Escherichia coli O157 and other Shiga toxin-producing *Escherichia coli* (STEC) infections

Escherichia coli O157 (O157) is one of the most dreaded causes of infectious gastroenteritis. Bloody diarrhea is a hallmark of this pathogen, but the real danger is post-diarrheal hemolytic uremic syndrome (HUS). Oregon has been the setting for many O157 outbreaks, and the investigations of those outbreaks, combined with the analysis of other surveillance data, has contributed greatly to our understanding of this pathogen. Spread by the fecal-oral route, O157 has several animal reservoirs, the most important of which are ruminants: cattle, goats, sheep, deer, elk, etc. Transmission often occurs from consumption of contaminated food or water, as well as direct person-to-person spread and environmental exposures. Mid-to-late summer is the peak season for O157 infections.

With increasing deployment of diagnostic kits that identify Shiga toxin-producing *E. coli* (rather than O157 per se) comes an appreciation of the significant role that other STEC play as human pathogens. In the United States (and in Oregon), O26, O45, O103, O111, O121 and O145 are the most common "other" serogroups of the enterohemorrhagic *E. coli,* making up approximately half of the reported cases. O157 infections are much more likely to result in HUS than is infection by STEC.

Over the past 10 years, the number of O157 cases reported statewide has ranged between 57 and 106 annually. After being relatively steady during 2008–2011, the rate began to increase with a peak of 2.7 per 100,000 in 2013. In 2017, the rate was 1.4 per 100,000 persons.

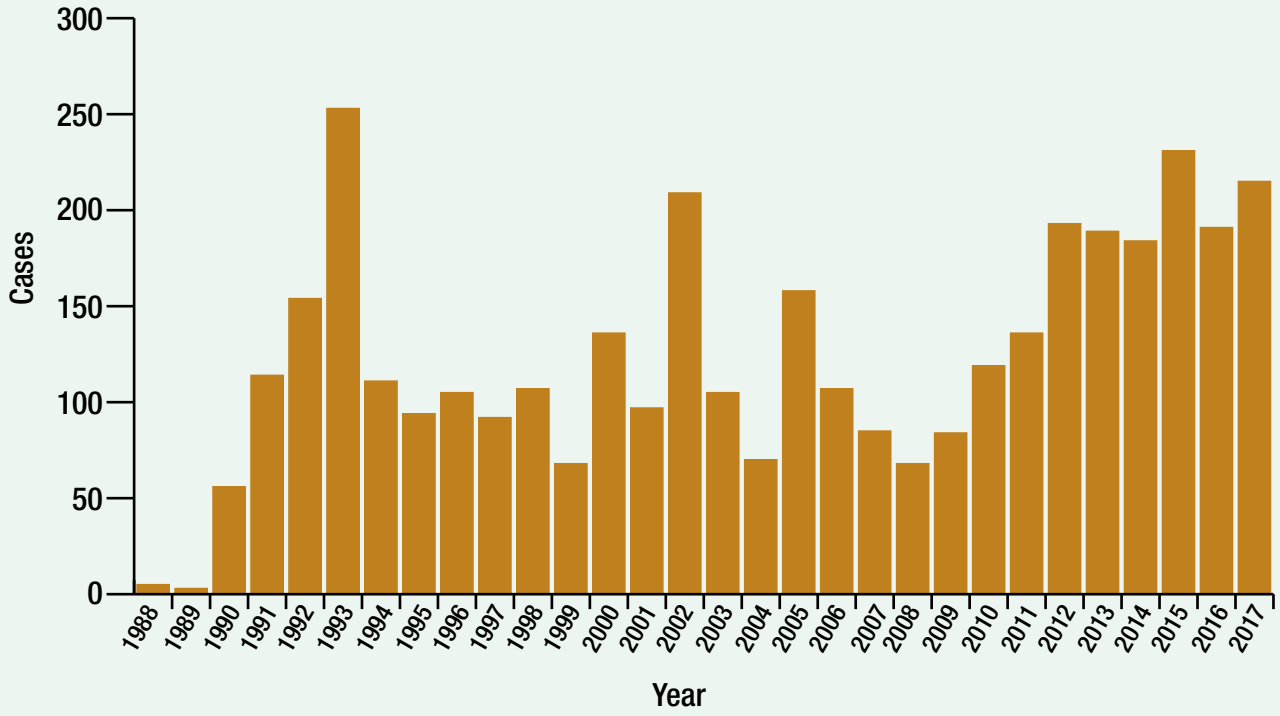
As for the non-O157 serogroups, those case counts have increased steadily from single digits in 2007 and 2008 to 144 confirmed cases in 2017. Of the 204 confirmed STECs serotyped in 2017, 60 were O157; 144 were non-O157, including O26 (52), O103 (20), O121 (16) and 20 other serogroups.

