

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 of the Saskatchewan Health Authority (SHA), Athabasca Health Authority, Saskatchewan Cancer Agency, 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 November 2018.

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

Summary of major revisions:

<u>Page:</u>	<u>Revisions:</u>
Entire document	Updated language referring to former regional health authorities (RHAs)
1-3	Updated epidemiology trends and national/provincial incidence rates
3	Added summary about most effective methods for CDI prevention
4-5	Order of PPE and Hand Hygiene sections reversed; updated hand hygiene section to align with current recommendations
7	“Chart Alerts” section - REMOVED
8	Added information related to importance and methods of environmental cleaning to remove <i>C. difficile</i> spores
10	Reinforce requirement to discard unused supplies after transfer/discharge
13	Updated definition of diarrhea to align with CNISP
16	Information about <i>C. difficile</i> on Saskatchewan’s notifiable disease list - REMOVED
16	Updated link to Saskatchewan CDI Surveillance Protocol on government website
17	Updated link to Long Term Care outbreak manual on government website
18	“Overview of Treatment Options” section - REMOVED; added links to access current clinical practice guidelines
19-22	Updated references and links
	Appendix H: CDI Medical Management Algorithm - REMOVED

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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 the existing health authority infection prevention and control program, 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.¹

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.² *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 2016 was 3.13 per 1,000 admissions and 4.05 per 10,000 patient days. For the Western region (BC, Alberta, Saskatchewan and Manitoba), the rate of CDI in 2016 was 3.10 per 1,000 admissions and 4.05 per 10,000 patient days.³ The Saskatchewan *Clostridium difficile* infection (CDI) surveillance program began on July 1, 2012. The incidence of HA-CDI in Saskatchewan in the 2017-18 surveillance year was 2.6 in acute care, 0.1 in long-term care, and 0.7 per 10,000 patient/resident days overall.⁴

Studies have revealed that the prevalence of asymptomatic colonization with *C. difficile* is 3%-26% among adult inpatients in acute care facilities and 5%-7% among elderly residents in long-term care

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

² Gerding DN and Lessa FC, 38.

³ Canadian Nosocomial Infection Surveillance Program (CNISP) "Antimicrobial Resistant Organisms (ARO) Surveillance: Surveillance Report for Data from January 1, 2012 to December 31, 2016", 3.

⁴ Government of Saskatchewan, "Clostridium difficile Surveillance Report: Saskatchewan 2017-18", 1.

facilities (LTCFs).⁵ It is interesting to note that a recent meta-analysis found the main risk factor for colonization is previous hospitalization, but neither antibiotic use, nor previous CDI were associated with colonization at the time of hospital admission.⁶

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 (>20% of cases in 2011) or outpatient settings.^{7,8} A recent retrospective cohort study found that rates of HA-CDI with healthcare onset were shown to have decreased by 20.3% over the 12 year period, while the rates of HA-CDI with community onset had increased slightly (1.9%) and rates of community-associated CDI (CA-CDI) had increased by 18.4%. The incidence of CDI cases in young, previously healthy individuals in the community with no recent healthcare exposure (i.e. CA-CDI) is also rising among persons previously thought to be at low risk. Recent studies indicate that patients with CA-CDI are usually younger, female, have fewer comorbidities and are less likely to have severe infections or have been exposed to antibiotics compared to patients with HA-CDI.^{9,10}

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. Other indicators of CDI morbidity include recurrent CDI, readmission to the hospital and discharge to LTCFs.¹¹ After the initial CDI diagnosis, 10-30% of patients develop at least one recurrent CDI episode, and the risk of recurrence increases with each successive recurrence, potential resulting in significant morbidity.¹² Since 2000, CDI attributable mortality has been reported to range from 4.5-16.7%. However, recurrent CDI is associated with a 33% increased risk of mortality within 6 months relative to patients who do not suffer a recurrence.¹³

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.¹⁴ 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 2012, CDI-attributable cost for acute care was estimated at \$3,427-\$9,960 (USD) per episode.¹⁵ However, there are additional costs of CDI that have yet to be quantified, such as

⁵ McDonald LC, Gerding DN, Johnson S et al., 13.

