Campylobacter

Disease Plan

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Last updated: June 29, 2021, by BreAnne Osborn.

Questions about this disease plan?

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

✓ CRITICAL CLINICIAN INFORMATION

Clinical Evidence
Signs/Symptoms • Common symptoms include abdominal pain, diarrhea, bloody stools, fever, nausea, and vomiting. • Potential complications include Guillain-Barré syndrome (GBS), hemolytic uremic syndrome (HUS), and thrombotic thrombocytopenic purpura (TTP).
Period of Communicability • Campylobacteriosis is communicable as long as the infected person excretes *Campylobacter* in his/her stool. • Shedding normally lasts for about a month. However, shedding can last anywhere from several days to several weeks.
Incubation Period • Range 1-10 days (average 2-5 days)
Mode of Transmission • Fecal-oral transmission
Laboratory Testing
Type of Lab Test/Timing of Specimen Collection • Culture is the preferred method for *Campylobacter* diagnosis.   ○ Collect specimens for culture as soon as possible, ideally within the first few days of illness, and process as soon as possible to ensure bacterial isolation. • Culture-independent Diagnostic Tests (CIDT), such as polymerase chain reaction (PCR) and enzyme immunoassay/enzyme-linked immunosorbent assay (EIA/ELISA) are available. Collect specimens as soon as possible after symptom onset.
Type of Specimens • Stool
Treatment Recommendations
Type of Treatment • Supportive therapy, including hydration, is important. • Antibiotics are sometimes prescribed.
Prophylaxis • None
Contact Management
Isolation of Case • Exclude cases in high-risk settings (food handlers, child/daycare attendees, healthcare employees, etc.) until their diarrhea subsides.
Quarantine of Contacts • Exclude symptomatic contacts of cases in high-risk settings (food handlers, child/daycare attendees, healthcare employees, etc.) until their diarrhea subsides.
Infection Control Procedures
• Enteric precautions

✓ WHY IS *CAMPYLOBACTER* IMPORTANT TO PUBLIC HEALTH?

The Centers for Disease Control and Prevention (CDC) estimates that 1.5 million Americans are infected with *Campylobacter* each year. Additionally, campylobacteriosis is the most common bacterial enteric disease reported in Utah each year. Although the illness is generally self-limiting, campylobacteriosis has the potential to cause severe illness and long-term complications. Raw, unpasteurized milk and cheese products have historically been a source of *Campylobacter* outbreaks in Utah, as well as consumption of undercooked poultry and exposure to live poultry, farm animals, and puppies/kittens. Thorough hand washing and consumption of only pasteurized milk products can prevent the majority of outbreaks.

✓ DISEASE AND EPIDEMIOLOGY

Clinical Description

Symptoms of campylobacteriosis include diarrhea, bloody stools, abdominal pain, malaise, fever, nausea, and sometimes vomiting. Infection can cause a spectrum of diseases ranging from mild, uncomplicated gastroenteritis to fulminant disease, similar to acute appendicitis. Asymptomatic infections can also occur. The illness is usually over within a week, but may be prolonged for some individuals and can sometimes relapse.

Causative Agent

Campylobacteriosis is caused by motile, gram-negative bacteria of the genus *Campylobacter*. This organism was not recognized until the 1980s as an agent of foodborne illness. It is similar to helicobacters and arcobacters. These organisms colonize the surface of the mucous membranes in the GI tract. The spiral shape and long flagella allow the *Campylobacter* organism to move rapidly and screw itself into the epithelial cells of the intestinal tract. Most human illness is caused by one species, *Campylobacter jejuni.*

Differential Diagnosis

The clinical manifestation of campylobacteriosis is often similar to other bacterial causes of gastroenteritis, including *Escherichia coli, Listeria,* and *Clostridioides difficile.* The differential diagnosis can also include viral causes of gastroenteritis such as norovirus, bacterial toxins such as those produced by *Staphylococcus*, and parasitic infections, such as *Cryptosporidium.*

Laboratory Identification

Stool culture has been considered the “gold standard” for *Campylobacter* detection for some time, and is still the preferred method for *Campylobacter* detection; however, there has been an increasing shift to using culture-independent diagnostic tests (CIDTs) over the last several years. There are two main categories of CIDTs: 1) enzyme immunoassays (EIA)/enzyme-linked immunosorbent assay (ELISA), and 2) polymerase chain reaction (PCR).

