

Cryptosporidiosis

Section 1

ABOUT THE DISEASE

A. Etiologic Agent

Cryptosporidiosis is a disease of the bowel caused by a parasite, *Cryptosporidium*. There are many species of *Cryptosporidium* that infect humans and a wide range of animals. *Cryptosporidium parvum* and *Cryptosporidium hominis* are the most prevalent species causing disease in humans. *Cryptosporidium parvum*, was first recognized as a cause of human illness in 1976.

B. Clinical Description

The most common symptom of cryptosporidiosis is profuse and watery diarrhea. Other signs and symptoms include weight loss, stomach cramps or pain, nausea, vomiting, and low-grade fever. Symptoms often present sporadically, but they resolve in 1-20 days in most people who are not immunocompromised. Immunodeficiency, especially advanced HIV infection, is associated with an inability to clear the parasite, and the disease may have a prolonged and fulminant clinical course, contributing to death. Asymptomatic infections are common and serve as a source of infection for others. Diagnosis is generally made by the identification of oocysts in fecal smears. Most often, stool specimens are examined microscopically using different techniques, e.g. acid-fast staining, direct fluorescent antibody, or by enzyme immunoassay (EIA) for detection of the *Cryptosporidium sp.* antigens. Molecular methods, like polymerase chain reaction (PCR), are also used increasingly, since they can identify the parasite at the species level.

C. Vectors and Reservoirs

Humans, cattle, and domestic animals are reservoirs.

D. Modes of Transmission

Millions of *Cryptosporidium* parasites can be released in a bowel movement from an infected human or animal. The infectious dose is not certain, but it is probably low. Oocysts are a form of the parasite that is relatively hardy and can survive in the environment for weeks or months. Oocysts are resistant to concentrations of chlorine and other disinfectants commonly used for drinking water treatment. They can be killed by heat or removed by filtration. The most common mode of transmission is from person to person. Persons become infected by hand-to-mouth transfer of oocysts from the feces of an infected individual, especially in institutions and daycare centers. Person-to-person transmission can also occur through sexual contact (e.g., oral-anal contact).

Large outbreaks traced to contaminated drinking water have been reported, including an outbreak in Milwaukee, WI in 1993 that reportedly affected 400,000 people. Localized outbreaks may occur from contaminated water, such as stream/lake waters and swimming pools that are open to contamination from human and animal feces. Outbreaks have also occurred from food contaminated by animal feces (e.g., unpasteurized apple cider). An infected food worker may also be a source of foodborne transmission. In

addition, zoonotic transmission can occur through contact with feces from infected animals (e.g., in livestock handlers, dairy farmers, veterinarians).

E. Incubation Period

Symptoms of cryptosporidiosis generally begin 2-10 days, with an average of about 7 days, after becoming infected with the parasite.

F. Period of Communicability or Infectious Period

The disease is communicable for as long as the infected person excretes *Cryptosporidium* oocysts, which generally begins at the onset of symptoms. Oocysts continue to be excreted in the stool for several weeks after symptoms subside, and they may remain infective outside the body for 2–6 months in a moist environment.

G. Epidemiology

Cryptosporidiosis has a worldwide distribution. In developed countries, the prevalence of infection ranges from <1 to 4.5% of individuals surveyed by stool examination. The prevalence is significantly higher in developing regions of the world. Cryptosporidiosis is still among the most common causes of persistent diarrhea in patients with AIDS in the U.S., but it has become less of a problem since the introduction of anti-retroviral therapy. Children less than two years of age, animal handlers, travelers to endemic areas, men who have sex with men, and close contacts of infected individuals are at higher risk for being infected. Outbreaks have been reported in daycare centers, and have been associated with public drinking water, contaminated swimming pools, lakes and ponds, and with drinking unpasteurized cider made from apples contaminated with cow manure.

H. Bioterrorist Potential

This pathogen is not considered to be of risk for use in bioterrorism.

Section 2

REPORTING CRITERIA AND LABORATORY TESTING

A. What to Report to the Massachusetts Department of Public Health (MDPH)

Report evidence of *Cryptosporidium* organisms or DNA in stool, intestinal fluid, tissue samples, biopsy specimens, or other biological sample by certain laboratory methods with a high positive predictive value such as the following:

- Direct fluorescent antibody [DFA] test,
- Polymerase chain reaction [PCR],
- Enzyme immunoassay [EIA], **OR**
- Microscopy of stained specimen.

Note: See Section 3C for information on how to report a case.

