UTAH DEPARTMENT OF HEALTH

Cyclosporiasis

Disease Plan

Quick Links:

Last updated: May 28, 2015, by Laine McCullough

Questions about this disease plan?

Contact the Utah Department of Health Bureau of Epidemiology: 801-538-6191.

✓ WHY IS CYCLOSPORIASIS IMPORTANT TO PUBLIC HEALTH?

Cyclospora cayetanensis is a parasite that is widely distributed throughout the world, including the United States (U.S.). When ingested, this parasite causes the diarrheal illness cyclosporiasis. On average, less than 100 cases of cyclosporiasis unrelated to outbreaks are reported each year in the U.S., and from 2009 and 2014, Utah has had between zero and one case reported each year. Though, in general, the illness is not common in the U.S., large outbreaks affecting hundreds can and do occur. Cyclosporiasis can result in severe illness, and treatment may be necessary. Correct diagnosis, early detection of cases, and interview of ill persons is crucial in identifying sources of illness and preventing future cases and outbreaks.

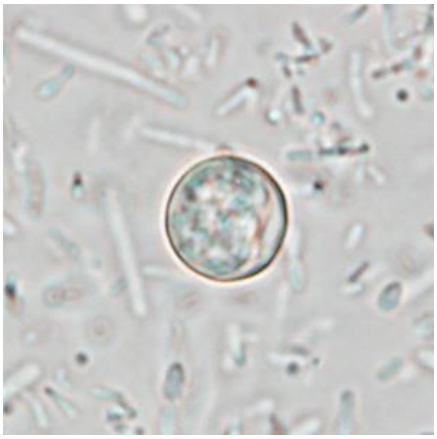
✓ DISEASE AND EPIDEMIOLOGY

Clinical Description

Cyclosporiasis is an infection of the small intestine, and the most common symptom is watery diarrhea. Other symptoms include nausea, vomiting, anorexia, weight loss, abdominal cramps, increased gas, bloating, fatigue, myalgia, and low-grade fever. Symptoms may be continuous, but remittance and relapse episodes can occur. Severe symptoms occur most often among young children and older adults. The illness can be self-limiting, and in untreated immunocompetent people, diarrhea usually lasts for 10 to 24 days. However, in immunocompromised persons, diarrhea can last for months. Guillain-Barré syndrome and Reiter's syndrome are two complications that may occur as a result of an infection that is not treated, or not treated promptly. Biliary tract disease has been reported. Some persons infected with *Cyclospora* do not develop any symptoms, though this is most commonly documented in settings where cyclosporiasis is endemic.

Causative Agent

Cyclosporiasis is an infection caused by the coccidian protozoan parasite *Cyclospora cayetanensis*. Humans with cyclosporiasis shed the unsporulated oocysts in a noninfectious form that requires several days or weeks to mature before they become infectious. The time for maturation to the infectious form depends on factors such as temperature and moisture, with sporulation occurring at temperatures between 22^{o}C to 32^{o}C. Iodine and chlorine are not effective against *Cyclospora*; however, the organism is easily destroyed by boiling water.



Cyclospora cayetanensis oocysts in wet mounts (CDC Photo, 2013)

Differential Diagnosis

The differential diagnosis for cyclosporiasis includes giardiasis, isosporiasis, microsporidiosis, cryptosporidiosis, *Clostridium difficile* infection, salmonellosis, shigellosis, campylobacteriosis, *Mycobacterium avium* complex infection, and viral infections (e.g., with cytomegalovirus, rotavirus, norovirus, and adenovirus).

Laboratory Identification

Cyclospora can be identified by modified acid-fast staining, modified safranin, or by wet mount under phase contrast microscopy. Identification of this parasite in stool requires special kinds of laboratory techniques that are not routinely used. Therefore, physicians should specifically request testing for this parasite. Because oocysts may be shed at low levels, more than one stool sample may need to be checked to find the organism. *Cyclospora* can also be identified through PCR testing.