PCR is a testing method that amplifies the DNA in an organism. Rapid film array panels that test for numerous organisms simultaneously are common. Many laboratories in Utah that utilize PCR tests use either the BioFire FilmArray® or the VERIGENE® multiplex panels.

EIA/ELISA is a testing method that identifies the presence of *Campylobacter* antigens in the stool. This testing method will identify most campylobacteriosis cases, though it generally has lower sensitivity than PCR methods.

Laboratories employing any CIDT method should send positive stool samples to the Utah Public Health Laboratory (UPHL) for confirmation, subtyping, and whole genome sequencing (WGS).

> **UPHL**: UPHL accepts isolates and stool specimens for isolation, serotyping, and whole genome sequencing (WGS). Submit all specimens and isolates from other laboratories to UPHL.

Treatment

Treatment is usually not recommended for most *Campylobacter* infections because the symptoms are usually self-limiting and resolve after about a week. Hydration and rest are effective methods of treatment for most mild cases. Severe illness may require antibiotic treatment; recommended medications include azithromycin and fluoroquinolones, such as levofloxacin and ciprofloxacin.

Case Fatality

Death from campylobacteriosis is rare, with a mortality rate of between .01% and 1.0%. Deaths are usually attributed to another co-morbidity.

Reservoir

Campylobacter is ubiquitous in the environment and generally lives in the gastrointestinal tracts of animals. Notable animal reservoirs include live poultry, cattle, wild birds, puppies, and kittens.

Transmission

Campylobacter is an enteric disease that is primarily transmitted through ingestion of contaminated food, milk, or water. It can also be transmitted from person-to-person through the fecal-oral route. Foreign travel, direct animal contact, undercooked meat, and swimming in contaminated water are other risk factors.

Common risk factors reported by *Campylobacter* cases in Utah, 2015-2019
(n=2,663)

Risk Factor	%	Risk Factor Notes
Raw Milk Exposure	5%	Usually consumed 2-5 days prior to onset.
Suspect Meat Exposure	11%	Raw chicken is often heavily contaminated with *Campylobacter*.
Animal Exposure	47%	Much of Utah is rural and animal contact is common. Livestock, live poultry, cows, horses, puppies and kittens can have the bacteria.
Suspect Water Exposure	16%	*Campylobacter* can live and grow in natural water sources, including lakes and springs.
Immunocompromised	25%	Cases with conditions such as HIV/AIDS, cancer, rheumatoid arthritis, or who have recently undergone a transplant.
Foreign Travel	22%	Often called “traveler’s diarrhea” when contracted in a foreign country.
Out of State Travel	12%	Cases that were out of the state for their entire exposure period were designated as “Out of State.”
Other	9%	Other likely sources of illness

NOTE: Reported risk factors are not mutually exclusive and do not necessarily represent the true vehicle of transmission.

Susceptibility

All people are susceptible to *Campylobacter* infection. Immunity to serologically related strains may build over time. Immunocompromised individuals, pregnant, or less than five years of age may be susceptible to more severe infection.

Incubation Period

The incubation period for *Campylobacter* may range from 1-10 days, with most symptoms starting 2-5 days after exposure to the bacteria. *Campylobacter* has a dose-response; the more bacteria ingested, the shorter the incubation time will be.

Period of Communicability

People continue to shed *Campylobacter* in their stools, even after they feel better; it is communicable for as long as the infected person sheds the bacteria. Shedding can last from several days to several weeks, with an average of one month from the first onset of symptoms. Persons with immunocompromising conditions or medications tend to shed the bacteria for a longer period of time.

Epidemiology

Campylobacter is the most common bacterial cause of diarrheal illness in the United States. It is estimated that 1.5 million cases occur in the U.S. annually. Infections tend to occur mostly during the warmer months, and children and young adults have the highest incidence of infection. Over the past five years, an average of approximately 530 cases of *Campylobacter* have been reported annually in Utah.

