Isolation and Characterization of Shiga Toxin-Producing Escherichia coli from Clinical Samples: Public Health Laboratory Guidelines

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BACKGROUND

CDC recommends that clinical laboratories simultaneously test all stool samples submitted for the routine diagnosis of acute, community-acquired diarrhea for Escherichia coli O157:H7 (O157 STEC) by culture (MMWR Recomm Rep. 2009. 58(RR-12): p. 1-14). In addition, samples should be screened for non-O157 STEC by an assay that detects Shiga toxins or the genes encoding these toxins regardless of patient age, time of year, or presence or absence of blood in the stool. Further recommendations are that clinical laboratories forward, as soon as possible, all O157 STEC isolates and Shiga toxin-positive broths that do not yield O157 STEC to a public health laboratory (PHL) for organism isolation and characterization. Evidence indicates that the use of enzyme immunoassays (EIA) for screening, in conjunction with culture and molecular characterization of isolates at the PHL, provides increased diagnostic sensitivity compared with the use of either method alone (Diagn Microbiol Infect Dis. 2008. 62(1): p. 7-10).

METHODS

In response to the 2009 recommendations, the Association of Public Health Laboratories convened an STEC Workgroup of 16 subject matter experts from CDC and across the country. The workgroup was tasked with writing guidance for PHL’s regarding the isolation of STEC from Shiga toxin-positive stools/specimens and for the characterization of isolates including identification, virulence gene detection, and pulsed-field gel electrophoresis (PFGE) analysis. Prior to distribution of these guidelines, APHL conducted a short assessment of current STEC testing practices in state and local PHL’s. The 2011 APHL STEC assessment was designed to 1) evaluate awareness of the 2009 clinical guidelines and 2) compare PHL practices with those recommended in the new guidelines. A survey report will be available in August 2012. A second assessment will be conducted in 2013 to measure the impact of the guidelines, to assess PHL progress in implementing the recommendations, and to identify barriers to implementation.

ASSESSMENT RESULTS

Response rate: 92% (48/52) of state/territorial public health laboratories (SPHLs) and 39% (15/38) of local public health laboratories (LPHLs)

Yes: 94% (46/49) of responding laboratories

- Is your laboratory in compliance with the 2009 MMWR recommendations?
- Does your laboratory centrally process stool samples or test stool specimens directly?
- Does your laboratory subculture onto highly-selective agar to recover O157 STEC?
- Does your laboratory subculture onto less-selective agar to recover non-O157 STEC?
- Does your laboratory test colony swabs for the presence of non-O157 STEC by some means?
- Does your laboratory serotype isolates for the O157 antigen?
- Does your laboratory serotype isolates for the “big six” non-O157 O groups?
- Does your laboratory differentiate Stx1 and Stx2 toxin production by some means?
- Does your laboratory perform IMS testing on HUS cases?

KEY BENEFITS OF THE GUIDELINES

These guidelines encourage active follow-up of HUS cases and improved recovery of STEC from clinical specimens.

CONCLUSIONS

These public health recommendations, in conjunction with the 2009 MMWR, provide a solid framework for the efficient and rapid diagnosis of STEC. Adoption of these recommendations nationwide will lead to improved comparability of laboratory findings between jurisdictions for surveillance purposes and outbreak investigations. Overall, 93% (57/61) of all respondents follow the recommendation to subculture to selective agar for O157 STEC. Further, 82% (50/61) of all respondents follow the new recommendation to subculture to less-selective agar for non-O157 STEC. Additional analysis based on the respondents’ PulseNet and FoodNet funding status and number of population served may be completed later. It should be noted this survey assessed current practices, which may not reflect planned changes that will increase the national level of STEC testing recommendations. Such changes may be reflected in the follow-up survey in 2013.