

**SHIGA TOXIN-PRODUCING ENTEROHEMORRHAGIC *E. COLI* (STEC) AND  
HEMOLYTIC UREMIC SYNDROME (HUS)  
(*E. coli* O157:H7)**

**REPORTING INFORMATION**

- **Class B:** Report by the close of the next business day after the case or suspected case presents and/or a positive laboratory result to the local public health department where the patient resides. If patient residence is unknown, report to the local public health department in which the reporting health care provider or laboratory is located.
- Reporting Form(s) and/or Mechanism:
  - The Ohio Disease Reporting System (ODRS) should be used to report lab findings to the Ohio Department of Health (ODH).
  - For healthcare providers without access to ODRS, you may use the [Ohio Confidential Reportable Disease form](#) (HEA 3334).

**STEC cases:**

- [Ohio Enteric Case Investigation Form](#) may be useful in the local health department follow-up of cases. Do not send this form to the Ohio Department of Health (ODH); information collected from the form should be entered into ODRS where fields are available and the form should be uploaded in Administration section of ODRS.
- The [hypothesis-generating questionnaire](#) may be helpful when investigating cases involved in multistate or multicounty clusters.
- [Ohio Department of Health \(ODH\) Ground Beef Supplemental Form](#) for Ohio Cases of Shiga Toxin Positive *E. coli* is available for use to assist in local health department investigation of ground beef exposures. Do not send this form to the Ohio Department of Health (ODH); information collected from the form should be entered into ODRS where fields are available and the form should be uploaded in Administration section of ODRS.

**HUS cases:**

- Individuals diagnosed with HUS should be entered in ODRS. Separate HUS and STEC case reports should be entered in ODRS when an individual is reported with both conditions.

**AGENT**

*E. coli* O157:H7 and other enterohemorrhagic *E. coli* also known as Shiga toxin-producing *E. coli* (STEC) is the causative agent. *E. coli* is normally considered non-pathogenic, normal flora of the human gut. STEC, however, are pathogenic strains of *E. coli*.

**Infectious Dose**

The infectious dose is very small, perhaps as few as 1-10 organisms.

A case of hemolytic uremic syndrome (HUS) or thrombotic thrombocytopenic purpura (TTP) might or might not have a laboratory-confirmed finding of STEC. However, it should be noted that in children, STEC is the leading cause of HUS; therefore, a high index of suspicion of STEC is warranted among the contacts of an HUS patient, especially in the child care setting.

**CASE DEFINITION FOR SHIGA TOXIN-PRODUCING ENTEROHEMORRHAGIC *E. COLI* (STEC)**

**Clinical Criteria**

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

## Laboratory Criteria for Diagnosis

### *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.

### *Confirmation testing*

- Clinical laboratories should send STEC isolates as well as reflex specimens testing positive for the presence of Shiga toxin(s) or STEC DNA in a clinical specimen using a culture-independent diagnostic testing (CIDT) to Ohio Department of Health Laboratory for culture confirmation testing and pulsed-field gel electrophoresis (PFGE) analysis.

## 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 Classification

### Suspected:

- A person that meets the supportive laboratory criteria for diagnosis with no known clinical compatibility, **OR**
- A person with a diagnosis of post-diarrheal HUS/TTP (see HUS case definition).

### 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 which has 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.

### Confirmed:

A person that meets the confirmatory laboratory criteria for diagnosis.

Not a Case: This case status will not generally be used when reporting a case but may be used to reclassify a report if investigation revealed it was not a case.

**Criteria to distinguish a new case of this disease or condition from reports or notifications which should not be enumerated as a new case for surveillance**

- A new case should be created when a positive laboratory result is received more than 180 days after the most recent positive laboratory result associated with a previously reported case in the same individual, **OR**
- When two or more different serogroups/serotypes are identified in one or more specimens from the same individual, each serogroup/serotype should be reported as a separate case.

**Comments**

Confirmation is based on laboratory findings and clinical illness is not required. Health departments are encouraged to act upon a finding of STEC; culture and antigen confirmation can be delayed.

Asymptomatic infections and infections at sites other than the gastrointestinal tract in people (1) meeting the confirmatory laboratory criteria for diagnosis or (2) 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, are considered STEC cases and should be reported.