Four STEC outbreaks were investigated in 2017; all were foodborne.

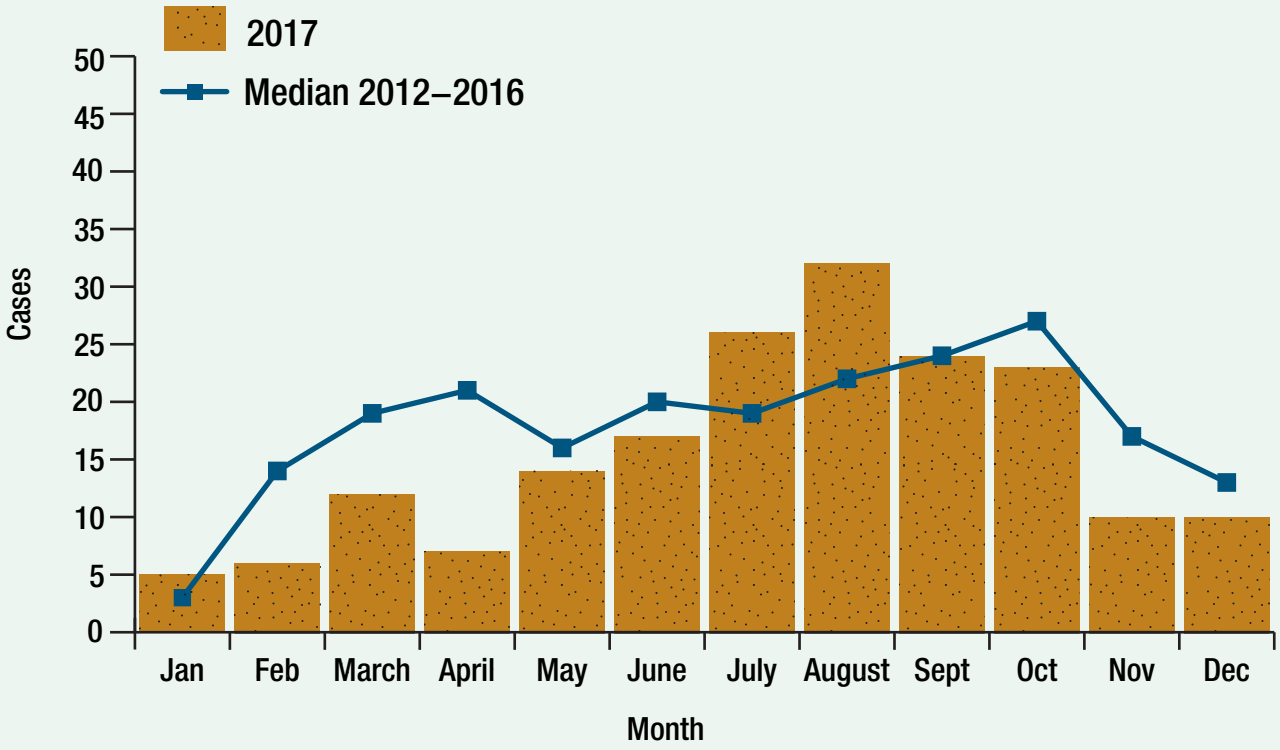
More labs are testing for the presence of Shiga toxin rather than just O157. Unfortunately, at the same time, many labs are dropping culture-based methods, leaving clinicians (and epidemiologists) in the dark as to the specifics of the etiologic agent, and putting more of the diagnostic burden on the public health reference lab.

Much of the heavy lifting for prevention must be done upstream, with plans to minimize contamination of crops and processing equipment. Hazard Analysis and Critical Control Point (HACCP) practices focus on documenting and controlling risks during food processing and commercial food preparation, as well as efforts to control water and other potential environmental sources of infection.

