Utah Department of Health & Human Services

Shiga toxin-producing *Escherichia coli* (STEC) infection

Disease plan

Quick links

Last updated: June 28, 2021 by BreAnne Osborn
Updated to match DHHS style guide and terminology: June 5, 2025

Questions about this disease plan?

Contact the Utah Department of Health and Human Services, Office of Communicable Diseases: 801-538-6191.

Critical clinician information

Clinical evidence

Signs/symptoms

- Common symptoms include diarrhea (often bloody), abdominal cramps, nausea, and vomiting.
- Complications include hemolytic uremic syndrome (HUS) and thrombotic thrombocytopenic purpura (TTP).

Period of communicability

- The illness usually lasts 5–7 days, but often lasts about 2 weeks in cases of HUS. Most people are not infectious about a week after diarrhea stops. However, in young children, the organism can persist in the stool for weeks.

Incubation period

- Symptoms generally begin 3–4 days after ingesting the bacteria, but can range from 1–10 days.

Mode of transmission

- Fecal-oral

Laboratory testing

Type of lab test/timing of specimen collection

- Culture is the preferred method for STEC diagnosis.
    - Specimens for culture should be collected as soon as possible, ideally within the first few days of illness, and should be processed as soon as possible to ensure bacterial isolation.
- PCR and other rapid tests are available and specimens should be collected as soon as possible.

Type of specimens

- Stool

Treatment recommendations

Type of treatment

- Non-specific supportive therapy, including hydration, is important.
- Antibiotics should **not** be used to treat this infection; they are not generally helpful and can increase risk of HUS.
- Anti-diarrheal medication, like Imodium®, may increase risk of developing HUS.

Prophylaxis

- None

Contact management

Isolation of case

- Cases who work in high-risk settings (food handlers, child/daycare attendees, healthcare employees, etc.) should be excluded until their diarrhea subsides and they produce negative stools as outlined later in this disease plan.

Quarantine of contacts

- Epi-linked food handlers with diarrhea should be treated the same as a probable case, and should be excluded from high-risk work/childcare settings.

Infection control procedures

- Enteric precautions

Why is shiga toxin-producing e. coli (STEC) important to public health?

Escherichia coli, or *E. coli*, are a diverse group of bacteria found in the U.S. and around the world. Most strains of *E. coli* are harmless, though some can cause serious disease. One of the most common types of pathogenic *E. coli* is Shiga toxin-producing *Escherichia coli* (STEC). STEC can cause illness that ranges from mild diarrhea to bloody diarrhea, and a life-threatening condition, hemolytic uremic syndrome (HUS), which occurs in 5–10% of cases. STEC are categorized into serogroups by their somatic O antigen. The STEC serogroup most commonly identified and associated with severe illness in the U.S. is *E. coli* O157; however, there are over 50 other serogroups that can cause illness.

An estimated 265,000 STEC infections occur in the U.S. each year, though most of these are not reported to public health authorities because many individuals do not seek health care, or are not tested for STEC. It is important to investigate suspected STEC outbreaks to identify the cause of the outbreak (i.e., implicated food item and setting where transmission occurred) so action can be taken to prevent further illnesses. Additionally, the information collected in an outbreak investigation can be used to develop and refine STEC prevention efforts.

Disease and epidemiology

Clinical description

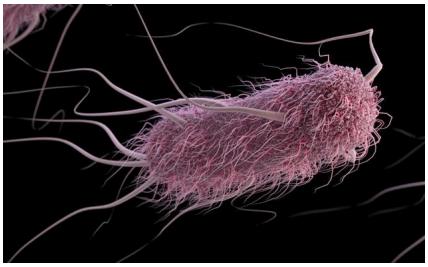
Infection with STEC may present with a wide spectrum of clinical manifestations. An individual may be asymptomatic, have relatively mild diarrhea, or have grossly bloody diarrhea. Abdominal cramps, nausea, and vomiting may also be present. Cases may have a low-grade fever, though it is uncommon. Most diagnosed cases present with bloody diarrhea 1–3 days after initial onset and recover within 5–7 days.

