

Appendix A: Disease-Specific Chapters

Chapter: *Clostridium difficile* Infection (CDI) outbreaks
in public hospitals

[Known as *Clostridium difficile* associated disease
(CDAD) in the regulations under the HPPA]

Effective: February 2019

***Clostridium difficile* Infection (CDI) outbreaks in public hospitals**

Communicable

Virulent

**Health Protection and Promotion Act:
O. Reg. 135/18 (Designation of Diseases)**

1.0 Aetiologic Agent

Clostridium difficile (*C. difficile*) is a gram-positive, spore-forming, anaerobic bacillus. It is widely distributed in the environment and colonizes up to 3-5% of adults without causing symptoms. Some strains can produce two toxins that are responsible for diarrhea: toxin A and toxin B.¹

2.0 Case Definition

2.1 Surveillance Case Definition

Refer to [Appendix B](#) for Case Definitions.

2.2 Outbreak Case Definition

The outbreak case definition varies with the outbreak under investigation. Please refer to the *Infectious Diseases Protocol, 2018* (or as current) for guidance in developing an outbreak case definition as needed.

The outbreak case definitions are established to reflect the disease and circumstances of the outbreak under investigation. The outbreak case definitions should be developed for each individual outbreak based on its characteristics, reviewed during the course of the outbreak, and modified if necessary, to ensure that the majority of cases are captured by the definition. The case definitions should be created in consideration of the outbreak definitions.

Outbreak cases may be classified by levels of probability (*i.e.* confirmed and/or probable).

Please also see Annex C of the Provincial Infectious Diseases Advisory Committee (PIDAC)'s Routine Practices and Additional Precautions in All Health Care Settings.¹

3.0 Identification

3.1 Clinical Presentation

Symptoms of *C. difficile* infection (CDI) include:²

- Diarrhea (as defined in Appendix B);
- Fever;
- Loss of appetite;
- Nausea; and
- Abdominal pain or tenderness.

Complications include dehydration and colitis,² and may also lead to life threatening systemic toxicity requiring surgical intervention and may also lead to death.^{1,2}

Recurrence of CDI is common and occurs in about 30% of cases.¹

3.2 Diagnosis

See [Appendix B](#) for diagnostic criteria relevant to the Case Definitions.

For additional information, please consult Public Health Ontario's (PHO) testing information on *Clostridium difficile*.³

4.0 Epidemiology

4.1 Occurrence

C. difficile is the most frequent cause of infectious diarrhea in health care facilities in Canada.⁴ Outbreaks in Canada, the United States, and Europe have been associated with a hypervirulent epidemic strain referred to as the NAP1/BI/027 strain. Characteristics of this strain include the presence of a binary toxin; increased resistance to clindamycin and the fluoroquinolone class of antibiotics; and an increased likelihood of a serious illness.¹

Between 2013 and 2017, an average of 2,661 cases (confirmed and probable) of CDI has been reported per year in Ontario.*

Rates of CDI associated with reporting facilities have decreased 27%, from 3.0 per 10,000 patient days in 2013 to 2.2 per 10,000 patient days in 2017.

Please refer to PHO's Reportable Disease Trends in Ontario reporting tool and other reports for the most up-to-date information on infectious disease trends in Ontario.

<http://www.publichealthontario.ca/en/DataAndAnalytics/Pages/DataReports.aspx>

For additional national and international epidemiological information, please refer to the Public Health Agency of Canada and the World Health Organization.

* Data included in the epidemiological summary are from January 1, 2013 to December 31, 2017. Data were extracted from Query on February 7, 2018 and therefore are considered preliminary.

4.2 Reservoir

C. difficile bacteria are found in feces of humans.⁴

4.3 Modes of Transmission

C. difficile is widely distributed in the environment. It produces spores that survive for longer periods of time and are resistant to destruction by environmental factors (e.g. temperature, humidity), including standard cleaning agents.⁵ In an effort to protect itself from undesirable environmental conditions, it assumes its spore form.

