

# **Guidelines for the Management of *Clostridium difficile* Infection (CDI) in all Healthcare Settings**

**Saskatchewan  
Infection Prevention and Control Program**

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The Saskatchewan Infection Prevention and Control Program is a collaboration among Regional Health Authorities (RHAs), the Ministry of Health, and other stakeholders. Its mandate is to ensure that all participants are aware of leading infection control practices and emerging standards.

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This document is current to August 2015.

New material in this revision is highlighted in olive green in the text.

**Summary of major revisions:**

<b><u>Page:</u></b>	<b><u>Revisions:</u></b>
1-2	Updated epidemiology trends and national/provincial incidence rates
3	Clarification of several risk factors for the development of CDI
4	Further clarification of hand hygiene practices for care of patients/residents with CDI
5	New section on personal hygiene for patients/residents with CDI
6	Clarification of the role of ICP consultation for accommodation of patients/residents with CDI
6-7	Stronger stance on bedpan management
7-8	Updated and clarified information about environmental cleaning practices
11	Addition of three new subject headings: Handling deceased bodies, Discharge planning, and Antimicrobial stewardship
12-14	Complete revision of lab testing section to reflect current provincial testing practices
15	New link to Saskatchewan CDI Surveillance Protocol on government website
15-16	Enhanced outbreak management measures
16	New link to Saskatchewan outbreak reporting protocol and forms on government website
17-19	Complete revision of medical management section to reflect current technology
27-28	New Appendix D – Discharge/transfer cleaning checklist
30	Enhanced cleaning instructions for CDI in the home (Appendix E)
31-32	New Appendix F – CDI outbreak management checklist
33	New Appendix G – Patient Stool Record Chart
34-35	New Appendix H – CDI Medical Management Algorithm
36-37	Additions to glossary

## Table of Contents

Introduction .....	1
Epidemiology.....	1
Infection Prevention and Control Measures .....	3
1. Initiation of Contact Precautions .....	4
2. Hand Hygiene.....	4
3. Personal Hygiene .....	5
4. Personal Protective Equipment (PPE).....	5
5. Accommodation.....	5
6. Patient/Resident Transport .....	6
7. Chart Alerts .....	7
8. Disposal of Waste .....	7
9. Environmental Cleaning.....	7
10. Patient/Resident Care Equipment .....	10
11. Dietary.....	10
12. Linen and Laundry.....	10
13. Visitors .....	10
14. Patient/Resident and Family Teaching .....	11
15. Staff Exclusion from Work .....	11
16. Discontinuing Additional Precautions.....	11
17. Handling Deceased bodies.....	11
18. Discharge Planning.....	11
19. Antimicrobial Stewardship.....	11
Identifying <i>Clostridium difficile</i> Infection.....	12
Outbreak Management .....	15
Medical Management of <i>Clostridium difficile</i> Infection .....	16
References .....	20
Appendix A: IPAC Measures for Suspected and Confirmed Cases of CDI .....	24
Appendix B: Sample Hand Washing Poster .....	25
Appendix C: Procedure – Transporting a Patient/Resident on Contact Precautions.....	26
Appendix D: Discharge/Transfer Cleaning Checklist.....	27
Appendix E: Information Sheet – Patient, Resident and Family Information about <i>Clostridium difficile</i>	29
Appendix F: <i>Clostridium difficile</i> (CDI) Outbreak Management Checklist.....	31
Appendix G: Patient Stool Record Chart.....	33
Appendix H: CDI Medical Management Algorithm .....	34
Glossary.....	36

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## Introduction

This document outlines infection prevention and control practices to:

- assist healthcare providers in the management of patients and residents with *Clostridium difficile* infection (CDI) and outbreaks related to CDI; and,
- prevent the transmission of *Clostridium difficile* infection to other patients and residents.

It applies to all patients and residents in acute care, long-term care, and other residential care facilities.

These guidelines should be integrated with existing health region infection prevention and control programs, and used as part of a comprehensive effort to maintain accepted standards of infection prevention and control.

## Epidemiology

*Clostridium difficile* (*C. difficile*) is a gram positive, spore-forming anaerobic bacillus. It is the leading cause of healthcare-associated diarrhea in industrialized countries and has been responsible for a large number of outbreaks in Canadian hospitals.<sup>1</sup>

*C. difficile* is commonly found in nature and is able to survive for long periods in the environment through the production of spores. *C. difficile* cells die within minutes of exposure to air; however, it is the spores that are the transmissible form of *C. difficile*. *C. difficile* has been found in animals such as pigs, dogs, cat, horses, calves and sheep, as well as in common environmental reservoirs such as drinking water, swimming pools and soil. Despite the widespread presence and hardiness of *C. difficile* spores and the high likelihood that humans ingest *C. difficile* frequently, most remain asymptomatic and uncolonized as a result of their normal protective gut flora.<sup>2</sup> *C. difficile* infection is highly associated with healthcare exposure due to the disruption of this normal flora, usually by prior antimicrobial use.

According to a recent report prepared by the Public Health Agency of Canada through the Canadian Nosocomial Infection Surveillance Program (CNISP), the incidence of healthcare-associated CDI (HA-CDI) in Canada in 2013 was 3.99 per 1,000 admissions and 5.10 per 10,000 patient days. For the Western region (BC, Alberta, Saskatchewan and Manitoba), the rate of CDI in 2012 was 3.66 per 1,000 admissions and 4.86 per 10,000 patient days.<sup>3</sup> The Saskatchewan *Clostridium difficile* infection (CDI) surveillance program began on July 1, 2012. The incidence of HA-CDI in Saskatchewan in the 2014-15 surveillance year was 3.2 in acute care, 0.1 in long-term care, and 0.8 per 10,000 patient/resident days overall.<sup>4</sup>

In the healthcare setting, the primary reservoirs of *C. difficile* include colonized or infected patients/residents, and contaminated environments and surfaces within hospitals and long-term care facilities. *C. difficile* spores can survive on environmental surfaces for months or years and can be

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<sup>1</sup> Provincial Infectious Diseases Advisory Committee (PIDAC), "Annex C: Testing, Surveillance and Management of *Clostridium difficile*", 3.

<sup>2</sup> Gerding and Lessa, 38.

<sup>3</sup> Canadian Nosocomial Infection Surveillance Program (CNISP) "Antimicrobial Resistant Organisms (ARO) Surveillance: Surveillance Report for Data from January 1 2009 to June 30 2014", 3.

<sup>4</sup> Government of Saskatchewan, "Clostridium difficile Surveillance Report: Saskatchewan 2014-15", 1.

found on multiple surfaces in the healthcare settings.<sup>5</sup> Transmission of *C. difficile* occurs primarily through the fecal-oral route following transient contamination of the hands of healthcare workers and patients/residents. Contamination of the care environment also plays a major role in the spread of *C. difficile*.

The clinical presentation of CDI ranges in severity from mild or moderate diarrhea to life-threatening pseudomembranous colitis, which can lead to toxic dilation of the colon (megacolon), sepsis and death.<sup>6</sup> CDI has been associated with increased length of hospital stay, costs, morbidity and mortality in adult and pediatric patients. There is limited data on the true economic burden of CDI, although it is known to be significant. In 2008, CDI was estimated to cost \$4.8 billion in excess healthcare costs in acute-care facilities in the US. However, there are additional costs of CDI that have yet to be quantified, such as cost of treating CDI in long-term care facilities (LTCFs), increases in discharges to LTCFs, lost opportunity costs if the patient/resident with CDI is isolated in a semiprivate room, and contributions to the transmission of *C. difficile* and additional new cases of CDI.<sup>7</sup>

Studies have revealed that the prevalence of asymptomatic colonization with *C. difficile* is 7%-26% among inpatients in acute care facilities and 5%-7% among elderly residents in long-term care facilities.<sup>8</sup> It is interesting to note that, even though they may be a source of *C. difficile* transmission to others, patients with asymptomatic colonization have been shown to have a significantly lower risk of developing CDI compared with uncolonized patients on the same wards at the same time.<sup>9</sup>

Recent studies suggest that the epidemiology of healthcare-associated CDI is changing. Although CDI continues to be a healthcare-associated infection, with 94% of all CDI being related to a recent healthcare exposure, location of onset of these infections has begun to shift from acute care hospitals (87% of CDI cases in 1986) to LTCFs or outpatient settings. Of all health-care-associated CDIs reported to the Emerging Infections Program in the US in 2010, 75% had their onset outside of hospitals, and 52% of the CDIs treated in hospitals were present on admission.<sup>10</sup> In recent years there has also been an increase in the incidence and severity of *C. difficile* infection across North America and Europe, due in large part to the emergence of a hyper-virulent strain of *C. difficile*, typed NAP1/BI/027, that has shown high resistance to fluoroquinolone antibiotics. CDI caused by this strain is of particularly high severity, causing increased mortality and requiring increased use of colectomy as a treatment when other medical management is ineffective.<sup>11</sup>

The incidence of CDI cases in young, previously healthy individuals in the community with no recent healthcare exposure (i.e. community-associated CDI) is also rising among persons previously thought to be at low risk. Recent studies indicate that only two thirds of CDI cases identified in the community are actually linked to recent antibiotic therapy and prior hospitalization.<sup>12</sup> Patients with community-associated CDI (CA-CDI) are usually younger than those with HA-CDI, and are also less likely to have

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<sup>5</sup> Cohen, Gerding, Johnson et al., 442.

<sup>6</sup> Association for Professionals in Infection Control & Epidemiology, Inc. (APIC), "Guide to Preventing *Clostridium difficile* Infections", 9.

<sup>7</sup> Dubberke and Olsen, S91.

<sup>8</sup> Cohen, Gerding, Johnson et al., 436.

<sup>9</sup> Shim, Johnson, Samore et al, 633-636.

<sup>10</sup> CDC MMWR 2012;61, 160.

<sup>11</sup> Gerding and Lessa, 40.

