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## Cyclosporiasis

### Overview <sup>(1,2,4)</sup>


Cyclosporiasis is caused by parasitic infection with *Cyclospora cayetanensis* (a coccidian protozoan) of the upper small-bowel. Cyclosporiasis is spread by exposure to contaminated feces. Exposure may be via waterborne (drinking or swimming in contaminated water) or foodborne (eating contaminated fresh fruits and vegetables) transmission. Oocysts in freshly excreted stool are not infectious. *Cyclospora* oocysts require days to weeks outside the host, and certain environmental conditions, to produce spores and so become infectious. In the United States, outbreaks of cyclosporiasis have been associated with imported fresh produce. Additionally, cyclosporiasis is a cause of traveler’s diarrhea and isolated cases of community-acquired diarrhea.

In some cases of cyclosporiasis, an influenza-like illness may precede diarrhea. However, a profuse, non-bloody, watery diarrhea is the most common symptom of cyclosporiasis. Other symptoms may include abdominal cramps, nausea/vomiting, anorexia and weight loss, fatigue, and perhaps fever. The typical incubation period is approximately one week, but ranges from 1-14 days. Cyclosporiasis is a self-limiting illness, but symptoms can last for weeks. In untreated cases, relapse is common. Individuals who are immunocompromised may experience a prolonged illness.

Cyclosporiasis is treatable with antibiotics. Laboratory identification of cyclosporiasis is usually based on the presence of *Cyclospora* oocysts or DNA in stool or small-bowel biopsy specimens.

For a more complete description of cryptosporidiosis, please refer to the following texts:

- ◆ *Control of Communicable Diseases Manual*. (CCDM), American Public Health Association. 19<sup>th</sup> ed. 2008.
- ◆ American Academy of Pediatrics. *Red Book: 2009 Report of the Committee on Infectious Diseases*. 28<sup>th</sup> ed. 2009.
- ◆ *Mandell, Douglas, and Bennett’s Principles and Practice of Infectious Diseases*. 7<sup>th</sup> ed. 2010.

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## **Case Definition** <sup>(3)</sup>

### ***Clinical description:***

An illness of variable severity caused by the protozoan parasite *Cyclospora cayetanensis*. The most common symptom is watery diarrhea. Other common symptoms include loss of appetite, weight loss, abdominal cramps/bloating, nausea, body aches, and fatigue. Vomiting and low-grade fever also may be noted.

### ***Laboratory criteria for diagnosis:***

Laboratory-confirmed cyclosporiasis shall be defined as the detection of *Cyclospora* organisms or DNA (by polymerase chain reaction) in:

1. stool, or
2. in intestinal fluid/aspirate, or
3. in intestinal biopsy specimens.

### ***Case classification:***

***Confirmed:*** a case that meets the clinical description and at least one of the criteria for laboratory confirmation as described above.

***Probable:*** a case that meets the clinically description and that is epidemiologically linked to a confirmed case.

## **Information Needed for Investigation**


**Verify the diagnosis.** What laboratory tests were conducted and what were the results? Was Cyclosporiasis confirmed?

**When investigating gastrointestinal illness of unknown etiology,** see the Outbreak Investigation, Acute Gastroenteritis section.

**Establish the extent of illness.** Determine if household or other close contacts are, or have been ill, by contacting the health care provider, patient or family member.

**Determine the source of infection to prevent other cases.**

- Has the case traveled out of the country to an endemic area?
- Had the case consumed imported fruits or vegetables up to two (2) weeks prior to becoming ill?
- Have there been other cases linked by time, place or person (persons who drink from the same water supply, consumed fresh fruit or vegetables)?
- Has the case ingested untreated water from a lake or stream?
- Had the case participated in water recreational activities in a pool, water park, lake or stream?

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## **Notification**


- Contact the [District Communicable Disease Coordinator](#), or the [Senior Epidemiology Specialist](#), or the Department of Health and Senior Services' Situation Room (DSR) at 800-392-0272 (24/7), immediately if an outbreak\* of cyclosporiasis is suspected.
- Contact the Bureau of Environmental Health Services at 573-751-6095 and the Section for Child Care Regulation at 573-751-2450, if the case is associated with a child care center.
- Contact the Section for Long Term Care Regulation at 573-526-8505, if cases are associated with a long-term care facility.
- Contact the Bureau of Health Services Regulation at 573-751-6303, if cases are associated with a hospital or hospital-based long-term care facility.