✓ PUBLIC HEALTH CONTROL MEASURES

Public Health Responsibility

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

Prevention

Environmental Measures

Implicated food items must be removed from stores and establishments. A decision about testing implicated food items can be made in consultation with the Enteric Diseases Epidemiologist at the Utah Department of Health (UDOH) and UPHL.

The general policy of UPHL is to test only food samples implicated in suspected outbreaks, not in single cases (except when botulism is suspected). If holders of food implicated in single case incidents would like their food tested, they may do so at a private laboratory, or they may store the food in their freezer for a period of time in the event additional reports are received. However, in certain circumstances, a single, confirmed case with leftover food that had been consumed within the incubation period may be considered for testing.

Personal Preventive Measures/Education

To avoid exposure to *Campylobacter*, persons should:

- Always wash their hands thoroughly with soap and water for at least 20 seconds before eating, handling, or preparing food; after using the toilet, cleaning the bathroom, or changing diapers (the child should also wash his/her hands); and after touching pets and other animals.
- Dispose of diapers in a closed-lid garbage can.
- Avoid letting infants or young children come into contact with pets that are sick with diarrhea, especially puppies and kittens.
- Keep food that will be eaten raw, such as vegetables, from becoming contaminated by animal-derived food products. Produce should be washed thoroughly, especially when consumed raw.
- Make sure to cook all food products from animals thoroughly, and avoid consuming raw eggs or cracked eggs, unpasteurized milk, or other unpasteurized dairy products.
    - Poultry and should be cooked to a minimum internal temperature of 165°F (73.9°C). Steaks and roasts should be cooked to a minimum internal temperature of 145°F (62.8°C). Ground beef, pork, and lamb should be cooked to a minimum internal temperature of 160°F (71.1°C).
- Drink only pasteurized milk, juice, or cider.
- Treat potentially contaminated water (i.e., when pipes leak or undergo repairs) with adequate levels of chlorine/other effective disinfectants, or boil to guard against chance contamination.
- Discuss transmission risks that may result from oral-anal sexual contact. Latex barrier protection (e.g., dental dam) may prevent the spread of campylobacteriosis to a case's sexual partner(s), and may prevent exposure to and transmission of other fecal-oral pathogens.

Chemoprophylaxis

None.

Vaccine

None.

Isolation and Quarantine Requirements

Isolation

Food handlers

Exclude food handlers with campylobacteriosis from work until diarrhea has resolved.

Childcare

Since campylobacteriosis may be transmitted from person-to-person through fecal-oral transmission, it is important to follow-up carefully on cases of campylobacteriosis in a childcare setting. General recommendations are as follows:

- Exclude children with *Campylobacter* infection who have diarrhea until their diarrhea is resolved.
- Children with *Campylobacter* infection who have no diarrhea and are not otherwise ill may be excluded, or may remain in the program if special precautions are taken.
- Most staff in childcare programs are considered food handlers. Individuals with *Campylobacter* in their stool (symptomatic or not) can remain on site, but must not prepare food or feed children until their diarrhea has resolved. Negative stool specimens may be required.

School

Since campylobacteriosis may be transmitted from person to person through fecal-oral transmission, it is important to follow-up on cases in school settings. General recommendations are as follows:

- Exclude students or staff with *Campylobacter* infection who have diarrhea until their diarrhea is resolved.
- Students or staff with *Campylobacter* who do not handle food, have no diarrhea or have mild diarrhea, and are not otherwise sick may remain in school if special precautions are taken.
- Students or staff who handle food and have *Campylobacter* infection must not prepare food until their diarrhea is resolved.

Congregate Living

Place residents and patients with campylobacteriosis who reside in congregate living settings (long-term care, assisted living, residential treatment facilities, etc.) on Standard (including enteric) Precautions until their symptoms subside. Staff members with campylobacteriosis who give direct patient care (e.g., feed patients, give mouth or denture care, or give medications) are considered food handlers and should be excluded as such. In addition, staff members with *Campylobacter* infection who are not food handlers should not work until their diarrhea is resolved.