⁶ Zacharioudakis IM, Zervou FN, Pliakos EE et al.

⁷ Gerding DN and Lessa FC, 40.

⁸ Reveles KR, Pugh MV, Lawson KA et al., 431-5.

⁹ Khanna S, Pardi DS, Aronson SL et al.

¹⁰ Salaripour M, Johnstone J, Gardam M.

¹¹ McDonald LC, Gerding DN, Johnson S et al., 11.

¹² McFarland LV, Surawicz CM, Rubin M et al.

¹³ Olsen MA, Yan Y, Reske KA, et al.

¹⁴ Association for Professionals in Infection Control & Epidemiology, Inc. (APIC), "Guide to Preventing *Clostridium difficile* Infections", 9.

¹⁵ Kwon JH, Olsen MA, and Dubberke ER.

cost of treating CDI in 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.

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 found on multiple surfaces in the healthcare settings. 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*.¹⁶

Existing data indicate that the most effective methods to prevent CDI in healthcare facilities are¹⁷:

- Improving antimicrobial prescribing;
- Promptly identifying patients with CDI and placing them on contact precautions, and
- Making sure that healthcare workers are compliant with contact precautions, including gowns, gloves, use of dedicated equipment whenever possible, and ensuring that non-dedicated equipment is adequately cleaned between patients.

Risk factors for development of CDI^{18,19}

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.

¹⁶ McDonald LC, Gerding DN, Johnson S et al., 13.

¹⁷ Dubberke ER, Carling P, Carrico R, et al.

¹⁸ Gerding DN and Lessa FC, 45.

¹⁹ PIDAC, "Annex C: Testing, Surveillance and Management of *Clostridium difficile*", 4.

Infection Prevention and Control Measures

The local 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;
- 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) 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.
- (c) Signage shall be prominently displayed on the patient's/resident's door stating that hand hygiene is required (refer to sub-section 3, "Hand Hygiene").

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

2. Personal Protective Equipment (PPE)

Contact precautions require the use of PPE, specifically gloves and a long-sleeved gown. Refer to the local policy for contact precautions. For more information, refer to PIDAC's "Routine Practices and Additional Precautions in All Health Care Settings".²⁰

Studies indicate that it is very important to stress compliance with glove use each and every time a healthcare worker enters a room housing a patient with CDI. McFarland and colleagues²¹ found that none of the glove-wearing healthcare workers exiting the room of a patient with CDI had *C. difficile* cultured from their hands. Care should also be taken to prevent contamination of hands when removing gloves. However, after gloves are removed, hand hygiene must be performed because microorganisms can contaminate hands via small defects in the gloves or during glove removal.

²⁰ PIDAC, "Routine Practices and Additional Precautions in All Health Care Settings", 31-34.

²¹ McFarland LV, Mulligan ME, Kwok RY, et al.

Long-sleeved gowns have been recommended because of potential soiling and contamination of healthcare worker uniforms with *C. difficile* and evidence for reducing transmission of other enteric drug resistant organisms such as VRE. Although there is no evidence that uniforms are a source of *C. difficile* transmission, the fact that gloves reduce transmission provides further indirect evidence for gowns.²²

3. Hand Hygiene^{23,24,25}

As alcohol does not kill spores, soap and water are theoretically more effective at removing spores than alcohol-based hand rub (ABHR). However, healthcare workers (HCWs) use gloves when providing personal care to patients with diarrhea, and Contact Precautions for patients with CDI. Gloves reduce the risk of hand contamination and have been shown to reduce the risk of transmission of CDI.

