Wisconsin Department of Health Services
Division of Public Health
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Communicable Disease Case Reporting and Investigation Protocol
SHIGA TOXIN-PRODUCING *ESCHERICHIA COLI* (STEC)

(STECs are sometimes referred to as Enterohemorrhagic E. coli (EHEC) and Verotoxin-producing E. coli (VTEC).)

I. IDENTIFICATION AND DEFINITION OF CASES

A. **Clinical Description:** An infection of variable severity characterized by diarrhea (often bloody), abdominal cramps, and fatigue. Illness may be complicated by hemolytic uremic syndrome (HUS) or thrombotic thrombocytopenic purpura (TTP); asymptomatic infections may also occur.

B. **Laboratory Criteria:**

- **Confirmatory laboratory evidence:**
  - Isolation of *E. coli* O157:H7 from a clinical specimen, or
  - Isolation of *E. coli* from a clinical specimen with detection of Shiga toxin or Shiga toxin genes.
- **Supportive laboratory evidence:**
  - Isolation of *E. coli* O157 from a clinical specimen without confirmation of H7 antigen, detection of Shiga toxin, or detection of Shiga toxin genes, or
  - Detection of Shiga toxin or Shiga toxin genes in a clinical specimen using a culture-independent diagnostic test (CIDT*) and no known isolation of *Shigella* from a clinical specimen, or
  - Detection of *E. coli* O157 or STEC/Enterohemorrhagic E. coli (EHEC) in a clinical specimen using a CIDT, or
  - Identification of an elevated antibody titer against a known Shiga toxin-producing serogroup of *E. coli*.

*Culture-independent diagnostic testing (CIDT) typically refers to polymerase chain reaction (PCR) or enzyme immunoassay (EIA), but could refer to any non-culture based test method.

C. **Wisconsin Surveillance Case Definition:**

- **Confirmed:** A case that meets the confirmed laboratory criteria for diagnosis.
- **Probable:**
  - A person with isolation of *E. coli* O157 from a clinical specimen without confirmation of H antigen, detection of Shiga toxin or detection of Shiga toxin genes, or
  - A clinically compatible illness in a person:
    - With detection of Shiga toxin or Shiga toxin genes in a clinical specimen using a CIDT and no known isolation of *Shigella* from a clinical specimen, or
    - With detection of *E. coli* O157 or STEC/EHEC from a clinical specimen using a CIDT, or
    - That is epidemiologically linked to a confirmed or probable case with laboratory evidence, or
    - With identification of an elevated antibody titer against a known Shiga toxin-producing serogroup of *E. coli*, or
    - That is a member of a risk group as defined by public health authorities during an outbreak.
- **Suspect:**
  - Identification of an elevated antibody titer against a known Shiga toxin-producing serogroup of *E.coli* in a person with no known clinical compatibility, or
  - Detection of Shiga toxin or Shiga toxin genes in a clinical specimen using a CIDT and no known isolation of *Shigella* from a clinical specimen in a person with no known clinical compatibility, or
  - Detection of *E. coli* O157 or STEC/EHEC in a clinical specimen using a CIDT in a person with no known clinical compatibility, or
  - A person with a diagnosis of post-diarrheal HUS/TTP (see HUS case definition).

Notes: Clinical laboratories are asked to forward all isolates of Shiga toxin-producing *E. coli* and all clinical specimens from which Shiga toxin, *E. coli* O157 or EHEC was detected using a CIDT, to the Wisconsin State Laboratory of Hygiene (WSLH) for surveillance purposes.

Discordant results may occur between clinical and public health laboratories, including the WSLH. Persons with detection of Shiga toxin or Shiga toxin genes using a CIDT and the absence of isolation of STEC or *Shigella* from a clinical specimen, should be classified as a suspect or probable case (See Section C), regardless of whether detection of Shiga toxin or Shiga toxin genes is confirmed by a public health laboratory.

Although infections with Shiga toxin-producing organisms in the United States are primarily caused by STEC, in recent years an increasing number are due to infections by Shiga toxin-producing *Shigella*. Persons with (1) detection of Shiga toxin or Shiga toxin genes using a CIDT and (2) isolation of *Shigella* spp., and no isolation of *E. coli* from a clinical specimen, should not be reported as a STEC case. These should be reported as a case of shigellosis.

D. **Criteria to Distinguish a New Case:**
- A case should not be counted as a new case if laboratory results were reported within 180 days of a previously reported infection in the same individual.
- When two or more different serotypes are identified from one or more specimens from the same individual, each should be reported as a separate case.

II. REPORTING

A. **Wisconsin Disease Surveillance Category II – Methods for Reporting:** This disease shall be reported to the patient's local health officer or to the local health officer's designee within 72 hours of recognition of a case or suspected case, per Wis. Admin. Code § DHS 145.04 (3) (b). Report electronically through the Wisconsin Electronic Disease Surveillance System (WEDSS), or mail or fax a completed Acute and Communicable Disease Case Report (F-44151) to the address on the form.

B. **Responsibility for Reporting**: According to Wis. Admin. Code § DHS 145.04(1), persons licensed under Wis. Stat. ch. 441 or 448, laboratories, health care facilities, teachers, principals, or nurses serving a school or day care center, and any person who knows or suspects that a person has a communicable disease identified in Appendix A.

C. **Clinical Criteria for Reporting:** A case of post-diarrheal HUS or a clinically compatible illness in a person that is epidemiologically linked to a case with confirmatory or supportive laboratory evidence of STEC infection.

D. **Laboratory Criteria for Reporting:** Laboratory evidence of infection by culture or nonculture-based methods. All positive results should be reported.