Healthcare

Place hospitalized patients with campylobacteriosis on Standard (including enteric) Precautions. Healthcare 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. In addition, staff members with *Campylobacter* infection who are not food handlers should not work until their diarrhea is resolved.

Quarantine

Symptomatic contacts of a campylobacteriosis case who work in or attend any of the above high-risk settings shall be considered the same as a case and shall be handled in the same way. No restrictions apply for asymptomatic contacts.

NOTE: In certain circumstances, cases, ill contacts, and/or asymptomatic contacts in high-risk settings 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 antibiotic therapy. If two negative stool samples are determined to be necessary, separate collection of the samples by at least 24 hours.

✓ CASE INVESTIGATION

Reporting

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

1. Any person with *Campylobacter* spp. isolated from a clinical specimen.
2. Any person with *Campylobacter* spp. detected in a clinical specimen using culture independent diagnostic tests (CIDT).
3. Any person with at least one gastrointestinal symptoms of illness such as diarrhea, abdominal cramping, nausea, vomiting and who is either a contact of a confirmed case of campylobacteriosis or a member of a risk group as defined by the public health authorities during an outbreak.
4. A person whose healthcare record contains a diagnosis of campylobacteriosis.
5. A person whose death certificate contains campylobacteriosis as a contributing or underlying cause of death.

Table 1: Criteria to determine whether a case should be reported to public health

Criterion	Campylobacteriosis
Clinical Evidence	
Clinically compatible illness	N
Healthcare record contains a diagnosis of campylobacteriosis	S
Death certificate contains campylobacteriosis as a contributing or underlying cause of death	S
Laboratory Evidence	
Isolation of *Campylobacter* spp. From a clinical specimen	S
Detection of *Campylobacter* spp. in a clinical specimen using a CIDT	S
Epidemiological Evidence	
Epidemiologically linked to a confirmed or probable laboratory-confirmed case of campylobacteriosis	S

Notes:
S = This criterion alone is Sufficient to report a case.
N = All "N" criteria in the same column are Necessary to report 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" criteria in the same column—is required to report a case.

CSTE Case Definition
Campylobacteriosis 2014

Clinical criteria

An illness of variable severity commonly manifested by diarrhea, abdominal pain, fever, nausea and sometimes vomiting. The organism may also rarely cause extra-intestinal infections such as bacteremia, meningitis, or other focal infections.

Laboratory criteria

Confirmed: Isolation of *Campylobacter* spp. in a clinical specimen.

Probable: Detection of *Campylobacter* spp. in a clinical specimen using culture independent diagnostic testing (CIDT).

Case classification

Confirmed: A clinically compatible case that meets the confirmed laboratory criteria for diagnosis.

Probable: A clinically compatible case that is epidemiologically linked to a case that meets the probable or confirmed laboratory criteria for diagnosis.

OR

Probable: A clinically compatible case with detection of *Campylobacter* spp. in a clinical specimen using CIDT.

Table 2: Criteria for defining a case of campylobacteriosis

Criterion	Confirmed	Probable (Laboratory Evidence)	Probable (Epi-Linked)
Clinical Evidence			
Diarrhea	O	O	O
Abdominal Cramping	O	O	O
Nausea	O	O	O
Vomiting	O	O	O
Febrile bacteremia	O		O
Meningitis	O		O
Focal infection	O		O
Healthcare record contains a diagnosis of campylobacteriosis			O
Death certificate containing campylobacteriosis as a contributing or underlying cause of death			O

Laboratory Evidence			
Detection of *Campylobacter* spp. In a clinical specimen using a CIDT		N	
Isolation of *Campylobacter* spp. From a clinical specimen	N		
Epidemiological Evidence			
Epidemiologically linked to a confirmed or probable laboratory-confirmed case of campylobacteriosis			N
Member of a risk group as defined by the public health authorities during an outbreak			O
Criteria to distinguish a new case:			
Not counted as a new case if it occurred within 30 days of a previous reported case in the same individual	N	N	N

Notes:
S = This criterion alone is Sufficient to classify a case.
N = All N criteria in the same column are Necessary to classify a case. A number following an N indicates that this criterion is only required for a specific disease/condition subtype (see below).
A = This criterion must be absent (e.g., NOT present) for the case to meet the classification criteria.
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 criteria in the same column is required to classify a case. (These optional criteria are alternatives, which mean that a single column will have either no O criteria or multiple O criteria; no column should have only one O.) A number following an O indicates that this criterion is only required for a specific disease/condition subtype.

