

# Cryptosporidiosis

## *Cryptosporidium*

### DISEASE REPORTABLE WITHIN 24 HOURS OF DIAGNOSIS

Per N.J.A.C. 8:57, healthcare providers and administrators shall report by mail or by electronic reporting within 24 hours of diagnosis, confirmed cases of Cryptosporidiosis to the health officer of the jurisdiction where the ill or infected person lives, or if unknown, wherein the diagnosis is made. A directory of local health departments in New Jersey is available at <http://www.nj.gov/health/lh/index.shtml>.

If the health officer is unavailable, the healthcare provider or administrator shall make the report to the Department by telephone to 609.826.5964, between 8:00 A.M. and 5:00 P.M. on non-holiday weekdays or to 609.392.2020 during all other days and hours.



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## Cryptosporidiosis (*Cryptosporidium*)

# 1 THE DISEASE AND ITS EPIDEMIOLOGY

### A. Etiologic Agent

*Cryptosporidium parvum*, a coccidian protozoan, is associated with human infection and was not recognized as a cause of human illness until 1976.

*Cryptosporidium* is a microscopic parasite that causes the diarrheal disease cryptosporidiosis. Both the parasite and the disease are commonly known as "Crypto."

There are many species of *Cryptosporidium* that infect animals, some of which also infect humans. *Cryptosporidium parvum* and *Cryptosporidium hominis* are the two species which most commonly infect humans.<sup>1</sup> The parasite is protected by an outer shell that allows it to survive outside the body for long periods of time and makes it very tolerant to chlorine disinfection.

While this parasite can be spread in several different ways, water (drinking water and recreational water) is the most common way to spread the parasite. *Cryptosporidium* is a leading cause of waterborne disease among humans in the United States.

### A. Clinical Description and Laboratory Diagnosis

The most common symptom of cryptosporidiosis is diarrhea that may be profuse and watery associated with abdominal pain and cramping. Nausea, vomiting, fever, headache and loss of appetite may also occur. Symptoms can come and go for up to 30 days, but usually subside in 1 to 2 weeks in most healthy people. People with weakened immune systems may be at higher risk for acquiring cryptosporidiosis. Immunodeficiency, especially in 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 possible and remain a source of infection for others.

Laboratory diagnosis is generally made by the identification of oocysts in fecal smears. Organisms can also be identified in intestinal fluid, tissue samples, biopsy specimens, or

other biological sample by methods such as direct fluorescent antibody [DFA] test, polymerase chain reaction [PCR], enzyme immunoassay [EIA] or light microscopy of stained specimen as well as *Cryptosporidium* antigen by a screening test method, such as immunochromatographic card/rapid card test.

## **B. Reservoirs**

Humans, cattle, and other domestic and feral animals are reservoirs.

## **C. Modes of Transmission**

The mode of transmission is fecal-oral, which includes person to person, animal to person, waterborne and foodborne transmission. The most common mode of transmission is person-to-person. Persons become infected by hand-to-mouth transfer of oocysts from the feces of an infected individual (or animal), especially in institutions and daycare centers. Transmission can also occur by ingesting water contaminated with *Cryptosporidium*, eating undercooked food or drinking unpasteurized/raw apple cider or milk. Person-to-person spread through certain types of sexual contact (e.g., oral-anal contact) can also occur.

Infected animals and people shed *Cryptosporidium* parasites in their stool. An infected person can shed 10,000,000 to 100,000,000 *Cryptosporidium* germs in a single bowel movement. Shedding of *Cryptosporidium* in stool begins when symptoms such as diarrhea begin and can last for weeks after symptoms stop. Swallowing as few as 10 *Cryptosporidium* germs can cause infection. Oocysts are relatively hardy and can survive in the environment for a long time. They are resistant to the concentrations of chlorine and other disinfectants commonly used for drinking water treatment. They can be killed by heat or removed from water by adequate filtration or by a combination of filtration and disinfection.

