

Cyclosporiasis

A. Protocol checklist

General activities

- Enter available information into Merlin upon receipt of initial report
- Review background on disease ([section B](#)), case definition ([section C](#)), and laboratory testing ([section D](#))
- Contact provider ([section E](#))
- Interview patient(s)
 - Review disease facts ([section B](#))
 - Modes of transmission
 - Incubation period
 - Symptoms
 - Ask about exposure to relevant risk factors ([section E](#))
 - Travel
 - Consumption of produce, including herbs
 - Provide education on possible sources of contamination ([section E](#))
 - Wash fruits and vegetables thoroughly before consumption
 - Avoid drinking or swallowing untreated surface water
 - Address case-patient's questions or concerns
- Follow-up on special situations, including outbreaks ([section H](#))
- Enter additional data obtained from interview into Merlin ([section F](#))

B. Disease reporting and epidemiology

Purpose of reporting and surveillance

To identify the source of transmission (e.g., commercially distributed food product, untreated water) and to stop transmission from such a source.

Legal reporting requirements

Laboratories and physicians are required to report cases to the local county health department (CHD) within one working day of identification/diagnosis.

CHD investigation and intervention responsibilities

1. Begin the investigation as soon as possible but no longer than two business days after receiving report from a provider or laboratory.
2. Report all confirmed and probable cases in Merlin. Interview cases with an onset date between May 1 and August 31 using the National Hypothesis Generating Questionnaire for Cyclosporiasis (NHGQ-C). All other cases with onset dates outside this timeframe should use the cyclosporiasis case report form to assess exposures. If an above-average number of cases are being reported outside of the May–August timeframe, administration of the NHGQ-C may be requested. The NHGQ-C is available at: [FloridaHealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/_documents/cnhgq-cyclo.pdf](https://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/_documents/cnhgq-cyclo.pdf). The cyclosporiasis case report form is available at: [FloridaHealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/_documents/crf-cyclosporiasis.pdf](https://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/_documents/crf-cyclosporiasis.pdf).

Etiologic agent

Cyclosporiasis is caused by a unicellular protozoan (parasite), *Cyclospora cayetanensis*, which infects the small bowel.

Illness

Cyclosporiasis is a gastrointestinal illness which can persist intermittently for weeks and is characterized by watery diarrhea (~6 stools/day), nausea, anorexia, abdominal cramping, loss of appetite, marked fatigue, vomiting and weight loss; low-grade fever can also occur. Not currently endemic to the United States, seen most commonly in tropical and subtropical regions, *Cyclospora* is a reported cause of traveler's diarrhea. The disease is usually self-limiting, but episodes of relapse have been noted.

Reservoirs

Humans are the only reservoirs for *Cyclospora cayetanensis*.

Modes of transmission

Cyclosporiasis is acquired by ingestion of food or water contaminated with feces that contain infective oocysts. After infection and reproduction in the small bowel within a human host, oocysts are produced and excreted in the stool. Excreted oocysts are not immediately infectious as they must sporulate outside the host. This may take days to weeks; therefore, direct person-to-person infection is unlikely to occur. Raspberries, lettuce, basil, snow peas, mesclan lettuce, cilantro and other imported produce have historically been implicated in outbreaks in the United States and Canada. However, recently domestically grown produce has been implicated. Domestically acquired, travel-associated and documented United States outbreaks have occurred year-round, with the highest case counts in the spring and summer months. Although some countries with endemic

cyclosporiasis have shown seasonal variability, no consistent pattern has been discerned with respect to time of year and environmental conditions.

Incubation period

Incubation is usually around seven days (range: two days to greater than two weeks) after ingestion of sporulated oocyst. Infection can be asymptomatic.

Period of communicability

Cyclospora cayetanensis is not immediately contagious, which is what differentiates it from *Cryptosporidium*. Unsporulated oocysts are released into the environment via the stool where it may take days or weeks for the oocysts to become infective. The oocysts are resistant to most disinfectants and can remain viable for prolonged periods in cool, moist environments.

Treatment

Cyclosporiasis is usually a self-limiting disease, but relapses can occur for weeks to months after infection. Seven to ten days of trimethoprim-sulfamethoxazole is the treatment of choice. Persons infected with HIV may need long-term maintenance therapy. Ciprofloxacin is less effective but should be used for individuals who cannot tolerate sulfa drugs.

Post-Exposure Prophylaxis

None indicated.

Immunity

Immunocompetent individuals can be infected with *Cyclospora* more than one time, but immunity does appear to occur over time.