- Wash hands with soap and water after glove removal if a dedicated staff hand washing sink is immediately available. **NOTE:** Hand hygiene should not be carried out at a patient sink, as this will re-contaminate the HCW's hands.
- If a dedicated staff hand washing sink is not immediately available, hands should be cleaned using ABHR (70% alcohol preferred in healthcare facilities) after glove removal, followed by a wash with soap and water at the closest hand hygiene sink.
- Provide education to the patient and visitors on the need and procedure to be used for hand hygiene. Patients who are unable to perform hand hygiene independently should be assisted by the HCW.

4. 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.²⁶ Therefore, showering a patient/resident is the preferred method of performing personal hygiene while symptomatic.²⁷ 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.

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

²² McDonald LC, Gerding DN, Johnson S et al., 24.

²³ IPAC-Canada Hand Hygiene Practice Recommendations Jun 2017.

²⁴ PIDAC, "Annex C: Testing, Surveillance and Management of *Clostridium difficile*", 6.

²⁵ McDonald LC, Gerding DN, Johnson S et al., 24.

²⁶ Jury LA, Guerrero DM, Burant CJ et al, 181-4.

²⁷ Association for Professionals in Infection Control & Epidemiology (APIC) "Guide to Preventing *Clostridium difficile* Infections", 30.

patient's/resident's condition. Individuals who are incontinent of feces are more likely to contaminate the environment with *C. difficile*.²⁸

- (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 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.²⁹
- (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.^{30,31}

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.³²
- 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

²⁸ PIDAC, "Annex C: Testing, Surveillance and Management of *Clostridium difficile*", 5-6.

²⁹ Association for Professionals in Infection Control & Epidemiology (APIC) "Guide to Preventing *Clostridium difficile* Infections", 45.

³⁰ PHAC, "*Clostridium difficile* Infection Prevention and Control Guidance for Management in Acute Care Settings", 9.

³¹ PHAC, "*Clostridium difficile* Infection Prevention and Control Guidance for Management in Long-Term Care Settings", 10.

³² APIC, Guide to Preventing *Clostridium difficile* Infections", 37.

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.³³

6. Patient/Resident Transport³⁴

- (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.

7. Disposal of Waste³⁵

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 perform hand hygiene.

- (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.

³³ Lobè C.

³⁴ Public Health Agency of Canada (PHAC), “*Clostridium difficile* Infection Prevention and Control Guidance for Management in Acute Care Settings”, 9.

³⁵ Public Health Agency of Canada (PHAC), “*Clostridium difficile* Infection Prevention and Control Guidance for Management in Acute Care Settings”, 10.

- (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.

8. Environmental Cleaning³⁶

C. difficile is a spore-forming bacterium which is readily killed in the vegetative form with hospital-grade disinfectants, but the spores can persist in the environment for months. The spores can be spread by contact and germinate once ingested. Specialized cleaning and disinfection practices are required for *C. difficile*. *C. difficile* control is facilitated through thorough cleaning and disinfection of the patient/resident environment to remove and kill the spores.³⁷

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.

A. Product Selection and Use:

IMPORTANT: Use only 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

³⁶ PIDAC, "Best Practices for Environmental Cleaning for Infection Prevention and Control", 109.

³⁷ PIDAC, "Annex C: Testing, Surveillance and Management of *Clostridium difficile*", 7.

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/resident room and bathroom** 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 local housekeeping policies and procedures for specific information regarding environmental cleaning upon discharge/transfer.

The following additional procedures must be incorporated into the 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.

9. 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 8, "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.
- (e) Once patient/resident is discharged or precautions are discontinued, discard all unused supplies (e.g. dressing materials, tape, etc.).

10. 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.**³⁸

11. Linen and Laundry³⁹

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

12. Visitors

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

- (a) Instruct visitors to perform hand hygiene before entering and after leaving the patient's/resident's room, and before and after personal contact (refer to sub-section 3, "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 local policies and procedures (refer to sub-section 2, "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.

13. Patient/Resident and Family Teaching

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

14. 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 local policy) after diarrhea has resolved, or as directed by the Medical Health Officer and/or Occupational Health Services.

15. 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 local policy).⁴⁰

³⁸ Gerding DN, Muto CA and Owens RC, S47.