Outbreaks traced to contaminated drinking water have been reported, including an outbreak in Milwaukee that reportedly affected 400,000 people<sup>2</sup>. Localized outbreaks may occur from the ingestion of fecally contaminated recreational waters, such as streams, lakes, swimming pools, or water parks, which are vulnerable to contamination by human and animal feces.

Outbreaks have also occurred from eating food contaminated by animal feces (e.g., unpasteurized apple cider). In addition, zoonotic transmission can occur through contact with feces from infected animals (e.g., livestock handlers, dairy farmers, veterinarians). Infected food workers have also been the source for food-borne transmission in a few cases.

## **D. Incubation Period**

The incubation period ranges from one to 12 days, with an average of about seven days.

## **E. Period of Communicability or Infectious Period**

The disease is communicable for at least as long as the infected person excretes

*Cryptosporidium* oocysts, which generally begins at the onset of symptoms. Oocysts may be excreted in the stool for several weeks after symptoms subside, and they can remain infective outside the body for two to six months in a moist environment.<sup>3</sup> *Cryptosporidium* is chlorine resistant and can live for days in chlorine-treated water.

## F. Epidemiology

While travelers to developing countries may be at greater risk for infection because of poorer water treatment and food sanitation cryptosporidiosis has a worldwide distribution. In the United States, an estimated 748,000 cases of cryptosporidiosis occur each year making it the leading cause of waterborne disease in humans. The prevalence is significantly higher in developing regions of the world. Once infected, people with decreased immunity are most at risk for severe disease. Children who attend childcare centers, international travelers, hikers/campers who drink unfiltered water, swimmers who swallow water from contaminated sources, people who handle infected cattle, men who have sex with men, and close contacts of infected individuals are those most likely to be infected. Outbreaks have been reported in daycare centers and have been associated with public drinking water; swimming in contaminated pools, water parks, lakes, and ponds; and drinking unpasteurized cider made from apples contaminated with cow manure. It is estimated that 50% of dairy calves may shed oocysts and that the parasite is present in more than 90% of dairy farms.<sup>4</sup> Over a period of six years between 2012-2015, an average of 64 (range 42-84) confirmed cases of cryptosporidiosis were reported to the New Jersey Department of Health.

# 2 CASE DEFINITIONS

## B. NJDOH Case Definition

### 1. Clinical Description

A gastrointestinal illness characterized by diarrhea **and** one or more of the following: diarrhea duration of 72 hours or more, abdominal cramping, vomiting, or anorexia.

### 2. Laboratory Criteria for Diagnosis

*Confirmed:* Evidence of *Cryptosporidium* organisms or DNA in stool, intestinal fluid, tissue samples, biopsy specimens, or other biological sample by laboratory methods including:

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

*Probable:* The detection of *Cryptosporidium* antigen by a screening test method, such as

immunochromatographic card/rapid card test; or a laboratory test of unknown method.

### **3. Case Classification**

#### **CONFIRMED**

- A case that is diagnosed with *Cryptosporidia* spp. infection based on laboratory testing using a method listed in the confirmed criteria.

#### **PROBABLE**

- A case with supportive laboratory test results for *Cryptosporidia* spp. infection using a method listed in the probable laboratory criteria. When the diagnostic test method on a laboratory test result for cryptosporidiosis cannot be determined, the case can only be classified as probable, **OR**
- A case that meets the clinical criteria and is epidemiologically linked to a confirmed case.

#### **POSSIBLE**

Not used.

### **C. Differences from CDC Case Definition**

There are no differences in the case definitions.

## **3 LABORATORY TESTING SERVICES AVAILABLE**

The NJDOH, Public Health, Environmental and Agricultural Laboratories (PHEAL) does not routinely test clinical and water samples for *Cryptosporidium* spp. If testing is needed in an outbreak situation, please contact NJDOH staff to discuss alternatives.

Most commercial/hospital laboratories offer testing for this organism, but it is not part of a standard enteric pathogen panel and should be specially requested.

