appropriate. Enter all data into Orpheus by the end of the week.
4. For recognized outbreaks, report to PHD within one day, complete investigation in conjunction with the assigned Acute and Communicable Disease Prevention (ACDP) epidemiologist and complete the outbreak summary report within 30 day of last case onset.

2. THE DISEASE AND ITS EPIDEMIOLOGY

2.1 Etiologic Agent

Cryptosporidiosis is an infection with a protozoan parasite in the genus *Cryptosporidium*.¹ Two species are recognized that commonly affect humans: *C.*

Cryptosporidiosis

parvum and *C. hominis*. As the epithet would imply, the latter infects primarily humans, but the former can infect many species; cattle may be the most important reservoir. Other species in the genus *Cryptosporidium* typically infect other mammals and birds, but rarely if ever humans. However, recent human illness associated with other species (*ubiquitum*, *meleagridis*^{2,3}) has been documented. *C. parvum* and *C. hominis* are rarely distinguished with existing laboratory tests. So, unless specified we are talking about undifferentiated “*Cryptosporidium* sp.” From epidemiological and clinical perspectives, *C. parvum* and *C. hominis* infections are pretty much indistinguishable, aside from the fact that the former are more likely to be cattle-associated.

Infected animals and people can excrete large numbers of oocysts in stool—10⁹ or more. Oocysts are immediately infective to other susceptible hosts. The infectious dose can be very low—as few as 10–30 oocysts. 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), inactivated by ultraviolet light or ozone, removed by adequate filtration (often hard to obtain), or inactivated by prolonged disinfection processes that in practice may be difficult to achieve. At a pH of 7.5, in the absence of a chlorine stabilizer, it takes 10.6 days (15,300 minutes) to disinfect a chlorinated water source. A lengthy wait compared to 45 min for *Giardia* and less than 1 minute for *Escherichia coli* O157. Practically, that means that a *Cryptosporidium*-contaminated pool may need to be closed for days, or in some cases hyper chlorinated, drained and refilled.

2.2 Description of Illness

Infections are often asymptomatic, but illness is characterized by mild to severe diarrhea, sometimes watery, usually accompanied by moderate to severe abdominal cramps. Nausea, vomiting, and low-grade fever are common. Uncommonly, some may experience predominantly upper GI symptoms. Illness can be intermittent and prolonged, lasting from days to weeks in many patients; to over a month in some. Severely immunocompromised persons with AIDS might never recover from the infection.

Cryptosporidiosis is grossly underdiagnosed, in part because the parasite is rarely identified on a routine stool culture; providers must specifically order an “O & P” (ova and parasite) for parasites. Shedding may be intermittent, and, more importantly, special laboratory methods are usually required. Thus, “negative” stool exams should be interpreted with caution. Persons with chronic exposure may develop partial or complete immunity to infection or illness.

2.3 Reservoirs

A wide variety of mammals can be hosts for these parasites. Young livestock, notably calves and lambs, are commonly infected with *C. parvum* and may excrete huge numbers of oocysts (>10⁸). While many wild animals are infected, their importance as a source of human infection is not clear. Humans appear to

Cryptosporidiosis

be the only hosts of significance for *C. hominis*. Unfortunately, it is difficult to speciate oocysts (which includes distinguishing pathogenic from nonpathogenic species in environmental testing).

2.4 Modes of Transmission

Transmission is fecal-oral. Most recognized outbreaks to date have been waterborne or from direct animal contact. Well documented problems include:

1. Contact with fecally contaminated recreational water (e.g., swimming pools, water slides, fountains);
2. Drinking fecally contaminated and inadequately treated water;
3. Person-to-person spread by direct/indirect contact (e.g., in daycare centers);
4. Drinking unpasteurized milk or cider;
5. Contact with infected animals;
6. Consumption of unpasteurized cheeses, raw shellfish, produce, or other contaminated food.

2.5 Incubation Period

The incubation period is dose-dependent, generally in the 2–12-day range, most commonly 5–8 days.

2.6 Period of Communicability

As long as oocysts are being shed, typically days to weeks. Shedding may persist after symptoms resolve, although the concentration of oocysts (and hence infectivity) soon declines. Outside the body, in moist conditions, oocysts can remain infective for 2–6 months or longer.

2.7 Treatment

Most people with healthy immune systems will recover without treatment. Oral rehydration should be encouraged if they are experiencing diarrhea. Young children and pregnant women may be more susceptible to dehydration and should increase their fluid intake. Antidiarrheal medication should only be taken in consultation with a health care provider. Nitazoxanide (Alinia®, Romark Laboratories) is the FDA-approved treatment for diarrhea caused by *Cryptosporidium*. This is the first drug to show reasonable efficacy against this bug in immunocompetent hosts. It is available in powder form that can be mixed with water as a suspension for children 1–11 years old, and in tablet form for older children and adults. Nitazoxanide is not proven effective for use in HIV+ individuals. For persons with AIDS, antiretroviral therapy that improves immune status can reduce or eliminate symptoms; however, symptoms may return once immune status worsens.