In severe cases, the patient may progress to develop hemolytic uremic syndrome (HUS) and thrombocytopenic purpura (TTP), which can result in renal failure and death. HUS is a serious disease in which red blood cells are destroyed and the kidneys fail. TTP is a rare blood disorder where blood clots form in small blood vessels throughout the body. Transfusions of blood or blood clotting factors as well as renal dialysis may be needed. A prolonged hospital stay is often required.

Causative agent

Escherichia coli is a gram-negative bacterium that is a part of the normal flora of the bowels. There are over one hundred different serotypes of *E. coli*, most of which do not cause human illness.

Some strains of *E. coli*, such as O157:H7 and several other serotypes (e.g., O26, O111) contain genes that produce potent cytotoxins, called Shiga toxins, which give the bacteria the ability to attach to epithelial cells and cause disease. These strains are usually referred to as enterohemorrhagic *E. coli* (EHEC), Verocytotoxin-producing *E. coli,* or Shiga toxin-producing *E. coli* (STEC).



E. coli (*Escherichia coli*) (CDC Photo, 2016)

Differential diagnosis

The differential diagnosis for STEC includes other bacterial causes of diarrhea, such as salmonellosis, shigellosis, and yersiniosis.

Laboratory identification

Culture independent diagnostic testing (CIDT)

Stool culture has been considered the "gold standard" for detection of STEC for some time; 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: enzyme immunoassays (EIA)/enzyme-linked immunosorbent assay (ELISA) and 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 test that identifies the presence of Shiga toxin in the stool. This testing method will identify most STEC 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).

Culture

Stool culture is the preferred method for STEC diagnosis. Some laboratories culture for O157, but not for other strains of STEC. According to the Centers for Disease Control and Prevention (CDC), approximately 64% of STEC infections in the U.S. are caused by non-O157 strains. Therefore, a negative O157 culture result does not rule out the possibility of STEC infection.

Antibody titer

The CSTE case definition includes identification of an elevated antibody titer against a known Shiga toxin-producing serogroup of *E. coli* as criteria under laboratory evidence. The CDC offers serology

for STEC O157 and O111. However, this is only offered in cases of HUS with the CDC's approval. There have been no Utah cases that have had this test performed.

> **UPHL:** The Utah Public Health Laboratory (UPHL) accepts isolates and stool specimens for isolation, serotyping, and whole genome sequencing (WGS). All isolates and specimens from other laboratories should be submitted to UPHL.

Treatment

Non-specific supportive therapy, including hydration, is important. Antibiotics should not be used to treat this infection. There is no evidence that treatment with antibiotics is helpful, and taking antibiotics may increase the risk of HUS. Antidiarrheal agents like Imodium® may also increase that risk.

Case fatality

Approximately 5–10% of persons diagnosed with STEC develop HUS; young children are particularly susceptible. Fifteen percent of young children with an STEC O157 infection develop HUS. Three to five percent of all patients who develop HUS die. Though rates can vary by serotype, about 55% of persons who develop HUS as a result of STEC O157:H7 require dialysis and about 5% die.

Reservoir

Cattle are a reservoir of significant public health importance. Other animals, such as deer, sheep, and goats, are also known to carry STEC. In addition, humans may serve as a reservoir for person-to-person transmission.

Transmission

STEC transmission can be foodborne, waterborne, spread from animal to person, or from person to person through fecal-oral transmission. Foodborne transmission occurs when a person eats food containing the bacteria. The bacteria live in the intestine of some healthy cattle, and contamination of meat may occur in the slaughtering process. Eating meat, especially ground beef that is rare or not fully cooked, is the most common mechanism of infection. Other possible foodborne causes include drinking unpasteurized milk or eating unwashed fruits or vegetables that have been fertilized with cow manure. Waterborne transmission can occur by drinking or swimming in water that is contaminated with fecal matter. Animal-to-person transmission can occur when a person comes into contact with the feces of an infected animal. Person-to-person transmission can occur if infected persons do not wash their hands after using the toilet or after changing diapers. Sexual contact has also been shown to transmit the bacteria. Transmission requires a low infectious dose, and large outbreaks can occur.