## **4 PURPOSE OF SURVEILLANCE AND REPORTING REQUIREMENTS**

### **A. Purpose of Surveillance**

- To identify whether the case may be a source of infection for other persons (e.g., if case is 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 contaminated public water supply) and to stop transmission from such sources.
- To provide education about reducing the risk of infection.

## **B. Laboratory Reporting Requirements**

The New Jersey Administrative Code (NJAC) 8:57 stipulates that laboratories report using the Communicable Disease Reporting and Surveillance System (CDRSS) all cases of cryptosporidiosis to the local health officer having jurisdiction over the locality in which the patient lives, or, if unknown, to the health officer in whose jurisdiction the healthcare provider requesting the laboratory examination is located. The report shall contain, at a minimum, the reporting laboratory's name, address, and telephone number; the age, date of birth, gender, race, ethnicity, home address, and telephone number of person tested; the test performed; the date of testing; the test results; and the healthcare provider's name and address.

## **C. Healthcare Provider Reporting Requirements**

The New Jersey Administrative Code NJAC 8:57 stipulates that healthcare providers report (by telephone, confidential fax, over the internet using CDRSS, or in writing) all cases of cryptosporidiosis to the local health officer having jurisdiction over the locality in which the patient lives, or, if unknown, to the health officer in whose jurisdiction the healthcare provider requesting the laboratory examination is located.

## **D. Health Officer Reporting and Follow-Up Responsibilities**

The New Jersey Administrative Code NJAC 8:57 stipulates that each local health officer must report the occurrence of any case of cryptosporidiosis within 24 hours of receiving a report from a laboratory or healthcare provider to the NJDOH. A report must be filed electronically over the internet using the confidential and secure CDRSS.

# **5 CASE INVESTIGATION**

## **A. Forms**

It is the health officer's responsibility to investigate the case by interviewing the patient and others who may be able to provide pertinent information about the case patient's illness. Some of the information required in CDRSS can be obtained from the patient's healthcare provider or the medical record. Much of the information on exposure must be obtained from the patient as it not likely in the medical record. The *Cryptosporidiosis Case Report Worksheet* may be used as a guide to help obtain relevant information about the case. This is available at: [http://nj.gov/health/cd/documents/topics/crypto/crypto\\_worksheet.pdf](http://nj.gov/health/cd/documents/topics/crypto/crypto_worksheet.pdf)

NJDOH recommends interviewing the patient and asking about exposure (travel, activities, food) using the incubation period range for cryptosporidiosis one to 12 days.

Focus specifically on the period beginning a minimum of one day prior to the case's symptom onset date back to 12 days before onset.

Use the following guidelines in completing the form and conducting the investigation:

- Ask questions about travel history and outdoor activities to help identify other potential exposure sources during the incubation period such as swimming in pools, lakes, rivers, waterparks.
- Ask questions about water supply and whether the patient drank untreated water because cryptosporidiosis may be acquired through water consumption.
- Ask questions about animal exposure including contact with pets and other animals (visits to farm, zoo, county fairs) and their waste.
- If possible, record any restaurants at which the patient ate.
- Ask about food items(s) eaten at home or in a restaurant, such as raw or unpasteurized milk or milk products (cheese, cream, ice cream), unpasteurized cider, raw fruits or vegetables and date(s) consumed.
- Ask questions regarding ill household/close contacts.
- Determine whether the patient attends or works at a daycare facility and/or is a food handler or healthcare worker. Food handlers should be excluded from handling food until 24 hours after symptoms resolve.
- In a case of an outbreak (see section 7, Outbreak Situations for definition), immediately notify the NJDOH by telephone at 609.826.5964 during business hours and 609.392.2020 after business hours and on weekends and holidays.
- After speaking with the patient, healthcare provider and completing the worksheet, enter all collected information into the Communicable Disease Reporting and Surveillance System (CDRSS).