Cyclosporiasis in Florida

Incidence is strongly seasonal with 50 percent of the cases occurring in June and July. Large outbreaks occurred in 2005 and 2019, with many cases in other years linked to multi-state outbreaks. Incidence has been on the rise recently with most cases being acquired locally. Outbreaks have most often been linked to imported produce including cilantro, basil and bagged lettuce mix.

C. Case definition

Background

Cyclosporiasis is an illness of variable severity caused by the protozoan *Cyclospora cayetanensis* and commonly characterized by watery diarrhea (most common), anorexia (loss of appetite), weight loss, abdominal bloating and cramping, nausea, myalgia or other body aches and fatigue. Vomiting and low-grade fever also may be noted. Relapses and asymptomatic infections can occur.

Clinical criteria for case classification

One or more of the following: diarrhea, anorexia, weight loss, abdominal bloating, abdominal cramps, nausea, myalgia, body aches, fatigue, vomiting or fever.

Laboratory criteria for diagnosis

Either of the following:

- Demonstration of *Cyclospora* oocysts (by morphologic criteria or by demonstration of sporulation) in a clinical specimen.

- Or detection of *Cyclospora* DNA by polymerase chain reaction (PCR) in a clinical specimen.

Epidemiologic criteria for case classification

A person who is epidemiologically linked to a confirmed cyclosporiasis case.

Case classification

Confirmed: A clinically compatible illness in a person with laboratory criteria.

Probable: A clinically compatible illness in a person with epidemiological criteria.

Criteria to distinguish a new case from a previous report

Not applicable.

Comment

Cyclospora is almost exclusively identified in clinical specimens from stool, duodenal/jejunal aspirates or small-bowel biopsy. Laboratory results identifying *Cyclospora* from other clinical specimen types should be discussed further with the case reviewer. All *Cyclospora*-positive stool specimens must be sent to the Bureau of Public Health Laboratories (BPHL) in total-fix transport media. Formalin- or PVA-based transport media is not acceptable as it does not allow for confirmation and additional testing of the specimen at BPHL. Permanent slides, if available, must also be sent to BPHL in addition to the specimen.

D. Laboratory testing

Criteria for diagnosis

Diagnosis of cyclosporiasis is made by examination of stool samples. Because detection of *Cyclospora cayetanensis* can be difficult, patients may be asked to submit several stool samples over several days. Most often, stool specimens are examined microscopically using different techniques (e.g., acid-fast staining, direct fluorescent antibody [DFA], and/or enzyme immunoassays for detection of *Cyclospora* spp. antigens).

Molecular methods (e.g., polymerase chain reaction [PCR]) are increasingly used in reference diagnostic labs since they can be used to identify *Cyclospora* spp. at the species level. Tests for *Cyclospora cayetanensis* are not routinely done in most laboratories; therefore, health care providers should specifically request testing for this parasite.

Services available at Bureau of Public Health Laboratories (BPHL)

BPHL-Jacksonville uses acid-fast staining of stool smears from stool submitted in total-fix transport medium to determine the presence or absence of *Cyclospora* spp.

Testing requests

1. Submitting specimens/isolates to BPHL
 - a. All submissions should be accompanied by Clinical Lab Submission Form 1847. The form is found at: [FloridaHealth.sharepoint.com/sites/DISEASECONTROL/LAB/Shared%20Documents/DH1847--rev-5-13.pdf](https://www.floridahealth.gov/sharing/healthcare/providers/clinical-lab-submission-form-1847-rev-5-13.pdf).
 - b. Electronic laboratory ordering (ELO) may also be used by entering requests into the HMS State Laboratory System, placing bar coded label on the O&P vial and writing the date collected on the vial.
2. Specimen collection
 - a. A small portion (acorn size) of formed stool or equal portion of liquid stool should be transferred aseptically to an O&P transport vial (Total-fix) that is properly labeled (name, date of birth, date collected).

Note: please write “suspect *Cyclospora* for confirmation and speciation” in the comment section of the Clinical Lab Submission Form 1847.