Susceptibility

Persons of all ages are at risk for infection. Young children, older adults, and those with compromised immune systems are the most likely to develop HUS. Peak incidence of disease occurs in the late summer months.

Incubation period

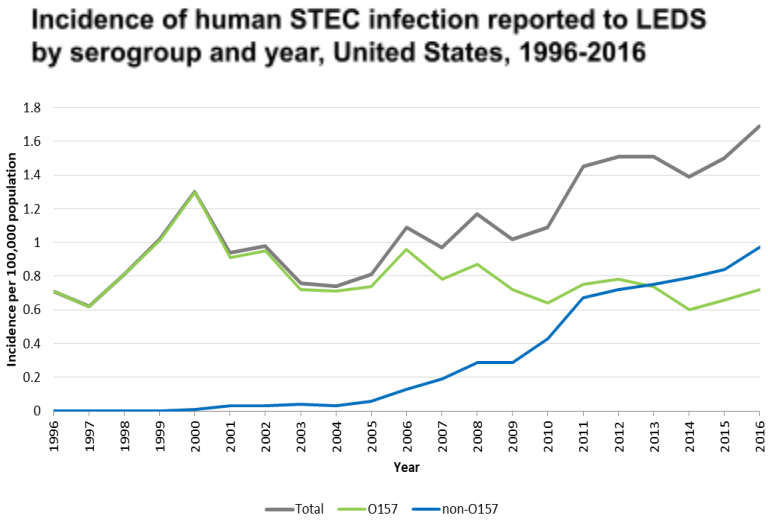
The incubation period for STEC is 1–10 days, with a median of 3–4 days.

Period of communicability

The illness usually lasts 5–7 days (about 2 weeks in cases of HUS) and most people are no longer infectious about a week after diarrhea stops. However, the organism can persist in the stool of young children for weeks.

Epidemiology

The most commonly isolated STEC serotype in North America is *E. coli* O157:H7; this serotype is believed to account for nearly 95% of all STEC-associated HUS cases. However, incidence of *E. coli* O157 has decreased in recent years, while incidence of *E. coli* non-O157 has increased.



Utah consistently has high incidence rates for STEC. According to the most recent CDC laboratory-based enteric disease surveillance (LEDS) report from 2016, Utah's incidence of culture-confirmed STEC was 3.2 cases per 100,000 people, compared to the U.S. incidence rate of 1.5 cases per 100,000 people. Outbreaks in the U.S. have been associated with romaine lettuce, ground beef, unpasteurized milk and apple cider, and other food products. Outbreaks have also been linked to petting zoos and other animal-contact settings.

Public health control measures

Public health responsibility

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

Prevention

Environmental measures

Implicated food items must be removed from consumption. A decision about testing implicated food items can be made in consultation with the enteric epidemiologist at the Utah Department of Health and Human Services (DHHS) 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 be referred to a private laboratory that will test food or store the food in their freezer for a period of time in case 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 STEC or other bacteria that may cause HUS, individuals should:

- Always wash hands thoroughly with soap and water for at least 20 seconds before eating, handling, or preparing food; after using the toilet, helping someone use the toilet, cleaning the bathroom, or changing diapers (the child should also wash their hands); and after touching pets or other animals (especially cattle).
- Dispose of diapers in a closed-lid garbage can.
- 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.
- Avoid eating hamburger or other ground beef products that have not been fully cooked. Cook all ground beef and hamburger thoroughly. Make sure the cooked meat is brown throughout (not pink), and the juices run clear. Use a food thermometer to make sure meat has been cooked to the proper temperature.

    - 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.
- Never bathe a child experiencing diarrhea in the same bathwater with another child.
- Discuss transmission risks that may result from oral-anal sexual contact. Latex barrier protection (i.e., dental dam) may prevent the spread of *E. coli* to a case's sexual partners and may prevent exposure to and transmission of other fecal-oral pathogens.

Chemoprophylaxis

None.

Vaccine

None.