\*Outbreak is defined as the occurrence in a community or region, illness(es) similar in nature, clearly in excess of normal expectancy and derived from a common or a propagated source.

## **Control Measures**

### **General**

- Identify symptomatic associates of the index case and obtain stool specimen. Be sure to inform the laboratory to test for *Cyclospora*. Cyclospora oocyst can be excreted intermittently and in small numbers thus a single negative stool specimen does not rule out the diagnosis; three or more specimens at two or three day intervals may be required.<sup>(5)</sup> Symptomatic associates of the index case should be interviewed and referred for medical assessment.
- Direct person-to-person transmission is unlikely because Cyclospora oocysts are not infectious at the time of excretion.<sup>(4)</sup>
- The recommended treatment for cyclosporiasis is a 7 to 10 day course of a combination of two oral antibiotics, trimethoprim-sulfamethoxazole (TMP-SMX). (For adults, 160 mg. trimethoprim plus 800 mg. sulfamethoxazole twice daily; for children, 5mg/kg trimethoprim plus 25 mg./kg. sulfamethoxazole twice daily.)<sup>(1,2)</sup> As an alternative, particularly for patients with sulfa allergy or intolerance, ciprofloxacin is similarly efficacious for both treatment and suppression.<sup>(4)</sup>
- Transmission can be foodborne or waterborne and occurs either through drinking (or swimming in) contaminated water or through consumption of contaminated fresh fruits and vegetables. Collect patient history on the consumption of water, especially untreated (e.g. private wells, cisterns, etc.) and exposures to recreational waters (e.g. lakes, streams, ponds).<sup>1</sup>
- If cases are epidemiologically associated with a public water supply, notify the [District Communicable Disease Coordinator](#), prior to sample collection.
- Several outbreaks have been linked to contaminated food, especially imported produce.<sup>(1)</sup> If food is suspected to be the source of the illness, collect a food history for the 14 days prior to onset of the illness.

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- If fresh fruits or vegetables are suspected as the vehicle in an outbreak, trace back of the product may prevent additional cases.

### **Food Handlers and Health Care Workers**

- Cyclospora oocysts in freshly excreted stool are not infectious. They require days to weeks outside the host to sporulate and become infectious.<sup>(1)</sup> There is little risk for transmission from food handlers who may be infected. Food handlers without diarrhea may return to work. Scrupulous hand washing should be maintained.

### **Child Care**


- Cyclospora oocysts in freshly excreted stool are not infectious. They require days to weeks outside the host to sporulate and become infectious.<sup>(1)</sup> There is little risk for transmission from children or staff in child care who may be infected. However, in addition to standard precautions, contact precautions are recommended for diapered or incontinent children that are infected.<sup>(2)</sup> Children and staff without diarrhea may return to work/child care. Scrupulous hand-washing and thorough cleaning of the facility should be maintained.

### **Health Care**

- Cyclospora oocysts in freshly excreted stool are not infectious. They require days to weeks outside the host to sporulate and become infectious.<sup>(1)</sup> There is little risk for transmission from health care workers who may be infected. However, in addition to standard precautions, contact precautions are recommended for diapered or incontinent patients who are infected.<sup>(2)</sup> Health care workers without diarrhea may return to work. Scrupulous hand washing should be maintained.

### **Schools**

- Cyclospora oocysts in freshly excreted stool are not infectious. They require days to weeks outside the host to sporulate and become infectious.<sup>(1)</sup> There is little risk for transmission from students or staff who may be infected. Students and staff without diarrhea may return to school. Scrupulous hand washing should be maintained.