³⁹ PIDAC, "Best Practices for Environmental Cleaning for Infection Prevention and Control", 70.

⁴⁰ PIDAC, "Annex C: Testing, Surveillance and Management of *Clostridium difficile*", 11.

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.

16. Handling Deceased bodies⁴¹

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

17. Discharge Planning⁴²

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.

18. 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 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.”⁴³ There is evidence that the judicious use of antimicrobial agents can contribute to the reduction in the incidence of CDI.⁴⁴ 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.^{45,46}

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,

⁴¹ PHAC, “*Clostridium difficile* Infection Prevention and Control Guidance for Management in Acute Care Settings”, 12.

⁴² PHAC, “*Clostridium difficile* Infection Prevention and Control Guidance for Management in Acute Care Settings”, 13.

⁴³ Dellit TH, Owens RC, McGowan Jr JE et al., 159.

⁴⁴ Aldeyab MA, Kearney MP, Scott MG et al., 2993.

⁴⁵ APIC, “Guide to Preventing *Clostridium difficile* Infections”, 79.

⁴⁶ Loo VG, Davis I, Embil J et al., “AMMI Canada treatment practice guidelines for *C. difficile* infection”, 81.

including a list of Core Elements of Hospital Antibiotic Stewardship Programs and an accompanying checklist.^{47,48}

Identifying *Clostridium difficile* Infection

Case Definition for CDI⁴⁹

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:

- 6 or more watery stools in a 36-hour period; or
- 3 or more unformed stools in a 24-hour period and this is new or unusual for the patient

Note: If the information about the frequency and consistency of diarrhea is not available, a positive laboratory result for *C. difficile* toxin or the presence of toxigenic *C. difficile* in the stool will be considered as a case.

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 residents⁵⁰), and positive test results in the absence of a compatible clinical picture can be misleading and even harmful.

⁴⁷ CDC, "Core Elements of Hospital Antibiotic Stewardship Programs".

⁴⁸ AHRQ, "Toolkit for Reduction of *Clostridium difficile* Through Antimicrobial Stewardship".

⁴⁹ CNISP, "Antimicrobial Resistant Organisms (ARO) Surveillance: Surveillance Report for Data from January 1 2012 to December 31 2016", 20.

⁵⁰ Ziakas PD, Zacharioudakis IM, Zervou FN et al, 1-14.

- (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.^{51,52} 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.⁵³
- (g) If symptoms return following a period of resolution, retesting may be indicated to determine if a relapse has occurred. Consultation with an infection prevention and control professional may be required in this situation.
- (h) Repeat testing following a negative result is not recommended if a recommended testing algorithm is used by the laboratory.⁵⁴ 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.

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*.

⁵¹ Schultze GE, Willoughby RE, Committee on Infectious Diseases, American Academy of Pediatrics, 196-200.

⁵² Larson HE, Barclay FE, Honour P et al, 727-733.

⁵³ Issak MI, Elliott TS, 610-11.

⁵⁴ Sharp S, Gilligan P, "A practical guidance document for the laboratory detection of toxigenic *Clostridium 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 facility.

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.⁵⁵

Refer to the Saskatchewan *Clostridium difficile* Infection (CDI) Surveillance Protocol

[<https://www.ehealthsask.ca/services/resources/Resources/CDI%20Surveillance%20Protocol%20March%202016.pdf>] 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."⁵⁶

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:⁵⁷

- (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;⁵⁸
- (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;⁵⁹
- (e) Cohorting of staff to patients/residents (i.e., assigning staff to work exclusively with CDI positive patients or residents);

⁵⁵ Public Health Agency of Canada (PHAC), "*Clostridium difficile* Infection Prevention and Control Guidance for Management in Acute Care Settings", 6.

⁵⁶ PIDAC, "Annex C: Testing, Surveillance and Management of *Clostridium difficile*", 17.

⁵⁷ Public Health Agency of Canada (PHAC), "*Clostridium difficile* Infection Prevention and Control Guidance for Management in Acute Care Settings", 14.

