REPORT TO THE BOARDS OF HEALTH

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Shiga Toxin Producing E. coli (STEC)

E. coli is a bacterium that normally lives in the intestines, or bowels, of both people and animals. Most *E. coli* strains are harmless and actually help keep our intestinal tract in balance. When *E. coli* is found someplace, such as in waterways, it is an indicator that human or animal waste is present. Some strains, however, have taken on genes from other bacteria giving them very harmful characteristics. These strains are called pathogenic *E. coli*, meaning they can cause illness. Special molecular tests must be used to identify these strains from normal, harmless *E. coli*. There are five strains of *E. coli* that cause illness in humans:

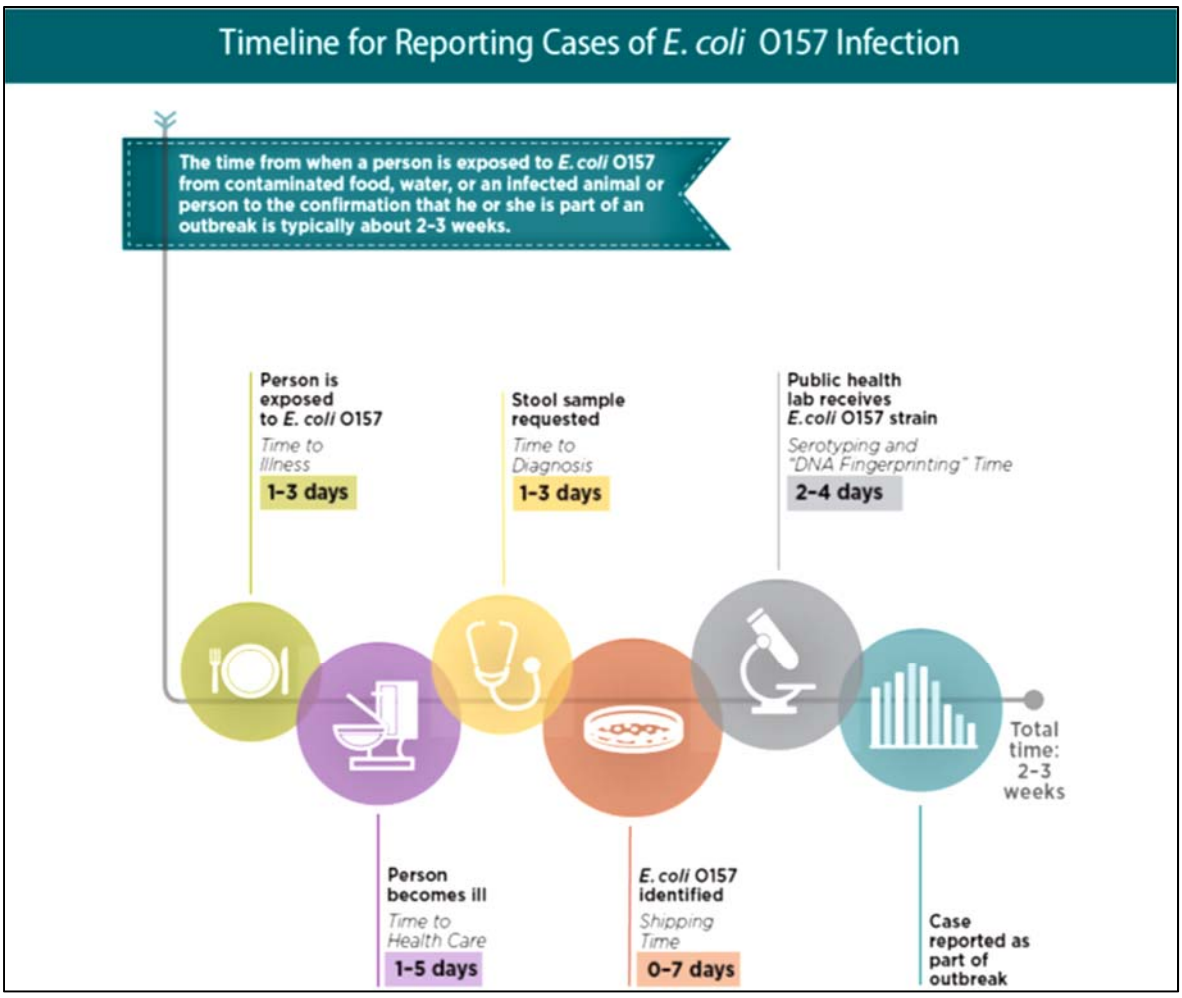
E. coli Strain	Type of Illness
Shiga toxin-producing *E. coli* (STEC), or Enterohemorrhagic *E. coli* (EHEC)	Bloody and/or watery diarrhea, fever, cramps, nausea, vomiting and possible hemolytic uremic syndrome (HUS)
Enterotoxigenic *E. coli* (ETEC)	Watery diarrhea
Enteropathogenic *E. coli* (EPEC)	Diarrhea in infants
Enteroinvasive *E. coli* (EIEC)	Dysentery-severe often bloody diarrhea
Enteroaggregative *E. coli* (EAEC)	Chronic diarrhea in children and people infected with HIV

