09-ID-30

Committee: Infectious

Title: Public Health Reporting and National Notification for Escherichia coli, Shiga toxin-producing (STEC)

I. Statement of the Problem

CSTE position statement 07-EC-02 recognized the need to develop an official list of nationally notifiable conditions and a standardized reporting definition for each condition on the official list. The position statement also specified that each definition had to comply with American Health Information Community recommended standards to support "automated case reporting from electronic health records or other clinical care information systems." In July 2008, CSTE identified sixty-eight conditions warranting inclusion on the official list, each of which now requires a standardized reporting definition.

II. Background and Justification

Background[1]

Escherichia coli O157:H7 was first recognized as a major foodborne pathogen in the 1980s after the investigation of several large outbreaks. Subsequently, other serotypes of *E. coli* were identified which produce Shiga toxin and cause indistinguishable clinical illness, including progression to the hemolytic uremic syndrome in a fraction of those infected. In 1995, *E. coli* O157:H7 was made a nationally notifiable disease. In 2000, the nationally notifiable condition was expanded to include all Shiga toxin-producing *E. coli* causing clinical illness, in part due to the increasing recognition of the burden of non-O157 Shiga toxin-producing *E. coli*, and in part because clinical laboratories could test for it. A 2005 CSTE resolution clarified the classification of cases and included serotypes in case reporting.

The epidemiology and clinical consequences of infection with the different serotypes of STEC are distinctive but poorly understood in the United States, making it important to distinguish among serotypes in surveillance. STEC is a major cause of foodborne illness in the United States. Surveillance is necessary to detect and control outbreaks and to monitor the effectiveness of national strategies to prevent STEC infections.

Justification

Escherichia coli, Shiga toxin-producing (STEC) meets the following criteria for a nationally and **standard** notifiable condition, as specified in CSTE position statement 08-EC-02:

[1] Much of the material in the background is directly quoted from the CDC's E. coli website. See the references for further information on this source.

- A majority of state and territorial jurisdictions—or jurisdictions comprising a majority of the US population—have laws or regulations requiring **standard** reporting of *Escherichia coli,* Shiga toxin-producing (STEC) to public health authorities
- CDC requests **standard** notification of *Escherichia coli,* Shiga toxin-producing (STEC) to federal authorities
- CDC has condition-specific policies and practices concerning the agency's response to, and use of, notifications.

III. Statement of the desired action(s) to be taken

CSTE requests that CDC adopt this standardized reporting definition for *Escherichia coli,* Shiga toxin-producing (STEC) to facilitate more timely, complete, and standardized local and national reporting of this condition.

IV. Goals of Surveillance

To provide information on the temporal, geographic, and demographic occurrence of *Escherichia coli,* Shiga toxin-producing (STEC) to facilitate its prevention and control.

V. Methods for Surveillance

Surveillance for Escherichia coli, Shiga toxin-producing (STEC) should use the sources of data and the extent of coverage listed in Table V.

Table V. Recommended sources of data and extent of coverage for ascertaining cases of *Escherichia coli,* Shiga toxin-producing (STEC).

	Coverage	
Source of data for case ascertainment	Population-wide	Sentinel sites
clinician reporting	X	
laboratory reporting	X	
reporting by other entities (e.g., hospitals, veterinarians, pharmacies)	X	
death certificates	X	
hospital discharge or outpatient records	X	
extracts from electronic medical records	X	
telephone survey		
school-based survey		
other _____		

VI. Criteria for Reporting

Reporting refers to the process of healthcare providers or institutions (e.g., clinicians, clinical laboratories, hospitals) submitting basic information to governmental public health agencies about cases of illness that meet certain reporting requirements or criteria. Cases of illness may also be ascertained by the secondary analysis of administrative health data or clinical data. The purpose of this section is to provide those criteria that should be used by humans and machines to determine whether a specific illness should be reported.[2]

A. Narrative description of criteria to determine whether a case should be reported to public health authorities

Report any illness to public health authorities that meets any of the following criteria:

1. Any person with a culture positive for *E. coli* O157:H7 from a clinical specimen.
2. Any person with a culture positive for a Shiga-toxin producing *E. coli* from a clinical specimen.
3. Any person with diarrhea who is a contact of an STEC case or is a member of a defined risk group during an outbreak.
4. Any person with a diagnosis of hemolytic-uremic syndrome.
5. Any person with a diagnosis of thrombotic thrombocytopenic purpura.
6. Any person with diarrhea who has an elevated antibody titer against a Shiga-toxin producing serotype of *E. coli*.
7. A person whose healthcare record contains a recent diagnosis of *Escherichia coli*, Shiga toxin-producing (STEC).
8. A person whose death certificate lists *Escherichia coli*, Shiga toxin-producing (STEC) as a cause of death or a significant condition contributing to death.