3. CASE DEFINITIONS, DIAGNOSIS AND LABORATORY SERVICES

3.1 Confirmed Case Definition

Those with *Cryptosporidium* oocysts identified in fecal specimen. Identification can be done by light microscopy on concentrated and stained preps, by direct fluorescence assay (DFA) or EIA using commercial kits, or by PCR. ImmunoCard STAT tests (see §3.5 for a list of labs that use this test) have a low positive predictive value and are not adequate for confirmation.

3.2 Presumptive Case Definitions

Acute diarrheal illness lasting 3 days in someone epidemiologically linked to a confirmed case or a person with a positive ImmunoCard STAT test for *Cryptosporidium*.

3.3 Suspect Case (*not reportable to Oregon PHD*)

Anyone with undiagnosed GI illness, including those epi-linked to a symptomatic person with a laboratory ImmunoCard STAT positive test result.

3.4 Services Available at the Oregon State Public Health Laboratories

The OSPHL does not perform microscopy for *Cryptosporidium* or *Cyclospora*.

OSPHL can perform PCR testing for *Cryptosporidium* and *Cyclospora* using BioFire only. Testing must be approved by ACDP Epidemiologists prior to specimen submission.

Collect fresh stool and place Cary Blair transport media. Mix well. Complete specimen acceptance criteria are available on the OSPHL Lab Test Menu at www.healthoregon.org/labtests. All specimens must be properly packaged for transport and be accompanied by the Virology/Immunology Test Request Form (Form #42).

Serotyping and molecular testing of raw stool is available at the CDC in certain situations after consultation with and approval from ACDP.

3.5 *Cryptosporidium* Laboratory Testing

[Use this table](#) to determine the test method performed. Labs using a rapid cartridge/quick test, will meet a presumptive case definition. A follow-up test MUST be done to consider the case confirmed.

Testing of water should be done using the EPA method 1623.⁴ [A list of certified Oregon labs](#) is maintained at the [state drinking water website](#). This testing is not performed at the OSPHL.

4. ROUTINE CASE INVESTIGATION

Interview the case (or parents) and others who may be able to provide pertinent information.

Cryptosporidiosis

4.1 Identify Source of Infection

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

- Name, diagnosis, and phone number of any acquaintances or household members with a similar illness. (N.B. — anyone meeting the presumptive case definition should be reported and investigated in the same manner as a confirmed case);
- Attendance or work at a child care facility by the case or a household member;
- Source(s) of drinking water, including water at home and work, as well as streams, lakes or other untreated sources;
- Recreational water exposures: hot tubs, lakes, rivers, swimming pools, water slides, splash pads;
- Travel outside the area;
- Contact with livestock and other animals;
- Consumption of uncooked ready to eat produce, raw milk, unpasteurized juice;
- Other high-risk exposures as detailed in the *Cryptosporidiosis* case-report form or in the Orpheus Risks tab.

5. CONTROLLING FURTHER SPREAD

5.1 Education

Provide basic instruction in fecal-oral modes of transmission and personal hygiene, emphasizing proper hand washing techniques.

Use the results of the exposure interview to guide other health education efforts. For example, people who confess to drinking raw milk should get the raw milk lecture. Backpackers and hunters should be informed about the potential risks of drinking untreated surface water, including some private water supplies or water from streams or lakes. Emphasize that these and other high-risk habits are not just important for Crypto; many bugs can be spread this way. Generally, persons should be educated about the risks of both giardiasis and cryptosporidiosis. Although some chemical disinfectants are effective against *Giardia*, most are ineffective against *Cryptosporidium*. Bringing water to a full, rolling boil for at least one minute is sufficient to kill both parasites. Several filters are also available that remove *Giardia* cysts and the smaller *Cryptosporidium* oocysts. Filters must be able to remove particles >1 µm in diameter and must be properly maintained. Filters that have an absolute 1 micron or smaller pore size or use reverse osmosis and are labeled NSF 53 or NSF 58 are the best bet for *Cryptosporidium* removal.

Cases should be strongly discouraged from bathing in communal facilities (pools, fountains, etc.) until at least 2 weeks after resolution of diarrhea.

5.2 Isolation and Work or Child Care Restrictions

Standard precautions are adequate to minimize the risk of further transmission.

Cryptosporidiosis

Children with diarrhea or other symptoms referable to cryptosporidiosis may not attend day care until symptoms have resolved for at least 24 hours. An exemption should be granted only if cohorting (separating ill children from well children) and special care with hand washing after diaper changing and before food handling can be implemented to prevent transmission. Cohorting is generally not feasible unless the facility is equipped with separate toilet facilities and entrances. See also §6, Managing Special Situations.

5.3 Case Follow-up

Generally not indicated.

