



Escherichia coli (Verotoxigenic)

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This chapter was adapted with permission from Alberta Health. For more information regarding *Escherichia coli* see: [Alberta Public Health Disease Management Guidelines: Escherichia coli Verotoxigenic Infections](#).

1. CASE DEFINITION

Confirmed Case

- Laboratory confirmation of infection with or without clinical illness*
 - Isolation of verotoxin-producing *Escherichia coli* (includes but not limited to O157:H7) from an appropriate clinical specimen (e.g., feces, urine, blood) **OR**
 - Detection of verotoxin antigen or nucleic acid in an appropriate clinical specimen

Probable Case

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

*Clinical illness is characterized by diarrhea (often bloody) and abdominal cramps. Disease may be complicated by hemolytic uremic syndrome (HUS), thrombocytopenia purpura (TTP), or pulmonary edema. The microorganism may also cause extra-intestinal infections and asymptomatic infections do occur.

2. DIAGNOSIS

- The diagnosis is made by positive stool, urine, and blood culture for *E. coli*
- The diagnosis of *E. coli* should be considered in the presence of:
 - Severe diarrhea
 - Hemolytic uremic syndrome (HUS)



- Thrombocytopenia purpura (TTP)
- Hemorrhagic colitis
- Confirmation can be obtained by isolation of *E. coli* of the same serotype from the incriminated food
- For more information, please refer to [Alberta Provincial Laboratory Guide to Services](#)

3. REPORTING

Health Care Professionals

- Confirmed and probable cases are to be reported to the Office of the Chief Public Health Officer (OCPHO) by telephone (867) 920-8646, **immediately AND**
- Within **24 hours** complete and fax
 - The [Communicable Disease Reporting Form](#) to the OCPHO (867) 873-0442 **AND**
 - The [Food and Waterborne Illness Investigation Form](#) to the Environmental Health Office (867) 669-751
- **Immediately** report all outbreaks or suspect outbreaks by telephone (867) 920-8646 to the OCPHO

Laboratories

- Report positive results to the OCPHO by fax (867) 873-0442 **immediately**

4. OVERVIEW

Causative Agent

- *Escherichia coli* (*E. coli*) is a gram-negative bacillus
- *E. coli* cause illness by creating a toxin referred to as a verotoxin (VTEC), sometimes referred to as shiga-like toxin (STEC)
- The organism has a low infective dose (10 organisms by ingestion) and is resistant to cold storage, acid conditions, and drying
- *E. coli* is a bacterial species with many strains, one of which is of main concern: 0157:H7

Clinical Presentation and Major Complications

For information regarding *E. coli* Verotoxin clinical presentations and complications See [Alberta Public Health Disease Management Guidelines: Escherichia coli Verotoxigenic Infections](#).



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 (especially fruits and vegetables) contaminated by cow manure are 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 can also occur directly from person to person (in families, daycares, and institutions)
- Infection can occur after swimming in or drinking contaminated water
- Cattle are the main reservoir of *Escherichia coli* including the strain O157:H7
- Humans may serve as an accidental host and act as a reservoir for person-to-person transmission

Incubation Period

- The incubation period is typically 3-4 days with a range of 1-10 days
- The infection is communicable for the duration of pathogen excretion:
 - ≤ 1 week in adults
 - About 3 weeks in 33% of children
- Prolonged carriage is uncommon

Clinical Guidance

- For patient specific clinical management consult your local healthcare professional, paediatrician, infectious disease specialist, or the [NWT Clinical Practice Guidelines](#)

5. PUBLIC HEALTH MEASURES

Key Investigations

- Determine the possible source of infection taking into consideration the incubation period, reservoir, and mode of transmission
- Assessment may include:
 - Determining ingestion, and time of ingestion of potentially contaminated food, especially, undercooked meats (primarily ground beef), unpasteurized milk, juices, raw fruits, and vegetables



- Obtaining a food history
- Determining history of contact with untreated water
- Determining history of working with animals
- Assessing for recent visit to a farm or petting zoo
- Determining history of high-risk sexual practices, especially contact with feces
- Identifying history of recent travel
- Identify history of residing in areas with poor sanitation including improper water treatment and sewage disposal and include recent immigration
- Assess for history of similar symptoms in other members of the household
- Obtain implicated food samples, if possible
- Suspected contaminated food may be held to prevent of consumption
- Suspected contaminated food may be destroyed
- Identify contacts.

