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Characteristics of Shiga-Toxin Producing *Escherichia coli* (STEC) Isolates — Alaska, June 2007 to December 2008

Background

Infection with Shiga-toxin producing *Escherichia coli* (STEC) can cause bloody diarrhea and can result in potentially life-threatening hemolytic uremic syndrome (HUS). The most common STEC serotype documented in the United States is *E. coli* O157:H7; the extent of non-O157 STEC infections is not well-characterized.

In 2000, the U.S. Centers for Disease Control and Prevention (CDC) added all STEC infections to the Nationally Notifiable Conditions List and began reporting STEC infections by state in the Morbidity and Mortality Weekly Report. All STEC infections are legally reportable in most states. In Alaska, current regulations only require reporting to the Alaska Section of Epidemiology (SOE) of *E. coli* O157:H7 infections. Since May 2004, however, the Alaska State Public Health Laboratory (ASPHL) has requested hospital laboratories to submit all STEC isolates for further analysis.

Methods

ASPHL uses a rapid Shiga-toxin test to detect the two most common cytotoxins produced by enterohemorrhagic *E. coli*, ST-I and ST-II.¹ Specimens that are positive by rapid test are then cultured to isolate STEC bacteria. Isolate serotypes are then further identified using a polymerase chain reaction test. If isolates cannot be identified, specimens are forwarded to CDC for more specialized evaluation. ASPHL performs pulsed field gel electrophoresis (PFGE) analysis on all *E. coli* O157 isolates and CDC performs PFGE on STEC isolates they receive to identify epidemiologic linkages between isolates obtained from clinical and environmental samples.

Results

From June 2007 through December 2008, 26 STEC isolates were referred to ASPHL. The most common serotype was O157:H7 (11/26 or 42%). The remaining isolates were one of six other serotypes (n=11) or incompletely characterized (n=4) (Table). By PFGE patterns, two O157:H7 isolates comprised a small unique Alaska cluster, and one matched a larger interstate cluster associated with consumption of a certain brand of ground meat. For non-O157:H7 isolates, the PFGE pattern from two Alaska siblings matched a cluster in New York; however, no obvious common exposure was discovered.

Table. Results of STEC Specimens (N=26) Referred to ASPHL, June 2007 through December 2008

Result	Number
O157:H7	11
O157:non-motile	3
O26:H11	3
O103:H2	2
O174:H21	1
O121:H19	1
O45:H2	1
O undetermined:H19	1
Evidence of STEC via rapid test kit, but unable to isolate organism	3

Discussion

Non-O157 STEC infections have caused outbreaks, HUS, and substantial morbidity worldwide.²⁻³ A recent restaurant-associated outbreak of *E. coli* O111 infection in Oklahoma involved over 300 persons.⁴

While a non-O157 STEC outbreak has not yet been identified in Alaska, ASPHL data presented here indicate that non-O157 serotypes are isolated from stool samples almost as commonly as the O157:H7 serotype. Furthermore, it is possible that outbreaks have occurred but were not detected, as non-O157 STEC is not reportable in Alaska and specimens that test positive for STEC by a rapid test at hospital and commercial laboratories frequently are not cultured.⁵ Without isolating the organism and determining its PFGE profile, the ability to identify outbreaks is restricted.

For the reasons discussed above, SOE is planning on making all STEC infections reportable in Alaska. Until the regulation is formally changed, we would like for health care providers and laboratories to begin reporting of all STEC infections now.

Recommendations

1. Health care providers should promptly report cases of suspected and confirmed STEC infection to SOE at 907-269-8000 during working hours or 800-478-0084 after hours.
2. Laboratories should forward Shiga-toxin positive specimens to ASPHL for confirmation and identification. Gram negative broths are the preferred transport media. ASPHL has specimen collection kits and can perform routine cultures for enteric bacterial pathogens free of charge. Contact ASPHL at 907-334-2100 to obtain specimen collection kits.
3. Persons with infectious diarrhea caused by STEC should be restricted from jobs involving food handling, patient care, and working in a daycare until two successive stools collected >24 hours apart and >48 hours after the last dose of antibiotics are negative.⁶ These same restrictions apply for daycare attendees.

References

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