⁵⁸ Dubberke ER, Carling P, Carrico R et al., 636.

⁵⁹ 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.”⁶⁰ 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 the local Infection Prevention and Control (IPAC) department 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 <https://www.ehealthsask.ca/services/Manuals/Documents/Outbreaks%20in%20Long%20Term%20Care%20and%20Integrated%20Facilities.pdf> for protocol)

⁶⁰ Saskatchewan Ministry of Health, Section 9-52, 1.

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.⁶¹

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:⁶²

- (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).

NOTE: Updated clinical guidelines are published by several societies including the [Infectious Disease Society of America \(IDSA\)](#) and the [Society for Hospital Epidemiology of America \(SHEA\)](#) and the [Association for Medical Microbiology and Infectious Disease Canada \(AMMI Canada\)](#). It is recommended that clinical practice guidelines such as these be consulted to obtain the most up-to-date CDI treatment recommendations.

⁶¹ Loo VG, Kearney MP, Scott MG et al., "AMMI Canada treatment practice guidelines for *Clostridium difficile* infection".

⁶² PICNet, "British Columbia *Clostridium difficile* Infection (CDI) Toolkit and Clinical Management Algorithm", 35.

References

- Agency for Healthcare Research and Quality (AHRQ) "Toolkit for Reduction of *Clostridium difficile* Through Antimicrobial Stewardship." Atlanta, GA: US Department of Health and Human Services, CDC; (2012). [<http://www.ahrq.gov/professionals/quality-patient-safety/patient-safety-resources/resources/cdifftoolkit/cdifftoolkit.pdf> - retrieved September 10, 2018]
- Aldeyab MA, Kearney MP, Scott MG, Aldiab MA, Alahmadi YM, Darwish Elhajji FW, Magee FA and McElnay JC, "An evaluation of the impact of antibiotic stewardship on reducing the use of high-risk antibiotics and its effect on the incidence of *Clostridium difficile* infection in hospital settings." *Journal of Antimicrobial Chemotherapy* 67 (August 2012): 2988–2996.
- Association for Professionals in Infection Control & Epidemiology, Inc. (APIC), "Guide to Preventing *Clostridium difficile* Infections" (Washington, DC: APIC, 2013). [<http://apic.org/Resource/EliminationGuideForm/59397fc6-3f90-43d1-9325-e8be75d86888/File/2013CDiffFinal.pdf>–retrieved September 10, 2018]
- Canadian Nosocomial Infection Surveillance Program (CNISP), "Antimicrobial Resistant Organisms (ARO) Surveillance: Surveillance Report for Data from January 1 2012 to December 31 2016" (Ottawa, ON: Public Health Agency of Canada, December 2017).
- Centres for Disease Control and Prevention. "Core Elements of Hospital Antibiotic Stewardship Programs." Atlanta, GA: US Department of Health and Human Services, CDC; (2014). [<https://www.cdc.gov/antibiotic-use/healthcare/pdfs/core-elements.pdf>–retrieved September 10, 2018]
- Dellit TH, Owens RC, McGowan Jr JE, Gerding DN, Weinstein RA, Burke JP, Huskins WC, Paterson DL, Fishman NO, Carpenter CF, Brennan PJ, Billeter M and Hooton TM, "Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America Guidelines for Developing an Institutional Program to Enhance Antimicrobial Stewardship" *Clinical Infectious Diseases* 44 (January 2007): 159–77.
- Dubberke ER, Carling P, Carrico R, Donskey CJ, Loo VG, McDonald LC, Maragakis LL, Sandora TJ, Weber DJ, Yokoe DJ, Gerding DN "Strategies to prevent *Clostridium difficile* infections in acute care hospitals: 2014 Update (SHEA/IDSA Practice Recommendation)," *Infection Control and Hospital Epidemiology* 35, No. 6 (June 2014): 628-645.
- Gerding DN and Lessa FC, "The Epidemiology of *Clostridium difficile* Infection Inside and Outside Health Care Institutions." *Infectious Disease Clinics of North America* 29 (2015): 37–50.
- Gerding DN, Muto CA and Owens RC, "Measures to control and prevent *Clostridium difficile* Infection," *Clinical Infectious Diseases* 46, no 1, supplement 1 (January 2008): S43-S49.
- Government of Saskatchewan, "*Clostridium difficile* Surveillance Report: Saskatchewan 2017-18", July 2018 [<https://www.ehealthsask.ca/services/resources/Pages/Communicable-Disease.aspx>–retrieved September 2018].