3. Packaging and shipping
 - a. All specimens and isolates for *Cyclospora* testing should be sent to the Jacksonville BPHL laboratory.
 - b. Place labeled vial in the proper inner/outer container (aluminum screw-cap inner container with spill absorber holds the primary vial and that is then placed in an outer cardboard screw-cap container). Please place the Clinical Lab Submission Form 1847 in a plastic Ziploc®-type bag between the inner and outer container.
 - c. Follow packaging and shipping guidelines for diagnostic specimens (Biological Substance, Category B, UN3373). All suspect diagnostic specimens must be shipped and packaged according to International Air Transport Association (IATA) and Department of Transportation (DOT) Packaging Instructions 650 for Biological Substance, Category B agents. Per these regulations, anyone who handles, offers for transport or transports specimens must be trained and certified to do so.
 - d. Contact BPHL for packaging and shipping training dates. BPHL conducts approximately 20 trainings per year all over Florida free of charge. FDOH employees must register for the classes in the FDOH online training system, TRAIN-FL. For shipping guidance, contact BPHL. Additional shipping trainings are also available commercially through vendors.
 - e. Specimens and isolates should be sent at ambient temperature or cooler, but cool packs should not be in direct contact with vials.
 - f. Packaging and Shipping of Diagnostic Specimens Guidance can be found at this link: [FloridaHealth.sharepoint.com/sites/DISEASECONTROL/LAB/Shared%20Documents/Guidance%20for%20shipping%20specimens%20to%20BPHL%202019%20v103119%20\(0000002\).pdf](https://FloridaHealth.sharepoint.com/sites/DISEASECONTROL/LAB/Shared%20Documents/Guidance%20for%20shipping%20specimens%20to%20BPHL%202019%20v103119%20(0000002).pdf).
4. Contact the regional laboratory with questions. See: FloridaHealth.sharepoint.com/sites/DISEASECONTROL/LAB/Pages/Default.aspx.

Interpretation of results

Results will indicate that oocysts are present or not present.

E. Case Investigation and Follow-up

Contact the physician or hospital

1. Confirm that a *Cyclospora cayetanensis* infection has been diagnosed in the reported case.
2. Obtain the following:
 - a. Date of onset
 - b. Signs and symptoms (especially watery diarrhea, loss of appetite, weight loss, abdominal bloating and cramping)
 - c. Predisposing conditions (e.g., immunosuppression)
 - d. Tests performed (O&P, PCR)
 - e. Treatment (especially antibiotics)
3. Ask what information has been given to the patient, including whether the patient knows about the diagnosis.
4. Obtain as much demographic information as possible, including contact information (home, cellular and/or work numbers). Ask how and where the patient can be contacted (i.e., at hospital or home).
5. Notify the physician that you will be contacting the case as DOH follows up on all cases of cyclosporiasis to assess risks factors and to identify potential means for preventing further illness. It may also be appropriate at this point to determine if the physician has any concerns about the health department contacting the case.

Interview the case

1. Contact the case by telephone, home visit or visit to the hospital. Interviews should be completed as soon as possible after being reported to optimize recall.
 - a. Make at least three phone call attempts to reach the case.
 - b. Calls should be made at different times of the day, with at least one attempt in the evening.
 - c. If unable to contact after three attempts, document in Merlin notes and note lost to follow-up.
2. Cyclosporiasis Case Report Form
 - a. For disease onset between May 1 and August 31, the Cyclosporiasis National Hypothesis Generating Questionnaire (NHGQ-C) is required. The form can be found at [FloridaHealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/_documents/cnhgq-cyclo.pdf](https://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/_documents/cnhgq-cyclo.pdf). This form can be used to guide the interview and can be completed during the interview.
 - b. For the rest of the year, the NHGQ-C can be used but is not required. The required case reporting form corresponds to the extended data screens in Merlin. It can be found at: [FloridaHealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/_documents/crf-cyclosporiasis.pdf](https://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/_documents/crf-cyclosporiasis.pdf)
3. Items to cover during interview include:
 - a. Provide brief background on disease, including possible modes of transmission, incubation period, symptoms, etc.
 - b. Document exposures during exposure period (two weeks before onset):
 - i. Travel outside Florida or the United States. Determine dates of travel and location.
 - ii. Consumption of produce and where produce was purchased.
 - iii. Restaurant meals. Obtain the name of the restaurant(s), date(s) and location(s) of the meal(s).
 - iv. Public gathering where food was consumed (e.g., birthday parties, picnics, etc.). Obtain the date, location and sponsor of the event.
 - c. Determine if others (e.g., family, friends, coworkers, customers, patients, etc.) are known or thought to be ill with similar symptoms. If so, inquire about possible common source exposures. Obtain the name, phone number or address and clinical information of the ill person. Anyone meeting the probable case definition should be reported and investigated in the same manner as a confirmed case.
 - d. Provide basic instruction to cases and potentially exposed contacts about thoroughly washing all produce, travel safety and avoiding untreated drinking water

Environmental health investigation

During routine case investigations of cyclosporiasis, if a commercial food facility is involved, the CHD investigator should complete an entry in the Florida Complaint and Outbreak Reporting System (FL-CORS) (flcors.com/Home.aspx) or complete the Tri-Agency Foodborne Illness Survey/Complaint Form and forward to the Regional Environmental Epidemiologist (REE). If a foodborne or waterborne outbreak is suspected, contact the REE. Food workers should be excluded from work until asymptomatic for 24 hours.