Isolation and quarantine requirements

Isolation

Food handlers

The Utah Food Code requires that food handlers are restricted from work until 1 of the following 3 criteria are met:

1. Two consecutive negative stool specimen cultures are taken:
    a. Not earlier than 48 hours after the discontinuance of antibiotics, and
    b. At least 24 hours apart;
2. More than 7 days have passed since resolution of vomiting or diarrhea; or
3. More than 7 days have passed since diagnosis if the employee was asymptomatic.

Childcare

Children with STEC (symptomatic or asymptomatic) may only return to childcare after producing 2 consecutive negative stool specimens collected 24 hours apart and at least 48 hours after cessation of any antibiotic therapy. Most staff in childcare programs are considered food handlers and should be excluded as such.

School

Students/staff with STEC who have diarrhea should be excluded until their diarrhea resolves. However, if students/staff do not handle food and have no diarrhea or mild

diarrhea, they may remain at school if special precautions are taken. Students/staff who handle or prepare food are considered food handlers and should be excluded as such.

Congregate living

Residents and patients with STEC who reside in congregate living settings (long-term care, assisted living, residential treatment facilities, etc.) should be placed on standard (including enteric) precautions until their symptoms subside and they have 2 negative stool specimens for *E. coli* taken 24 hours apart.

Staff members with STEC who give direct patient care (i.e., feed patients, give mouth or denture care, or give medications) are considered food handlers and are subject to food handler restrictions. In addition, staff members with STEC who are not food handlers should consider not working until diarrhea is resolved.

Quarantine

Symptomatic contacts of an STEC 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 outbreak circumstances involving a facility, asymptomatic contacts may be required to submit stool specimens for testing, at the discretion of the local health department. In these circumstances, a stool specimen should not be collected until at least 48 hours after cessation of any antibiotic therapy, and specimens 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:

- Any person with *E. coli* O157 or *E. coli* O157:H7 isolated from a clinical specimen;
- Any person with STEC isolated from a clinical specimen;
- Any person with an elevated antibody titer against a known Shiga toxin-producing serogroup of *E. coli*;
- Any person with Shiga toxin, Shiga toxin genes, *E. coli* O157, or STEC/EHEC detected in a clinical specimen using a CIDT;
- Any person with abdominal cramps or diarrhea who is a contact of an STEC case or a member of a risk group defined by public health authorities during an outbreak investigation;
- Any person with a diagnosis of post-diarrheal HUS;
- Any person with a diagnosis of post-diarrheal thrombotic thrombocytopenic purpura (TTP);
- A person whose healthcare record contains a recent diagnosis of STEC infection; or

- A person whose death certificate lists STEC as a cause of death or a significant condition contributing to death.

Other recommended reporting procedures:

- All cases of STEC should be reported.
- Reporting should be ongoing and routine.
- Frequency of reporting should follow the Utah Department of Health's (UDOH) routine schedule.

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

Criterion	STEC	
Clinical evidence		
Abdominal cramps		O
Diarrhea		O
Diagnosis of post-diarrheal hemolytic uremic syndrome (HUS)	S	
Diagnosis of post-diarrheal thrombotic thrombocytopenic purpura (TTP)	S	
Healthcare record contains a recent diagnosis of STEC infection	S	
Death certificate lists STEC as a cause of death or a significant condition contributing to death	S	
Laboratory evidence		
Isolation of *E. coli O157:H7* from a clinical specimen	S	
Isolation of *E. coli O157* from a clinical specimen with detection of Shiga toxin or Shiga toxin genes	S	
Isolation of *E. coli* O157 from a clinical specimen, without confirmation of H antigen, detection of Shiga toxin or detection of Shiga toxin genes	S	
Identification of an elevated antibody titer against a known Shiga toxin-producing serogroup of *E. coli*	S	
Detection of Shiga toxin, Shiga toxin genes, *E. coli* O157, or STEC/EHEC in a clinical specimen using a CIDT	S	
Epidemiological evidence		
Epidemiologically linked to an STEC case		O
Member of a risk group as defined by public health authorities during an outbreak investigation		O

Notes:

S = This criterion alone is Sufficient to report a case.