- Infection Prevention and Control Canada (IPAC-Canada) Hand Hygiene Practice Recommendations, June 2017 [https://ipac-canada.org/photos/custom/Members/pdf/17JulHand%20Hygiene%20Practice%20Recommendations_final.pdf – retrieved Sept 2018]
- Issack MI, Elliott TS. “*Clostridium difficile* carriage after infection,” *Lancet* 335, no 8689(1990):610-11.
- Jury LA, Guerrero DM, Burant CJ, Cadnum JL, Donskey CJ, “Effectiveness of routine patient bathing to decrease the burden of spores on the skin of patients with *Clostridium difficile* infection,” *Infection Control Hospital Epidemiology* 32, no 2 (February 2011): 181-4.
- Loo VG, Davis I, Embil J, Evans GA, Hota S, Lee C, Lee TC, Longtin Y, Louie T, Moayyedi P, Poutanen S, Simor AE, Steiner T, Thampi N, Valiquette L, “Association of Medical Microbiology and Infectious Disease Canada treatment practice guidelines for *Clostridium difficile* infection.” *Journal of the Association of Medical Microbiology and Infectious Disease Canada* 3.2 (2018): 71-92.
- Khanna S, Pardi DS, Aronson SL, et al. The epidemiology of community-acquired *Clostridium difficile* infection: a population-based study. *Am J Gastroenterol*. 107 no.1 (2012):89–95.
- Kwon JH, Olsen MA, Dubberke ER, “The morbidity, mortality, and costs associated with *Clostridium difficile* infection,” *Infectious Disease Clinics of North America* 29(2015):123–34.
- Larson HE, Barclay FE, Honour P, Hill ID. “Epidemiology of *Clostridium difficile* in infants,” *Journal of Infectious Diseases* 146, no 6 (1982):727–733.
- Lobè C, “Comparative analysis of bedpan processing equipment” (Montréal, QC: Agence d’évaluation des technologies et des modes d’intervention en santé (AETMIS), 2009).
[<http://www.crd.york.ac.uk/CRDWeb/PrintPDF.php?AccessionNumber=32008100423&Copyright=Health+Technology+Assessment+%28HTA%29+database%3Cbr+%2F%3ECopyright+%26copy%3B+2017+Agence+d%27Evaluation+des+Technologies+et+des+Modes+d%27Intervention+en+Sante+%28AETMIS%29%3Cbr+%2F%3E> – retrieved September 2018]
- McDonald LC, Gerding DN, Johnson S, Bakken JS, Carroll KC, Coffin SE, Dubberke ER, Garey KW, Gould CV, Kelly C, Loo V, Shaklee Sammons J, Sandora TJ and Wilcox MH. “Clinical Practice Guidelines for *Clostridium difficile* Infection in Adults and Children: 2017 Update by the Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA),” *Clinical Infectious Diseases* 66, no 7 (March 2018): 1-48.
- McFarland LV, Surawicz CM, Rubin M, Fekety R, Elmer GW, Greenberg RN, “Recurrent *Clostridium difficile*: epidemiology and clinical characteristics”, *Infect Control Hosp Epidemiol*. 20 (1999): 43-50.
- McFarland LV, Mulligan ME, Kwok RY, Stamm WE. “Nosocomial acquisition of *Clostridium difficile* infection”, *N Engl J Med* 320 (1989):204-210.
- Olsen MA, Yan Y, Reske KA, Zilberberg MD, Dubberke ER, “Recurrent *Clostridium difficile* infection is associated with increased mortality”, *Clin Microbiol Infect* 21 (2015): 164-70.