Although infections with Shiga toxin-producing organisms in the United States are primarily caused by STEC, in recent years an increasing number are due to infections by Shiga toxin-producing *Shigella*. Persons with (1) detection of Shiga toxin or Shiga toxin genes using a CIDT and (2) isolation of *Shigella* spp. from a clinical specimen should not be reported as an STEC case.

Due to the variable sensitivities and specificities of CIDT methods and the potential for degradation of Shiga toxin in a specimen during transit, discordant results may occur between clinical and public health laboratories. Persons with (1) detection of Shiga toxin or Shiga toxin genes using a CIDT and (2) the absence of isolation of *Shigella* from a clinical specimen, should be reported as a probable case, regardless of whether detection of Shiga toxin or Shiga toxin genes is confirmed by a public health laboratory.

**CASE DEFINITION FOR HEMOLYTIC UREMIC SYNDROME, POSTDIARRHEAL**

**Clinical Description**

Hemolytic uremic syndrome (HUS) is characterized by the acute onset of microangiopathic hemolytic anemia, renal injury and low platelet count. Thrombotic thrombocytopenic purpura (TTP) also is characterized by these features but can include central nervous system (CNS) involvement and fever and may have a more gradual onset. Most cases of HUS (but few cases of TTP) occur after an acute gastrointestinal illness (usually diarrheal).

**Laboratory Criteria for Diagnosis**

- Anemia (acute onset) with microangiopathic changes (i.e. schistocytes, burr cells, helmet cells) on peripheral blood smear **AND**
- Renal injury (acute onset) evidenced by either hematuria, proteinuria or elevated creatinine level (i.e.  $\geq 1.0$  mg/dL in a child aged  $<13$  years or  $\geq 1.5$  mg/dL in a person aged  $\geq 13$  years or  $\geq 50\%$  increase over baseline).

**Note:** A low platelet count can usually, but not always, be detected early in the illness, but it may then become normal or even high. If a platelet count obtained within 7 days after onset of the acute gastrointestinal illness is not  $<150,000/\text{mm}^3$ , other diagnoses should be considered.

## **Case Classification**

### Probable:

- An acute illness diagnosed as HUS or TTP that meets the laboratory criteria in a patient who does not have a clear history of acute or bloody diarrhea in preceding 3 weeks; *OR*
- An acute illness diagnosed as HUS or TTP that has onset within 3 weeks after onset of an acute or bloody diarrhea and meets the laboratory criteria except that microangiopathic changes are not confirmed.

Confirmed: An acute illness diagnosed as HUS or TTP that both meets the laboratory criteria and began within 3 weeks after onset of an episode of acute or bloody diarrhea.

Not a Case: This status will not generally be used when reporting a case, but may be used to reclassify a report if investigation revealed that it was not a case.

### **Comment**

Some investigators consider HUS and TTP to be part of a continuum of disease. Therefore, criteria for diagnosing TTP on the basis of CNS involvement and fever are not provided because cases diagnosed clinically as post-diarrheal TTP also should meet the criteria for HUS. These cases are reported as post-diarrheal HUS.

Most diarrhea-associated HUS is caused by Shiga toxin-producing *Escherichia coli*, most commonly *E. coli* O157. If a patient meets the case definition for both Shiga toxin-producing *E. coli* (STEC) and HUS, the case should be reported for each of the conditions.

## **SIGNS AND SYMPTOMS**

### **STEC (*E. coli* O157:H7)**

Infection may be asymptomatic or produce diarrheal illness ranging from mild to severe. Fever and vomiting are usually not present.

### **HUS**

A potential complication following infection with STEC (*E. coli* O157:H7). Characterized by kidney failure often necessitating transfusion and dialysis.

## **DIAGNOSIS**

*E. coli* O157:H7 is diagnosed by means of a stool culture. Sorbitol-MacConkey agar or CHROM Agar O157 is used by laboratories to screen for *E. coli* O157:H7. Non-O157 STEC infections may be diagnosed by testing fecal specimens for Shiga toxin genes. Clinical laboratories are asked to send all isolates to the ODH Laboratory for serogroup typing and pulsed-field gel electrophoresis (PFGE) analysis. Clinical labs that do not culture for *E. coli* O157:H7, and only test for shiga toxin should send toxin positive broths to the ODH Laboratory for confirmation testing. HUS and TTP are diagnosed by the findings described above. Patients with HUS and TTP should be cultured for enteric pathogens, including *E. coli* O157:H7. Failure to recover the organism is common, since HUS generally occurs several days after the diarrheal illness and the patient might no longer be shedding the pathogen. The ODH Laboratory performs testing for *E. coli* O157:H7. In some circumstances testing can be done at ODH Laboratory without charge. To obtain the fee exemption and to arrange for receipt of the stool transport kit, contact the ODH Bureau of Infectious Diseases Outbreak Response and Bioterrorism Investigation Team (ORBIT) at 614-995-5599 with the names of the persons for whom this testing is being requested.