O = At least one of these "O" (One or more) 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.

*A requisition or order for any of the "S" laboratory tests is sufficient to meet the reporting criteria.

CSTE case definition (CSTE position statement, 2017)

Clinical criteria

An infection of variable severity characterized by diarrhea (often bloody) and/or abdominal cramps. Illness may be complicated by HUS. Some clinicians still use the term thrombotic thrombocytopenic purpura (TTP) for adults with post-diarrheal HUS.

Laboratory criteria

Confirmatory laboratory evidence

- Isolation of *E. coli* O157:H7 from a clinical specimen, **OR**
- Isolation of *E. coli* from a clinical specimen with detection of Shiga toxin or Shiga toxin genes.

Supportive laboratory evidence

- Isolation of *E. coli* O157 from a clinical specimen without confirmation of H antigen, detection of Shiga toxin, or detection of Shiga toxin genes, **OR**
- Identification of an elevated antibody titer against a known Shiga toxin-producing serogroup of *E. coli*, **OR**
- Detection of Shiga toxin or Shiga toxin genes in a clinical specimen using a CIDT and no known isolation of *Shigella* from a clinical specimen, **OR**
- Detection of *E. coli* O157 or STEC/EHEC in a clinical specimen using a CIDT.

Epidemiologic linkage

- A clinically compatible illness in a person that is epidemiologically linked to a confirmed or probable case with laboratory evidence, **OR**
- A clinically compatible illness in a person that is a member of a risk group as defined by public health authorities during an outbreak.

Case classifications

Confirmed

A person that meets the confirmatory laboratory criteria for diagnosis.

Probable

- A person with isolation of *E. coli* O157 from a clinical specimen without confirmation of H antigen, detection of Shiga toxin or detection of Shiga toxin genes, **OR**
- A clinically compatible illness in a person with identification of an elevated antibody titer against a known Shiga toxin-producing serogroup of *E. coli*, **OR**

- A clinically compatible illness in a person with detection of Shiga toxin or Shiga toxin genes in a clinical specimen using a CIDT and no known isolation of *Shigella* from a clinical specimen, **OR**
- A clinically compatible illness in a person with detection of *E. coli* O157 or STEC/EHEC from a clinical specimen using a CIDT, **OR**
- A clinically compatible illness in a person that is epidemiologically linked to a confirmed or probable case with laboratory evidence, **OR**
- A clinically compatible illness in a person that is a member of a risk group as defined by public health authorities during an outbreak.

Suspect

- Identification of an elevated antibody titer against a known Shiga toxin-producing serogroup of *E. coli* in a person with no known clinical compatibility, **OR**
- Detection of Shiga toxin or Shiga toxin genes in a clinical specimen using a CIDT and no known isolation of *Shigella* from a clinical specimen in a person with no known clinical compatibility, **OR**
- Detection of *E. coli* O157 or STEC/EHEC in a clinical specimen using a CIDT in a person with no known clinical compatibility, **OR**
- A person with a diagnosis of post-diarrheal HUS/TTP (see HUS case definition).

Table 2: Criteria for defining a case of STEC

Criterion	Confirmed		Probable					Suspect	
Clinical evidence									
Abdominal cramps			O	O	O	O			
Diarrhea			O	O	O	O			
Diagnosis of post-diarrheal HUS/TTP								N	
Absence of abdominal cramps and diarrhea									O
Unknown									O
Laboratory evidence									
Isolation of *E. coli* O157: H7 from a clinical specimen		N							
Isolation of *E. coli* from a clinical specimen	N								
Isolation of *E. coli* O157 from a clinical specimen without confirmation of H antigen							N		

Identification of an elevated antibody titer against a known Shiga toxin-producing serogroup of *E. coli*				N					O
Detection of Shiga toxin or Shiga toxin genes in a clinical specimen using a CIDT	N					N			O
Detection of *E. coli* O157 or STEC/EHEC in a clinical specimen using a CIDT					N				O
Absence of isolation of *Shigella* from a clinical specimen						N			
Absence of detection of Shiga toxin or Shiga toxin genes in a clinical specimen using a CIDT							N		
Epidemiologic evidence									
Epidemiologically linked to a confirmed or probable STEC case with laboratory evidence			O						
Member of a risk group as defined by the public health authorities during an outbreak investigation			O						
Criteria to distinguish a new case									
A positive laboratory result reported more than 180 days after the most recent positive laboratory result associated with a previously reported case in the same individual	N	N	N	N	N	N	N	N	N
Two or more different STEC serogroups/serotypes identified in one or more specimens from 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.