F. Merlin data entry and reports

Merlin data entry

Create a case in Merlin under disease code **CYCLOSPORIASIS – 00720**. Enter the data collected into Merlin, being sure to include all required fields on the Basic Data screen, complete the Case Symptoms screen, and attach all relevant labs. Please associate **ALL** labs received via electronic laboratory reporting (ELR) with the profile of the case. Attach the completed NHGQ-C or case report form on the Case Documents screen.

G. Controlling further spread

Case and household education on prevention recommendations

Wash fruits and vegetables thoroughly before consumption. When traveling, avoid drinking or swallowing untreated surface water. Untreated water should be boiled before consumption. *Cyclospora* is unlikely affected by iodine and chlorine.

Isolation of cases

For hospitalized patients, in addition to standard precautions, contact precautions are recommended for diapered or incontinent patients during duration of illness.

Management of contacts

Symptomatic contacts: if the probable case definition is met, the contact should be reported, investigated and managed in the same manner as a confirmed case to determine if the symptomatic contact had the same exposures as the originally reported case. Because unsporulated oocysts must be exposed to the environment for days to weeks before they become infective, person-to-person spread is unlikely.

Immunization recommendations

Not applicable.

Outbreaks

Contact your REE immediately if you suspect a foodborne outbreak due to *C. cayetenansis*. Imported produce is often associated with outbreaks of *Cyclospora*; however, recently outbreaks have been linked to domestically grown produce. Raspberries, basil, lettuce, cilantro and snow peas have all been implicated in previous outbreaks. Identification of the source of the produce through trace-back is crucial to stopping the distribution of contaminated product.

H. Managing sensitive situations

Case or symptomatic contact attends or works at a day care facility

Case should be excluded until asymptomatic.

Health care settings

Case should be excluded until asymptomatic.

Food workers

Food workers should be excluded from work until asymptomatic for 24 hours.

I. Resources and references

Resources

CDC Cyclosporiasis Website
cdc.gov/parasites/cyclosporiasis/index.html

Cyclosporiasis Surveillance United States 2011–2015
cdc.gov/mmwr/volumes/68/ss/ss6803a1.htm

Laboratory Diagnosis of Cyclosporiasis
cdc.gov/dpdx/cyclosporiasis/index.html

Cyclosporiasis National Hypothesis Generating Questionnaire

[FloridaHealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/_documents/cnhgq-cyclo.pdf](https://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/_documents/cnhgq-cyclo.pdf)

Cyclosporiasis Case Report Form

[FloridaHealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/_documents/crf-cyclosporiasis.pdf](https://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/_documents/crf-cyclosporiasis.pdf)

Investigation of Foodborne Outbreaks

[FloridaHealth.gov/diseases-and-conditions/food-and-waterborne-disease/_documents/chapter-g-food-and-waterborne-disease-surveillance-and-investigation-manual.pdf](https://www.floridahealth.gov/diseases-and-conditions/food-and-waterborne-disease/_documents/chapter-g-food-and-waterborne-disease-surveillance-and-investigation-manual.pdf)

Regional Environmental Epidemiologist Map

[FloridaHealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/_documents/environmental-epi-map.pdf](https://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/_documents/environmental-epi-map.pdf)

References

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Heymann, D. L. (Ed) (2015). *Control of Communicable Diseases Manual*, 20th Edition, Cyclosporiasis (pp.139-140), American Public Health Association.

Ortega, Yne´s R. and Sanchez, Roxana, "Update on *Cyclospora cayetanensis*, a Food-Borne and Waterborne Parasite." *Clinical Microbiology Reviews* Jan 2010, Vol 23 (No 1): pp. 218-234.

United States Food and Drug Administration Center for Food Safety and Applied Nutrition (2012). *Bad Bug Book: Foodborne Pathogenic Microorganisms and Natural Toxins Handbook. Cyclospora cayetanensis*, (pp. 136-138).