## **B. Other Reporting/Investigation Issues**

Once LHD completes its investigation and assigns a report status of “LHD CLOSED” in CDRSS, NJDOH will review the case. NJDOH will approve the case by changing the report status to “DHSS APPROVED”. At this time, the case will be submitted to CDC and the case will be locked for editing. If additional information is received after a case has been placed in “DHSS APPROVED” you will need to contact NJDOH to reopen the case. This should be done only if the additional information changes the case status of the report.

Institution of disease control measures is an integral part of the case investigation. It is

the health officer's responsibility to understand, and, if necessary, institute the control guidelines listed in section 6, Controlling Further Spread.

## **6 CONTROLLING FURTHER SPREAD**

### **A. Isolation and Quarantine Requirements**

#### **1. Minimum Period of Isolation of Patient**

Food handlers with cryptosporidiosis are to be excluded from food handling duties until 24 hours after diarrhea has resolved.

Children should not attend school until diarrhea has resolved.<sup>5</sup> See section 6B, Managing Special Situations, for children in daycare.

Since *Cryptosporidium* can survive even in well-maintained pools for more than 10 days, patients should not swim for 2 weeks after diarrhea has resolved.

#### **2. Protection of Contacts**

Food handlers who are contacts of a confirmed case, and who have diarrhea shall be considered the same as the case and be excluded from food handling duties until 24 hours after diarrhea has resolved and be advised to maintain appropriate hand hygiene upon their return.

### **B. Managing Special Situations**

#### **1. Daycare**

Because cryptosporidiosis may be transmitted person-to-person through fecal-oral transmission, it is important to follow cases of cryptosporidiosis in a daycare setting. The spread of Cryptosporidiosis is highest among young children who are not toilet trained and their caregivers (those who change diapers).<sup>6</sup> General recommendations include the following:

- Children with cryptosporidiosis who have diarrhea should be excluded until their diarrhea has resolved.
- Children with cryptosporidiosis who have no diarrhea and are otherwise not ill may remain in the program and encouraged to maintain appropriate hand hygiene.

Because most staff in childcare programs are considered food handlers, those with *Cryptosporidium* in their stools who are symptomatic must not prepare food or feed children until 24 hours after their diarrhea has resolved and be advised to maintain appropriate hand



hygiene upon their return.

To stop *Cryptosporidium* from spreading in the child care setting:

- Educate staff and parents.
- Inform all staff and parents about the symptoms of Cryptosporidiosis, how infection is spread, and outbreak control policies.
  - Notify parents of children who have been in direct contact with a child or an adult caregiver with diarrhea. Parents should contact the child's healthcare provider if their child develops diarrhea.
  - Inform staff and parents of children about the potential for Cryptosporidiosis to be a severe disease in people with weakened immune systems. Immunocompromised persons should consult their healthcare provider for further guidance.
- Adhere to exclusion criteria for children and staff.
- Establish, implement, and enforce policies on water-play and swimming that;
  - Exclude children diagnosed with Cryptosporidiosis from water-play and swimming activities for an additional 2 weeks after their diarrhea has resolved.
  - Discourage all children from getting the water in their mouths and swallowing it.
  - Include handwashing of all children and staff before using water tables.
  - Prohibit the use of swimming pools where children sit in water because they can spread Cryptosporidiosis.
  - Encourage frequent bathroom breaks or diaper checking and handwashing.
    - Change children's diapers in a diaper-changing area or bathroom and not by the water.
- Reinforce frequent hand washing and good hand washing technique for all children and adults. **Note: Alcohol based hand sanitizers are not effective against *Cryptosporidium*.**
  - Observe handwashing or assist when needed.
  - Wash children's hands when they arrive at facility, after they use the toilet, or after having their diapers changed, and before eating snacks or meals.
  - Adults should wash hands after using the toilet, after helping a child use the toilet, after diapering a child, and before handling or eating food.