C. difficile is spread through the fecal-oral route of transmission.⁴ *C. difficile* can be acquired in both hospital and community settings.⁵ *C. difficile* can be transmitted and/or acquired by patients through contact with contaminated surfaces (including both vegetative cells and spores).

CDI may occur when antibiotics kill normal bowel bacteria and allow the *C. difficile* to grow. When *C. difficile* grows, it may produce toxins, which can damage the bowel and may cause diarrhea.⁴

4.4 Incubation Period

The incubation period of *C. difficile* following acquisition has not been clearly defined. Studies have determined that onset of infection can occur within 48 hours after exposure and up to 3 months post exposure.^{6,7}

4.5 Period of Communicability

Precise period of communicability is unknown; it may vary depending on the amount of toxin in the stool, which can vary from very small to large spores and are very difficult to eliminate from surfaces and objects. Cytotoxins may persist in stool for weeks.¹

4.6 Risk Factors for Acquisition of CDI

Risk Factors associated with CDI include:¹

- a history of antibiotic usage, particularly broad spectrum antibiotics that affect the normal gut bacterial flora, such as fluoroquinolones;
- immunosuppressive therapy post-transplant;
- proton pump inhibitors;
- bowel disease and bowel surgery;
- chemotherapy; and/or
- hospitalization.

Additional risk factors that predispose some people to develop more severe disease include:¹

- history of CDI;
- increased age;
- immunosuppressive therapy;

- recent surgery; and/or
- CDI with the hypervirulent strain of *C. difficile*.

5.0 Reporting Requirements

As per Requirement #3 of the “Reporting of Infectious Diseases” section of the *Infectious Diseases Protocol, 2018* (or as current), the minimum data elements to be reported for each case are specified in the following:

- *Ontario Regulation 569* (Reports) under the *Health Protection and Promotion Act* (HPPA);⁸
- The iPHIS User Guides published by PHO; and
- Bulletins and directives issued by PHO.

6.0 Prevention and Control Measures

6.1 Personal Prevention Measures

Effective hand hygiene is essential to limit the spread of *C. difficile*. Other infection prevention and control strategies, including, but not limited to, education for staff, patients, visitors/families may be used.¹

Messaging to visitors should be written in clear language and include the following:

- What is CDI and what the visitor’s risk of acquiring it is;
- How to properly clean their hands (and its importance);
- When personal protective equipment is needed and how to put on and take off;
- Measures to take when providing direct care to the patient/or having significant contact with the patient’s environment (i.e. wear gown and gloves);
- Instructions to only use visitor washrooms and where these are located; and
- Instructions to visit their significant other in isolation last if they are visiting more than one person in the hospital.

6.2 Infection Prevention and Control Strategies

Prevention Strategies in institutions include:¹

- early identification and testing of patients with symptoms;
- empowering front-line staff to institute additional precautions at onset of symptoms; and
- daily surveillance reporting to Infection Prevention and Control program staff.

In addition to Routine Practices, Contact Precautions should be initiated by any regulated health care provider (e.g., physician, nurse) at onset of diarrhea and prior to receipt of *C. difficile* test results.

More detailed information is available in the PIDAC’s Annex C: Testing, Surveillance and Management of *Clostridium difficile*.¹

6.3 Management of Cases

In addition to the requirements set out in the Requirement #2 of the “Management of Infectious Diseases – Sporadic Cases” and “Investigation and Management of Infectious Diseases Outbreaks” sections of the *Infectious Diseases Protocol, 2018* (or as current), the board of health may be requested to provide guidance to manage cases. Individual cases should be managed as per individual facility protocols. Facilities developing protocols may refer to the Roles and Responsibilities of Hospitals and Public Health Units in CDI Reporting and Outbreak Management, 2014 (or as current) and the PIDAC’s Annex C: Testing, Surveillance and Management of *Clostridium difficile*.^{1,9}

6.4 Management of Contacts

Not applicable.