<sup>12</sup> Wilcox, Mooney, Bendall et al., 388.

relapses. The CDI relapse rate is reported to be 10% among CA-CDI cases, but approximately 20% among HA-CDI cases.<sup>13</sup>

Transmission of CDI can be prevented by strict adherence to routine practices and additional precautions. Practices that are critical to preventing transmission of CDI in the healthcare setting include appropriate use of personal protective equipment (PPE), meticulous hand hygiene, and thorough and appropriate cleaning and disinfection of environmental surfaces and equipment.

Antimicrobial stewardship has been shown to be the single most successful strategy for preventing CDI. Antibiotic prescribing (selection, frequency and duration) should be reviewed with an emphasis on avoiding the use of high-risk agents (e.g., cephalosporins, fluoroquinolones, clindamycin) for at-risk patients/residents. Gastric acid suppression with proton pump inhibitors (PPIs) has also been recognized as a potential risk factor for CDI and should be used selectively.<sup>14</sup> A surveillance system that identifies trends is critical to limiting the spread of CDI within a facility.

### **Risk factors for development of CDI<sup>15,16</sup>**

Risk factors include:

- Antibiotic exposure;
- Increased patient age;
- Prior, and/or prolonged hospitalization;
- Severity of underlying illness;
- Treatment with proton pump inhibitors and H2 blockers;
- Abdominal surgery;
- Nasogastric tube;
- Long term care residency;
- Immunosuppressive therapy post-transplant.

Additional risk factors that predispose some people to developing severe disease include:

- History of CDI, particularly with the NAP1 strain of *C. difficile*;
- Recent surgery;
- Increased age.

### **Infection Prevention and Control Measures**

Your health region's Infection Prevention and Control (IPAC) department should be consulted when:

- There is a confirmed case of CDI;
- An outbreak of CDI is suspected;
- Challenges are encountered with accommodation or cohorting;

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<sup>13</sup> Gerding and Lessa, 42.

<sup>14</sup> Cohen, Gerding, Johnson et al., 437.

<sup>15</sup> Gerding and Lessa, 45.

<sup>16</sup> PIDAC, "Annex C: Testing, Surveillance and Management of *Clostridium difficile*", 4.

- Additional precautions are discontinued or the patient is discharged;
- Assistance is required for patient or facility management.

**Note:** For a quick reference guide to IPAC measures for suspected and confirmed cases of CDI, refer to Appendix A

### **1. Initiation of Contact Precautions**

In addition to routine practices, contact precautions shall be initiated by a healthcare provider **at the onset of diarrhea** (refer to the definition of diarrhea in the Glossary). **Do not delay** placement of the patient or resident on contact precautions while awaiting results of *C. difficile* testing.

#### **Upon initiation of Contact Precautions:**

- (a) Signage shall be prominently displayed on the patient's/resident's door outlining the necessary precautions (contact precautions) to be used when entering the room.
- (b) Signage shall be prominently displayed on the patient's/resident's door stating that hand washing with soap and water is required (refer to sub-section 2, "Hand Hygiene").
- (c) Personal protective equipment (PPE) must be easily accessible either directly outside the patient's/resident's room, in the anteroom, or (if using spatial separation) on a supply cart directly outside the curtained bed space.

Contact precautions should be lifted only upon the advice of an infection prevention and control professional.

### **2. Hand Hygiene**

Effective hand hygiene is essential in limiting the spread of *C. difficile*.

- (a) All staff entering the patient's/resident's room shall **wash hands with soap and water** before and after contact with the patient/resident or their environment (a sample hand washing poster is provided in Appendix B).  
**Note:** Soap and water is more effective than alcohol based hand rub (ABHR) as it is the mechanical action (friction) of washing and rinsing that physically removes spores from the hands. ABHR is not effective at removing *C. difficile*.
- (b) If a hand washing sink is not readily available, use ABHR before leaving the room and wash hands at the nearest **staff** hand wash sink (excluding sinks within clean service rooms, food and nutrition services and medication rooms). Do not perform hand hygiene in patient/resident sinks (this will re-contaminate healthcare provider's hands).
- (c) Patients and residents should be educated regarding the need and the proper procedure for hand hygiene. Patients/residents may wash their hands in the patient/resident sink in their own room. Those who are unable to perform hand hygiene independently must be assisted by a healthcare provider after toileting, before meals, and before mobilization outside of the room.

### 3. Personal Hygiene

Although routine bathing has been shown to have limited efficacy in reducing *C. difficile* spores on the skin, showering has been demonstrated to be more effective than bed-bathing.<sup>17</sup> Therefore, showering a patient/resident is the preferred method of performing personal hygiene while symptomatic.<sup>18</sup> If showering is not possible, a bed-bath would be the next preferred method.

**NOTE:** If a bathtub must be used to bathe the patient/resident, follow the manufacturer's instructions for how to properly clean and disinfect the tub using a sporicidal product.

### 4. Personal Protective Equipment (PPE)

Contact precautions require the use of PPE, specifically gloves and a long-sleeved gown. Refer to your region's policy for contact precautions. For more information, refer to PIDAC's "Routine Practices and Additional Precautions in All Health Care Settings".<sup>19</sup>

Studies involving healthcare workers caring for patients/residents with CDI have shown that wearing gloves can prevent hand contamination. This is important because hand washing may not remove all potential pathogens when hands are heavily contaminated. Studies have also provided evidence that wearing gloves can help reduce transmission of pathogens in healthcare settings.<sup>20</sup> For example, in a prospective controlled trial that required personnel to routinely wear vinyl gloves when handling any bodily substances, the incidence of *C. difficile* diarrhea among patients decreased from 7.7 cases per 1,000 patient discharges during the six months before the intervention to 1.5 cases per 1,000 discharges during the six months of the intervention.<sup>21</sup>

After gloves are removed, hands must be washed with soap and water because microorganisms can contaminate hands via small defects in the gloves or during glove removal.

### 5. Accommodation

Decisions regarding accommodation for patients/residents with CDI should be based on the mode of transmission of *C. difficile* (i.e. the spread of feces containing *C. difficile* spores) and the patient's/resident's condition. Individuals who are incontinent of feces are more likely to contaminate the environment with *C. difficile*.<sup>22</sup>

- (a) A single room with dedicated toileting facilities (private bathroom or dedicated commode chair) is strongly recommended.
- (b) A patient or resident who is incontinent of stool shall have priority for a private room.
- (c) If a single room is not available, the Infection Prevention and Control (IPAC) department or an infectious disease physician should be consulted to assess the risks and determine the best placement options. Laboratory-confirmed CDI cases may be cohorted with other laboratory-confirmed CDI cases but not with patients or residents infected with multidrug-resistant

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<sup>17</sup> Jury LA, Guerrero DM, Burant CJ et al, 181-4.

<sup>18</sup> Association for Professionals in Infection Control & Epidemiology (APIC) "Guide to Preventing *Clostridium difficile* Infections", 30.

<sup>19</sup> PIDAC, "Routine Practices and Additional Precautions in All Health Care Settings", 31-34.

<sup>20</sup> PIDAC, "Annex C: Testing, Surveillance and Management of *Clostridium difficile*", 6.

<sup>21</sup> Johnson, Gerding, Olson et al., 137.

<sup>22</sup> PIDAC, "Annex C: Testing, Surveillance and Management of *Clostridium difficile*", 5-6.

organisms (MDROs) such as Vancomycin-resistant *Enterococcus* (VRE) or Methicillin-resistant *Staphylococcus aureus* (MRSA).

- (d) If two or more patients/residents are cohorted, when the diarrhea stops for one person (i.e., the patient/resident is symptom-free for at least 48 hours), that patient/resident should be transferred to a clean room.<sup>23</sup>
- (e) Immediately after transfer to a clean room, the vacated bed space, furniture, patient/resident care equipment and bathroom shall receive a terminal cleaning and disinfection with a sporicidal agent.
- (f) Symptomatic patients/residents suspected or confirmed to have CDI may be allowed out of the room following a risk assessment and **consultation by an Infection Control Professional (ICP)**, providing diarrhea can be contained and hand hygiene compliance is adequate.<sup>24,25</sup>

In healthcare settings where private rooms are not available, other measures should be taken:

- a) Display signage indicating the precautions to be used (at minimum, contact precautions).
- b) Maintain physical separation (draw a privacy curtain, or maintain space of at least two metres) to reduce the opportunity for inadvertent sharing of items between patients/residents. Some facilities use a visual cue, such as coloured tape on the floor, in order to identify areas where restricted access and use of additional precautions are needed.<sup>26</sup>
- c) Provide an easily accessible supply cart with PPE outside the bed space.
- d) Place a laundry hamper and hands-free waste container within the patient's/resident's bed space.
- e) Dedicate a commode chair and other personal care items for the patient's or resident's use. **The toilet or commode must not be shared.**
- f) Bedpans must not be shared unless they are appropriately cleaned and disinfected with a sporicidal agent between patients/residents. Sterilization of reusable bedpans between patients/residents should be considered as the aim is to have bedpans free of bacterial spores in order to better control sources of *C. difficile* infection.<sup>27</sup>

## 6. Patient/Resident Transport

- (a) Transportation of the patient/resident to other departments should be limited to medically necessary procedures only.
- (b) If the patient/resident is transferred to another unit or facility, the receiving unit/facility must be notified and must be able to comply with requirements for accommodation. For example, a sticker that notes "Contact Precautions Required" may be placed on the nurse to nurse referral form.
- (c) Refer to "Appendix C: Procedure – Transporting a Patient/Resident on Contact Precautions" for further instructions on patient/resident transportation.

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<sup>23</sup> Association for Professionals in Infection Control & Epidemiology (APIC) "Guide to Preventing *Clostridium difficile* Infections", 45.

<sup>24</sup> PHAC, "*Clostridium difficile* Infection Prevention and Control Guidance for Management in Acute Care Settings", 9.