Other recommended reporting procedures

- All cases of *Escherichia coli*, Shiga toxin-producing (STEC) should be reported.
- Reporting should be on-going and routine.
- Frequency of reporting should follow the state health department's routine schedule.

[2] "Human-based" criteria (described below under "A. Narrative") can be applied by medical care providers and laboratory staff based on clinical judgment and clinical diagnosis. Machine-based criteria (described below under "B. Table") can be applied using computerized algorithms that operate in electronic health record systems, including computerized records of laboratory test orders and laboratory test results; other clinical data systems (e.g., hospital discharge data systems serving multiple hospitals); or administrative data (e.g., healthcare provider billing data, vital records, and EMS data).

B. Table of criteria to determine whether a case should be reported to public health authorities

Table VI-B. Proposed Table of criteria to determine whether a case should be reported to public health authorities. Note: The following criteria are proposed for evaluation before general implementation. For purposes of currently implementing reporting the narrative description in VI-A, should be used.

Criterion	Reporting							
Clinical Presentation								
Diarrhea					N	N		N
Bloody diarrhea					C	C		C
Abdominal cramping					C	C		C
Hemolytic-uremic syndrome						N		
Thrombotic thrombocytopenic purpura							N	
Healthcare record contains a diagnosis of *Escherichia coli*, Shiga toxin-producing (STEC) gastrointestinal tract infection			S					
Death certificate lists *Escherichia coli*, Shiga toxin-producing (STEC) gastrointestinal tract infection as a cause of death or a significant condition contributing to death				S				
Laboratory findings								
Hemolytic anemia						N	N	
Thromobocytopenia						C	N	
Positive culture for *E. coli* O157:H7 from a clinical specimen	S							
Positive culture for *E. coli* that produces Shiga toxin from a clinical specimen		S						
Positive test for antibody to a Shiga toxin producing serotype of E. coli								N
Detection of Shiga toxin								
Positive culture for *E. coli* O157 from a clinical specimen without testing for H antigen								
Epidemiological risk factors								
Contact of a confirmed case of STEC infection					O			
Member of a high risk group defined by the public health authorities during an outbreak					O			

Notes:
S = This criterion alone is sufficient to report a case
N = This criterion in conjunction with all other "N" and any "O" criteria in the same column is required to report a case.

O = At least one of these "O" criteria in each category in the same column (e.g., clinical presentation and laboratory findings)—in conjunction with all other "N" criteria in the same column—is required to report a case.
C = This finding corroborates (i.e., supports) the diagnosis of—or is associated with—Escherichia coli, Shiga toxin-producing (STEC), but is not required for reporting.

C. Disease Specific Data Elements:

Disease-specific data elements to be included in the initial report are listed below.

Epidemiological Risk Factors

Food history for the 10 days prior to onset of illness
Consumption of raw, rare or undercooked ground beef
Consumption of lettuce
Consumption of uncooked spinach
Contact with recreational water in the 10 days prior to onset of illness
Contact with farm animals in the 10 days prior to onset of illness

VII. Case Definition for Case Classification

Narrative description of criteria to determine whether a case should be classified as confirmed, probable (presumptive), or suspected (possible).

Clinical description

An infection of variable severity characterized by diarrhea (often bloody) and abdominal cramps. Illness may be complicated by hemolytic uremic syndrome (HUS) or thrombotic thrombocytopenic purpura (TTP); asymptomatic infections also may occur and the organism may cause extraintestinal infections.

Laboratory criteria for diagnosis

- Isolation of Shiga toxin-producing *Escherichia coli* from a clinical specimen. *Escherichia coli* O157:H7 isolates may be assumed to be Shiga toxin-producing. For all other *E. coli* isolates, Shiga toxin production or the presence of Shiga toxin genes must be determined to be considered STEC.

Case classification

Suspect: A case of postdiarrheal HUS or TTP (see HUS case definition), or identification of Shiga toxin in a specimen from a clinically compatible case without the isolation of the Shiga toxin-producing *E. coli*.