Comment

The use of CIDT as standalone tests for the direct detection of *Campylobacter* in stool is common. Data available about the performance characteristics of these assays indicates there is variability in the sensitivity, specificity, and positive predictive value of these assays depending on the test type (PCR vs EIA/ELISA) and platform (e.g., BioFire, ImmunoCard, etc.). Therefore, it is useful to collect information on the type of CIDT test and the platform that are used to diagnose a case. Culture confirmation of CIDT positive specimens is still ideal.

Case Investigation Process

- Exclude food handlers from work until diarrhea has resolved. Negative stool specimens may also be required in some circumstances.
- Assure isolate submission to UPHL.

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.” To confirm an outbreak of

campylobacteriosis, the same *Campylobacter* species must be isolated from clinical specimens from at least two ill persons, or the species must be isolated from an epidemiologically implicated food. The source of the infection should be identified and measures to identify additional ill persons and/or to remove the source from consumers should be taken.

Identify Case Contacts

When a neonatal case is less than one month of age, use the following procedure for data entry to EpiTrax:

- The mother is the case-patient, or “parent” CMR
    - Enter mother’s medical record number in parent CMR
    - Enter mother’s symptoms in the parent CMR
    - Enter mother’s exposure history in parent CMR
    - Add attachments and lab report(s) for mother on parent CMR
- Neonate is entered as a contact of the mother
    - Enter neonate medical record number as a contact of the mother
    - Enter neonate symptoms as a contact of the mother
    - Enter neonate exposure as a contact of the mother
    - Add attachments and lab report(s) for neonate as a contact of the mother
- Neonate may be promoted to own CMR as appropriate
- When searching UTNEDSS for name of mother or neonate, both CMRs should show in search results.

✓ REFERENCES

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✓ VERSION CONTROL

Updated March 2015: Added a table and more detailed clinical description of symptoms. Added a photo and description of the other serotypes of Campylobacter. Added a link to a website with an actual Dx Diag. Clarified that even CIDT results should be forwarded to UPHL. Added the new treatment recommendations from Up-to-Date. Updated case fatality section, added percentages instead of national counts. Updated transmission section to include a chart of risk factors that cases mentioned in Utah. Epidemiology - Added statistics, updated old and inaccurate estimates of case counts. Case Investigation - Updated to make a specific note that *Campylobacter* is now a nationally notifiable condition.

Updated June 2021: Updated disease burden estimates and statistics. Updated post-diarrheal complications. Updated GBS and RA statistics and list of complications. Added additional differential diagnoses. Updated information about CIDTs and culturing, deleted information about darkfield/phase-contrast microscopy as it's not widely used anymore. Combined and simplified prevention bullet points. Updated food handler isolation requirements in schools to be consistent with those for other food workers. Added note applicable to all high-risk settings that negative stools may be required at the LHDs' discretion. Updated references. Added ELR rules for culture and identification results

✓ UT-NEDSS (EpiTrax) Minimum/Required Fields by Tab

Demographic

- First Name
- Last Name
- Street Number
- Street Name
- City
- State
- County
- Zip Code
- Date of Birth
- Area Code
- Phone Number
- Birth Gender
- Ethnicity
- Race

Clinical

- Disease
- Onset Date
- Diagnostic Facility
- Symptoms
- Visit Type
  - (if inpatient) Did Campylobacteriosis cause hospitalization?
- Died
  - (if yes) Date of Death
  - (if yes) Did campylobacteriosis cause death?