<sup>25</sup> PHAC, "*Clostridium difficile* Infection Prevention and Control Guidance for Management in Long Term Care Settings", 10.

<sup>26</sup> APIC, "Guide to Preventing *Clostridium difficile* Infections", 37.

<sup>27</sup> Lobè.

## 7. Chart Alerts

- (a) Temporarily flagging the patient/resident chart with “Contact Precautions” is suggested to increase awareness during transfers within and outside the unit or facility. The chart label may be removed once contact precautions have been discontinued.
- (b) A chart alert need **not** be permanently affixed to the patient/resident file.

## 8. Disposal of Waste<sup>28</sup>

The safe disposal of excrement is of critical importance in preventing contamination of the worker’s hands, clothing and environment. Healthcare workers must be alert to the risks of transporting waste in bedpans and urinals outside the patient/resident room as there are many opportunities to contaminate the corridor and the utility room environment. At all times, the healthcare worker must wear gloves and wash hands with soap and water after glove removal.

- (a) It is strongly recommended that disposable bedpans are used instead of reusable ones.
- (b) Do not empty bedpans into sinks or toilets.
- (c) The bedpan or commode must be covered and transported to the soiled service room for cleaning and disinfection.
- (d) Bedpans of patients/residents with CDI should not be cleaned manually as this poses a very high risk of infection. **Spray wands must not be used.**
- (e) If available, use a washer/disinfector (WD). The manufacturer should be contacted to determine if adjustments can be made to the WD to achieve conditions that will effectively eliminate spores. Without this process, the WD may remain contaminated, thereby contaminating items subsequently washed in the unit.
- (f) Washer/disinfectors must be installed and maintained according to the manufacturer’s directions. To ensure that the equipment is operating properly, preventive maintenance and verification of the machine’s operational parameters must be performed regularly.
- (g) If a macerator system is used in the facility, the bedpan support frames must be washed and disinfected after each use. These items require autoclaving upon patient transfer/discharge or disposal as appropriate.
- (h) Use of hygienic bags is recommended during a CDI outbreak. Waste is contained in the bag and disposed of in general waste. In order to avoid accidental spillage, it is advisable to discard the soiled pads and bag in a sturdy leak-proof garbage bag. The plastic holder can be discarded after precautions are discontinued.
- (i) Upon discontinuation of contact precautions, commodes and bedpans (if reusable) must be cleaned and disinfected with a sporicidal agent before use with another patient/ resident.

## 9. Environmental Cleaning

The rooms of patients/residents **without** *C. difficile* should be cleaned first, in keeping with the recommended practice of moving from clean to dirty for all cleaning. **NOTE:** There may be some exceptions to this practice. Always follow manufacturer’s instructions when implementing appropriate cleaning/disinfection protocols.

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<sup>28</sup> Public Health Agency of Canada (PHAC), “*Clostridium difficile* Infection Prevention and Control Guidance for Management in Acute Care Settings”, 10.

### A) Product Selection and Use:

**IMPORTANT:** Only use Health Canada approved disinfectants that carry a Drug Identification Number (DIN#), and are approved by Health Canada to kill *C. Difficile* spores. Ensure that both the DIN# and the sporicidal claim are stated on the product label. Follow the label instructions and ensure that the stated contact time is met (i.e., the number of minutes the surface must stay visibly wet for the product to be efficacious).

Please note that the claim "*Clostridium difficile* sporicide" is not considered acceptable for products that do not have an established sporicidal claim. Rather, look specifically for claims on the product label to determine if the product is efficacious against specific bacterial spores (i.e., look for "inactivates/ kills *Clostridium difficile* spores" or "effective against *Clostridium difficile* spores").

**The following disinfectants have been shown to be effective against *C. difficile* spores:**

**1) Sodium hypochlorite (Bleach) in Ready-To-Use formulations, such as wipes and/or liquids, with a minimum concentration of 5,000 parts per million (ppm) with both an established sporicidal claim and Drug Identification Number (DIN).**

**NOTE:** Household/Laundry "jug" bleach (concentrated) is NOT recommended for disinfection of *C. difficile* spores in healthcare facilities for the following reasons:

- a) Household "jug" bleach is not a cleaner; therefore an approved detergent would need to be used to clean the area prior to disinfecting the surface with a diluted bleach solution. This would result in a 2-step process – a cleaning step, followed by a disinfection step. This 2-step process makes compliance with environmental cleaning procedures more difficult and resource intensive.
- b) Concentrated Household "jug" bleach must be diluted to obtain a concentration that will kill spores (e.g., 5,000 parts per million), in a realistic contact time (i.e., less than 5 minutes). The dilution ratio of sodium hypochlorite (bleach) to water is dependent on the label concentration. While "household bleach" used to be sold with a concentration of 5.25%, bleach concentrations can now vary widely by manufacturer (3-8% sodium hypochlorite). This variation makes it difficult to standardize practices and ensure appropriate concentrations are being prepared and used consistently. If the bleach solution is diluted too much, it will require a longer contact time to kill the spores (e.g., 1,000 ppm requires 30 minutes of contact time). If it is too concentrated, it can harm surfaces and have other occupational health and safety implications (e.g., strong odours, hypersensitivities, etc.).
- c) Diluted bleach solutions must be prepared daily, as sodium hypochlorite degrades quickly in a diluted state, making it difficult to assess whether prepared solutions are at the required concentration to kill *C. difficile* spores.
- d) Always check the product expiry dates. Discard unused portion of product if it has expired.

If household "jug" bleach is the only product available for *C. difficile* disinfection, the following link contains a bleach dilution calculator that should be used to calculate the appropriate dilution required to achieve the desired concentration.

<http://www.publichealthontario.ca/en/ServicesAndTools/Tools/Pages/Dilution-Calculator.aspx>

**2) Improved Hydrogen Peroxide (IHP) formulations (4.5%) with both an established sporicidal claim and Drug Identification Number (DIN).**

**B) Decontamination/Cleaning/Disinfection Practices**

Decontamination, cleaning and disinfection of environmental surfaces must be thorough and incorporate the following:

- (a) Use checklists to promote consistency in cleaning among staff, and to help identify opportunities for improvement. Checklists can be used for:
  - i. surfaces and equipment in a patient's room that need **twice daily** cleaning and disinfection,
  - ii. outbreak management,
  - iii. cleaning following discharge or transfer of patient/resident (Refer to Appendix D for a sample discharge/transfer cleaning checklist).
- (b) Declutter the patient/resident room to facilitate cleaning and disinfection.
- (c) Always work from clean items/surfaces to dirty ones (unless otherwise specified by the disinfectant product manufacturer).
- (d) Whether a one-step or two-step cleaning/disinfection process is used, staff should be educated about the importance of using mechanical friction to successfully remove *C. difficile* spores from a surface. It is also critical that that disinfectant be applied to the surface for the appropriate contact time.
- (e) All cleaning and disinfectant solutions must be applied directly to the cloth. Saturating a clean cloth in a pail of solution and using one at a time is the safest way to clean and disinfect. The used cloth must go directly into the laundry. **Applications of cleaning chemicals by aerosol or trigger sprays may cause eye injuries or induce or compound respiratory problems or illness and should not be used.**
- (f) Cloths and mop heads must not be double dipped and must be changed after use in the patient's/resident's room. This practice reduces contamination of clean cloths, mops and the disinfectant solution, and prevents transferring bacteria to other rooms and equipment.
- (g) Disposable toilet brushes shall be used in the rooms of all patients/residents with CDI.
- (h) Housekeeping staff shall wear appropriate PPE (i.e. gown and gloves) at all times.

A discharge/terminal cleaning must be done upon discontinuation of precautions, transfer of the patient/resident to another room, or discharge from the healthcare facility. In cases where precautions are being discontinued (refer to sub-section 15, "Discontinuing Additional Precautions"), patients/residents must be temporarily removed from the room while terminal cleaning is done. The person should be bathed and dressed in clean bed-clothes or personal clothing before re-admission to the room. Please refer to your region's housekeeping policy and procedure manual for specific information regarding environmental cleaning upon discharge/transfer.

The following additional procedures must be incorporated into your organization's discharge/terminal cleaning and disinfection procedure for CDI:

- a) Contact precautions shall remain in effect until discharge cleaning has taken place.
- b) All privacy, shower, and window curtains shall be taken down and sent for laundering.

- c) All disposable items including paper towels, toilet paper, glove boxes and toilet brush must be discarded.
- d) Clean and disinfect all dedicated equipment in the patient's/resident's room upon discharge or transfer.

#### **10. Patient/Resident Care Equipment**

- (a) Dedicate noncritical nursing and personal-care equipment (e.g., thermometer, stethoscope, blood pressure cuff, tourniquet, vacutainer, laundry hamper stand, commode/bedpan) to a single patient/resident.
- (b) If sharing of equipment is unavoidable, clean and disinfect it between patients/residents (refer to sub-section 9, "Environmental Cleaning").
- (c) Equipment that cannot be disinfected must be discarded rather than being used for another patient/resident.
- (d) Limit the supplies taken into the room to avoid unnecessary waste when the patient/resident is discharged or precautions are discontinued.

#### **11. Dietary**

No special handling or precautions are required in addition to contact precautions.

**Feeding tubes:** One study found that tube feeding was an independent risk factor for CDI. The investigators suggest four causes: *C. difficile* on the hands of healthcare workers handling tube feeding equipment; contaminated formulas and delivery systems; formulas lacking dietary fibre, resulting in an intestinal environment favourable to the growth of *C. difficile*; and, delivery of formulas below the gastric acid barrier. **Healthcare workers should wear gloves when handling feeding tube systems.**<sup>29</sup>

#### **12. Linen and Laundry**<sup>30</sup>

No special handling or precautions are required in addition to contact precautions.