## **EPIDEMIOLOGY**

### **Source**

Humans and cattle are the primary reservoirs of STEC (*E. coli* O157:H7). Bodies of water or food contaminated by animal or human waste can serve as a source of

infection.

### **Occurrence**

STEC (*E. coli* O157:H7) occurs worldwide. In Ohio, more cases occur in the summer than in any other season. More cases are recognized in children than in any other age group, but all ages are at risk.

### **Mode of Transmission**

Direct person-to-person transmission via the fecal-oral route occurs, as well as direct animal-to-person transmission, especially from sick calves. Infection can also be acquired from contaminated beef (especially ground beef) which is undercooked, or when raw meat juices contaminate cooked food or food to be eaten raw (e.g. fruits, vegetables). Swimming in contaminated recreational water is another means by which transmission has occurred.

### **Period of Communicability**

STEC (*E. coli* O157:H7) is present in the stool during the acute illness and possibly for a few weeks afterward. The carrier state in humans does not generally develop.

### **Incubation Period**

The incubation period is 2 to 10 days, with a median of 3 to 4 days.

## **PUBLIC HEALTH MANAGEMENT**

### **Case**

#### Investigation

All cases reported to the local health department should initially be followed up with a telephone call to obtain demographic and epidemiologic data. Please complete the Ohio Enteric Case Investigation Form for Ohio cases of Shiga-toxin positive *E. coli*. No further work-up is recommended if neither the case nor any household member is employed in a sensitive occupation (direct food handling, direct patient care, employee in a child care center who handles food or directly cares for children) or attends a child care center, unless there is evidence that the case is part of an outbreak.

#### Treatment

No effective antibiotic therapy is recognized for STEC (*E. coli* O157:H7). 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. Anti-diarrheal medications should be avoided.

#### Isolation and Follow-up Specimens

Ohio Administrative Code (OAC) 3701-3-13 (J) states:

"*Escherichia coli* (*E. coli*) O157:H7, other enterohemorrhagic (Shiga toxin-producing) *E. coli* or hemolytic uremic syndrome (HUS): a person with *Escherichia coli* (*E. coli*) O157:H7, other enterohemorrhagic (Shiga toxin-producing) *E. coli* or hemolytic uremic syndrome (HUS) who attends a child care center or works in a sensitive occupation shall be excluded from the child care center or work in the sensitive occupation and may return after his or her diarrhea has ceased and after two consecutive follow-up stool specimens are negative for *E. coli* O157:H7 or other enterohemorrhagic (Shiga toxin-producing) *E. coli*."

Obtain the first specimen at least 48 hours after cessation of diarrhea or, if being treated, at least 48 hours after completion of antibiotic therapy. Obtain the remaining specimen(s) at least 24 hours apart.

## **Contacts**

If the case or any household member is employed in a sensitive occupation or is a child care center attendee, **all** household members should be screened for Shiga toxin-producing *E. coli* (STEC). The purpose of this is to identify asymptomatic infected individuals who could serve as a continuing source of infection to others. See sections below on sensitive occupations and child care contacts.

## **Prevention and Control**

Ground beef and hamburger should be well-cooked; using a food thermometer is the only sure way of knowing if your food has reached a high enough temperature to destroy bacteria. Ground beef products should be cooked to an internal temperature of 160° F. Color is not a reliable indicator that ground beef patties have been cooked to a temperature high enough to kill harmful bacteria such as *E. coli* O157:H7.

