

Non-O157 Shiga toxin-producing *E. coli*: What are we missing?

This past spring, an outbreak of *E. coli* O145, ultimately linked to shredded romaine lettuce, was recognized in the U.S. Twenty-six confirmed and 7 probable cases were reported in people from MI, NY, OH, PA and TN. Forty percent of the cases were hospitalized and 3 developed hemolytic uremic syndrome (HUS). No cases were identified in Vermont. However, not all clinical laboratories in the U.S., including Vermont, routinely culture for O157 STEC. Even fewer have the capability to culture for non-O157 serogroups. It is possible that many cases were missed.

According to the Centers for Disease Control and Prevention (CDC), Shiga toxin-producing *E. coli* (STEC) causes approximately 100,000 illnesses, 3000 hospitalizations and 90 deaths annually in the United States. Most reported STEC infections in the US are caused by *E. coli* O157:H7, but non-O157 STEC bacteria are increasingly recognized as important causes of illness and outbreaks in the US.

Non-O157 STEC bacteria cause acute, often bloody diarrhea just like *E. coli* O157:H7. HUS can result from any STEC infection, and progression to HUS depends on strain virulence and host factors. The virulence of non-O157 STEC is partly determined by the toxins they produce. Strains that produce only Shiga toxin 2 are more often associated with HUS than strains that produce only Shiga toxin 1 or those that produce both types of toxins. Over 150 STEC serotypes have been associated with illness, but in the US, six non-O157 serogroups (O26, O45, O103, O111, O121, and O145) account for the majority of non-O157 reported cases.

In October 2009, CDC published updated recommendations for the identification of STEC by clinical laboratories (<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5812a1.htm>). To improve the diagnosis of STEC, CDC recommends that all stools submitted for testing from patients with acute community-acquired diarrhea (i.e., for detection of the enteric pathogens *Salmonella*, *Shigella*, and *Campylobacter*) be cultured for O157 STEC. Unlike *E. coli* O157:H7, non-O157 STECs cannot be distinguished from non-pathogenic *E. coli* when standard culture methods are used. Therefore, in order to detect non-O157 STECs, CDC also recommends that specimens routinely be tested for Shiga toxins or the genes encoding these toxins.

Over the past few years, the Vermont Department of Health (VDH) has received between 15 and 30 reports of STEC each year, mostly serogroup O157. However, the VDH Laboratory routinely tests for both O157 and non-O157 STEC bacteria and has also identified O111:NM, O26:H11, O50:H7, O121:H19, and O103:H2. Currently in our state, the only other clinical laboratory to routinely test for the presence of Shiga toxin is Mt. Ascutney Hospital. The VDH Laboratory will accept requests for Shiga toxin testing by EIA if stool specimens have tested negative for *E. coli* O157:H7 and STEC is still suspected. Acceptable specimens include stool preserved in Cary Blair transport media or stool inoculated into MacConkey broth. Contact the VDH Laboratory Microbiology Program at 802-863-7336 for more details.

It's Arbovirus Season Again:

Summer means the return of mosquitoes and the risk for mosquito-borne infections. Although the last documented case of West Nile virus (WNV) infection in a Vermont resident occurred in 2003, WNV was found in birds and mosquitoes in 2009. Healthcare providers should consider arboviral infection in the differential diagnosis for persons hospitalized with encephalitis, meningitis of suspected viral origin, or Guillain-Barre syndrome. No arbovirus activity has been detected in Vermont so far this year, but Massachusetts, New York and New Jersey are reporting unusually early West Nile virus and eastern equine encephalitis virus activity in mosquitoes. For more information about West Nile virus, see <http://www.healthvermont.gov/prevent/wnv/wnv.aspx>