#### **13. Visitors**

The following apply to anyone visiting a patient/resident with CDI:

- (a) Instruct visitors to wash their hands before entering and after leaving the patient's/resident's room, and before and after personal contact (refer to sub-section 2, "Hand Hygiene").
- (b) Visitors who provide direct care to the patient/resident, or who have significant contact with the patient/resident or their environment, should follow the same precautions as healthcare providers, as per health region policies and procedures (refer to sub-section 4, "Personal Protective Equipment").
- (c) Visitors must not use the patient's/resident's bathroom or sit on the bed.
- (d) Visitors must not visit other patients/residents or attend social functions within the facility.

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<sup>29</sup> Gerding, Muto and Owens, S47.

<sup>30</sup> PIDAC, "Best Practices for Environmental Cleaning for Prevention and Control of Infections In All Health Care Settings", 51.

#### **14. Patient/Resident and Family Teaching**

Provide teaching material to patients, residents and families regarding *C. difficile*. Refer to “Appendix D: Information Sheet – Patient, Resident and Family Information about *Clostridium difficile*”.

#### **15. Staff Exclusion from Work**

Food handlers, environmental services workers and healthcare workers with symptoms of enteric illness including CDI are to be excluded from work for at least 48 hours (as per regional policy) after diarrhea has resolved, or as directed by the Medical Health Officer and/or Occupational Health Services.

#### **16. Discontinuing Additional Precautions**

Contact precautions should be discontinued only upon the advice of Infection Prevention and Control. Typically, this is when the patient/resident has had no symptoms of diarrhea (i.e., is producing formed stool, or stool normal for the individual) for at least 48 hours (as per regional policy).<sup>31</sup>

**Colostomy and ileostomy patients:** Contact precautions may be discontinued when 72 hours of stools of a type consistent with pre-illness are present. Retesting of patients/residents with an ileostomy may be required in cases where no change in stool consistency is observed.

#### **17. Handling Deceased bodies<sup>32</sup>**

Routine practices should be used in addition to contact precautions for handling deceased bodies, preparing them for autopsy, or transferring them to mortuary services.

#### **18. Discharge Planning<sup>33</sup>**

When patients/residents with CDI or recovering from CDI are being prepared for discharge, they should be provided with information/education about the following:

- (a) Any medication they are to take home;
- (b) Reminders on the importance of washing their hands with soap and water after using the toilet, handling used linen, and preparing and/or eating food.
- (c) That special handling of dishes, bed linen and waste is not necessary (whether symptomatic or not). Solid fecal matter that can be removed using a gloved hand and toilet tissue from clothing or linen should be placed in a bedpan or toilet for flushing prior to being laundered;
- (d) The importance of thorough bathroom cleaning using regular household cleaners and household bleach;
- (e) The frequency of recurrence of CDI; and
- (f) Notifying their physician if acute diarrheal symptoms recur.

#### **19. Antimicrobial Stewardship**

Antimicrobial stewardship, an activity that includes appropriate selection, dosing, route, and duration of antimicrobial therapy, is an essential component of prevention and control of CDI and should be

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<sup>31</sup> PIDAC, “Annex C: Testing, Surveillance and Management of *Clostridium difficile*”, 11.

<sup>32</sup> PHAC, “*Clostridium difficile* Infection Prevention and Control Guidance for Management in Acute Care Settings”, 12.

<sup>33</sup> PHAC, “*Clostridium difficile* Infection Prevention and Control Guidance for Management in Acute Care Settings”, 13.

viewed as a function of enhancing patient safety. “The primary goal of antimicrobial stewardship is to optimize clinical outcomes while minimizing unintended consequences of antimicrobial use, including toxicity, the selection of pathogenic organisms (such as *C. difficile*), and the emergence of resistance.”<sup>34</sup> There is evidence that the judicious use of antimicrobial agents can contribute to the reduction in the incidence of CDI.<sup>35</sup> Considering the critical role that antibiotic use plays in the pathogenesis of CDI, it is important for all healthcare practitioners and facilities to implement an antimicrobial stewardship program that focuses on CDI prevention, control and treatment using a combination of optimal infection prevention and antibiotic control.<sup>36</sup>

To help healthcare facilities develop antimicrobial stewardship programs, the Centres for Disease Control (CDC) and the Agency for Health Research and Quality (AHRQ) have developed several tools, including a list of Core Elements of Hospital Antibiotic Stewardship Programs and an accompanying checklist.<sup>37,38</sup>

## Identifying *Clostridium difficile* Infection

### Case Definition for CDI<sup>39</sup>

A patient/resident is identified as a CDI case if:

- s/he has diarrhea, or fever, abdominal pain and/or ileus, **AND** a laboratory confirmation of a positive toxin assay for *C. difficile*;  
**OR**
- s/he has a diagnosis of pseudomembranes on sigmoidoscopy or colonoscopy or histological/pathological diagnosis of CDI;  
**OR**
- s/he has a diagnosis of toxic megacolon.

Diarrhea (watery or unformed stool that takes the shape of the specimen collection container) is defined as one of the following:

- 3 or more unformed stools in a 24-hour period for at least 1 day and new or unusual for the patient;
- 6 or more watery stools in a 36-hour period; or
- 8 or more unformed stools over 48 hours.

**Note:** If the information about the frequency and consistency of diarrhea is not available, a toxin-positive stool will be considered as a case.

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<sup>34</sup> Dellit, Owens, McGowan et al., 159.

<sup>35</sup> Aldeyab, Kearney, Scott et al., 2993.

<sup>36</sup> APIC, Guide to Preventing *Clostridium difficile* Infections”, 79.

<sup>37</sup> CDC. “Core Elements of Hospital Antibiotic Stewardship Programs”.

<sup>38</sup> CDC. “Toolkit for Reduction of *Clostridium difficile* Through Antimicrobial Stewardship.”

<sup>39</sup> CNISP “Antimicrobial Resistant Organisms (ARO) Surveillance: Surveillance Report for Data from January 1 2007 to December 31 2012”, 14.

### Testing for *C. difficile* Toxin

Prompt identification of CDI is required for rapid initiation of appropriate treatment, and for timely application of infection control interventions to reduce the risk of transmission. Early identification of CDI may be improved by permitting nursing staff to order *C. difficile* testing at the onset of diarrhea.

- (a) Before sending any specimens for *C. difficile* testing, ensure that the patient/resident meets the clinical components of the CDI case definition. Asymptomatic colonization with *C. difficile* can be common in certain patient populations (estimated to be 15% in long term care residents<sup>40</sup>), and positive test results in the absence of a compatible clinical picture can be misleading and even harmful.
- (b) Do not send specimens for testing from children less than one year of age as toxigenic *C. difficile* is found in a high proportion of healthy infants (up to 50%) as part of the normal gut flora.<sup>41,42</sup> In children between the ages of 1 and 3 years, positive toxigenic *C. difficile* test results should be interpreted with caution, and alternative diagnoses considered before assuming their clinical relevance.
- (c) Formed stools are not routinely processed for *C. difficile* testing. If a patient/resident is experiencing paralytic ileus due to a suspected severe presentation of *C. difficile*, contact the laboratory to request special processing.
- (d) Stool specimen should be collected in a plain sterile container without transport medium. If there is a delay in transport, refrigerate the specimen.
- (e) Delays in specimen transport can affect the sensitivity of toxigenic *C. difficile* testing and result in false negative results.
- (f) Retesting after treatment is not indicated. Up to one third of patients can remain colonized with toxigenic *C. difficile* after resolution of infection, thus decisions regarding the need for further treatment or discontinuation of infection control precautions should be based on clinical assessment and resolution of symptoms.<sup>43</sup>
- (g) If symptoms return following a period of resolution, retesting may be indicated to determine if a relapse has occurred. Consultation with a regional infection prevention and control professional may be required in this situation.
- (h) Repeat testing following a negative result is not recommended if a recommended algorithm is used.<sup>44</sup> Due to the high sensitivity of these algorithms, testing a second specimen from a negative patient is more likely to yield a false-positive result than it is to represent a true infection.

<sup>40</sup> Ziakas PD, Zacharioudakis IM, Zervou FN et al, 1-14.

<sup>41</sup> Schultze GE, Willoughby RE, Committee on Infectious Diseases, American Academy of Pediatrics, 196-200.

<sup>42</sup> Larson HE, et al, 727-733.

<sup>43</sup> Issak MI, Elliott TS, 610-1

<sup>44</sup> Sharp S, Gilligan P, "A practical guidance document for the laboratory detection of toxigenic *Clostridium difficile*".

### Diagnostic Assays for CDI testing

There are multiple tests that can be used in the diagnosis of CDI. However, no single currently available test provides cost-effective, rapid, and accurate results. Thus, most laboratories use a combination of tests to maximize the benefits of different assays.

**GDH Assay:** Glutamate dehydrogenase (GDH) is an enzyme produced by all strains of *C. difficile*. Detection of this antigen indicates the presence of *C. difficile*, but does not specify whether the strain can produce, or is producing, toxin. Assays detecting GDH are very sensitive and have a rapid (<1 hour) turnaround time, so this is often used as an initial screening step. A specimen that is negative for GDH can reliably be considered negative for toxigenic *C. difficile*.

**Toxin A/B EIA Assay:** Toxin A/B EIA testing directly detects the presence of *C. difficile* toxin with high specificity and has a rapid turnaround time (<1 hour). This means a positive Toxin A/B EIA test result can be assumed to represent the presence of toxin-producing *C. difficile*. However, this assay on its own has poor sensitivity and negative results should be confirmed by additional diagnostics.

**Cell Cytotoxicity Neutralization Assay:** This assay looks for the direct effect of the *C. difficile* toxin on cell cultures in the laboratory. If this effect is neutralized by *C. difficile*-specific anti-toxin, it conclusively demonstrates the presence of *C. difficile* toxin. It is considered a gold standard for the detection of toxigenic *C. difficile* and has excellent sensitivity and specificity. However, it requires a high level of technical expertise and results may take up to 3 days.

