Prince Edward Island
CANADA

Health and Wellness

Prince Edward Island Guidelines for the Management and Control of Shiga toxin-producing *Escherichia coli* (STEC/VTEC)

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Department of Health and Wellness
Chief Public Health Office

Contents

Case Definition[1]

Confirmed Case

Laboratory confirmation[a] of infection with or without clinical illness*:

- Isolation of Shiga toxin-producing *Escherichia coli* (STEC)[b] from an appropriate clinical specimen (e.g., stool, blood, urine);

  OR

- Detection of Shiga toxin antigen or nucleic acid in an appropriate clinical specimen (dependent on the test used) using a culture independent diagnostic test (CIDT), such as a nucleic acid test (NAT), or polymerase chain reaction (PCR).

Probable Case[c]

- Clinical illness in a person who is epidemiologically linked to a confirmed case, which would include persons with hemolytic uremic syndrome (HUS);

  OR

- Detection of E. coli O157 nucleic acid that is Shiga toxin negative or pending, with or without clinical illness, in an appropriate clinical specimen (i.e., dependent on the test used) using a NAT, such as a PCR.

Note: Culture is required for public health and clinical management, especially when the Shiga toxin type is unknown (i.e., unable to differentiate between stx1 and stx2). Thus, culture must be performed on CIDT/NAT-positive (CIDT+/NAT+) specimens to enable molecular typing (e.g., whole genome sequencing) for surveillance, outbreak detection and response, as per Canadian Public Health Laboratory Network (CPHLN) guidance. An isolate may also be required for antimicrobial susceptibility testing (AST) and/or antimicrobial resistance (AMR) predictions for AMR surveillance.

Note: NAT- positive (NAT+) and culture-negative (culture–) results for E. coli O157 would still be considered a probable case.

*Clinical illness may be characterized by the following symptoms: Diarrhea (often bloody), severe abdominal pain, vomiting, and less commonly fever. Illness may be complicated by hemolytic uremic syndrome (HUS). The severity of illness may vary. While not considered clinical illness, asymptomatic infections may occur.

[a] The use of CIDTs in clinical settings as stand-alone tests for the direct detection of STEC in stool is increasing. Common CIDTs used for STEC include antigen-based tests and molecular nucleic acid tests (NATs). It is best practice to culture the CIDT positive specimen as soon as possible, such as performing culture in the laboratory that generated the CIDT positive signal. When a specimen is positive using a CIDT, it is strongly advised to collect and document information on all culture results for the specimen (i.e., CIDT+/culture+ **versus** CIDT+/culture– **versus** CIDT+/culture not done); this information is helpful to inform the development and implementation of CIDT and associated case definitions at the provincial, territorial, and national levels.

[b] STEC includes non-O157 E. coli. **Note: The organism name "STEC" is synonymous with Verotoxigenic or Verocytotoxigenic Escherichia coli (VTEC).**

[c] Probable case definitions are provided as guidelines to assist with case finding and public health management and are not for national notification purposes.

Reporting Requirements

Laboratories

The Provincial Laboratory shall in accordance with the Prince Edward Island *Public Health Act*[2], report all positive laboratory results by phone and mail, fax or electronic transfer as soon as the result is known to the Chief Public Health Officer (CPHO) (or designate).

Etiology

Escherichia coli are gram-negative bacilli. The bacteria cause illness by creating a toxin referred to as a verotoxin (VTEC) or shiga-like toxin (STEC). The organism has a low infective dose.

Clinical Presentation

Like other foodborne illnesses, the symptoms of verotoxin-producing *Escherichia coli* (VTEC) involve the gastrointestinal tract including acute diarrhea, cramps, nausea, emesis and occasional fever. Diarrhea can range from mild and non-bloody to stools that are virtually all blood. The illness is often self-limited. Most individuals recover in 5 to 10 days.

Approximately 5-10% of those with VTEC can develop HUS which develops when the verotoxin breaks down the lining of the intestines and in some cases, damages the kidneys. This occurs in up to 15% of children and the elderly. The overall case fatality of VTEC is 1%.

Diagnosis

The diagnosis is made by positive stool, urine and blood culture for *E. coli* O157:H7. However, other serotypes of *E.coli* have also produced verotoxin such as O145. The diagnosis of *VTEC* should be considered in the presence of severe diarrhea, HUS, TTP or hemorrhagic colitis.

Epidemiology[3]

1. **Reservoir**

   Cattle are the principle reservoir of *Escherichia coli* including O157:H7. Humans may serve as an accidental host and therefore, act as a reservoir for person to person transmission.

2. **Transmission**

   The predominant mode of transmission is through the ingestion of contaminated food, often related to inadequate cooking or through cross-contamination during food preparation. Foods (in particular fruits and vegetables) contaminated by cow manure have been documented modes of transmission. Serious outbreaks have occurred in North America from inadequately cooked hamburgers, unpasteurized milk or cheese, apple cider, alfalfa sprouts, dry-cured salami, lettuce, game meat, and cheese curds. Transmission also occurs directly from person to person (in families, daycares, and institutions). Infection can occur after swimming in or drinking contaminated water. Outbreaks in children have been associated with petting zoos.