Provincial Infection Control Network of British Columbia (PICNet), “British Columbia *Clostridium difficile* Infection (CDI) Toolkit and Clinical Management Algorithm” (British Columbia: Provincial Infection Control Network, February 2013).

[<https://www.picnet.ca/wp-content/uploads/Toolkit-for-Management-of-CDI-in-Acute-Care-Settings-2013.pdf> - retrieved September 2018].

Provincial Infectious Diseases Advisory Committee (PIDAC), “Routine Practices and Additional Precautions in All Health Care Settings” (Toronto, ON: Ontario Ministry of Health and Long-Term Care, November 2012).

[http://www.publichealthontario.ca/en/eRepository/RPAP_All_HealthCare_Settings_Eng2012.pdf - retrieved September 2018]

Provincial Infectious Diseases Advisory Committee (PIDAC), “Best Practices for Environmental Cleaning for Prevention and Control of Infections in All Health Care Settings” (Toronto, ON: Ontario Ministry of Health and Long-Term Care, April 2018).

[https://www.publichealthontario.ca/en/eRepository/Best_Practices_Environmental_Cleaning.pdf - retrieved September 2018]

Provincial Infectious Diseases Advisory Committee (PIDAC), “Annex C: Testing, Surveillance and Management of *Clostridium difficile* in All Health Care Settings” [Annex to “Routine Practices and Additional Precautions”] (Toronto, ON: Ontario Ministry of Health and Long-Term Care, January 2013).

[http://www.publichealthontario.ca/en/eRepository/PIDAC-IPC_Annex_C_Testing_SurveillanceManage_C_difficile_2013.pdf – retrieved September 2018]

Public Health Agency of Canada (PHAC), “*Clostridium difficile* infection: Infection Prevention and Control Guidance for Management in Acute Care Facilities” (2013). [<https://www.canada.ca/en/public-health/services/infectious-diseases/nosocomial-occupational-infections/clostridium-difficile-infection-prevention-control-guidance-management-acute-care-settings.html>] – retrieved October 2018]

Public Health Agency of Canada (PHAC), “*Clostridium difficile* infection: Infection Prevention and Control Guidance for Management in Long-Term Care Facilities” (2013).

[<https://www.canada.ca/en/public-health/services/infectious-diseases/nosocomial-occupational-infections/clostridium-difficile-infection-prevention-control-guidance-management-long-term-care-facilities.html>] – retrieved October 2018]

Reveles KR, Pugh MV, Lawson KA, Mortensen EM, Koeller JM, Argamany JR, Frei CR, “Shift to community-onset *Clostridium difficile* infection in the national Veterans Health Administration, 2003-2014”, *American Journal of Infection Control* 46 (April 2018): 431-5.

Salaripour M, Johnstone J, Gardam M, “Epidemiology of patients hospitalized with *Clostridium difficile* infection: a comparative analysis of community-associated and healthcare-associated *Clostridium difficile* infections”, *Canadian Journal of Infection Control* 33 no. 2 (Summer 2018): 96-101.