**Toxigenic Culture:** *C. difficile* can be isolated using anaerobic culture, and can then be further tested for toxin production. This method has high sensitivity, and allows strains to be further characterized through antibiotic susceptibility testing, or epidemiologic analyses important in outbreak investigations. However, it is labor-intensive and may take up to 7 days for final results.

**NAAT Assay:** Nucleic acid amplification testing (NAAT) detects the presence of *C. difficile*-specific genes and the presence of genes required for toxin production. It has excellent sensitivity and rapid turnaround time (~1 hour), but is relatively expensive. It also must be noted that NAAT assays do not directly detect the presence of toxin, so asymptomatic carriers may be over diagnosed with infections if testing is performed on patients at low risk of having CDI.

**NOTE:** Diagnostic assays performed for CDI testing in Saskatchewan may vary, depending on the Regional Health Authority (RHA).

### Surveillance

Prospective surveillance using accepted CDI case definitions and denominators should be in place to determine the organization's baseline rate and to monitor changes in the CDI rate. By adopting a

recognized provincial or national case definition, organizations will be able to benchmark their CDI rate against other facilities.<sup>45</sup>

On July 31, 2014, *Clostridium difficile* Infection was added as a Category I communicable disease with the amendments to Saskatchewan Disease Control Regulations.<sup>46</sup> CDI was added to the Regulations to support the Saskatchewan Infection Prevention and Control *C. difficile* Surveillance Protocol. As *C. difficile* is now reportable, all positive lab reports must be forwarded to regional Infection Control Professionals for investigation and monitoring using the current surveillance mechanisms.

Refer to the Saskatchewan *Clostridium difficile* Infection (CDI) Surveillance Protocol [<http://www.saskatchewan.ca/live/health-and-healthy-living/health-care-provider-resources/treatment-procedures-and-guidelines/infection-prevention/infection-prevention-and-control-program>] for more information.

## Outbreak Management

Ontario's Provincial Infectious Diseases Advisory Committee (PIDAC) defines a CDI outbreak as: "CDI occurring at a rate exceeding the normally expected baseline rate for the health care setting (or unit, floor, ward) during a specified period of time."<sup>47</sup>

When there is evidence of continued transmission of *C. difficile* within a facility or when the incidence rate for *C. difficile* is higher than the facility's baseline rate, the following heightened measures should be considered:<sup>48</sup>

- (a) Reporting the outbreak to local public health officials as per regional/provincial reporting requirements (see below);
- (b) Prolonging the duration of contact precautions after a patient (in acute care) becomes asymptomatic until hospital discharge;<sup>49</sup>
- (c) Increasing the frequency of cleaning, including bathing and toileting facilities, recreational equipment, all horizontal surfaces in the patient's/resident's room and, in particular, areas/items that are frequently touched (e.g., hand and bedrails, light cords, light switches, door handles, furniture, etc.), common areas, nursing stations, staff washrooms, etc., on the affected unit(s);
- (d) Double cleaning (i.e., room/bed space is cleaned and then cleaned again immediately after, in addition to twice daily for routine *C. difficile* room cleaning) of rooms or designated bed spaces of patients/residents with confirmed CDI, using appropriate sporicidal agents, following discharge or transfer;<sup>50</sup>
- (e) Cohorting of staff to patients/residents (i.e., assigning staff to work exclusively with CDI positive patients or residents);

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<sup>45</sup> Public Health Agency of Canada (PHAC), "*Clostridium difficile* Infection Prevention and Control Guidance for Management in Acute Care Settings", 6.

<sup>46</sup> Saskatchewan Ministry of Health, "Table 1:Category I Communicable Disease".

<sup>47</sup> PIDAC, "Annex C: Testing, Surveillance and Management of *Clostridium difficile*", 17.

<sup>48</sup> Public Health Agency of Canada (PHAC), "*Clostridium difficile* Infection Prevention and Control Guidance for Management in Acute Care Settings", 14.

<sup>49</sup> Dubberke, Carling, Carrico et al., 636.

<sup>50</sup> PIDAC, "Annex C: Testing, Surveillance and Management of *Clostridium difficile*", 29.

- (f) With associated high burden of illness, particularly with higher than expected attributable mortality, there may be a role, in consultation with a microbiologist and public health, to characterize the strain type and clonality of *C. difficile* isolates;
- (g) Increase auditing for adherence to hand hygiene practices, PPE use by staff, cleaning/disinfecting shared non-critical equipment, and environmental cleaning procedures;
- (h) Reviewing the process for disposal of fecal matter, as well as appropriate commode storage;
- (i) Closing affected unit(s) to admissions if initial control measures are ineffective in controlling the spread of *C. difficile*;
- (j) Reviewing antimicrobial prescribing practices, including indications for prescribing and specific agents used. In some settings, it may be helpful to restrict the use of specific antimicrobial agents; and
- (k) Consulting provincial or other appropriate health expertise in outbreak management for ongoing outbreak situations.

For long-term care, the Saskatchewan Ministry of Health “Communicable Disease Manual” defines an enteric outbreak as: “Two (2) or more residents/clients and/or staff members are exhibiting signs and symptoms of gastrointestinal illness over a twenty-four (24) hour period.”<sup>51</sup> Sections 9-50 to 9-55 of this manual provide detailed information for the management of an outbreak of enteric illness including CDI. Key points include:

- (a) Facilities must report **suspected** enteric outbreaks to local or regional Infection Prevention and Control (IPAC) personnel and the Medical Health Officer (MHO) as soon as possible.
- (b) The outbreak is declared by the Medical Health Officer or a designate.
- (c) A multidisciplinary team with expertise in outbreak management should be assembled to assist in determining the course of action for admissions, discharges, cancellations of service and internal and external communication.
- (d) Only the Medical Health Officer or designate may declare the outbreak over.
- (e) An outbreak report shall be submitted to the Saskatchewan Ministry of Health according to defined specifications and timelines (See <http://www.saskatchewan.ca/live/health-and-healthy-living/health-care-provider-resources/treatment-procedures-and-guidelines/communicable-disease-control-manual#section-9-outbreaks> for protocol)

## Medical Management of *Clostridium difficile* Infection

Initial management of CDI focuses on close monitoring, supportive therapy, discontinuation of aggravating antibiotic therapy, and medical treatment based on the clinical symptoms of the patient/resident. Consideration should be given to the assessment of whether PPIs and H2 blockers need to be continued, as they are associated with an increased risk of CDI.<sup>52</sup> See Appendix H - CDI Medical Management Algorithm.

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<sup>51</sup> Saskatchewan Ministry of Health, Section 9-52, 1.

<sup>52</sup> Blondel-Hill E, Fryters S. “Bugs and Drugs” 2012.

**Key Points:**

In addition to a timely and appropriate treatment plan, patients/residents should be monitored closely by health care providers, and examined on a daily basis for signs and symptoms of progressing illness. Patients/residents with CDI, particularly those over age 65 and/or with complex health conditions can deteriorate rapidly. It is recommended that the following is monitored:<sup>53</sup>

- (a) At a minimum, daily vital signs (temperature, heart rate, and blood pressure).
- (b) Daily assessment for presence and number of diarrheal episodes and consistency (Refer to Appendix G for Stool Record Chart).
- (c) Daily assessment of patient's/resident's hydration level.
- (d) Ensure adequate nutrition and hydration. Refer to a dietician, if necessary.
- (e) Baseline blood work for CBC and differential, electrolytes and creatinine or estimated glomerular filtration rate (eGFR), with retesting as clinically indicated. Albumin may be obtained if patients/residents are at risk of or suspected to have severe disease, and lactate monitored for those with fulminant disease.
- (f) *C. difficile* testing should not be used as a test of cure, as tests may remain positive several months after the episode.
- (g) Increasing WBC, hypotension, acute kidney injury (with rising serum creatinine or declining eGFR), ileus, or toxic megacolon are indications to evaluate the need for further investigations (e.g., abdominal imaging, sigmoidoscopy), escalation or modification of the treatment regimen, or specialist consultation (e.g., Infectious Diseases, Gastroenterology, or General Surgery).

**Overview of Treatment Options**<sup>54</sup>

**Metronidazole**

Oral metronidazole is currently recommended as first line therapy for the treatment of initial episodes of mild to moderate CDI. This includes patients/residents whose WBC is less than  $15 \times 10^9$  cells/L and serum creatinine is less than 1.5x their normal level. Metronidazole may also be used for patients/residents experiencing a first relapse, whose symptoms continue to remain mild to moderate. Metronidazole oral suspension is poorly received in the pediatric population due to its offensive taste.

Intravenous metronidazole is not a recommended therapy for CDI on its own. In patients/residents with severe ileus or intractable vomiting, where oral medications may not fully reach the colon, or complicated severe presentations involving hypotension, shock, or septic megacolon, metronidazole IV should be given in combination with high dose oral vancomycin.

**Vancomycin**

Oral vancomycin is currently recommended as first line therapy for the treatment of **severe CDI**, and for patients/residents experiencing multiple relapses. This includes patients/residents whose WBC is greater than  $15 \times 10^9$  cells/L and serum creatinine is greater than 1.5x their normal level. Orally administered vancomycin is not well absorbed from the gastrointestinal tract, allowing luminal drug levels to be very high.

<sup>53</sup> PICNet, "British Columbia *Clostridium difficile* Infection (CDI) Toolkit and Clinical Management Algorithm", 35.

<sup>54</sup> Cohen, Gerding, Johnson et al., 432-433.

Patients/residents experiencing a second relapse should be prescribed a tapering and/or pulsed regimen of vancomycin, and considered for referral to an infectious disease or gastroenterology specialist.

In patients/residents with severe ileus or intractable vomiting, where oral medications may not fully reach the colon, or complicated severe presentations involving hypotension, shock, or septic megacolon, high dose oral (or by nasogastric tube) vancomycin should be used in combination with IV metronidazole. In the setting of complete ileus, consider adding rectal instillation of vancomycin.