Vermont – Selected Reportable Diseases – 2010

(Data through MMWR Week 25 – 6/26/10) – Provisional

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	Campylobacter			Cryptosporidium			E. coli*			Giardia			Group A Strep Inv			Hepatitis A			Hepatitis B - Acute			Hepatitis B - Chronic			Hepatitis C - Acute			Hepatitis C - Chronic			Legionellosis**			Listeriosis			Lyme §			Meningococcal Inf.			Pertussis			Salmonella			Shigella			Tuberculosis**			Varicella §				
Age																																																											
<5	10	10	2	11	0	0	0	0	0	2	0	0	4	3	1	3	0	0	14	0	0	0	0	0	0	9	0	0	1	0	0	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5-14	2	3	2	20	3	0	0	0	0	0	0	0	9	0	0	1	0	0	41	0	0	0	0	0	0	9	0	0	1	0	0	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
15-24	16	11	0	9	0	0	0	1	0	18	0	0	5	0	2	4	0	0	5	0	0	0	0	1	0	5	0	2	4	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
25-39	14	3	0	21	0	0	0	15	0	61	0	0	8	0	0	3	0	0	1	0	0	0	0	15	0	8	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
40-64	23	4	0	13	2	0	2	12	0	124	1	0	35	1	0	7	1	1	0	12	0	0	2	12	0	124	1	0	35	1	0	7	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
65+	10	0	1	3	9	0	0	0	0	6	1	1	14	0	0	4	0	0	0	0	0	0	0	0	0	6	1	1	14	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Total (YTD)	75	31	5	77	14	0	2	28	0	211	2	1	75	4	3	22	1	1	61	2	28	0	211	2	1	75	4	3	22	1	1	61	2	1	1	61	2	1	1	61	2	1	1	61	2	1	1	61	2	1	1								
5-yr Median (YTD)	57	23	5	56	13	2	1	†	1	†	2	1	†	1	8	31	2	1	165	1	†	1	†	2	1	†	1	8	31	2	1	165	1	†	1	165	1	†	1	165	1	†	1	165	1	†	1	165	1	†	1								
County of Residence																																																											
Addison	7	10	2	6	3	0	0	0	0	8		0	5	1	0	2	0		2	0	0	0	0	0	0	8		0	5	1	0	2	0		2	0		2	0		2	0		2	0		2	0		2	0								
Bennington	2	0	0	1	0	0	0	1	0	11		0	20	1	0	1	0		2	0	0	0	0	1	0	11		0	20	1	0	1	0		2	0		2	0		2	0		2	0		2	0		2	0								
Caledonia	5	3	0	3	0	0	0	0	0	18		0	1	0	0	0	0		1	0	0	0	0	0	0	18		0	1	0	0	0	0		1	0		1	0		1	0		1	0		1	0											
Chittenden	19	1	1	30	4	0	0	18	0	58		0	4	0	1	5	1		35	0	18	0	0	18	0	58		0	4	0	1	5	1		35	0		35	0		35	0		35	0		35	0											
Essex	0	0	0	3	0	0	0	0	0	0		0	0	0	0	0	0		0	0	0	0	0	0	0	0		0	0	0	0	0	0		0	0		0	0		0	0		0	0		0	0											
Franklin	6	1	0	5	0	0	0	0	0	12		0	2	0	0	1	0		0	0	0	0	0	0	0	12		0	2	0	0	1	0		0	0		0	0		0	0		0	0		0	0											
Grand Isle	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0		0	0	0	0	0	0	0	0		0	0	0	0	0	0		0	0		0	0		0	0		0	0														
Lamoille	2	1	0	3	1	0	0	0	0	4		0	0	0	0	1	0		1	0	0	0	0	0	0	4		0	0	0	0	1	0		1	0		1	0		1	0		1	0														
Orange	4	3	0	6	2	0	0	0	0	5		0	1	0	1	0	0		4	0	0	0	0	0	0	5		0	1	0	1	0	0		4	0		4	0		4	0		4	0														
Orleans	1	2	0	0	0	0	0	0	0	9		0	1	0	0	2	0		0	0	0	0	0	0	0	9		0	1	0	0	2	0		0	0		0	0		0	0		0	0														
Rutland	6	1	0	7	1	0	1	2	0	19		0	16	0	0	4	0		4	0	0	0	1	2	0	19		0	16	0	0	4	0		4	0		4	0		4	0		4	0														
Washington	10	8	2	3	1	0	0	4	0	24		0	1	1	0	2	0		3	0	0	0	0	4	0	24		0	1	1	0	2	0		3	0		3	0		3	0																	
Windham	4	0	0	7	0	0	1	2	0	26		0	15	1	0	3	0		3	0	0	0	1	2	0	26		0	15	1	0	3	0		3	0		3	0		3	0																	
Windsor	9	1	0	3	2	0	0	1	0	17		1	9	0	1	1	0		5	0	0	0	0	1	0	17		1	9	0	1	1	0		5	0		5	0																				
Unknown	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0		0	0	0	0	0	0	0	0		0	0	0	0	0	0		0	0		0	0		0	0																	
Total (YTD)	75	31	5	77	14	0	2	28	0	211	2	1	75	4	3	22	1	1	61	2	28	0	211	2	1	75	4	3	22	1	1	61	2	1	1	61	2	1	1	61	2	1	1	61	2	1	1												
VDH District Office																																																											
Barre	10	8	2	5	1	0	0	1	0	0		0	0	1	0	2	0		3	0	0	0	0	1	0	0		0	0	1	0	2	0		3	0		3	0		3	0																	
Bennington	2	0	0	1	0	0	0	1	0	0		0	0	1	0	1	0		2	0	0	0	0	1	0	0		0	0	1	0	1	0		2	0		2	0		2	0																	
Brattleboro	2	0	0	7	0	0	0	2	0	0		0	0	1	0	2	0		3	0	0	0	0	2	0	0		0	0	1	0	2	0		3	0		3	0																				
Burlington	19	1	1	30	0	0	0	16	0	0		0	0	0	0	4	1		35	0	16	0	0	16	0	0		0	0	0	0	4	1		35	0		35	0																				
Middlebury	7	10	2	7	3	0	0	0	0	0		0	0	1	0	2	0		2	0	0	0	0	0	0	0		0	0	1	0	2	0		2	0		2	0																				
Morrisville	2	2	0	3	1	0	0	0	0	0		0	0	0	0	1	0		1	0	0	0	0	0	0	0		0	0	0	0	1	0		1	0		1	0																				
Newport	1	1	0	1	0	0	0	0	0	0		0	0	0	0	2	0		0	0	0	0	0	0	0	0		0	0	0	0	2	0		0	0		0	0																				
Rutland	6	1	0	6	1	0	1	2	0	0		0	0	0	0	4	0		4	0	0	0	1	2	0	0		0	0	0	0	4	0		4	0		4	0																				
St. Albans	6	1	0	5	0	0	0	0	0	0		0	0	0	0	1	0		1	0	0	0	0	0	0	0		0	0	0	0	1	0		1	0		1	0																				
St. Johnsbury	5	3	0	6	0	0	0	0	0	0		0																																															