Management of Cases

- All cases should be instructed about disease transmission, appropriate personal hygiene, routine practices, and contact precautions.
- Exclusion should be considered for symptomatic and asymptomatic persons who are:
 - **Food handlers** whose work involves:
 - Touching unwrapped food to be consumed raw or without further cooking
 - Handling equipment or utensils that touch such food
 - **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
 - Are 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
 - **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 infected person a minimum of 24 hours apart and at least 48 hours after normal stools have resumed, are reported as negative
- Reassignment to low-risk areas may be used as an alternative to exclusion
- Contact precautions should be used in healthcare settings where the patient has poor hygiene or incontinence that cannot be contained, otherwise, routine practices are adequate

Management of Contacts

- If there are others who are ill, the OCPHO will require a line list of symptomatic contacts, if any are noted by patient



- Contacts include:
 - Persons living in the household,
 - Children and childcare workers in a daycare/day home
 - Individuals exposed to the same source (if it is identified)
- Contacts should be instructed about disease transmission, appropriate personal hygiene, contact precautions, and routine precautions
- Symptomatic contacts
 - Contacts who are symptomatic should be assessed by a physician
 - Contacts who are symptomatic may be excluded from daycare or similar facilities or occupations involving food handling, patient care or care of the young, care of the elderly, and care of dependent persons as per CPHO (or designate) assessment and until they are no longer symptomatic
 - One stool specimen or culture may be requested from symptomatic contacts
 - 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 the young, care of the elderly, or care of dependent persons
- Asymptomatic contacts
 - Asymptomatic contacts are generally excluded from daycare or similar facilities or occupations involving food handling, patient care or care of the young, care of the elderly or care of dependent persons
 - Consultation with the CPHO (or designate) is appropriate
 - Asymptomatic contacts who have been excluded from work or daycare may be required to submit one stool specimen, if deemed appropriate (e.g., past recent illness, on the advice of the CPHO or designate)

Prevention

- 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
- 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
- Adherence to the regulations outlined in [the Food establishment safety regulations of the NWT Public Health Act](#)
- Advise infected individuals to avoid food preparation
- Educate about the risk of sexual practices that permit fecal-oral contact
- Educate about condom use for safer sex



- Test private water supplies for presence of bacterial contamination, if suspected
- Advise individuals to not use public recreational water (e.g., pools, lakes, ponds) for two weeks after the symptoms resolve
- Advise individuals to consume only pasteurized milk, dairy products, and juices
- Thoroughly cook meats. Heat beef (especially ground beef) to 74°C during cooking

6. PUBLIC & HEALTH PROFESSIONAL EDUCATION

For more information about Verotoxigenic *E. coli*:

- Health Canada: Canada/[Verotoxigenic *E. coli*](#)
- BC CDC: [E.coli Infection](#)
- Centres for Disease Control and Prevention: CDC/[Verotoxigenic *E. coli*](#)
- World Health Organization: WHO/[Verotoxigenic *E. coli*](#)

7. EPIDEMIOLOGY

- The first reported Verotoxigenic *E. coli* outbreak was in the United States in 1982
- Since this outbreak, cases and outbreaks have occurred sporadically in Canada
- Overall, the highest incidence is found in children under the age of 15 years
- For more information on the epidemiology of Verotoxigenic *E. coli* in the Northwest Territories (NWT) see: [Epidemiological Summary of Communicable Diseases HSS Professionals](#)

8. REFERENCES

Information for this chapter was adapted with permission from Alberta Health's Public Health Disease Management Guidelines. For more information see [Alberta Public Health Disease Management Guidelines: *Escherichia coli* Verotoxigenic Infections.](#)