B. Laboratory Testing Services Available

The Massachusetts State Public Health Laboratory (MA SPHL) does not perform testing for *Cryptosporidium*.

Section 3

REPORTING RESPONSIBILITIES AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify whether the case may be a source of infection for other persons (e.g., a diapered child, daycare attendee, or food handler), and if so, to prevent further transmission.
- To identify transmission sources of public health concern (e.g., a restaurant or a contaminated public water supply), and to stop transmission from such sources.

B. Laboratory and Health Care Provider Reporting Requirements

Cryptosporidiosis is reportable to the local board of health (LBOH). The MDPH requests that health care providers immediately report to the LBOH in the community where the case is diagnosed, all confirmed or suspect cases of cryptosporidiosis, as defined by the reporting criteria in Section 2A.

Laboratories performing examinations on any specimens derived from Massachusetts residents that yield evidence of *Cryptosporidium* infection shall report such evidence of infection directly to the MDPH within 24 hours.

C. Local Board of Health (LBOH) Reporting and Follow-Up Responsibilities

Reporting Requirements

MDPH regulations (*105 CMR 300.000*) stipulate that cryptosporidiosis is reportable to the LBOH and that each LBOH must report any case of cryptosporidiosis or suspect case of cryptosporidiosis, as defined by the reporting criteria in Section 2A. Cases should be reported to the MDPH Bureau of Infectious Disease and Laboratory Sciences, Office of Integrated Surveillance and Informatics Services (ISIS) via MAVEN.

Refer to the List of Diseases Reportable to Local Boards of Health for information on prioritization and timeliness requirements of reporting and case investigation

<http://www.mass.gov/eohhs/docs/dph/cdc/reporting/rprtbldiseases-lboh.pdf>

Case Investigation

It is the responsibility of the LBOH to complete questions in each of the question packages in MAVEN by interviewing the case and others who may be able to provide information. Much of the information required can be obtained from the health care provider or from the medical record.

Calling the provider

If the case was hospitalized (i.e. reporting facility is a hospital), call infection control at the named hospital. A list of infection preventionists can be found in the help section of MAVEN. If the case was seen at a clinician's office, ask to speak to a nurse working with the ordering provider. You should confirm that the patient was notified of the diagnosis and let them know that you will be calling the case for further information.

Calling the case or parent/guardian of the case

Before calling the case, review the disease fact sheet by clicking on the Help Button located in MAVEN and all the information in this chapter. The call may take a few minutes, so in order to maximize the chance of getting the information needed, it might be good to note the potential length of the call with your contact, and offer the opportunity to call back when it is more convenient. Asking questions about how the case or child is feeling may get the case or parent talking. If you are unable to answer a question they have, don't hesitate to call the Division of Epidemiology and Immunization at 617-983-6800 for assistance, and call the case back with the answer later. People are often more than willing to talk about their illness, and they may be very happy to speak with someone who can answer their questions.

Using MAVEN

Administrative Question Package

Monitor your "Online LBOH Notification for non-Immediate Disease" workflow in MAVEN for any new cases of Cryptosporidiosis. Once a new event appears in this workflow, open the Administrative Question Package (QP) and under the "Local Health and Investigation" section, answer the first question "**Step 1** - LBOH acknowledged" by selecting "Yes". The "LBOH acknowledged date" will then auto populate to the current day. Completing this first step will move the event out of this workflow and into your "Online LBOH notified but Case Report Forms (CRF) are pending" workflow. Note the date you started your investigation by answering "**Step 2** - Investigation started" as "Yes" and then note the date where shown. Record your name, agency, and phone numbers where shown in "**Step 3** - LBOH/Agency Investigator."

Demographic Question Package

Record all demographic information. It is particularly important to complete the Race/Ethnicity and Occupation questions

Clinical Question Package

Complete the "Diagnosis/Clinical Information" section, providing the diagnosis date, symptom information and date of symptom onset and other medical information.

Risk Exposure/Control & Prevention Question Package

Accurately record all risk questions regarding travel and consumption of any high risk foods. As you enter data into MAVEN, additional questions will appear for you to answer regarding risk/exposure. When asking about exposure history (e.g., food, travel, activities), if possible, use the entire incubation period range of cryptosporidiosis (2-10 days). Specifically, however, focus on the time period around

seven days prior to the case's onset, which is the average incubation period. If possible, record any restaurants at which the case ate, including food item(s) and date(s) of consumption. Accurately capture any travel history and outdoor activities.