III. CASE INVESTIGATION

A. **Responsibility for case investigation**: It is the responsibility of the local health department (LHD) to investigate or arrange for investigation of suspected or confirmed cases as soon as is reasonably possible. A case investigation may include information collected by phone, in person, in writing, or through review of medical records or communicable disease report forms, as necessary and appropriate.

B. **Required Documentation:**
1. Complete the WEDSS disease incident investigation report, including appropriate, disease-specific tabs. This may be facilitated by completing a Routine Enteric Follow-Up Worksheet. See page 1 of the Worksheet for specific instructions regarding which sections should be completed during routine follow-up.
2. If patient is unable to be reached for follow-up, contact the provider to obtain reported signs and symptoms. This is necessary for assigning the correct case classification. Document provider-reported signs, symptoms, onset date, hospitalization status, and any available exposure or risk information in the corresponding fields of the Lab/Clinical or Enteric Risk tabs in WEDSS.
3. Upon completion of investigation, set WEDSS disease incident process status to "Sent to State."

C. **Additional Investigation Responsibilities**
1. Assess all patients for high-risk settings or activities to include food handling, providing patient care or child care, or attending a child care facility.
2. Source investigation by LHD.

3. If the case is potentially outbreak-related, notify the Wisconsin Division of Public Health (DPH), Bureau of Communicable Diseases (BCD).

IV. PUBLIC HEALTH INTERVENTIONS AND PREVENTION MEASURES

A. In accordance with Wis. Admin. Code § DHS 145.05, local public health agencies should follow the methods of control recommended in the current editions of *Control of Communicable Diseases Manual*, edited by David L. Heymann, published by the American Public Health Association, and the American Academy of Pediatrics' *Red Book: Report of the Committee on Infectious Diseases*, unless otherwise specified by the state epidemiologist.

B. Educate the public about proper handwashing after using the toilet, changing diapers, assisting another with toileting, handling contaminated clothing or linens, before cooking, or when associating with high-risk individuals.

C. Exclude symptomatic patients from high-risk settings including food handling, providing patient care or child care, or attending a child care facility or 4K program.
   1. Individuals should not return to high-risk settings following exclusion until they have been cleared by their LHD. Return to high-risk activities for a person diagnosed with a STEC infection routinely requires evidence of two stool specimens negative for Shiga toxin-producing *E. coli* by culture or CIDT be provided to the LHD. Stool specimens for clearance (test of cure) should be collected 1) after the individual is asymptomatic and 2) at least 48 hours after discontinuing of antimicrobial therapy. Specimens should be collected at least 24 hours apart.
   2. Exclusion, restriction, and reinstatement criteria used by the LHD for infected individuals who are food employees should meet Wisconsin Food Code criteria, and may be more restrictive than the Wisconsin Food Code.

D. Follow-up should be conducted with child care facilities, 4K programs and other public or private group child settings where a STEC patient 1) spent time during the 7 days prior to illness onset, or 2) spent time while symptomatic, or 3) spent time after symptom resolution but before having verified negative stool specimens. Particular attention should be given to case finding, outreach, and education in settings with diaper-aged children or young children (approximately 5 years and under) whose hand hygiene may be unreliable and where risk of person-to-person transmission is more likely.

V. CONTACTS FOR CONSULTATION

A. Local health departments and tribal health agencies: https://www.dhs.wisconsin.gov/lh-depts/index.htm

B. Bureau of Communicable Diseases, Communicable Diseases Epidemiology Section: 608-267-9003

C. Wisconsin State Laboratory of Hygiene: 1-800-862-1013

VI. RELATED REFERENCES

A. Heymann DL, ed. *E. coli* Diarrheal Diseases. In: *Control of Communicable Diseases Manual*. 20th ed. Washington, DC: American Public Health Association, 2015: 158-172.

B. Pickering LK, ed. *Escherichia coli* Diarrhea. In: *Red Book*: *2015 Report of the Committee on Infectious Diseases*. 30th ed. Elk Grove Village, IL: American Academy of Pediatrics, 2015: 343-347.

C. Centers for Disease Control and Prevention website: http://www.cdc.gov/ecoli/etec.html

D. Wisconsin Food Code: http://docs.legis.wisconsin.gov/code/admin_code/atcp/055/75_.pdf

Table 1. Case Classification Determination Table

Laboratory Testing and Results			Clinically Compatible Illness	No Clinically Compatible Illness or Asymptomatic
Laboratory evidence of infection with STEC (culture and/or CIDT)	**Isolate of *E. coli* (Culture)**	Isolate of *E. coli* O157:H7 (Shiga toxin testing is <u>not</u> necessary; all *E. coli* O157:H7 isolates are assumed to produce Shiga toxin.)	Confirmed	Confirmed
		Isolate of *E. coli*, regardless of O group, with evidence of Shiga toxin by CIDT.	Confirmed	Confirmed
		Isolate of *E. coli* O157; No laboratory evidence of Shiga toxin by CIDT or demonstration of H7 antigen	Probable	Probable
	No isolate of *E. coli*	Laboratory evidence of Shiga toxin production, O157 antigen, STEC, or EHEC by CIDT.	Probable	Suspect
		Elevated Ab Titer to an STEC	Probable	Suspect
No laboratory evidence of infection with STEC (i.e. no specimens submitted for STEC testing).		Epi linked or in an outbreak risk group	Probable	N/A
		Diagnosis of post-diarrheal HUS/TTP	Suspect	N/A

Note: Culture independent diagnostic testing (CIDT) typically refers to polymerase chain reaction (PCR) or enzyme immunoassay (EIA), but could refer to any non-culture based test method.