5.4 Protection of Contacts

Not applicable.

5.5 Environmental Measures

While those with a poor-quality water source should be counseled about their risk, the general rule is that single, ostensibly sporadic cases can rarely if ever be linked to a specific source, and it is usually not worth a lot of time to try to confirm one. Provide education as indicated, but in general one can wait for that second (possibly) epi-linked case before getting too excited.

6. MANAGING SPECIAL SITUATIONS ⁴

6.1 Case Attends a Child Care Facility

If the case is a child, determine whether they should be excluded (see §5.2). If the facility includes diapered children, interview the operator and inspect attendance records to identify additional cases among other children or staff during the preceding month.

Instruct the operator and staff about proper food handling and hand washing after diaper changing, and the importance of keeping diaper changing areas away from food preparation areas. Discourage use of water-related play activities until any investigation is over. Operators should use hydrogen peroxide to disinfect diaper changing areas, toys, and other surfaces during an outbreak. Bleach solutions and alcohol-based sanitizers are not effective against *Cryptosporidium*.

If additional cases have occurred, collect stool specimens from children who have contact with the confirmed case(s) and arrange for testing at OSPHL or elsewhere. A single specimen is adequate for asymptomatic children; collect three (on different days) from symptomatic children. If additional cases are confirmed by this first round of testing, second and third specimens should be collected from the asymptomatic children as well.

Child-care restrictions outlined above in §5.2 apply to all newly identified symptomatic cases. All infected preschoolers should be excluded or physically separated (cohorted) from other children. Look for possible cases among family

Cryptosporidiosis

members of infected children. Stool exams are indicated for symptomatic household members and other children who attend a child-care facility.

The facility operator should be instructed to call the LHD immediately if new cases of diarrhea occur. The facility should be called or visited once each week for six weeks after onset of the last case to verify that surveillance and appropriate preventive measures are being carried out. Newly symptomatic children should be managed as outlined above.

6.2 Contaminated Swimming Pools

Fecal accidents in pools are a fact of life that pose risk to other bathers. That said, the risk from formed stools (which are most likely to be detected) is dwarfed by the risk from loose matter oozing out from a toddler with an infection. There are general guidelines for dealing with generic “stool-in-pool” events. Contamination from someone known to have cryptosporidiosis is a different problem, and one unlikely to show up outside the context of an outbreak investigation. Consult with ACDP epi staff.

6.3 Reported Incidence is Significantly Higher than Usual

If the number of reported cases in your county is higher than usual for the time of year, or you note possible epidemiological connections, consider the possibility of common-source outbreaks. Review the temporal, geographic, and demographic clues that you have. Recreational water, raw milk, and livestock contact-associated clusters (e.g., among veterinary students or farm families or workers) may be the most common kinds of outbreaks; drinking water outbreaks may be the biggest. In any event, consult with ACDP epi staff.

REFERENCES

1. CDC information: www.cdc.gov/parasites/crypto/index.html
2. [Cryptosporidium meleagridis: Infectivity in Healthy Adult Volunteers](#). Chappell Cynthia L, Okhuysen Pablo, Langer-Curry Rebecca C., Akiyoshi Donna E, Widmer Giovanni, Tzipori Saul.; Am J Trop Med Hyg. 2011 Aug 1; 85: 238–242. doi: 10.4269/ajtmh.2011.10–0664.
3. Subtyping *Cryptosporidium ubiquitum*: A zoonotic pathogen emerging in humans Li N, Xiao L, Alderisio K, Elwin K, Cebelinski E, Chalmers R, et al.. Emerg Infect Dis. 2014;20:217–24. <https://dx.doi.org/10.3201/eid2002.121797>.
4. EPA information on *Cryptosporidium*-approved testing: http://water.epa.gov/lawsregs/rulesregs/sdwa/lt2/lab_home.cfm

UPDATE LOG

January 2019 – Updated testing available at OSPHL – they no longer do microscopy but have a PCR panel for gastrointestinal illness. Updated species that can cause human illness. Updated filtration recommendations.

Cryptosporidiosis

March 2018 – Updated laboratory test offerings including services available at OSPHL. Created separate table posted online. Some editorial tweaks. (June Bancroft)

November 2015 –Updated into new template, updated laboratories and their testing methodologies, added PCR as a confirmatory test. Some editorial tweaks. (June Bancroft)

January 2012 – updated case definitions to be in line with national case definitions. Immunocard STAT test used by many Oregon laboratories is not sufficient to confirm a case. Minor other edits including reporting via Orpheus application, services from OSPHL and disinfection recommendations for child care operators. (June Bancroft)

June 2008. First update since 1994, with considerable revisions throughout reflecting newer information about taxonomy, treatment options, and management strategies. Local health departments are now required to investigate all routine case reports; previously this was required only if there were abnormally high case counts. Given the obvious potential for outbreaks, the status quo ante is difficult to defend. [Bill Keene]