**Intravenous vancomycin is not an effective therapy for CDI.**

### **Fidaxomicin**

A novel, narrow spectrum antibiotic, fidaxomicin has been shown to be non-inferior to vancomycin for treatment of CDI and may reduce the risk of recurrence. This antibiotic is listed under Exception Drug Status (EDS) on the Saskatchewan Formulary effective January 1, 2015. According to the EDS criteria<sup>55</sup>, fidaxomicin may be considered for the treatment of *Clostridium difficile* infection, in patients/residents who:

- Have confirmed CDI not improving after a course of metronidazole, and are allergic to, or are intolerant of oral vancomycin;

OR

- Patients/Residents with prior history of CDI after failure on other treatments\* who are experiencing a recurrence of CDI\*\*.

### **Notes:**

- (i) A course of metronidazole is defined as at least 7 days of oral metronidazole therapy with a dose of at least 500mg 3 times daily without acceptable clinical improvement.
- (ii) Fidaxomicin should not be used as add-on to existing therapy (metronidazole or vancomycin)
- (iii) Approved dose and duration: 200mg twice a day for 10 days.

\*Other treatments include metronidazole, vancomycin and vancomycin tapering regimen.

\*\* A recurrence of CDI is defined as greater than 56 days since last medication dose for a previous CDI. This medication should be prescribed in consultation with an infectious disease specialist.

### **Non-Antibiotic Therapies**

#### **Probiotics**

Evidence supporting the routine use of probiotics for treatment of CDI is evolving. They may be considered as an adjunct to antimicrobial therapy in patients/residents with recurrent disease. There has been no documented harm from probiotics, except a risk to the severely immunosuppressed. They should NOT be prescribed to immunocompromised patients/residents, to patients/residents in critical care settings, to patients/residents with a central line in place nor to patients/residents with bloody

<sup>55</sup> Saskatchewan Drug Formulary: Appendix A – Exception Drug Status Program

diarrhea or severe abdominal pain as there have been reports of bacteremia and fungemia associated with probiotics in such settings.

**Fecal Microbiota Transplantation (FMT)**

FMT involves repopulating the gastrointestinal tract of a patient/resident experiencing CDI with stool microbiota from a healthy donor. FMT has demonstrated efficacy in the treatment of recurrent CDI, and is currently being evaluated in clinical trials for more widespread use. Patients/residents who continue to experience relapses after tapered/pulsed vancomycin regimens and/or fidaxomicin treatment should be considered for enrollment in an approved clinical trial. Specialist consultation should be arranged.

**Monoclonal Antibodies**

Adjunctive use of monoclonal antibodies against *C. difficile* toxins A and B, in addition to antibiotic therapy, appears to reduce the recurrence rate of CDI. These are not yet available for clinical use, but studies are ongoing to determine whether they will have a role in the management or potentially the prevention of CDI.

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## Appendix A: IPAC Measures for Suspected and Confirmed Cases of CDI

Always follow Routine Practices including a Point of Care Risk Assessment

### Assessment

Patient/Resident develops acute infectious diarrhea<sup>1</sup>

### Actions for ALL acute diarrhea

#### Initiate **CONTACT** precautions immediately (NOTE: do not wait for lab results)

- Patient/Resident should be placed in **private room** or cohorted (only as directed by Infection Control dept.).
- Appropriate **signage** shall be posted outside room in noticeable location.
- Wear **gloves and gown** (as per regional policy) when entering the room.
- **Hand hygiene** (preferably with soap and water) must be performed before and after contact with patient/resident or their environment.
- **Dedicate** equipment to single patient/resident for duration of symptoms (e.g., commodes/bedpans)
- Contact precautions should only be **discontinued** upon the advice of Infection Prevention and Control (typically when patient/resident has been symptom free for 48-72 hours, as per regional policy).
- **NOTIFY** Medical Health Officer and/or Infection Control Dept. **immediately** if there are two (2) or more cases of acute infectious diarrhea within a 24 hour time period.

#### **LAB TESTING: Collect stool sample and submit request for *C. difficile* testing as soon as possible after symptoms develop**

- Submit to local lab or Saskatchewan Disease Control Laboratory (SDCL) as per regional procedures.

Lab results – toxigenic *C. difficile* +

### Actions for confirmed cases of *C. difficile* Infection

- Notify physician/nurse practitioner of positive lab result and **Initiate appropriate treatment**<sup>2</sup>, as necessary.
- Inform local **Infection Control Department** of positive case of CDI.
- Notify **Housekeeping department** that twice daily cleaning procedures for CDI<sup>3</sup> are to be initiated.
- **Provide *C. difficile* information**<sup>4</sup> to patient/resident and their family. **Document** that this has been given.

#### OPTIONAL:

- Post additional “hand washing required” signage<sup>5</sup> on patient/resident door as a visual hand hygiene cue for staff and visitors.
- Temporarily flag the patient/resident chart for CDI to increase awareness during transfers within and/or between facilities.

1. Loose/watery stool (i.e. if the stool were to be poured into a container it would conform to the shape of the container); **and** the bowel movements are unusual or different for the patient/resident; **and** there is no other recognized cause for the diarrhea (e.g. laxative use).

2. See Guidelines for the Management of *Clostridium difficile* Infection (CDI) in all Healthcare Settings: Page 20-23.

3. See Guidelines for the Management of *Clostridium difficile* Infection (CDI) in all Healthcare Settings: Pages 11-12.

4. See Guidelines for the Management of *Clostridium difficile* Infection (CDI) in all Healthcare Settings: Pages 32-33 (Appendix E)

5. See Guidelines for the Management of *Clostridium difficile* Infection (CDI) in all Healthcare Settings: Page 28 (Appendix B)

## Appendix B: Sample Hand Washing Poster

**Wash your hands with soap and water for 20 seconds immediately before entering and upon leaving the patient's bedside or room.**



### **Appendix C: Procedure – Transporting a Patient/Resident on Contact Precautions**

1. The caregiver or porter shall wash hands, don appropriate personal protective equipment (PPE) and obtain a clean sheet prior to entering the patient's/resident's room.
2. Place the clean sheet over the stretcher or wheelchair.
3. The patient/resident is to wear a clean gown and housecoat.
4. Assist the patient/resident to the stretcher or wheelchair.
5. Use a sporicidal disinfectant to wipe the handles of the wheelchair or the rails of the stretcher.
6. Assist the patient/resident to wash their hands with soap and water.
7. Remove your gown and gloves. Wash your hands.
8. Remove the patient/resident from the room.
9. Don clean gloves and gown. Place a clean sheet over the patient/resident.
10. Place the appropriate precaution sign on top of the chart.
11. Place the chart on top of the clean sheet, or in a plastic bag or pillow case.
12. Ensure that the receiving area is aware that the patient/resident has arrived and that contact precautions are required.
13. If the patient/resident is also on droplet or airborne precautions, a procedure mask should be provided to the patient. Staff shall wear a procedure mask or N95 respirator as required.
14. Upon completion of transport, clean the wheelchair or stretcher with an approved sporicidal disinfectant, remove gown and gloves, and wash hands with soap and water.

## Appendix D: Discharge/Transfer Cleaning Checklist

Room: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Item	Yes	No	Comments/NA
1. Were all dirty/used items removed?			
a. Suction container and tubing			
b. All items at bedside removed, including:			
– IV bags			
– tubes lines drains			
– medications			
– personal items			
– toilet paper			
– gauze			
– tape			
– patient/resident personal bar soap			
– gloves			
2. Were the curtains removed before starting to clean?			
3. Were clean cloths, mop (all supplies) and fresh solutions used to clean the room?			
4. Was the correct disinfectant and concentration used for cleaning and disinfection? - Sodium hypochlorite (concentration of at least 5,000ppm); <b>OR</b> - Improved Hydrogen Peroxide (IHP) (4.5%) with a sporicidal claim <b>NOTE:</b> Ensure product has a DIN number and manufacturer’s instructions are followed for dilution and contact time.			
5. Were pillow and mattresses cleaned and checked for tears (replaced if needed)?			
6. Were all cleaning cloths returned to housekeeping cart, placed in laundry or discarded after use?			
7. Were several cloths used to clean the room? Was double dipping of cloths into disinfectant avoided?			
8. Was cleaning always done clean to dirty?			
9. Were all surfaces cleaned allowing for correct contact time of disinfectant solution as above?			
a. Mattress			
b. Pillow (material pillows to laundry)			
c. BP cuff			
d. Bedrails and bed controls			
e. Call bell			
f. Stethoscope and column			

Guidelines for the Management of *Clostridium difficile* Infection (CDI) in all Healthcare Settings

g. Flow meters (medical gas controls)			
h. Suction tube and outer container (liner disposed)			
i. Pull cord in washroom			
j. Toilet, sink, tub and all washroom fixtures			
k. Over bed table			
l. Bedside table			
m. Locker or shelf for patient's personal items			
n. Inside drawers			
o. Bible			
p. TV Remote control/TV Controls			
q. Soap/Alcohol based hand rub dispensers			
r. Door handles			
s. Light switches			
t. Light cord			
u. Chair			
v. Telephone			
w. Television and TV handles			
x. Computers			
y. Wall mounted monitors (e.g. cardiac monitor)			
10. Were the following items cleaned and disinfected before use with another patient or removed from bed space?			
a. Commode/high toilet seat			
b. Wheelchairs			
c. Monitors			
d. IV poles/pumps			
11. If the sharps container was 3/4 full (or at full line) was it replaced?			
12. If there was a sheepskin used, was it sent to laundry or disposed?			
13. Was the lift mesh/sling sent to the laundry?			
14. Was the glove box discarded?			