Note: Where staffing permits, people who change diapers should not prepare or serve food.
- Reinforce good diapering practices.
  - Separate diaper-changing areas from children's play and food preparation areas.
  - Use disposable gloves, change them and perform hand hygiene after each diaper change.
  - Use disposable paper over diaper-changing surfaces and change it after each diaper change.
  - Ensure children wear clothing over their diapers to reduce the opportunity for

leakage.

- Wash hands: both staff and the child's after each diaper change.
- *Cryptosporidium* is resistant to chlorine disinfection, so it is tougher to kill than most disease-causing organisms. The usual disinfectants, including most commonly used bleach solutions, have little effect on *Cryptosporidium*. An application of hydrogen peroxide seems to work best.<sup>1</sup>
  - Disinfect surfaces and objects, including but not limited to bathrooms, diaper-changing areas, food-preparation areas, tabletops, high chairs, and toys. Note: Contaminated surfaces should be soaked for 20 minutes with a 3% hydrogen peroxide (99% kill rate) and then rinsed thoroughly. No disinfectant is guaranteed to be completely effective against *Cryptosporidium*. However, hydrogen peroxide is more effective than standard bleach solutions.
  - Note: Do not mix hydrogen peroxide and bleach solutions. The two chemicals may react violently.
- Notify the state or local health department about an excessive level of diarrhea or any *Cryptosporidium* infections in a daycare.

## 2. School

Because cryptosporidiosis may be transmitted person-to-person through fecal-oral transmission, it is important to follow cases of cryptosporidiosis in a school setting.

- Students or staff with cryptosporidiosis who have diarrhea should be excluded until their diarrhea has resolved.
- Students or staff with cryptosporidiosis who have no diarrhea and are not otherwise ill may remain in school.

Students or staff who handle food and have cryptosporidium infection and are symptomatic should be excluded until 24 hours after their diarrhea has resolved and be advised to maintain appropriate hand hygiene upon their return.

## 3. Camps

Summer camps can provide the perfect environment for the spread of cryptosporidiosis. Information on the prevention and control of cryptosporidiosis in camp settings can be found at <http://www.cdc.gov/parasites/crypto/camps.html>

## 4. Residential Programs

Actions taken in response to a case of cryptosporidiosis in a community residential program 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 placed on standard (including enteric) precautions until their symptoms subside. Staff members who give direct patient care (e.g., feed patients, give mouth or denture care, or give medications) are considered

food handlers and should be treated as such (See section 6A above).

In **residential facilities for the developmentally disabled**, staff and clients with cryptosporidiosis must refrain from handling or preparing food for other residents until 24 hours after their diarrhea has subsided and be advised to maintain appropriate hand hygiene upon their return.

In addition, staff members with cryptosporidiosis who are not food handlers should not work until their diarrhea has resolved.

If an outbreak is detected or suspected in a long-term care facility or community residential program, the facility must report the outbreak to its LHD. Facility management should also report any such outbreak to the Division of Health Facility Survey and Field Operations at 609-292-0412. (*This applies to Assisted Living Facilities, Assisted Living Programs, Comprehensive Personal Care Homes, Residential Health Care Facilities, and Adult and Pediatric Day Health Services Facilities ONLY.*)

## 7 OUTBREAK SITUATIONS

### *Reported Incidence Is Higher Than Usual/Outbreak Suspected*

If the number of reported cases of cryptosporidiosis in a facility or region is higher than usual, or if an outbreak is suspected, investigate to determine the source of infection and mode of transmission. A common vehicle (such as recreational water, drinking water, food, or association with a daycare or institutional setting) should be sought and applicable preventive or control measures should be instituted. Control of person-to-person transmission requires special emphasis on personal cleanliness including proper hand hygiene and sanitary disposal of feces. NJDOH staff can help determine a course of action to prevent further cases and can perform surveillance for cases that may cross several jurisdictions and therefore be difficult to identify at a local level.