O = At least one of these "O" (One or more) criteria in each category (i.e., 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.

Outbreaks

CDC defines a foodborne outbreak as "an incident in which 2 or more persons experience a similar illness resulting from the ingestion of a common food." To confirm an outbreak of STEC, the same *E. coli* species must be isolated from clinical specimens from at least 2 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

During interviews, cases should be asked if they have any symptomatic contacts. Contacts may also be identified through physician notes. This is to detect outbreaks and prevent transmission in high-risk settings/occupations such as childcare facilities, healthcare, food handling, schools, etc. Symptomatic contacts identified as part of a high-risk setting or occupation should be considered a probable case and managed accordingly.

Acknowledgements

We would like to acknowledge the Colorado Department of Public Health, the Massachusetts Department of Public Health and Environment, and the New Jersey Department of Health for select content in this document.

References

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Version control

Updated December 2014: CSTE reporting criteria, case definition, and case classification swim lanes included.

Updated April 2017: Added “critical clinician information” and “Why is STEC important to public health?” section. Updated symptoms and illness duration in “clinical description” section. Added information to “causative agent” section. Updated “laboratory identification,” “treatment”, “case fatality,” “reservoir”, “transmission”, and “susceptibility” sections. Updated “identify case contacts” section and updated and separated from “case contact management.” Added “acknowledgements”, “version control”, and “minimum data set” sections.

Updated October 2017: Updated the CSTE position statement and swim lanes for reporting and classification.

Updated January 2018: Added “electronic laboratory reporting processing rules” section. Added information regarding CIDT Testing under “laboratory identification.” Updated the classification of cases chart to reflect the new position statement.

Updated April 2018: Added information on animal-to-person transmission in “transmission” section. included description on antibody titer in “laboratory identification” section. Added food handler section to “case contact management.”

Updated June 2021: Updated statistics and laboratory information. Added recommendations for potentially contaminated water, swimming, and oral-anal sexual contact. Updated ELR rules.

Updated June 2025: Updated to match DHHS style and terminology. Added new logo.

EpiTrax minimum/required fields by tab

Demographic

- First name
- Last name
- Street number
- Street name
- City
- State
- County
- ZIP code
- Phone number
- Birth sex
- Ethnicity
- Race

Clinical

- Disease
- Onset date
- Visit type
    - (if inpatient) Did STEC cause hospitalization?
- Died
    - (if yes) Date of death
    - (if yes) Did STEC cause death?
- Symptoms
- Did patient have HUS or TTP?

Laboratory

- Lab name
- Lab test date
- Collection date
- Specimen source
- Test type
- Organism
- Test result
- Accession number

Contacts

- Does case's infection appear secondary to another person's infection?
- Any contacts ill with similar symptoms?

Epidemiological

- Food handler
    - What is the name of the facility where the patient handled food?
    - Location
    - Did the patient work while ill?
    - Important information, including dates
- Healthcare worker
    - What is the name of the healthcare facility?
    - Location
    - Did the patient work while ill?
    - Important information, including dates
- Group living
    - What is the name of the facility?
    - Location
    - Did the patient attend/work while ill?
    - Important information, including dates
- Childcare association
    - What is the name of the childcare?
    - Location
    - Did the patient work/attend while ill?
    - Important information, including dates
- Occupation
- Did the patient eat at any restaurants (fast food/chain/sit-down/cart/kiosk/etc.) in the 7 days before illness?
- Did the patient eat food from any grocery stores during the 7 days before illness? (including farmers' markets, produce or fruit stand, etc.)?