Probable:

- A case with isolation of *E. coli* O157 from a clinical specimen, without confirmation of H antigen or Shiga toxin production,

OR

- A clinically compatible case that is epidemiologically linked to a confirmed or probable case,

OR

- Identification of an elevated antibody titer to a known Shiga toxin-producing *E. coli* serotype from a clinically compatible case.

Confirmed: A case that meets the laboratory criteria for diagnosis. When available, O and H antigen serotype characterization should be reported.

Comment

For users of the legacy National Electronic Telecommunications System for Surveillance (NETSS), laboratory-confirmed isolates are also reported via the Public Health Laboratory Information System (PHLIS), which is managed by the Enteric Diseases Epidemiology Branch, Division of Foodborne, Bacterial and Mycotic Diseases, National Center for Zoonotic, Vector-borne, and Enteric Diseases, CDC. The National Electronic Disease Surveillance System (NEDSS) or NEDSS compatible systems will eventually replace PHLIS and NETSS; users of NEDSS or compatible systems which report to CDC should not report via PHLIS.

Both asymptomatic infections and infections at sites other than the gastrointestinal tract, if laboratory confirmed, are considered confirmed cases that should be reported

B. Classification Tables

Table VII-B lists the criteria that must be met for a case to be classified as confirmed, probable (presumptive), or suspected (possible).

Table VII-B. Proposed table of criteria to determine whether a case is classified. Note: The following criteria are proposed for evaluation before general implementation. For purposes of current notification, the narrative description in VII-A, should be used.

	Case Definition					
Criterion	Confirmed	Probable			Suspected	
Clinical Presentation						
Diarrhea	C	N	N	N	N	N
Bloody diarrhea	C	C	C	C	C	C

Abdominal cramping	C	C	C	C	C	C
Hemolytic-uremic syndrome	C				O	
Thrombotic thrombocytopenic purpura	C				O	
Healthcare record contains a diagnosis of *Escherichia coli*, Shiga toxin-producing (STEC) gastrointestinal tract infection						
Death certificate lists *Escherichia coli*, Shiga toxin-producing (STEC) gastrointestinal tract infection as a cause of death or a significant condition contributing to death						
Laboratory findings						
Hemolytic anemia	C				C	
Thromobocytopenia	C					
Positive culture for *E. coli* O157:H7 from a clinical specimen	O	A				A
Positive culture for *E. coli* that produces Shiga toxin from a clinical specimen	O	A				A
Positive test for antibody to a Shiga toxin producing serotype of E. coli				N		
Detection of Shiga toxin						N
Positive culture for *E. coli* O157 from a clinical specimen without testing for H antigen		N				
Epidemiological risk factors						
Contact of a confirmed case of STEC infection			O			
Member of a high risk group defined by the public health authorities during an outbreak			O			

Notes:
N = This criterion in conjunction with all other "N" and any "O" criteria in the same column is required to classify a case.
O = At least one of these "O" criteria in each category in the same column (e.g., clinical presentation and laboratory findings)—in conjunction with all other "N" criteria in the same column—is required to classify a case.
A = This criterion must be absent (i.e., NOT present) for the case to meet the case definition.
C = This finding corroborates (i.e., supports) the diagnosis of—or is associated with—Escherichia coli, Shiga toxin-producing (STEC), but is not included in the case definition.

VIII. Period of Surveillance

Surveillance should be on-going.

IX. Data sharing/release and print criteria

Notification to CDC of confirmed and probable cases is recommended.

- Data will be used to determine the burden of illness due STEC, to assess the effectiveness over time of national control programs, and to assess progress towards national goals for reduction in STEC incidence. Data may also be useful to compare case numbers with information from other foodborne disease surveillance systems. Electronic reports of STEC cases in the US are summarized weekly in the MMWR tables and annual case data is summarized in the yearly Summary of Notifiable Diseases.

- State-specific compiled data will continue to be published in the weekly and annual MMWR. In addition to those reports, the frequency of reports/feedback to the states and territories will be dependent on the current epidemiologic situation in the country. Frequency of cases, epidemiologic distribution, and other factors will influence communications.

- State-specific compiled data will continue to be published in the weekly reports and annual MMWR surveillance summaries. All cases are verified with the states before publication.

X. References

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