6.5 Management of Outbreaks

Provide public health support to health care facilities in the management of outbreaks or clusters in order to identify the source of illness and manage the outbreak as per the *Infectious Diseases Protocol, 2018* (or as current) and Roles and Responsibilities of Hospitals and Public Health Units in CDI Reporting and Outbreak Management, 2014 (or as current), See [Appendix B](#) for the CPE outbreak definition.⁹ PHO’s Infection Control Resource Teams (ICRTs) can provide Infection Control expertise and support in the event of an outbreak.

The criteria for declaring an outbreak over should be determined collaboratively by the facility and the local public health unit as part of the outbreak management team process.

Factors to consider in declaring an outbreak over should include:

- Control measures have been implemented and validated through an audit process.
- There has been a return to unit/ ward or facility baseline for nosocomial CDI. For a facility-wide outbreak, this should be a minimum period of one month.
- Reservoir of colonized patients/ residents in the facility has been discharged.
- Facility’s past experience with CDI outbreaks demonstrates ability to bring them under control.

7.0 References

1. Ontario Agency for Health Protection and Promotion, Provincial Infectious Diseases Advisory Committee. Annex C – Testing, Surveillance and Management of *Clostridium difficile*. Annexed to: Routine Practices and Additional Precautions in All Health Care Settings. Toronto, ON: Queen's Printer for Ontario; 2013. Available from: https://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/PIDAC/Pages/Routine_Practices_Additional_Precautions.aspx

2. Government of Canada. C. difficile (Clostridium difficile) [Internet]. Ottawa, ON: Her Majesty the Queen in Right of Canada; 2012 [updated October 9, 2012; cited May 31, 2018]. Available from: <https://www.canada.ca/en/public-health/services/diseases/c-difficile.html>
3. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Testing Information: Clostridium difficile [Internet]. Toronto, ON: Queen's Printer for Ontario; 2016 [updated September 30, 2016; cited June 11, 2018]. Available from: https://www.publichealthontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/Clostridium_difficile_toxin_EIA.aspx
4. Government of Canada. Fact Sheet - Clostridium difficile (C. difficile) [Internet]. 2014 [updated May 2, 2014]. Available from: <https://www.canada.ca/en/public-health/services/infectious-diseases/fact-sheet-clostridium-difficile-difficile.html>
5. McFarland LV, Beneda HW, Clarridge JE, Raugi GJ. Implications of the changing face of Clostridium difficile disease for health care practitioners. American Journal of Infection Control. 2007;35(4):237-53.
6. Muto CA, Pokrywka M, Shutt K, Mendelsohn AB, Nouri K, Posey K, et al. A large outbreak of Clostridium difficile–associated disease with an unexpected proportion of deaths and colectomies at a teaching hospital following increased fluoroquinolone use. Infection Control & Hospital Epidemiology. 2005;26(3):273-80.
7. Wilkins TD, Lyerly DM. Clostridium difficile testing: after 20 years, still challenging. Journal of clinical microbiology. 2003;41(2):531-4.
8. Health Protection and Promotion Act, R.S.O. 1990, Reg. 569, Reports, (2018). Available from: <https://www.ontario.ca/laws/regulation/900569>
9. Ontario. Ministry of Health and Long-Term Care. Roles and Responsibilities of Hospitals and Public Health Units in CDI Reporting and Outbreak Management, 2014. Toronto, ON: Queen's Printer of Ontario; 2014. Available from: http://www.health.gov.on.ca/en/pro/programs/publichealth/oph_standards/reference.aspx