UPHL: The Utah Public Health Laboratory (UPHL) does not test for *Cyclospora*. ARUP does perform laboratory testing for *Cyclospora*.

Treatment

Trimethoprim/sulfamethoxazole (TMP/SMX) for 7 -10 days is the preferred therapy for *Cyclospora* infection. Ciprofloxacin is less effective than TMP/SMX, but is the treatment of choice for patients who have a sulfa allergy. If not treated, the illness may last for a month or longer, and the patient may experience remitting or relapsing symptoms.

For patients co-infected with HIV, a higher dosage and longer treatment may be required. In all patients, fluid and electrolyte balance should be monitored and maintained.

Case Fatality

The case fatality rate is unknown, but thought to be very low.

Reservoir

Humans are the only known reservoir for *Cyclospora cayetanensis*, although the epidemiology of human cyclosporiasis suggests the existence of animal reservoirs, possibly birds. Several *Cyclospora* spp. are known to infect primates, though it is unclear if this is the case for *Cyclospora cayetanensis*.

Transmission

Cyclospora oocysts in freshly excreted stool are not infectious. Direct person-to-person transmission is unlikely, as is transmission via ingestion of newly contaminated food or water because excreted oocysts take days to weeks under favorable environmental conditions to

sporulate and become infective. Transmission occurs either through drinking (or swimming in) water, or consuming fresh fruits and vegetables, that have been contaminated with oocysts in the infectious stage.

Both foodborne and waterborne outbreaks have been reported. Most outbreaks in the U.S. have been associated with consumption of imported fresh produce.

The infectious dose is unknown, but trace amounts of oocyst contamination in food products indicates that it is likely to be very low. Oocysts are hardy and resistant to most disinfectants used in food and water processing. These oocysts can remain infective and survive for prolonged periods in cool, moist environments.

Susceptibility

Persons of all ages are at risk for infection. Although travelers to tropical countries may be at increased risk, infection can be acquired in such countries as the U.S. and Canada. Those co-infected with HIV and HIV/tuberculosis are particularly susceptible to infection. The risk may vary with season; most cases in the U.S. occur between May and July. Persons who have previously been infected with *Cyclospora* can become infected again.

Incubation Period

The incubation period for cyclosporiasis is about one to two weeks, with an average of one week.

Period of Communicability

People may shed *Cyclospora* parasites from days to over one month (while actively ill). It is not known how long the parasite may be shed after symptoms have stopped. Oocysts may remain infective outside the body for prolonged periods in a moist environment.

Epidemiology

Cyclosporiasis was first recognized in 1979. The parasite has a broad geographic distribution, but is most frequently reported in Latin America (particularly Guatemala, Peru, and Mexico), the Indian subcontinent, and Southeast Asia. In endemic areas, risk factors for infection include contaminated water, food, or soil; poor sanitation; and low socioeconomic status.

In the U.S., approximately one-third of cases not associated with an outbreak occur in travelers. Cyclosporiasis has frequently been reported as a cause of traveler's diarrhea. Most cases occur during the warmer months. For cases acquired in the U.S., waterborne and foodborne outbreaks have occurred. Foodborne outbreaks have been linked to various types of fresh produce imported from developing countries including raspberries, basil, snow peas, and lettuce. A recent outbreak in 2014 that included 304 ill persons from 19 states with confirmed *Cyclospora* infection was likely related to contaminated fresh cilantro imported from Mexico.

From 2009 to 2014, Utah has had between zero and one case reported each year, with foreign travel being a commonly reported risk factor.

✓ PUBLIC HEALTH CONTROL MEASURES

Public Health Responsibility

- Investigate all cases of disease and fill out and submit appropriate disease investigation forms.
- Provide education to the general public, clinicians, and first responders regarding disease transmission and prevention.
- Identify cases and sources to prevent further transmission.
- Identify clusters or outbreaks of this disease and determine the source.