Completing Your Investigation

1. If you were able to complete a case investigation and follow-up is complete, mark "**Step 4 – Case Report Form Completed**" as "Yes" and then choose Local Board of Health (LBOH) –Ready for MDPH review for the Completed by variable.
2. If you have made several attempts to obtain case information but have been unsuccessful (e.g., the case or health care provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please complete "**Step 4 - Case Report Form Completed**" as "No" and then choose a primary reason why the case investigation was not completed from the choices provided in the primary reason answer variable list.
3. If you are not online for MAVEN you may submit a paper case report form. After completing the form, attach laboratory report(s) and fax or mail (in an envelope marked "Confidential") to ISIS. The confidential fax number is (617) 983-6813. Call ISIS at (617) 983-6801 to obtain a copy of the case report form and to confirm receipt of your fax.

The mailing address is:

MDPH, Office of Integrated Surveillance and Informatics Services (ISIS)
305 South Street, 5th Floor
Jamaica Plain, MA 02130
Fax: (617) 983-6813

Section 4

CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (105 CMR 300.200)

Food handlers with cryptosporidiosis must be excluded from work.

Note: A case of cryptosporidiosis is defined by the reporting criteria in Section 2A of this chapter.

Minimum Period of Isolation of Patient

After diarrhea has resolved, food handling facility employees may only return to work after producing one negative stool specimen. If a case has been treated with an antimicrobial agent, the stool specimen shall not be collected until at least 48 hours after cessation of therapy. In outbreak circumstances, a second consecutive negative stool specimen will be required prior to returning to food handling duties.

Minimum Period of Quarantine of Contacts

Contacts who have diarrhea and are food handling facility employees shall be considered the same as a case and shall be handled in the same fashion. In outbreak circumstances, asymptomatic contacts who are food

handling facility employees shall be required to produce 2 negative stool specimens 24 hours apart. No restrictions otherwise.

Note: A food handler is any person directly preparing or handling food. This can include a patient care or childcare provider.

B. Protection of Contacts of a Case

None.

C. Managing Special Situations

Daycare

Since cryptosporidiosis may be transmitted from person to person through fecal-oral transmission, it is important to follow up on cases of cryptosporidiosis in a daycare setting carefully. General recommendations include:

- Infected children who have diarrhea should be excluded until their diarrhea has resolved.
- Infected children who have no diarrhea and are not otherwise ill may be excluded or may remain in the program, if special precautions are taken. Since most staff in childcare programs are food handlers, those with *Cryptosporidium* in their stools (symptomatic or not) can remain on site but must not prepare food or feed children until their diarrhea has resolved and they have one negative stool specimen (per 105 CMR 300.200).
- Notifying parents/guardians of attendees should be considered when cases of cryptosporidiosis occur in children or staff. Licensed daycare facilities must notify all parents in accordance with MDPH recommendations when any communicable disease or condition has been introduced into the program (606 CMR 7.11). MDPH epidemiologists are available to help determine whether notification is recommended and sample letters are available from the Division of Epidemiology and Immunization at (617) 983-6800.

School

Since cryptosporidiosis may be transmitted from person to person through fecal-oral transmission, it is important to follow up on cases of cryptosporidiosis in a school setting carefully. General recommendations for case follow-up and control in a school setting include the following:

- Infected students who have diarrhea should be excluded until their diarrhea has resolved.
- Infected students or staff who do not handle food, have no diarrhea or mild diarrhea, and are not otherwise sick may remain in school if special precautions are taken.
- Students or staff who handle food and have this parasitic infection (symptomatic or not) must not prepare food until their diarrhea has resolved and they have one negative stool test (collected at least 48 hours after completion of therapy, if antiparasitic agents are given) (per 105 CM 300.200).
- The school nurse and school physician should consult with the LBOH and the MDPH epidemiologists to determine whether some or all parents/guardians and staff should be notified. Parent/guardian notification should be discussed with the school administrator prior to initiation.

Sample letters are available from the Division of Epidemiology and Immunization at (617) 983-6800.

Refer to the MDPH Comprehensive School Health Manual <https://massclearinghouse.ehs.state.ma.us/SCH/SH3001R.html> for complete guidelines on handling diseases spread through the intestinal tract.

Community Residential Programs

Actions taken in response to a case of cryptosporidiosis in community residential programs will depend on the type of program and the level of functioning of the residents.

In long-term care facilities, residents with cryptosporidiosis should be maintained on standard precautions until their symptoms subside and they test negative for this parasite. Refer to the MDPH Division of Epidemiology and Immunization's Long Term Care Infection Control Guidelines <http://www.mass.gov/eohhs/gov/departments/dph/programs/id/epidemiology/providers/infection-control.html> for further actions. Staff members who provide direct patient care (e.g., feed patients, give mouth or denture care, or give medications) are considered food handlers and are subject to food handler restrictions (per 105 CMR 300.200). See Section 4A for more information. In addition, staff members with cryptosporidiosis who are not food handlers should not work until their diarrhea is resolved.