Avoid cross-contamination of other foods, especially raw produce, with raw meat juices. Wash fruits and vegetables thoroughly. Peel raw fruits when possible. Children under 5 years of age, pregnant women, immunocompromised persons, and the elderly should avoid eating raw sprouts. Drink only pasteurized milk, juice or cider. Drink only water that has been treated and is safe for drinking. Avoid swallowing lake or pool water while swimming. Wash hands thoroughly after bowel movements and after changing diapers. This is especially important for persons with diarrhea. Anyone with diarrhea should avoid swimming in public pools or lakes and preparing food for others.

### Food Handlers

Symptomatic persons should be excluded from work. As detailed in Isolation, above, foodhandlers who are laboratory-confirmed cases may only return to work after diarrhea has ceased and two consecutive stool samples are negative.

Food Service Operation rules also pertain to this situation. *E. coli* O157:H7 is a disease which can be transmitted through food. Persons infected with a disease that is communicable by food are not permitted to work as a food handler. For additional information, refer to Ohio Administrative Code (OAC) Chapter 3717-1 (Ohio Uniform Food Safety Code) Section 02.1, Management and Personnel: Employee Health.

### Healthcare Workers, Child Care Workers and Children who Attend Child Care Centers

Symptomatic persons should be excluded from work. As detailed in Isolation above, persons in these sensitive occupations who are laboratory-confirmed cases, and children who attend child care centers may return when diarrhea has ceased and two consecutive stool samples are negative.

### Child Care Center Outbreak Control

When a case of *E. coli* O157 or HUS occurs in a person who works in or attends a child care center, that person is excluded until diarrhea has ceased and two consecutive stools are negative per OAC 3701-3-13. In these situations, there should be a high index of suspicion of *E. coli* O157:H7 should any cases of diarrhea be reported among children or staff of the entire child care center. Also, it is **recommended** that all classroom contacts (children and adults) of the laboratory-confirmed case be screened with one stool sample using Cary-Blair medium, whether or not they are symptomatic. The purpose of this screening is to detect asymptomatic carriers who might be serving as a source of infection to others. Child care center workers or attendees with diarrhea (of infectious or unknown cause) are not permitted to attend the child care center per OAC 3701-3-13.

## **Special Information**

Persons with diarrhea of infectious or unknown cause (e.g. confirmed or suspect cases of *E. coli* O157:H7) are not permitted to work in sensitive occupations, according to OAC 3701-3-13 (H) which states: "Diarrhea, infectious or of unknown cause: a person with

diarrhea, of infectious or unknown cause, who attends a child care center or works in a sensitive occupation shall be excluded from the child care center or work in the sensitive occupation and may return only after diarrhea has ceased. A person with infectious diarrhea of known cause shall be isolated in accordance with the provisions of the rule set forth for the specified disease."

'Sensitive occupation' means direct food handling, direct patient care, the handling of food or provision of direct care to children in a child care center, or any other occupation which provides significant opportunity for an infected individual to transmit infectious disease agents" per OAC 3701-3-01 (Y).

## SAMPLE LETTER TO PARENTS/GUARDIAN

Dear Parents/Guardian:

A case of Shiga toxin-producing *E. coli* (STEC), *E. coli* O157:H7, and/or hemolytic uremic syndrome (HUS) has occurred in your child's classroom. This bacterium, *E. coli* O157:H7, can cause intestinal infection consisting of severe bloody diarrhea and abdominal cramps. Usually little or no fever is present, and the illness resolves in 5 to 10 days.

In some persons, particularly children under 5 years of age and the elderly, the bacterial infection produces a toxin which can cause a complication called hemolytic uremic syndrome (HUS). HUS affects the kidneys and blood clotting system. HUS occurs in approximately 2%-7% of the patients with *E. coli* O157:H7 infection. HUS often requires extensive hospitalization and therapy.

Persons can become infected with *E. coli* O157:H7 by ingesting the bacteria in undercooked beef, especially hamburger. Spread can occur easily among groups of small children because of their close contact and lack of well-developed personal hygiene skills. Frequent and thorough hand washing, especially after using the toilet and before eating, is important in preventing spread of this disease.

Due to the serious nature of HUS, arrangements have been made with the Ohio Department of Health for free STEC screening in your child's classroom. We highly recommend and urge you to take advantage of this opportunity.

In order to find out if your child has *E. coli* O157:H7 or STEC, a stool specimen must be collected. The materials needed to do this are included with this letter. You should have a screw-capped tube partially filled with liquid.