Environmental Services Supervisor (or delegate) signature: \_\_\_\_\_

**Source:** PICNet CDI Toolkit and Clinical Management Algorithm Feb 2013

## **Appendix E: Information Sheet – Patient, Resident and Family Information about *Clostridium difficile***

### **WHAT IS *Clostridium difficile* (also known as *C. difficile* or *C. diff*)?**

*C. diff* is one of the many kinds of bacteria that can be found in stool (bowel movement).

### **WHAT IS *C. diff* INFECTION (CDI)?**

*C. diff* is the most common cause of infectious diarrhea in hospitals or long-term care (LTC) facilities. CDI occurs when antibiotics kill the good bacteria in your bowel and allow the *C. diff* bacteria to grow. When *C. diff* grows it produces toxins (poisons). These toxins can damage the bowel and may cause diarrhea. *C. difficile* infection is usually mild, but can be severe. In extreme cases, patients/residents may need surgery. *C. diff* may even cause death.

### **WHAT ARE THE SYMPTOMS OF *C. diff*?**

The usual symptoms are watery diarrhea, fever, and abdominal pain.

### **WHO IS AT RISK FOR *C. diff*?**

- anyone with a recent history of antibiotic use
- persons (especially older or debilitated patients/residents) in hospital or long-term care
- persons with other bowel diseases or who have had bowel surgery
- persons on chemotherapy for cancer

### **HOW DO YOU TREAT *C. diff*?**

Treatment depends on how sick you are with *C. difficile* infection. People with mild symptoms may not need treatment. People with more severe disease may need to be treated with a special antibiotic that kills the *C. diff* bacteria.

### **HOW IS *C. diff* SPREAD?**

1. When a person has *C. diff*, the bacteria in the stool can contaminate surfaces such as toilets, handles, bedpans or commode chairs.
2. When touching these items our hands can become contaminated.
3. If we then touch our mouths without washing our hands, we can become infected.
4. Our soiled hands can also spread the bacteria to other surfaces.

### **WHAT PRECAUTIONS ARE REQUIRED TO PREVENT THE SPREAD OF *C. diff* IN HOSPITALS?**

If you have *C. diff*, special precautions will be taken to prevent it from spreading to other patients/residents in the facility. These precautions include:

- Single room accommodation if possible (the door can remain open).
- A sign posted outside your door to remind others who enter your room about the need for special precautions.

- Everyone who cares for you must wear a long-sleeved gown and gloves.
- Your activities outside the room may be restricted.
- Everyone **MUST** wash their hands when leaving your room.
- You must wash your hands after using the bathroom and before leaving your room.

### WHAT SHOULD I DO AT HOME?

Healthy people are at very low risk. This includes your family and friends who are not taking antibiotics.

#### Hand Hygiene

- Everyone who might help you with your personal hygiene or with going to the toilet should wash their hands after assisting you.
- Wash your hands after you go to the bathroom, after handling soiled laundry, and before preparing meals or eating food.

#### Cleaning the house

**Step 1:** Use a regular household cleaner (according to the instructions on the label) to clean commonly touched hard surfaces in the home (e.g., faucets, door handles, countertops, etc.). Pay special attention to areas (such as the toilet) that may be heavily soiled with stool and make sure to really rub and scrub the surfaces!

**Step 2:** Disinfect the same surfaces using a diluted chlorine bleach solution (i.e., household bleach diluted with water)

1. Dilute 1 part bleach with 9 parts water.
2. Wet the surface well (the surface must stay wet for at least 10 minutes) with a clean cloth dipped in the bleach solution and wipe using good friction. **DO NOT RINSE.**
3. Allow the surface to air dry.

#### Cleaning clothes

For clothes that are heavily soiled with stool:

1. Rinse stool off or dispose of stool in the toilet.
2. Wash separately from other household laundry in a hot water cycle with soap.
3. Dry items in the clothes dryer if possible.

#### Cleaning dishes

Dishes and cutlery should be washed with normal household dishwashing products.

#### Taking medication

It is very important that you take all of your medication as prescribed by your doctor. You should **NOT** take any medications (e.g., Immodium) that will stop your diarrhea.

#### Sources:

Saskatoon Health Region Infection: Prevention and Control Fact Sheet (*C. difficile*) 2007.  
PIDAC Sample Patient Information: *Clostridium difficile* 2010.

## Appendix F: *Clostridium difficile* (CDI) Outbreak Management Checklist

This checklist outlines the basic steps to be followed when managing a CDI outbreak. It is expected that the healthcare facilities and Public Health will work collaboratively towards successfully managing a CDI outbreak.

1. Assessment	Completed?	
	Yes	No
When an increased number of cases of CDI are identified in the facility, the ICP should complete the following:		
<ul style="list-style-type: none"> <li>Data on all line listed patients reviewed based on the provincial surveillance definition.</li> </ul>		
<ul style="list-style-type: none"> <li>All patients with symptoms of diarrhea line listed.</li> </ul>		
<ul style="list-style-type: none"> <li>Available laboratory results included on line listed patients.</li> </ul>		
<ul style="list-style-type: none"> <li>Appropriate infection prevention and control (IPAC) measures are implemented.</li> </ul>		
<ul style="list-style-type: none"> <li>Does a possible outbreak exist?</li> </ul>		
<ul style="list-style-type: none"> <li>Senior Management Team notified.</li> </ul>		
<ul style="list-style-type: none"> <li>Liaise with local Public Health to discuss findings.</li> </ul>		
2. Infection Prevention and Control Measures*	Yes	No
Contact Precautions initiated for all patients with diarrhea as soon as symptoms identified:		
<ul style="list-style-type: none"> <li>Appropriate PPE used.</li> </ul>		
<ul style="list-style-type: none"> <li>Hand Hygiene practice reinforced (with soap and water).</li> </ul>		
Dedicated equipment provided for all affected patients or cleaning protocols in place for equipment that must be shared.		
Education provided and reinforced for staff, patients and visitors.		
Environmental cleaning protocols reviewed with housekeeping.		
3. Consult with local Public Health	Yes	No
Local Medical Health Officer (MHO)/designate notified and line listing provided.		
If outbreak identified, obtain outbreak number.		
Contact information for facility ICP and public health assigned staff responsible for outbreak exchanged.		
4. Outbreak Declared	Yes	No
Outbreak declared in consultation with local MHO/designate.		
Outbreak Management Team (OMT) established.		
5. Outbreak Management Team	Yes	No
Initial meeting held with representatives from facility IPAC program, local public health, and appropriate facility departments (including senior administration).		
Roles and responsibilities, including communication channels, defined.		
Communication to healthcare facility departments and stakeholders, including other facilities and media, developed and sent.		
Line listing and IPAC measures reviewed.		

Any necessary additional measures identified (e.g. antibiotic stewardship, cohorting of staff, etc.)		
<b>6. Ongoing Outbreak Management</b>	<b>Yes</b>	<b>No</b>
OMT meets regularly throughout outbreak.		
Develop communication for general public as needed.		
Line listing reviewed with public health daily.		
Review IPAC measures.		
<b>7. Declare Outbreak Over</b>	<b>Yes</b>	<b>No</b>
Declaration that outbreak is over made in consultation with Public Health and healthcare facility based on:		
<ul style="list-style-type: none"> <li>• IPAC measures to prevent transmission are sustained.</li> </ul>		
<ul style="list-style-type: none"> <li>• Number of cases decreased to facility's baseline.</li> </ul>		
<ul style="list-style-type: none"> <li>• Nosocomial transmission rates are decreasing.</li> </ul>		
<ul style="list-style-type: none"> <li>• Location of cases.</li> </ul>		
<b>8. Review of Outbreak</b>	<b>Yes</b>	<b>No</b>
Debrief conducted by OMT to review the outbreak and prepare a joint report.		
Report prepared on outbreak, including lessons learned and recommendations to prevent future outbreaks, distributed to front line staff and senior management team.		
* implement measures as outlined on page 18 and 19 of this document.		

**Source:**

Public Health Division: Public Health Protection and Prevention Branch, Ontario Ministry of Health and Long-Term Care  
 "Control of Clostridium difficile Infection (CDI) Outbreaks in Hospitals: A Guide of Hospital and Health Unit Staff" (Dec 2009)

**Appendix G: Patient Stool Record Chart**

**Bristol Stool Chart**

Type 1		Separate hard lumps, like nuts (hard to pass)
Type 2		Sausage-shaped but lumpy
Type 3		Like a sausage but with cracks on the surface
Type 4		Like a sausage or snake, smooth and soft
Type 5		Soft blobs with clear-cut edges
Type 6		Fluffy pieces with ragged edges, a mushy stool
Type 7		Watery, no solid pieces. <b>Entirely Liquid</b>

**Diarrhea** = abnormally frequent watery stools (type 6 or 7).  
Send specimen after 3<sup>rd</sup> episode of diarrhea in 24 hours

**Source:** PICNet CDI Toolkit and Clinical Management Algorithm Feb 2013

Patient Name: \_\_\_\_\_  
 Patient ID Number: \_\_\_\_\_  
 Room/Bed Number: \_\_\_\_\_

Date	Time	Type/Description (Please refer to stool chart and tick all that apply)										Color	No BM	Initials	
		1	2	3	4	5	6	7	M	B	O				

M = Mucus present B=Blood present O = Offensive odour

## Appendix H: CDI Medical Management Algorithm

### SUSPECTED OR CONFIRMED CDI

- Diarrhea (unformed or watery stools  $\geq 3$  in 24 h) **AND**
1. Pending *C. difficile* test with high clinical suspicion **OR**
  2. Positive *C. difficile* test **OR**
  3. Endoscopic or histologic evidence of pseudomembranous colitis

### INSTITUTE CONTACT PRECAUTIONS

### EVALUATE CDI SEVERITY

Assess and document patient's/resident's clinical status (vital signs, hydration etc.)  
Obtain baseline CBC and differential, electrolytes, and serum creatinine

#### MILD OR MODERATE

(Does not meet criteria for SEVERE OR FULMINANT)

#### FIRST EPISODE

- Review all antibiotics and discontinue unless clearly indicated, or document reason for continuation
- Discontinue all proton pump inhibitors (PPIs) unless clearly indicated or document reason for continuation
- Stop all anti-peristaltic & pro-motility agents
- **Metronidazole 500 mg PO/NG TID x 10-14 d <sup>^</sup>**
- If diarrhea not improving by day 4-6, or patient/resident intolerant to oral metronidazole **change to vancomycin 125 mg PO/NG QID x 10-14 d <sup>++</sup>**
- If symptoms worsen, re-evaluate for CDI severity and follow appropriate algorithm pathway

#### SEVERE

Clinical criteria (any of the following):

- WBC  $>15,000/\text{mm}^3$  **OR**
- Acute kidney injury with rising serum creatinine (SCr) (e.g. SCr  $\geq 1.5$  times premorbid level or SCr  $\geq 175 \mu\text{mol/L}$ ) **OR**
- Pseudomembranous colitis **OR**
- Clinical judgment (age  $> 60$ , fever, etc.)