Laboratory

- Lab Name
- Lab Test Date
- Collection Date
- Specimen Source
- Test Type
- Organism
- Test Result
- Accession Number

Epidemiological

- Food Handler
  - Name of facility where patient handled food
  - Location
  - Did the patient work while ill?
  - Important information including dates
- Healthcare Worker
  - Name of healthcare facility
  - Location
  - Did the patient work while ill?
  - Important information including dates
- Group Living
  - Name of the facility
  - Location
  - Did the patient work/attend while ill?
  - Important information including dates
- Childcare Association
  - Name of the childcare
  - Location
  - Did the patient work/attend while ill?
  - Important information including dates
- Imported From
- Risk Factors
- Risk Factor Notes

Investigation

- Date 10 days before disease onset
- Date 1 day before disease onset
- Did the patient travel outside the U.S. during exposure period?
- Did the patient travel outside Utah but inside U.S. during exposure period?

- Did the patient drink raw/ unpasteurized milk during exposure period?
    - (if yes) Restaurant, store, or dairy
    - (if yes) Dates of purchase
- Did the patient eat soft, imported, or unpasteurized cheese?
    - (if yes) Restaurant, store, or dairy
    - (if yes) Dates of purchase
- Did the patient have contact with ANY animals (including farm animals, pets) during exposure period?
    - (if yes) With what animals did the patient have contact?
- Did patient have contact with any animals not listed above?
- Interview date
    - Person interviewed

Contacts

- Does case's infection appear secondary to another person's infection? (if YES, fill out information in contact table)
- Any contacts ill with similar symptoms? (if YES, fill out information in contact table)

Reporting

- Date first reported to public health

Administrative

- State Case Status
- Outbreak-Associated
- Outbreak Name
- Probable Case?
    - (if yes) Epi-linked or laboratory diagnosed?

✓ ELECTRONIC LABORATORY REPORTING PROCESSING RULES

Campylobacteriosis for Entering Laboratory Test Results

The following rules describe how laboratory results reported to public health should be added to new or existing events in UT-NEDSS (EpiTrax). These rules have been developed for the automated processing of electronic laboratory reports, although they apply to manual data entry, as well.

Test-Specific Rules

Test specific rules describe what test type and test result combinations are allowed to create new morbidity events in UT-NEDSS (EpiTrax), and what test type and test result combinations are allowed to update existing events (morbidity or contact) in UT-NEDSS (EpiTrax).

Test Type	Test Result	Create a New Event	Update an Existing Event
Culture	Positive	Yes	Yes
	Negative	No	Yes
	Equivocal	No	Yes
	Other	No	Yes
PCR/Amplification	Positive	Yes	Yes
	Negative	No	Yes
	Equivocal	No	Yes
	Other	No	Yes
Antigen by EIA/ELISA	Positive	Yes	Yes
	Negative	No	Yes
	Equivocal	No	Yes
	Other	No	Yes

Whitelist Rules

Whitelist rules describe how long an existing event can have new laboratory data appended to it. If a laboratory result falls outside the whitelist rules for an existing event, it should not be added to that event, and should be evaluated to determine if a new event (CMR) should be created.

Campylobacteriosis Morbidity Whitelist Rule: If the specimen collection date of the laboratory result is 30 days or less after the last positive laboratory result, the laboratory result should be added to the morbidity event.

Campylobacteriosis Contact Whitelist Rule: If the specimen collection date of the laboratory result is 30 days or less after the event date of the contact event, the laboratory result should be added to the contact event.

Graylist Rule

We often receive laboratory results through ELR that cannot create cases, but can be useful if a case is created in the future. These laboratory results go to the graylist. The graylist rule describes how long an existing event can have an old laboratory result appended to it.

Campylobacteriosis Graylist Rule: If the specimen collection date of the laboratory result is 30 days before to 7 days after the event date of the morbidity event, the laboratory result should be added to the morbidity event.

Other Electronic Laboratory Processing Rules

- If an existing event has a state case status of “not a case,” ELR will never add additional test results to that case. New labs will be evaluated to determine if a new CMR should be created.