Directions:

1. Make sure the patient information section on the side of the vial is completed.
2. Pass the stool into a clean, dry, container such as a margarine tub, wide mouth jar, milk carton with the top cut off, or if available a bedpan or stool hat.
3. Use the collection spoon built into the lid of the vial to place small scoops of the stool into the vial until the contents of the vial rise to the "FILL LINE" on the vial label.
4. For best results, select areas of the stool that appear bloody or watery. If the stool is formed (hard), sample small amounts from each end and the middle.
5. When sufficient stool added to raise the level to the "FILL LINE", replace and twist the cap onto the vial to tightly close.
6. Once the cap is tight, shake the vial vigorously until the contents are well mixed.
7. Wash your hands thoroughly after collection of the specimen.
8. Place properly labeled vial into a zip-lock plastic specimen bag or other leak-proof container. Do not place the specimen paperwork unprotected within the same zip-lock bag or container with the vial to prevent contamination should the sample leak.
9. Return the sample and paperwork immediately to your local health department or location as instructed when you were given the collection kit.
10. Store and transport at room temperature.

Thank you for your cooperation. If you have any questions, please contact (RN) at the (local) Health Department, (telephone number).

Sincerely,

**What are *Escherichia coli*?**

*Escherichia coli* (abbreviated as *E. coli*) are a large and diverse group of bacteria. Although most strains of *E. coli* are harmless, others can make you sick. Some kinds of *E. coli* can cause diarrhea, while others cause urinary tract infections, respiratory illness and pneumonia, and other illnesses. Still other kinds of *E. coli* are used as markers for water contamination—so you might hear about *E. coli* being found in drinking water, which are not themselves harmful, but indicate the water is contaminated. It does get a bit confusing—even to microbiologists.

**What are Shiga toxin-producing *E. coli* (STEC)?**

Some kinds of *E. coli* cause disease by making a toxin called Shiga toxin. The bacteria that make these toxins are called “Shiga toxin-producing” *E. coli*, or STEC for short. You might hear these bacteria called verocytotoxic *E. coli* (VTEC) or enterohemorrhagic *E. coli* (EHEC); these all refer generally to the same group of bacteria. The most commonly identified STEC in North America is *E. coli* O157:H7 (often shortened to *E. coli* O157 or even just “O157”). When you hear news reports about outbreaks of “*E. coli*” infections, they are usually talking about *E. coli* O157.

In addition to *E. coli* O157, many other kinds (called serogroups) of STEC cause disease. Other *E. coli* serogroups in the STEC group are sometimes called “non-O157 STECs”. Compared with STEC O157 infections, identification of non-O157 STEC infections is more complex. First, clinical laboratories must test stool samples for the presence of Shiga toxins. Then, the positive samples must be sent to public health laboratories to look for non-O157 STEC. Clinical laboratories typically cannot identify non-O157 STEC. Other non-O157 STEC serogroups that often cause illness in people in the United States include O26, O145, O111, and O103. Some types of STEC frequently cause severe disease, including bloody diarrhea and hemolytic uremic syndrome (HUS), which is a type of kidney failure.

**Are there important differences between *E. coli* O157 and other STEC?**

Most of what we know about STEC comes from studies of *E. coli* O157 infection, which was first identified as a pathogen in 1982. Less is known about the non-O157 STEC, partly because older laboratory practices did not identify non-O157 infections. As a whole, the non-O157 serogroups are less likely to cause severe illness than *E. coli* O157, though sometimes they can. For example, *E. coli* O26 produces the same type of toxins that *E. coli* O157 produces, and causes a similar illness, though it is typically less likely to lead to kidney problems (called hemolytic uremic syndrome, or HUS).

**Who gets STEC infections?**

People of any age can become infected. Very young children and the elderly are more likely to develop severe illness and hemolytic uremic syndrome (HUS) than others, but even healthy older children and young adults can become seriously ill.

**What are the symptoms of STEC infections?**

The symptoms of STEC infections vary for each person but often include severe stomach cramps, diarrhea (often bloody), and vomiting. If there is fever, it usually is not very high (less than 101°F/less than 38.5°C). Most people get better within 5–7 days. Some infections are very mild, but others are severe or even life-threatening.