- Did the patient attend/visit any events during the 7 days before illness?
- Imported from
- Risk factors
- Risk factor notes

Investigation

- Date 7 days before disease onset
- Date 1 day before disease onset
- Did the patient travel outside the U.S. during the exposure period?
    - (if yes) Describe travel (location, dates, mode, if other were ill, etc.):
- Did the patient travel outside Utah, but inside the U.S. during the exposure period?
    - (if yes) Describe travel (location, dates, mode, if other were ill, etc.):
- Did the patient travel outside the county, but inside Utah during the exposure period?
- Milk
    - (if yes) Details and source
    - (if yes) Unpasteurized?
        - (if yes) Date(s) of purchase
        - (if yes) Date(s) of consumption
        - (if yes) Was milk ever unrefrigerated >1 hour, including during transport?
- Block cheese (i.e., cheddar/Swiss/ mozzarella)
- Brie/other similar type
- Queso fresco
    - (if yes) Unpasteurized?
- Hamburger/ground beef
    - (if yes) If yes or maybe, cooked
    - (if yes) Pre-made uncooked patties
    - (if yes) Pre-made pre-cooked patties
    - (if yes) Details and source
- Turkey
- Roast beef/steak (carne asada)
    - (if yes) Details: variety/brand, how prepared, where bought/eaten (store/restaurant)
- Pepperoni/other salami
- Jerky
- Lamb or veal
- Venison (deer meat)/other game
- Fish (not canned tuna/salmon)
- Did the patient handle any other raw meat at home/anywhere else?
- Iceberg
- Green leaf
- Red leaf
- Romaine
- Mixed greens (mesclun)
- Spinach
- Other leafy greens
- Sprouts
    - If yes to any of the previous seven food questions, ask the following questions: Details: variety/brand, how prepared, where bought/eaten (store/restaurant).
- Tomatoes
- Watermelon
- Strawberries
- Mango
- Apple juice/cider
    - (if yes) Unpasteurized
- Did the patient visit any of the following during the exposure period?
- Did the patient have contact with animal waste/manure during the exposure period?

- Did the patient have contact with ANY animals (including farm animals, pets) during the exposure period?
- Source of drinking water at home:
- Did the patient drink or have exposure to any of the following during the exposure period?
- Did the patient drink or have exposure to any other water sources not listed during the exposure period?
    - (if yes) Specify details (dates, locations, etc.):
- Interview date
- Person interviewed
- (if Unable to Interview) Specify reason for unable to interview (i.e., LTF, refused, etc.)

Reporting

- Date first reported to public health

Administrative

- State case status (completed by DHHS)
- Outbreak associated
- Outbreak name
- Probable case?
    - (if yes) Epi-linked or laboratory diagnosed?

Electronic laboratory reporting processing rules

Please note that the below rules are specific to informatics as a way to standardize what labs are entered into EpiTrax and should not be used for investigational purposes.

Shiga-toxin producing E. coli rules for entering test results

The following rules describe how laboratory results reported to public health should be added to new or existing events in 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 EpiTrax, and what test type and test result combinations are allowed to update existing events (morbidity or contact) in EpiTrax.

Test type	Test result	Create a new event	Update an existing event
Antigen by EIA/ELISA	Positive	Yes	Yes
	Negative	No	Yes
	Other	No	Yes
	Equivocal	No	Yes
Culture	Positive	Yes	Yes
	Negative	No	Yes
	Other	No	Yes
	Equivocal	No	Yes
Identification	Positive	Yes	Yes
	Negative	No	Yes
	Other	No	Yes
	Equivocal	No	Yes
PCR/amplification	Positive	Yes	Yes
	Negative	No	Yes
	Other	No	Yes
	Equivocal	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.

Shiga-toxin producing *E. coli* morbidity whitelist rule: If the specimen collection date of the laboratory result is 180 days or less after the specimen collection date of the last positive laboratory result, the laboratory result should be added to the morbidity event.

Shiga-toxin producing *E. co*li 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.

Shiga-toxin producing *E. coli* graylist rule: If the specimen collection date of the laboratory result is 30 days before to seven 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.