Prevention

Personal Preventive Measures/Education
To avoid exposure and transmission, individuals should:

- Avoid swallowing recreational water.
- Avoid swallowing pool or bath water; chlorination may not eliminate the parasite.
- Avoid drinking unboiled or untreated water when hiking, traveling in developing countries, or visiting areas where water quality is unknown. Iodine is not effective against *Cyclospora*, but bringing water to a full, rolling boil is sufficient to kill it.
- Avoid swimming while ill with diarrhea and for at least two weeks after diarrhea resolves.
- Thoroughly wash all fresh fruits and vegetables prior to consumption.

Chemoprophylaxis

None.

Vaccine

None.

Isolation and Quarantine Requirements

Isolation: Food handlers with cyclosporiasis must be excluded from work until diarrhea has resolved. Persons diagnosed with cyclosporiasis should not use recreational waters for at least two weeks after symptoms resolve.

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

Hospital: Standard and contact precautions.

Quarantine: Contacts with diarrhea who are food handlers shall be considered the same as a case, and should be handled in the same manner. No restrictions otherwise.

NOTE: In certain circumstances, cases, ill contacts, and/or asymptomatic contacts who are food handlers may be required to have negative stool samples prior to returning to work. The local health department will decide which cases and/or contacts will need negative stool samples prior to returning to work, and whether one or two negative samples is necessary. If a case or contact has been treated with an antimicrobial agent, the stool specimen should not be collected until at least 48 hours after cessation of therapy. If two negative stool samples are determined to be necessary, they should be taken at least 24 hours apart.

✓ CASE INVESTIGATION

Reporting

Report any illness to public health authorities that meets any of the following criteria:

1. A symptomatic person with laboratory evidence of cyclosporiasis, which is defined as the detection of *Cyclospora* organisms or DNA in stool, intestinal fluid/aspirate, or intestinal biopsy specimens.
2. A symptomatic person with epidemiologic linkage to a confirmed case of cyclosporiasis.
3. A person whose healthcare record contains a diagnosis of cyclosporiasis.

Other recommended reporting procedures:

- All cases of cyclosporiasis should be reported.
- Reporting should be ongoing and routine.
- Frequency of reporting should follow the state health department's routine schedule (in Utah, within three working days of identification).

Reporting Table
Requirements for reporting are established under State and Territorial laws and/or regulations and may differ from jurisdiction to jurisdiction. These criteria are suggested as a standard approach to identifying cases of this condition for purposes or reporting, but reporting should follow State and Territorial law/regulation if any conflicts occur between these criteria and those laws/regulations.

Table of criteria to determine whether a case should be reported to public health authorities

Criterion	Reporting		
Clinical Evidence			
Diarrhea	O	O	
Fever	O	O	

Anorexia	O	O	
Abdominal bloating	O	O	
Abdominal cramping	O	O	
Weight loss	O	O	
Nausea	O	O	
Fatigue	O	O	
Vomiting	O	O	
Myalgia or other body aches	O	O	
Healthcare record contains a diagnosis of cyclosporiasis			S
Laboratory Evidence			
Cyclospora organisms or DNA in stool	O		
Cyclospora organisms or DNA in intestinal fluid/aspirate or intestinal biopsy specimens	O		
Epidemiologic Evidence			
Epidemiologic linkage to a confirmed case of cyclosporiasis		O	
Member of a risk group defined by public health authorities during an outbreak		O	

Notes:
S = This criterion alone is Sufficient to identify a case for reporting.
O = At least one of these "O" (Optional) criteria in each category (e.g., clinical evidence and laboratory evidence) in the same column is required to identify a case for reporting. (These optional criteria are alternatives, meaning that a single column will have either no O criteria or multiple O criteria; no column should have only one O.)

Case Definition

Cyclosporiasis (2010)

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

Laboratory-confirmed cyclosporiasis shall be defined as the detection of *Cyclospora* organisms or DNA in stool, intestinal fluid/aspirate, or 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 clinical description and that is epidemiologically linked to a confirmed case.

Classification Table
Criteria for defining cases of cyclosporiasis.