## 8 PREVENTATIVE MEASURES

### **Preventive Measures/Education**

Educate families, personnel, and residents of institutions, especially adult personnel of daycare centers, in personal hygiene and prevention measures.

Hand washing with soap and water is preferred over hand sanitizer. Alcohol based hand sanitizers are not effective against *Cryptosporidium*.

To avoid exposure and transmission, individuals should:

- Wash their hands thoroughly with soap and water frequently when ill with diarrhea, or when caring for someone with diarrhea, after using the toilet or helping someone use the toilet, after changing diapers (wash their own hands as well as the child's hands and dispose of diapers in a closed-lid garbage can), before eating or preparing food, after gardening, and after contact with animals (especially livestock) or animal waste.
- Avoid eating or drinking unpasteurized cider, milk or dairy products.
- Take precautions while at the pool. Take young children for bathroom breaks every 60 minutes or check their diapers every 30-60 minutes. Avoid swallowing the water. Do not swim if ill with diarrhea. If diagnosed with Cryptosporidiosis, do not swim for at least 2 weeks after diarrhea has stopped.
- Be aware of the risks of drinking water from streams or lakes while camping or hiking. Do not drink untreated water from a surface water supply, such as a pond, lake, or stream. Although the water may appear to be clean, it may contain *Cryptosporidium* parasites, which cannot be seen without a microscope.
- Avoid eating uncooked foods and drinking un-boiled water while traveling in developing countries or whenever the water quality is unknown. Bringing water to a full, rolling boil for one minute is sufficient to kill *Cryptosporidium*.
- If untreated water is all that is available there are several methods to disinfect water before drinking, rinsing uncooked foods, or brushing teeth such as boiling, use of filters and commercially bottled water. Information on healthy drinking water can be found at <http://www.cdc.gov/healthywater/drinking/travel/index.html>.
- Avoid sexual practices that might result in oral exposure to stool.

Immunocompromised individuals, however, may want to consider the following recommendations:

- Avoid sexual practices that may involve direct contact with feces. Latex barrier protection should be emphasized as a way to prevent the spread of *Cryptosporidium* to sexual partners as well as being a way to prevent the exposure to and transmission of other pathogens.
- Avoid touching farm animals particularly a calf, lamb or other young animal.
- Avoid touching the stool of pets. The risk of getting *Cryptosporidium* is greatest from pets that are less than 6 months old, animals that have diarrhea, and stray animals.
- Wash well all vegetables or fruit that will be eaten uncooked. When possible, peel fruit that will be eaten raw, after washing it. Do not eat or drink unpasteurized cider, milk or dairy products.
- Take additional measure to ensure safe drinking water by drinking certain commercially bottled water, boiling water, or filtering water 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](http://www.cdc.gov/parasites/crypto/gen_info/bottled.html) (NSF) Standard 53 or NSF Standard 58 for cyst or oocyst reduction. A guide to commercially bottled water and other beverages can be found at [http://www.cdc.gov/parasites/crypto/gen\\_info/bottled.html](http://www.cdc.gov/parasites/crypto/gen_info/bottled.html).

- When swimming in lakes, rivers, or pools, and when using hot tubs, avoid swallowing water. Lakes, streams (and other surface waters), and swimming pools may be contaminated with *Cryptosporidium*, and chlorination is not effective in eliminating the parasite.
- When travelling, particularly to developing nations, individuals may be at a greater risk for Cryptosporidiosis because of poorer water treatment and food sanitation. Warnings about food, drinks, and swimming are especially important. Foods and beverages, in particular raw fruits and vegetables, tap water, ice made from tap water, unpasteurized milk or dairy products, and items purchased from street vendors might be contaminated. Steaming-hot foods, fruits you peel yourself, bottled and canned processed drinks, and hot coffee or hot tea are probably safe. Discuss other guidelines for travel abroad with healthcare provider.

## Additional Information

A Cryptosporidiosis FAQ can be obtained at the NJDOH web site at <http://nj.gov/health/cd/topics/crypto.shtml>

## References

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