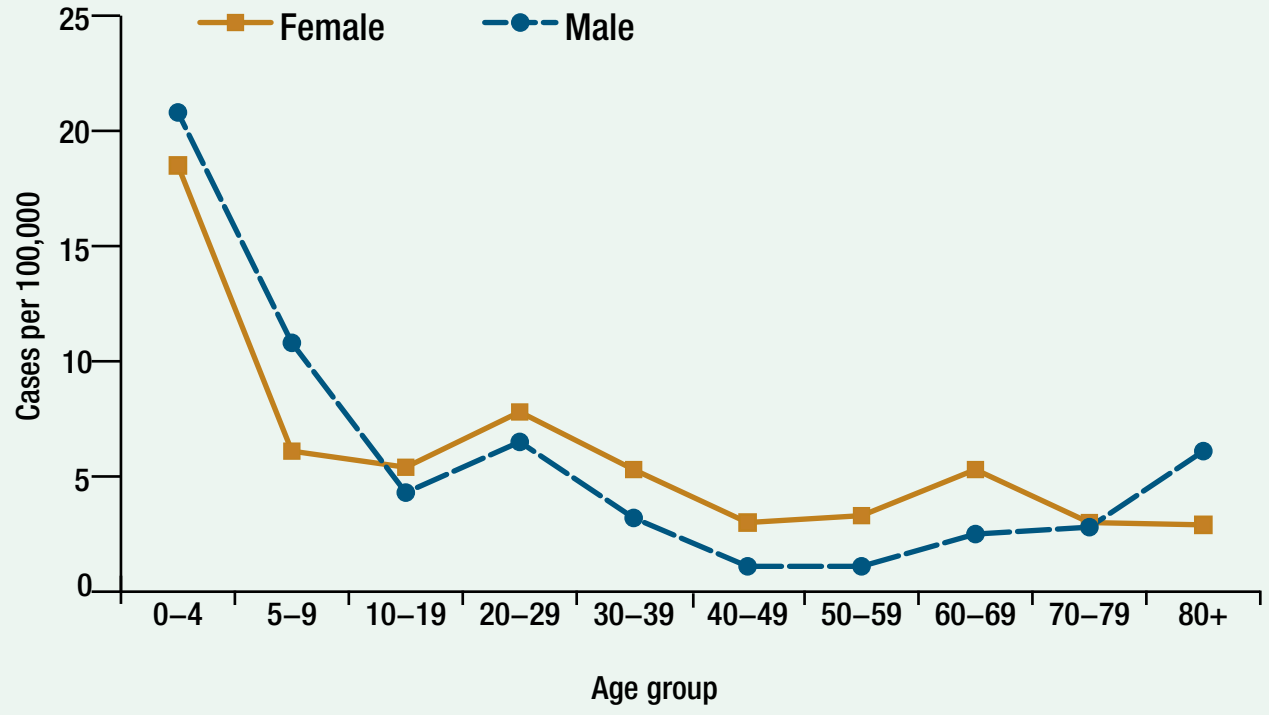
STEC infection (including *E. coli* O157) by year: Oregon, 1988–2017



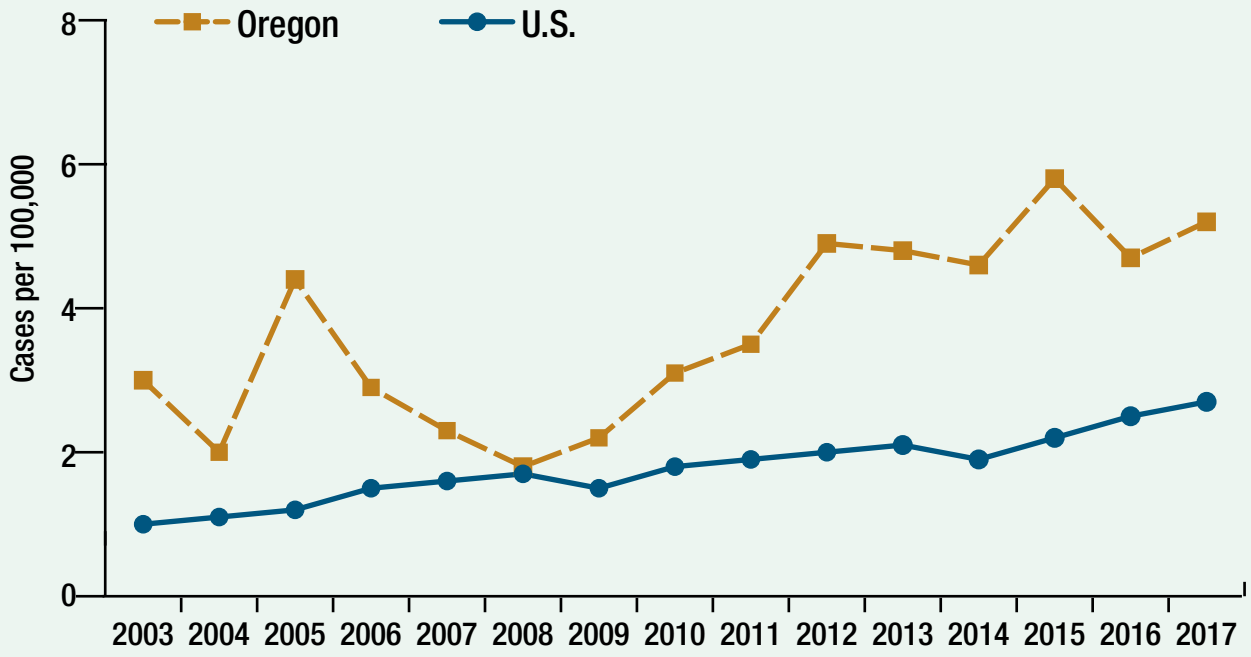
STEC infection by onset month: Oregon, 2017