Criterion	Confirmed	Probable
Clinical Evidence		
Diarrhea	O	O
Low grade fever	O	O
Anorexia	O	O
Abdominal bloating	O	O
Abdominal cramping	O	O
Weight loss	O	O
Nausea	O	O
Fatigue	O	O
Vomiting	O	O
Myalgia or other body aches	O	O
Laboratory Evidence		
Cyclospora organisms or DNA in stool	O	
Cyclospora organisms or DNA in intestinal fluid/aspirate or intestinal biopsy specimens	O	
Epidemiologic Evidence		
Epidemiologic linkage to a confirmed case of cyclosporiasis		O
Member of a risk group defined by public health authorities during an outbreak		O

Notes:
N = All "N" criteria in the same column are Necessary to classify a case.
O = At least one of these "O" (Optional) criteria in each category (e.g., clinical evidence and laboratory evidence) in the same column—in conjunction with all "N" (Necessary) criteria in the same column— is required to classify a case.

Case Investigation Process

All probable and confirmed cases should be interviewed with the cyclosporiasis case report form. Food handlers should be restricted from work until diarrhea has resolved. Negative stool specimens may be required.

Outbreaks

CDC defines a foodborne outbreak as, "an incident in which two or more persons experience a similar illness resulting from the ingestion of a common food." An outbreak of cyclosporiasis is confirmed by the demonstration of the organism in the stool or intestinal fluid or biopsy of two or more ill persons. *Cyclospora* is chlorine-resistant; therefore swimming in chlorinated pools may not protect against transmission.

Identify Case Contacts

Contacts of cyclosporiasis cases may include household contacts, daycare and school attendees and workers, and food handlers. These contacts may be identified through interview of the case-patient or physician notes. More information about management of case contacts are listed in the "Case Contact Management" section below.

Case Contact Management

Daycare and School
Transmission of cyclosporiasis from person-to-person is unlikely. After being shed in stool, the parasite must undergo developmental changes (taking days to weeks) before becoming infectious. Humans become infected by consuming food or water that has been contaminated with feces containing *Cyclospora*. Therefore, non-food handling students, teachers, and daycare attendees can continue to attend their programs as long as they feel well enough to do so. However, since most staff in childcare programs are considered to be food handlers, those with *Cyclospora* in their stool can remain onsite, but must not prepare food or feed children until their diarrhea has resolved. Negative stool specimens may be required.

✓ ACKNOWLEDGEMENTS

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✓ VERSION CONTROL

Updated Dec 2014 – CSTE reporting criteria, case definition, and case classification swim lanes included.

Updated May 2015 – "Why is Cyclosporiasis Important to Public Health" section added. Symptoms and illness duration updated in "Clinical Description" section. More information added to "Causative Agent" section. "Laboratory Identification," "Treatment", "Reservoir," "Transmission", and "Susceptibility" sections updated. "Identify Case Contacts" section updated and separated from "Case Contact Management." "Acknowledgements," "Version Control," and "Minimum Data Set" sections added.

✓ UT-NEDSS Minimum/Required Fields by Tab

Demographic
- ☑ Last Name
- ☑ First Name
- ☑ State
- ☑ County
- ☑ Date of Birth
- ☑ Area Code
- ☑ Phone Number
- ☑ Birth Gender
- ☑ Ethnicity
- ☑ Race

Clinical
- ☑ Disease
- ☑ Onset Date
- ☑ Date Diagnosed
- ☑ Died
- ☑ Date of Death
- ☑ Diagnostic Facility

Laboratory
- ☑ Test Type
- ☑ Test Result
- ☑ Accession Number

Epidemiological
- ☑ Food Handler
- ☑ Group Living
- ☑ Day Care Association
- ☑ Occupation
- ☑ Imported From
- ☑ Risk Factors
- ☑ Risk Factor Notes

Reporting
- ☑ Date first reported to public health

Administrative
- ☑ State Case Status (completed by UDOH)
- ☑ Outbreak Associated
- ☑ Outbreak Name