- Saskatchewan Ministry of Health, “Communicable Disease Manual, Section 9: Outbreaks in Long Term Care and Integrated Facilities” (Regina, SK: Saskatchewan Ministry of Health, June 2010).
[<https://www.ehealthsask.ca/services/Manuals/Documents/Outbreaks%20in%20Long%20Term%20Care%20and%20Integrated%20Facilities.pdf>– retrieved September 2018]
- Schultze GE, Willoughby RE, Committee on Infectious Diseases, American Academy of Pediatrics. “*Clostridium difficile* infection in infants and children.” *Pediatrics* 131, no 1 (2013): 196-200.
- Sharp S, Gilligan P, “A practical guidance document for the laboratory detection of toxigenic *Clostridium difficile*,” American Society for Microbiology, Washington, DC (2010).
- Siegel JD, Rhinehart E, Jackson M, Chiarello L and the Healthcare Infection Control Practices Advisory Committee, “Management of Multidrug-Resistant Organisms in Healthcare Settings, 2006” (Atlanta, GA: Centers for Disease Control and Prevention, 2006).
[<https://www.cdc.gov/infectioncontrol/pdf/guidelines/mdro-guidelines.pdf>– retrieved October 2018]
- Zacharioudakis IM, Zervou FN, Pliakos EE, Ziakas PD, Mylonakis E, “Colonization with toxinogenic *C. difficile* upon hospital admission, and risk of infection: a systematic review and meta-analysis,” *American Journal of Gastroenterology*, 110 no 3 (March 2015):381–90.
- Ziakas PD, Zacharioudakis IM, Zervou FN, Grigoras C, Pliakos EE, Mylonakis E, “Asymptomatic carriers of toxigenic *C. difficile* in long-term care facilities: a meta-analysis of prevalence and risk factors,” *PLoS One* 10, no 2 (February 2015): 1-14.

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 diarrhea¹

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 local 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 local 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 laboratory as per local 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**², as necessary.
- Inform local **Infection Prevention and Control Department** of positive case of CDI.
- Notify **Housekeeping department** that twice daily cleaning procedures for CDI³ are to be initiated.
- **Provide *C. difficile* information**⁴ to patient/resident and their family. **Document** that this has been given.

OPTIONAL:

- Post additional “hand hygiene required” signage⁵ on patient/resident door as a visual hand hygiene cue for staff and visitors.

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 18.

3. See Guidelines for the Management of *Clostridium difficile* Infection (CDI) in all Healthcare Settings: Pages 9-10.

4. See Guidelines for the Management of *Clostridium difficile* Infection (CDI) in all Healthcare Settings: Pages 28-29 (Appendix E)

5. See Guidelines for the Management of *Clostridium difficile* Infection (CDI) in all Healthcare Settings: Page 24 (Appendix B)

Appendix B: Sample Hand Hygiene Poster

Perform hand hygiene 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 perform hand hygiene.

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); OR - Improved Hydrogen Peroxide (IHP) (4.5%) with a sporicidal claim NOTE: 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			

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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.

	Completed?	
	Yes	No
1. Assessment		
When an increased number of cases of CDI are identified in the facility, the ICP should complete the following:		
• Data on all line listed patients reviewed based on the provincial surveillance definition.		
• All patients with symptoms of diarrhea line listed.		
• Available laboratory results included on line listed patients.		
• Appropriate infection prevention and control (IPAC) measures are implemented.		
• Does a possible outbreak exist?		
• Senior Management Team notified.		
• Liaise with local Public Health to discuss findings.		
2. Infection Prevention and Control Measures*	Yes	No
Contact Precautions initiated for all patients with diarrhea as soon as symptoms identified:		
• Appropriate PPE used.		
• Hand Hygiene practice reinforced.		
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 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.)		
6. Ongoing Outbreak Management	Yes	No
OMT meets regularly throughout outbreak.		
Develop communication for general public as needed.		
Line listing reviewed with public health daily.		
Review IPAC measures.		
7. Declare Outbreak Over	Yes	No
Declaration that outbreak is over made in consultation with Public Health and healthcare facility based on:		
• IPAC measures to prevent transmission are sustained.		
• Number of cases decreased to facility's baseline.		
• Nosocomial transmission rates are decreasing.		
• Location of cases.		
8. Review of Outbreak	Yes	No
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.		
Provincial Outbreak Report prepared and submitted to Ministry of Health		
* implement measures as outlined on page 16 and 17 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 for 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. Entirely Liquid

Diarrhea = abnormally frequent watery stools (type 6 or 7). Send specimen after 3rd 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															

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).⁶³

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.

⁶³ Siegel JD, Rhinehart E, Jackson M et al., 53.