8.0 Document History

Table 1: History of Revisions

Revision Date	Document Section	Description of Revisions
January 2014	General	<p>New template.</p> <p>Title of Section 5.2 changed from “To Public Health Division (PHD)” to “To the Ministry of Health and Long-Term Care (the ministry) or Public Health Ontario (PHO), as specified by the ministry”</p> <p>Section 9.0 Document History added.</p>
January 2014	1.0 Aetiologic Agent	<p>Changed from “<i>Clostridium difficile</i> (<i>C.difficile</i>) is a spore-forming gram-positive anaerobic bacillus that produces two exotoxins: toxin A and toxin B. It is present in the environment and can colonize in up to three to five per cent of adults in the community without causing symptoms” to “<i>Clostridium difficile</i> is a Gram-positive, spore-forming, anaerobic bacillus. It is widely distributed in the environment and colonizes up to 3-5% of adults without causing symptoms. Some strains can produce two toxins that are responsible for diarrhea: toxin A and toxin B.”</p>
January 2014	2.2 Outbreak Case Definition	<p>Changed from “See Appendix B” to “See Annex C of the PIDAC-IPC Routine Practices and Additional Precautions.”</p>

Revision Date	Document Section	Description of Revisions
January 2014	4.1 Occurrence	<p>The following paragraph was deleted “<i>C.difficile</i> infection (CDI) has been associated with infectious diarrhea in health care settings for about 30 years and can be acquired in both hospital and community settings (3). It may occur when antibiotics kill normal bowel bacteria and allow the <i>C. difficile</i> to grow. When <i>C. difficile</i> grows, it may produce toxins, which can damage the bowel and may cause diarrhea. <i>C. difficile</i> infection is usually mild but sometimes can be more severe. In severe cases, surgery may be needed, and in extreme cases <i>C. difficile</i> may cause death.”</p> <p>Second, third and fourth paragraphs added.</p>
January 2014	4.3 Modes of Transmission	Third paragraph added.
January 2014	4.6 Risk Factors for acquisition of CDI	<p>Section title changed from “Susceptibility and Resistance” to “Risk Factors for acquisition of CDI”.</p> <p>Risk factors updated.</p>
January 2014	5.0 Reporting Requirements	<p>Changed from “Mandatory and standardized reporting of <i>C. difficile</i> has been introduced for all Ontario hospitals to monitor rates...” to “Mandatory patient safety reporting and patient-level reporting of <i>C. difficile</i> outbreak related cases is in effect for all Ontario hospitals to monitor rates...”.</p>
January 2014	5.2 To the Ministry of Health and Long-Term Care (the ministry) or Public Health Ontario (PHO), as specified by the ministry	Entire section revised, reporting requirements updated.
January 2014	6.1 Personal Prevention Measures	Additional information about effective hand hygiene added to first paragraph.

Revision Date	Document Section	Description of Revisions
January 2014	6.2 Infection Prevention and Control Strategies	Control measures revised, changed from “Control Strategies in institutions include (3):In addition to routine practices, initiate contact precautions, which include signage for contact precautions, use of gloves and gown upon entering room, use of dedicated patient care equipment including bedpans and commodes, Isolate patients in private rooms or cohort patient(s) if necessary, Discontinue antibiotic therapy and commence treatment if applicable, Appropriate environmental cleaning practices, Reinforce hand hygiene practices” to “In addition to Routine Practices, Contact Precautions should be initiated by any regulated health care provider (e.g., physician, nurse) at onset of diarrhea and prior to receipt of C. difficile test results. Contact Precautions should also be initiated when: there is a suspected or confirmed case of CDI, there is toxic megacolon or pseudomembranous colitis. Ideally, patients should be placed on precautions in a single room with dedicated toileting facilities. When that is not possible the decision regarding placement should be based on the criteria outlined in PIDAC-IPC’s Annex C: Testing Surveillance and Management of Clostridium difficile”.
January 2014	6.5 Management of Outbreaks	Entire section revised.
January 2014	7.0 References	Updated.
January 2014	8.0 Additional Resources	Updated.

Revision Date	Document Section	Description of Revisions
February 2019	General	Minor revisions were made to support the regulation change to Diseases of Public Health Significance. Common text included in all Disease Specific chapters: Surveillance Case Definition, Outbreak Case Definition, Diagnosis, Reporting Requirements, Management of Cases and Management of Outbreaks. The epidemiology section and references were updated and Section 8.0 Additional Resources was deleted.
February 2019	6.0 Prevention and Control Measures	Information under each heading summarized.