3. Incubation Period

The incubation period is typically three to four days with a range of one to 10 days.

4. Period of Communicability

The infection is communicable for the duration of excretion of the pathogen, commonly a week or less in adults and up to approximately three weeks in about one-third of children. Prolonged carriage is uncommon.

5. Host susceptibility

The elderly and children appear to be at higher risk for illness. Children less than five years of age are at greatest risk of developing HUS.

Occurrence

1. General

VTEC is an important problem in North America, Europe, South Africa, Japan, the southern cone of South America, and Australia.

2. Canada

Sporadic cases and outbreaks have occurred in Canada since the first reported outbreak in the United States in 1982. The highest age specific rate is among children one to four years old. Overall, the highest incidence is found in children under the age of 15 years[4].

3. Prince Edward Island

In the past ten years, the number of cases has ranged from two cases up to 16[5].

Control

1. Management of a case

- The CPHO is involved with the investigation of all VTEC cases. Public Health Nursing, Health PEI, will follow up all lab confirmed cases and environmental health officers may be consulted on cases as appropriate. Advice on the management of cases will be provided by the CPHO.
- Notification of test results and prescription of treatment (if required) will be carried out by the attending health care provider.
- Information should be provided about disease transmission and the appropriate infection prevention and control measures to be implemented to minimize the possibility of transmission including strict hand hygiene especially after using the washroom, changing diapers and before preparing/handling and serving food.
- Provide direction on exclusion from work and day care/school. Exclusion is required for symptomatic persons who are:
    - food handlers whose work involves
        - touching unwrapped food to be consumed raw or without further cooking and/or

        - handling equipment or utensils that touch unwrapped food to be consumed raw or without further cooking,
    - healthcare, daycare or other staff who have contact through serving food with highly susceptible patients or persons, in whom an intestinal infection would have particularly serious consequences,
    - those involved in patient care or care of young children, elderly or dependent persons,
    - children attending daycares or similar facilities who are diapered or unable to implement good standards of personal hygiene, and
    - older children or adults who are unable to implement good standards of personal hygiene (e.g., mentally or physically challenged).

- Exclusion applies until **two stool specimens** taken from the case are reported as negative. These specimens should not be taken less than 24 hours apart and should be taken at least 48 hours after normal stools have resumed (lab requisition should note "test for clearance").
- Advise the case about proper food handling practices, and to refrain from preparing food for others for the duration of the period of communicability.
- Contact precautions should be used in healthcare settings where children or adults have poor hygiene or incontinence that cannot be contained. Otherwise, routine practices are adequate.

2. Treatment of a case

- The use of antibiotics is not recommended and may be harmful by enhancing the release of toxins.
- Antimotility agents should be avoided.
- Replace fluids and electrolytes as required.

3. Management of contacts

- Contacts should be instructed about disease transmission, appropriate personal hygiene, routine practices, and contact precautions.
- Symptomatic contacts
    - Contacts who are symptomatic should be assessed by a physician.
    - Contacts who are symptomatic must be excluded from daycare or similar facilities or occupations involving food handling, patient care or care of young, elderly or dependent persons until they are no longer symptomatic.
- One stool specimen or culture will be requested from symptomatic contacts and must be reported as negative prior to returning to daycare or similar facilities, or occupations involving food handling, patient care or care of young, elderly or dependent persons.

- Asymptomatic contacts
    - Cultures of asymptomatic contacts should be done in consultation with the CPHO and would generally be confined to food handlers, attendants, and children in child care centers and other settings where the spread of infection is particularly likely.
    - The specimen must be reported as negative prior to returning to daycare or similar facilities or occupations involving food handling, patient care or care of young, elderly or dependent persons.

4. Preventative measures

- Provide public education about personal hygiene, especially the sanitary disposal of feces and careful hand washing after defecation and sexual contact, and before preparing or eating food.
- Advise infected individuals to avoid food preparation.
- Educate food handlers about proper food and equipment handling, preparation, and hygiene especially in avoiding cross-contamination from raw meat products, and thorough hand washing.
- Advise individuals to consume only pasteurized milk, dairy products, and juices.
- Advise on safe food preparation such as cooking beef adequately, especially ground beef, to an internal temperature of 71^0C (160^0F) and using a meat thermometer and not relying on cooking until pink color is gone; washing fruits and vegetables, particularly if eaten raw; and peeling raw fruits when possible.
- Educate about the risk of sexual practices that permit fecal-oral contact.
- Advise on testing private water supplies for presence of bacterial contamination, if suspected.
- Advise on washing hands thoroughly and frequently using soap, in particular after contact with farm animals or the farm environment, contact with animals in public settings such as fairs, farm tours, petting zoos, camps, and schools.

References

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