STEC

It is estimated STEC causes 265,000 cases of illness, 3,600 hospitalizations, and 30 deaths each year in the U.S. Most illnesses caused by *E. coli* are caused by a strain of STEC called *E. coli* O157:H7. This strain was first identified in 1982 and became well known in 1992 when contaminated ground beef not cooked to a high enough temperature at Jack-in-the-Box restaurants caused illness in over 700 people and the death of four children. There are other strains of STEC. A large outbreak in Germany was caused by *E. coli* O104:H4, and illness has been caused in people by *E. coli* O45, O80, O104, O113, O117, O118, O128 and others. All of these are referred to as STEC as they produce Shiga toxin.

STEC is initially diagnosed by testing for the presence of Shiga toxin. If Shiga toxin 1 or 2 is found, it is assumed STEC is present. The sample should then be cultured, or grown, to determine what *E. coli* is present. Often this is done at the MDHHS Laboratory in Lansing. Genetic fingerprinting is done which can help determine if the bacterium matches *E. coli* that has been found in any other illnesses in the country. This can help find the source.

The treatment for *E. coli* is typically just treating the symptoms. Antibiotics do not appear to help people get better any faster and actually increase the risk of developing hemolytic uremic syndrome (HUS.) HUS is a serious complication that occurs in about 6% to 9% of all STEC infections and in 15% of all STEC infection in children younger than age 10. HUS is a combination of sudden kidney failure, hemolytic anemia (anemia caused by the red blood cells breaking apart), and thrombocytopenia (a drop in the number of platelets.) About half of people that develop HUS will need dialysis, 4% will suffer neurologic complications (seizures, stroke, coma, etc.,) and 3% to 5% will die.



STEC is very infectious; it only takes 10 to 100 organisms to make you ill. Foods that have been associated with STEC include:

- Ground beef
    - *E. coli* usually gets on the surface of meat during processing; when it is ground up, the bacteria get mixed all through the meat. During cooking, the inner part of the meat may not get hot enough to kill the bacteria, which makes ground meat a higher risk.
- Any beef, bison, wild game
- Raw milk
- Dairy products made from unpasteurized milk
- Unpasteurized juice or cider
- Any type of lettuce, leafy greens, spinach
- Sprouts

Other risks:

- Contaminated water
    - Drinking water
    - Recreational water, including lakes, rivers, pools, water parks, etc.
- Visits to petting zoos
- Visits to fairs
- Visits to farms
- Contact with animals

Animals that can spread *E. coli* O157:H7 to humans include:

- Cows, especially calves
- Goats
- Sheep
- Deer
- Humans (person-to person spread is possible)

The best way to prevent getting *E. coli*:

- WASH YOUR HANDS after:
    - Any contact with animals or anything that animals come in contact with (farms, petting zoos, fairs, pets, outdoors, etc.)
    - After using the bathroom
    - After changing diapers
    - Before preparing or eating food
- Do not eat or drink around animals at places such as petting zoos, fairs, or farms
- People who work with animals should keep work clothing and shoes away from other household members
- Thaw meats in the refrigerator, never on the counter
- Use separate cutting boards for meats and vegetables and wash cooking equipment well
- COOK meat thoroughly and properly
    - Cook ground beef to at least 160°
- Wash all fruits and vegetables, even prewashed, bagged vegetables, before use
- DO NOT eat or drink "raw" milk, unpasteurized dairy products, unpasteurized juices
- AVOID swallowing water when swimming or playing in lakes, ponds, streams, swimming pools, and backyard "kiddie" pools.

Healthy Living Recommendations:

1. Be aware: while most *E. coli* are normal and harmless residents of our colon, some strains can cause serious, even deadly, illness.
2. Children are very susceptible to serious illness due to STEC and HUS. They also do many things that put them at risk. Teach them hygiene and habits that will keep them safe.

Resources:

- CDC *E. coli* page: https://www.cdc.gov/ecoli
- CDC Food Safety Page: https://www.cdc.gov/foodsafety/prevention.html
- Foodsafety.gov: https://www.foodsafety.gov/index.html
- CDC Healthy Pets and *E. coli*: https://www.cdc.gov/healthypets/diseases/ecoli.html
- The Center for Food Security and Public Health: http://www.cfsph.iastate.edu/

Sources:

Centers for Disease Control and Prevention. *E. coli* Questions and Answers. https://www.cdc.gov/ecoli/general/index.html

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Nataro, J. Pathogenic Escherichia coli associated with diarrhea. In: UpToDate, Calderwood, S., Bloom, A. (Ed), UpToDate, Waltham, MA. (Accessed on September 13, 2018.)

The Center for Food Security and Public Health. (2016). Enterohemorrhagic Escherichia coli and Other E. coli Causing Hemolytic Uremic Syndrome.