**What is hemolytic uremic syndrome (HUS), a complication of STEC infections?**

Around 5–10% of those who are diagnosed with STEC infection develop a potentially life-threatening complication known as hemolytic uremic syndrome (HUS). Clues that a person is developing HUS include decreased frequency of urination, feeling very tired, and losing pink color in cheeks and inside the lower eyelids. Persons with HUS should be hospitalized because their kidneys may stop working and they may develop other serious problems.

Most persons with HUS recover within a few weeks, but some suffer permanent damage or die.

### **How soon do symptoms appear after exposure?**

The time between ingesting the STEC bacteria and feeling sick is called the “incubation period”. The incubation period is usually 3-4 days after the exposure but may be as short as 1 day or as long as 10 days. The symptoms often begin slowly with mild belly pain or non-bloody diarrhea that worsens over several days. HUS, if it occurs, develops an average 7 days after the first symptoms, when the diarrhea is improving.

### **Where do STEC come from?**

STEC live in the guts of ruminant animals, including cattle, goats, sheep, deer, and elk. The major source for human illnesses is cattle. STEC that cause human illness generally do not make animals sick. Other kinds of animals, including pigs and birds, sometimes pick up STEC from the environment and may spread it.

### **How are these infections spread?**

Infections start when you swallow STEC — in other words, when you get tiny (usually invisible) amounts of human or animal feces in your mouth. Unfortunately, this happens more often than we would like to think about. Exposures that result in illness include consumption of contaminated food, consumption of unpasteurized (raw) milk, consumption of water that has not been disinfected, contact with cattle, or contact with the feces of infected people. Some foods are considered to carry such a high risk of infection with *E. coli* O157 or another germ that health officials recommend that people avoid them completely. These foods include unpasteurized (raw) milk, unpasteurized apple cider, and soft cheeses made from raw milk. Sometimes the contact is pretty obvious (working with cows at a dairy or changing diapers, for example), but sometimes it is not (like eating an undercooked hamburger or a contaminated piece of lettuce). People have gotten infected by swallowing lake water while swimming, touching the environment in petting zoos and other animal exhibits, and by eating food prepared by people who did not wash their hands well after using the toilet. Almost everyone has some risk of infection.

### **Where did my infection come from?**

Because there are so many possible sources, for most people we can only guess. If your infection happens to be part of the about 20% of cases that are part of a recognized outbreak, the health department might identify the source.

### **How common are STEC infections?**

An estimated 265,000 STEC infections occur each year in the United States. STEC O157 causes about 36% of these infections, and non-O157 STEC cause the rest. Public health experts rely on estimates rather than actual numbers of infections because not all STEC infections are diagnosed, for several reasons. Many infected people do not seek medical care; many of those who do seek care do not provide a stool specimen for testing, and many labs do not test for non-O157 STEC. However, this situation is changing as more labs have begun using newer, simpler tests that can help detect non-O157 STEC.

### **How are STEC infections diagnosed and when should I contact my healthcare provider?**

STEC infections are usually diagnosed through laboratory testing of stool specimens (feces). Identifying the specific strain of STEC is essential for public health purposes, such as finding outbreaks. Many labs can determine if STEC are present, and most can identify *E. coli* O157. Labs that test for the presence of Shiga toxins in stool can detect non-O157 STEC infections. However, for the O group (serogroup) and other characteristics of non-O157 STEC to be identified, Shiga toxin-positive specimens must be sent to a state public health laboratory. Contact your healthcare provider if you have diarrhea that lasts for more than 3 days, or is accompanied by high fever, blood in the stool, or so much vomiting that you

cannot keep liquids down and you pass very little urine.

### **What is the best treatment for STEC infection?**

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.

### **How can STEC infections be prevented?**

- WASH YOUR HANDS thoroughly after using the bathroom or changing diapers and before preparing or eating food. WASH YOUR HANDS after contact with animals or their environments (at farms, petting zoos, fairs, even your own backyard).
- COOK meats thoroughly. Ground beef and meat that has been needle-tenderized should be cooked to a temperature of at least 160°F/70°C. It is best to use a thermometer, as color is not a very reliable indicator of “doneness”.
- AVOID raw milk, unpasteurized dairy products, and unpasteurized juices (like fresh apple cider).
- AVOID swallowing water when swimming or playing in lakes, ponds, streams, swimming pools, and backyard “kiddie” pools.
- PREVENT cross contamination in food preparation areas by thoroughly washing hands, counters, cutting boards, and utensils after they touch raw meat.