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## **Laboratory Procedures**

### **Specimens:**

#### **Microscopic examination for oocysts:**

1. Collect fecal specimens using an ova and parasite (O&P) kit, which contains two different preservatives, Polyvinyl (PVA) and formalin. Specimens must be placed in both preservatives and shipped at room temperature. The Missouri State Public Health Laboratory (SPHL) performs this test. The sender **must** specifically request testing for Cyclospora on the specimen submission form. Initial specimens should also be screened for *Cryptosporidium parvum* and *Giardia lamblia*. The same specimen can be used for both tests.
2. If a large number of samples will be submitted (+15), or if sampling will continue over a long period, contact the District Communicable Disease Coordinator so arrangements may be made with the SPHL.
3. Before any specimens are submitted as part of a food or water-borne disease outbreak, contact the [District Communicable Disease Coordinator](#) so arrangements may be made with the SPHL.


#### **Polymerase (PCR) testing or demonstration of sporulation:**

The SPHL does not perform PCR testing or sporulation assays of stool specimen for *Cyclospora*; however, some commercial laboratories and CDC may offer this service. Specimens for PCR testing may be frozen without fixation or fixed in 2.5% -potassium dichromate. Sporulation assays require that the stool specimen be fixed in 2.5% potassium dichromate."

## **Reporting Requirements**

Cyclosporiasis is a Category 3 disease and shall be reported to the local health authority or to the Missouri Department of Health and Senior Services within three (3) calendar days of first knowledge or suspicion:

1. For confirmed and probable cases, complete a "[Disease Case Report](#)" (CD-1) and "[Cyclosporiasis Surveillance Case Report Form](#)" (CDC-54.48).
2. If food is suspected to be the source of the illness, complete the "[Record of Investigation of Enteric Infection](#)" (CD-2C) and collect the case's food history for the fourteen days prior to onset of the illness.
3. Entry of the completed CD-1 into the WebSurv database negates the need for the paper CD-1 to be forwarded to the District Health Office.
4. Send the completed secondary investigation form(s) to the District Health Office.
5. All outbreaks or "suspected" outbreaks must be reported as soon as possible (by phone, fax or e-mail) to the District Communicable Disease Coordinator. This can be accomplished by completing the [Missouri Outbreak Surveillance Report](#) (CD-51).

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6. If an outbreak is associated with the consumption or use of water for drinking, or with ingestion, contact, or inhalation of recreational water, a [CDC 52.12 form](#) (Reporting Waterborne Disease and Outbreaks) is to be completed and submitted to the Bureau of Communicable Disease Control and Prevention.
7. Within 90 days from the conclusion of an outbreak, submit the final outbreak report to the [District Communicable Disease Coordinator](#).

### **References**

1. *Control of Communicable Diseases Manual*. Diarrhea caused by Cyclosporiasis. In: Heymann DL, ed. 19<sup>th</sup> ed. Washington, D.C.: American Public Health Association; 2008: 160-161.
2. American Academy of Pediatrics. Cyclosporiasis. In: Pickering LK, ed. *Red Book: 2009 Report of the Committee on Infectious Diseases*. 28<sup>th</sup> ed. Elk Grove Village, IL: American Academy of Pediatrics; 2009: 274-275, 789.
3. Centers for Disease Control and Prevention, *Nationally Notifiable Infectious Conditions, United States 2011*.  
[http://www.cdc.gov/osels/ph\\_surveillance/nndss/casedef/cyclosporiasis\\_current.htm](http://www.cdc.gov/osels/ph_surveillance/nndss/casedef/cyclosporiasis_current.htm) (8/11)
4. Fisk, T.L., Keystone, J.S., Kozarsk, P. Cyclosporiasis. In: Mandell GL, Bennett JE, Dolin R, eds. *Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases*. 7<sup>th</sup> ed. Philadelphia, Pa.: Elsevier Churchill Livingstone; 2010: vol.2: 3561-3563.
5. CDC PDX-Lab Assistance Cyclospora Infections.  
<http://www.dpd.cdc.gov/dpdx/HTML/Cyclosporiasis.htm> (8/11)

### **Other Sources of Information**

1. Centers for Disease Control and Prevention, "Cyclosporiasis"  
<http://www.cdc.gov/parasites/cyclosporiasis/> (8/11)
2. Shoff, W. H. & Behrman, A. J., eMedicine Journal, February 26, 2010, Cyclosporiasis,  
<http://emedicine.medscape.com/article/236105-overview> (8/11)