#### ANY EPISODE

- Review all antibiotics & discontinue unless clearly indicated or document reason for continuation
- Discontinue all PPIs unless clearly indicated or document reason for continuation
- Stop all anti-peristaltic & pro-motility agents
- **Vancomycin 125 mg PO/NG QID x 10-14 d <sup>☆</sup>**
- Consider ID, GI, and/or General surgery consult
- Consider CT scan of the abdomen if clinically indicated

#### FULMINANT

(any of the following):

- Toxic megacolon
- Perforation
- Signs of peritonitis
- Ileus
- Severe sepsis/septic shock
- Severe acute renal failure (e.g. oliguria or dialysis requirement)

#### ANY EPISODE

- Review all antibiotics & discontinue unless clearly indicated or document reason for continuation
- Discontinue all PPIs unless clearly indicated and document reason for continuation
- Stop all anti-peristaltic & pro-motility agents
- **Vancomycin 125 mg PO/NG QID \* with **OR** without Metronidazole 500 mg IV Q8H for 10-14 days**
- **If complete ileus **OR** if unable to take PO/NG vancomycin, consider adding vancomycin 500 mg via cecal tube or rectal administration <sup>Ⓢ</sup>**
- Obtain specialist (ID, GI, and/or General Surgery) and ICU consult immediately as directed by level of care

### FIRST RECURRENCE (MILD OR MODERATE)

- Confirm that episode is the 1<sup>st</sup> recurrence (not 2<sup>nd</sup> or more recurrences)
- Review all antibiotics & discontinue unless clearly indicated, or document reason for continuation
- Discontinue all PPIs unless clearly indicated or document reason for continuation
- Stop all anti-peristaltic and pro-motility agents
- **Metronidazole 500 mg PO/NG TID x 10-14 d<sup>^</sup>**
- If diarrhea not resolving by Day 4-6, **change to vancomycin 125 mg PO/NG QID x 10-14 d\***
- If symptoms worsen,
  - Re-evaluate for CDI severity
  - Obtain ID or GI consult

### SECOND OR FURTHER RECURRENCES

- **Vancomycin 125 mg PO/NG QID x 14 d\***, then may consider vancomycin tapering over 4 weeks (e.g. vancomycin 125 mg BID x 7 days, then 125 mg once daily x 7 days, then 125 mg every 2 or 3 days for 2 weeks)<sup>†</sup> or pulse therapy
- Obtain ID or GI consult

#### Footnotes for algorithm

- <sup>^</sup> May change to Vancomycin if patient/resident intolerant to Metronidazole
- <sup>++</sup> Vancomycin IV is **not** effective for the treatment of CDI
- <sup>☆</sup> **In consultation** with Med Micro, ID, or GI specialist, fidaxomicin may be considered in:
  - Mild or moderate disease not improving by day 4-6 **and** patient/resident allergic to oral vancomycin
  - Severe disease and patient/resident allergic to oral vancomycin
- <sup>#</sup> In patients/resident unable to mount a WBC response  $>15,000/\text{mm}^3$ , an increasing WBC with pronounced left shift may also be considered in these criteria; threshold of  $>15,000/\text{mm}^3$  is based on expert opinion.
- <sup>\*</sup> Vancomycin doses of 125-500 mg may be considered; appropriate dose has not been established in clinical trials. However, there is no evidence that doses higher than 125 mg. are more effective. Prolonging full-dose therapy beyond 14 days should be avoided as there is no evidence of effectiveness and it is likely to delay reconstitution of normal intestinal bacteria.
- <sup>⊗</sup> Physician assessment for perforation risk is required prior to rectal tube placement.
- <sup>†</sup> Tapering or pulse therapy regimens may vary considerably, as clinical data are limited. Specialist referral should be obtained in patients with more than 2 recurrences.

#### Note:

- Metronidazole tapering or Metronidazole pulse therapy is NOT recommended
- Prophylactic treatment for patients on antibiotics who have previously had *C. difficile* is NOT recommended. Consider Infectious Diseases consult.

**NOTE:** This algorithm is considered current up to August 2015. Updated clinical guidelines are published by several societies including the Infectious Disease Society of America (IDSA) and the Society for Hospital Epidemiology of America (SHEA) [http://www.idsociety.org/IDSA\\_Practice\\_Guidelines/](http://www.idsociety.org/IDSA_Practice_Guidelines/). It is recommended that clinical practice guidelines such as these be consulted to obtain the most up-to-date CDI treatment recommendations.

**Source:** PICNet CDI Toolkit and Clinical Management Algorithm Feb 2013

## Glossary

**Additional Precautions:** Additional precautions are used when routine practices alone may not interrupt transmission of an infectious agent. These precautions are based on the method of transmission (e.g., contact, droplet, airborne). Additional precautions are used in addition to (not in place of) routine practices.

**Alcohol Based Hand Rub (ABHR):** An alcohol-containing (60-90%) preparation (liquid, gel or foam) designed for application to the hands to kill or reduce the number of microorganisms on hands in clinical situations when the hands are not visibly soiled.

**CDAD:** *Clostridium difficile*-associated disease. This term is being replaced by the term *Clostridium difficile* Infection (CDI).

**CDI:** *Clostridium difficile* Infection. CDI is the acute phase of the disease characterized by the symptoms of watery diarrhea, abdominal pain and fever. In contrast, colonized carriers do not have symptoms of the disease and are generally not treated for CDI; however, they are still capable of transmitting *C. difficile* bacteria.

**Cleaning:** The physical removal of foreign material (e.g., dust, soil) and organic material (e.g., blood, secretions, excretions, micro-organisms). Cleaning removes microorganisms but does not kill them. Cleaning is accomplished using water, detergents and mechanical action.

**Cohorting:** Physically separating (e.g., in a separate room) two or more patients exposed to, or infected with, the same microorganism from other patients who have not been exposed to, or infected with, that same organism.

**Diarrhea:** Loose/watery stool (i.e., if the stool were to be poured into a container it would conform to the shape of the container); **and** the bowel movements are unusual or different for the patient/resident; **and** there is no other recognized etiology for the diarrhea (e.g., laxative use).

**Disinfection:** The inactivation of disease-producing microorganisms with the exception of bacterial spores. Medical equipment/devices must be cleaned thoroughly before effective disinfection can take place.

**Hand Hygiene:** A general term referring to any action of hand cleaning – the removal of visible soil, and removal or killing of transient microorganisms on the hands. Hand hygiene may be accomplished using soap and water or an alcohol based hand rub.

**High Touch Surfaces:** High touch surfaces are those that have frequent contact with the hands (e.g., doorknobs, call bells, bedrails, light switches).

**Improved Hydrogen Peroxide (IHP):** A formulation of hydrogen peroxide that contains surfactants, wetting agents and chelating agents. The resulting synergy makes it a powerful oxidizer that can rapidly achieve broad-spectrum disinfection for environmental surfaces and non-critical devices.

**Multidrug-resistant organism (MDRO):** Bacteria (excluding *M. tuberculosis*) that are resistant to one or more classes of antimicrobial agents and usually are resistant to all but one or two commercially available antimicrobial agents (e.g., MRSA, VRE, extended spectrum beta-lactamase [ESBL]-producing or intrinsically resistant gram-negative bacilli).<sup>56</sup>

**Pseudomembranous Colitis:** An inflammatory condition of the colon consisting of a characteristic membrane with adherent plaques associated with severe symptoms including profuse watery diarrhea and abdominal pain. The condition is considered distinctly characteristic of *Clostridium difficile* infection.

**Routine Practices:** The system of infection prevention and control practices recommended by the Public Health Agency of Canada to be used with all patients at all times to prevent and control transmission of microorganisms in healthcare settings.

**Sensitivity:** Sensitivity relates to a test's ability to correctly detect patients who do have a condition (i.e., to correctly identify people who are sick as being sick. This is sometimes referred to as the true positive rate.

**Specificity:** Specificity relates to a test's ability to correctly detect patients without a condition (i.e., to correctly identify healthy people as being healthy). This is sometimes referred to as the true negative rate.

**Spore:** The dormant stage some bacteria will enter when environmental conditions cause stress to the organism or no longer support its continued growth. *C. difficile* spores are highly resistant to cleaning and disinfection measures. The spores also make it possible for the organism to survive passage through the stomach, resisting the killing effect of gastric acid.

**Sporicidal agent:** A substance used to kill spores.

**Sterilization:** any process that eliminates (removes) or kills all forms of life, including transmissible agents (such as fungi, bacteria, viruses, spore forms, etc.).

**Terminal Cleaning:** The process for cleaning and disinfecting a patient room or bed space following discharge, transfer or discontinuation of contact precautions, in order to remove contaminating microorganisms that might be acquired by subsequent occupants.

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<sup>56</sup> Siegel, Rhinehart, Jackson et al., 53.