Incidence of STEC infection by age and sex: Oregon, 2017

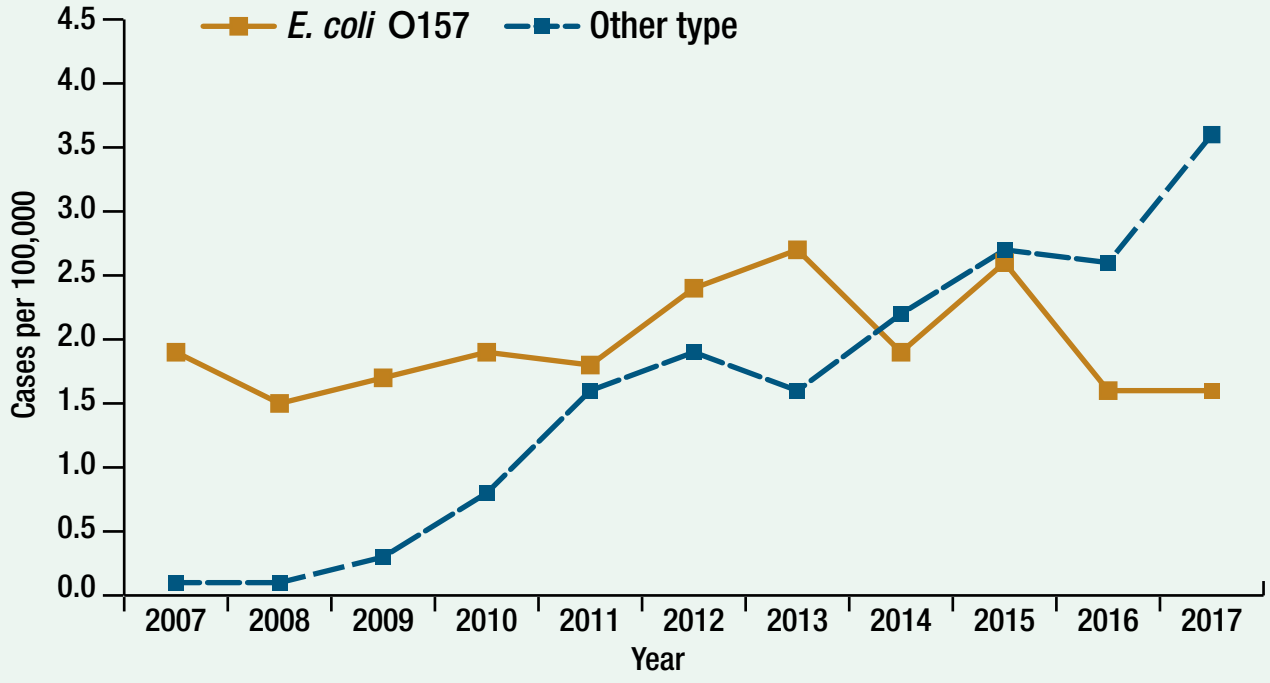


Incidence of STEC infection: Oregon vs. U.S., 2003–2017

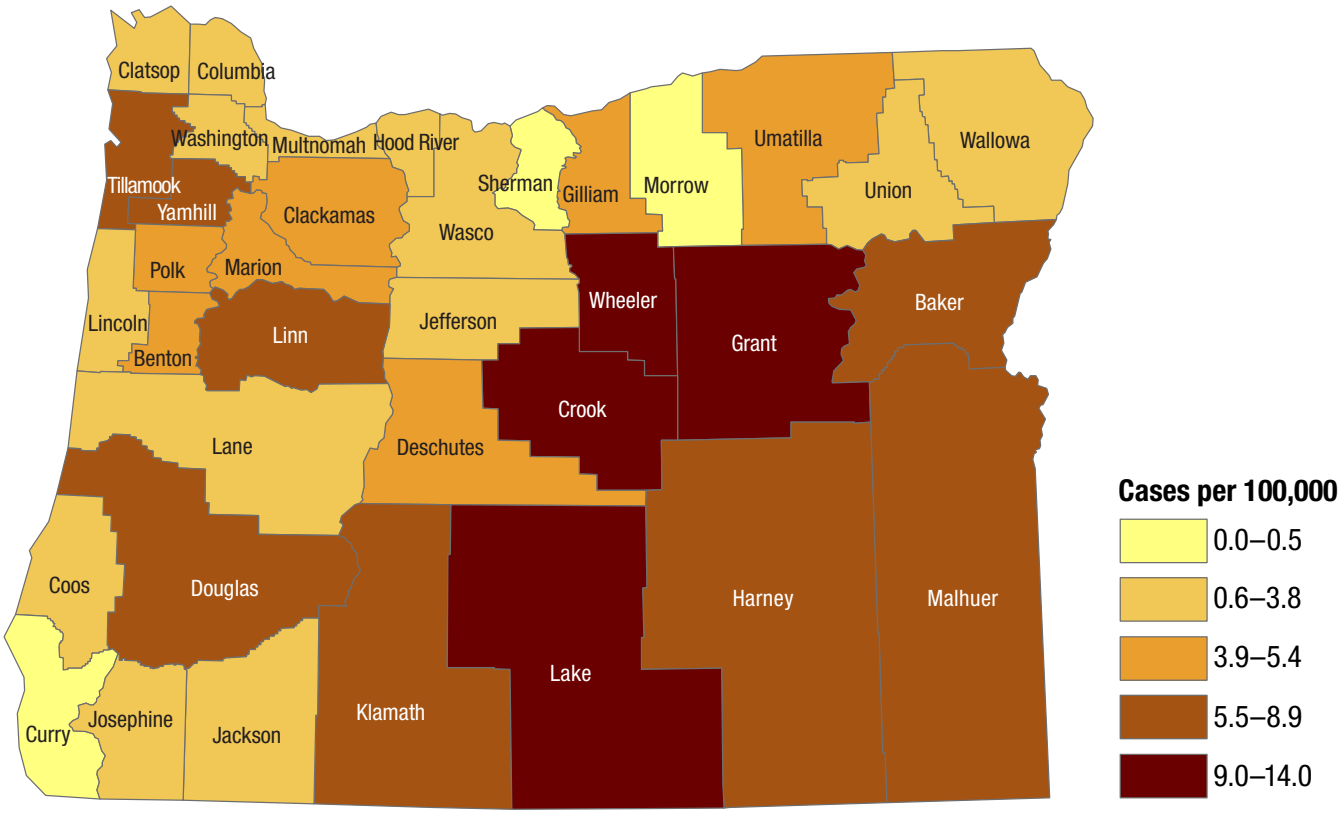


	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Oregon	3.0	2.0	4.4	2.9	2.3	1.8	2.2	3.1	3.5	4.9	4.8	4.6	5.8	4.7	5.2
U.S.	1.0	1.1	1.2	1.5	1.6	1.7	1.5	1.8	1.9	2.0	2.1	1.9	2.2	2.5	2.7

Incidence of STEC infection, O157 vs. non-O157 type: Oregon, 2007–2017



Incidence of STEC infection by county of residence: Oregon, 2008–2017



Prevention

- Wash hands with soap carefully and frequently, especially after going to the bathroom, changing diapers or touching livestock. Supervise hand washing of toddlers and small children after they use the toilet.
- Do not work or attend daycare, serve or prepare food, or work in health care while ill with diarrhea.
- Practice safe food handling. Rinse raw produce thoroughly under running tap water; separate uncooked meats from vegetables, cooked foods and ready-to-eat foods; and cook meat to the proper temperatures.
- Do not drink raw milk and do not eat foods that have unpasteurized milk in them.