In residential facilities for the developmentally disabled, staff and clients with cryptosporidiosis must refrain from handling or preparing food for other residents until their diarrhea has subsided and they have one negative stool specimen for *Cryptosporidium* (per 105 CMR 300.200). In addition, staff members with cryptosporidiosis who are not food handlers should not work until their diarrhea has resolved.

Reported Incidence Is Higher Than Usual/Outbreak Suspected

If the number of reported cases of cryptosporidiosis in your city/town is higher than usual or if you suspect an outbreak, investigate to determine the source of infection and the mode of transmission. A common vehicle (e.g., water, food, or association with a daycare center) should be sought, and applicable preventive or control measures should be instituted. Control of person-to-person transmission requires special emphasis on personal hygiene and sanitary disposal of feces. Consult with the epidemiologist on-call at the MDPH Division of Epidemiology and Immunization at (617) 983-6800. The epidemiologists can help determine a course of action to prevent further cases and can perform surveillance for cases across town lines, which would otherwise be difficult to identify at the local level.

Note: Refer to the MDPH's Foodborne Illness Investigation and Control Reference Manual for comprehensive information on investigating foodborne illness complaints and outbreaks. Copies of this manual have been made available to LBOH. It can also be located on the MDPH website in PDF format at <http://www.mass.gov/eohhs/docs/dph/environmental/foodsafety/ref-manual/intro-pages.pdf>. For the most recent changes to the Massachusetts Food Code, contact the FPP at (617) 983-6712 or through the MDPH website at www.mass.gov/dph/fpp.

D. Preventive Measures

Personal Preventive Measures/Education

To avoid exposure, recommend that individuals:

- Always wash their hands thoroughly with soap and water before eating or preparing food, after using the toilet, after changing diapers, and after contact with animals, especially cattle.
- Wash their own hands as well as the child's hands after changing diapers, and dispose of diapers in a sanitary manner.
- Wash their hands thoroughly and frequently when ill with diarrhea or when caring for someone with diarrhea. Hands should be scrubbed for at least 15–20 seconds after cleaning the bathroom, after using the toilet or helping someone use the toilet, after changing diapers, before handling food, and before eating.
- Avoid drinking raw milk, other unpasteurized dairy products, or unpasteurized apple cider.
- Avoid drinking water from streams or lakes. Avoid drinking unboiled water while traveling in developing countries or when the water quality is unknown. Bringing water to a full, rolling boil is sufficient to kill *Cryptosporidium*.
- Adhere to local advisories to boil water.

The likelihood that *Cryptosporidium* could cause illness in regulated, public drinking water is low. Immunocompromised individuals, however, may want to consider the following recommendations:

- Take care to avoid fecal contact.
- Boil tap water before drinking or making ice cubes.
- Consider the use of a home water filtration system with a very fine filter (absolute pore size of one micron or smaller). Such filters include: reverse-osmosis filters, filters labeled as “absolute” one micron filters, and those labeled as meeting National Sanitation Foundation (NSF) standard #53 for cyst removal.
- Avoid swallowing water when swimming. Lakes, streams (and other surface waters), and swimming pools may be contaminated with *Cryptosporidium*, and chlorination does not eliminate the parasite.

Discuss transmission risks that may result from oral-anal sexual contact. Latex barrier protection (e.g., dental dam) may prevent the spread of *Cryptosporidium* to a case's sexual partners and may prevent exposure to and transmission of other fecal-oral pathogens.

A Cryptosporidiosis Public Health Fact Sheet is available from the MDPH Division of Epidemiology and Immunization or on the MDPH website at

<http://www.mass.gov/eohhs/gov/departments/dph/programs/id/epidemiology/factsheets.html>. The fact sheet is available in English and Spanish.

ADDITIONAL INFORMATION

The formal Centers for Disease Control and Prevention (CDC) surveillance case definition for cryptosporidiosis is the same as outlined in Section 2A of this chapter. CDC case definitions are used by the MDPH and the CDC to maintain uniform standards for national reporting. When reporting to the MDPH, always use the criteria in Section 2A.

Note: The most up-to-date CDC case definitions are available on the CDC website at <http://www.cdc.gov/nndss/conditions/cryptosporidiosis/case-definition/2012/>

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