

Provincial Infectious
Diseases Advisory
Committee
(PIDAC)

**Best Practices
Document for the
Management of
Clostridium difficile
in all health care
settings**

Ministry of Health and Long-Term Care
Published - December 2004
Revised – January 2009



Disclaimer for Best Practice Documents

This document was developed by the Provincial Infectious Diseases Advisory Committee (PIDAC). PIDAC is a multidisciplinary scientific advisory body who provide to the Chief Medical Officer of Health evidence-based advice regarding multiple aspects of infectious disease identification, prevention and control. PIDAC's work is guided by the best available evidence and updated as required. Best Practice documents and tools produced by PIDAC reflect consensus positions on what the committee deems prudent practice and are made available as a resource to the public health and health care providers.

All or part of this report may be reproduced for educational purposes only without permission, so long as the following acknowledgement is included to indicate the source:

© Ontario Ministry of Health and Long-Term Care/Public Health Division/Provincial Infectious Diseases Advisory Committee

Toronto, Canada
Revised January 2009

© Queen's Printer for Ontario, 2009
ISBN: 1-4249-1545-7 (PDF)

Document Control Record

Last reviewed: June 2007

Revised: October 2008

Best Practices Document for the Management of <i>Clostridium difficile</i> in all health care settings		
Page No.	Paragraph / Section	Description
3	Document Control	Updated document control record to identify changes since last version
7	Preamble	Added statement on occupational health and safety to align with existing best practice documents
10	Section 1: Background	Added statement that IPAC practices remain the same even for the epidemic strain
16	Section 6: Treatment	Added new recommendations for use of vancomycin as first line drug for severe disease
32	References	Added reference for new treatment recommendation

PIDAC would like to acknowledge the contribution and expertise of the subcommittee which developed this document:

Infection Prevention and Control Subcommittee

Dr. Mary Vearncombe, Chair

Medical Director, Infection Prevention and Control, Microbiology
Sunnybrook Health Sciences Centre and Women's College Hospital

Mary Lou Card

Manager – Infection, Prevention & Control
London Health Services Ctr. & St. Joseph's Health Care

Dr. Maureen Cividino

Occupational Health Physician
St. Joseph's Hospital, Hamilton

Renee Freeman

Infection Control Practitioner
The Hospital for Sick Children

Dr. Michael Gardam

Director, Infection Control
University Health Network, Toronto

Dr. Beth Henning

Medical Officer of Health
Huron County

Dr. Allison McGeer

Director, Infection Control
Mount Sinai Hospital, Toronto

Pat Piaskowski

Network Coordinator
Northwestern Ontario Infection Control Network

Dr. Virginia Roth

Director, Infection Prevention and Control Program
Ottawa Hospital – General Campus

Dr. Dick Zoutman

Professor and Chair, Divisions of Medical Microbiology and of Infectious Diseases
Medical Director of Infection Control, South Eastern Ontario Health Sciences Centre
Queen's University, Kingston, Ontario
Co-Chair, Provincial Infectious Diseases Advisory Committee (PIDAC)

Clare Barry, Ex-officio

Senior Infection Prevention & Control Consultant
Strategic Planning & Implementation Branch
Public Health Division, Ministry of Health and Long-Term Care

Dr. Erika Bontovics, Ex-officio

Senior Infection Control Consultant, Infectious Diseases Branch
Public Health Division, Ministry of Health and Long-Term Care

Liz Van Horne, Ex-officio

Infection Prevention and Control Consultant
Strategic Planning and Implementation Branch
Public Health Division, Ministry of Health and Long-Term Care

TABLE OF CONTENTS

Preamble	6
About this Document	6
How and When to Use This Document	6
Assumptions and General Principles for Infection Prevention and Control.....	7
Occupational Health and Safety	8
Glossary of Terms:	9
Best Practices Document for the Management of Clostridium difficile in all health care settings	10
1. Background	10
2. Risk Factors for <i>C. difficile</i>	10
3. Testing for <i>C. difficile</i> Cytotoxin.....	10
4. Surveillance	11
5. Infection Prevention and Control Precautions for <i>C. difficile</i> Associated Disease	12
5.1 Accommodation	12
5.2 Contact Precautions	12
5.3 Hand Hygiene	13
5.4 Environmental Cleaning.....	13
5.5 Visitors	15
5.6 Patient Transfer	15
5.7 Patient Discharge	15
5.8 Discontinuation of Precautions for <i>C. difficile</i>	16
6. Treatment of <i>C. difficile</i>	16
7. Recurrence of Symptoms.....	17
8. Staff Education	17
9. Outbreaks of <i>C. difficile</i>	17
9.1 Outbreak Management:	18
10. Evaluation	18
Appendices.....	19
Appendix A: Patient Transportation	19
Appendix B: Sample Cleaning Protocol for Patient/Resident Rooms Contaminated With <i>Clostridium difficile</i>	21
Appendix C: Sample Checklist for Discharge/Transfer Cleaning	22
Appendix D: Patient Education Information Samples	24
References.....	32

Preamble

About this Document

This document deals with the prevention and control of the transmission of *Clostridium difficile* (*C. difficile*) in acute and non-acute health care settings.

This Best Practice does not address province-wide surveillance and reporting of *C. difficile*.

Each facility should develop a plan for the prevention and control of *Clostridium difficile* associated disease (CDAD).

Prevention and Control of Transmission of Clostridium difficile within Health care Facilities: Best Practice Document sets out the infection prevention and control practices to:

- Prevent the transmission of CDAD to other patients
- Assist health care providers to promptly identify clusters of CDAD
- Assist health care providers in the management of patients with CDAD and outbreaks related to CDAD

This document reflects the best expert opinion on the prevention and control of CDAD available at this time. Documents consulted are listed in the reference section. The recommendations in this document will be reviewed and updated from time to time.

How and When to Use This Document

*The best practices for Prevention and Control of Clostridium difficile within Health care Facilities applies to ALL patients with *C. difficile* in all settings where health care is delivered. These best practices should be integrated with existing infection prevention and control programs and be a part of a comprehensive organization-wide effort to maintain acceptable standards for infection prevention and control.*

Assumptions and General Principles for Infection Prevention and Control

The best practices set out in this document are based on the assumption that health care settings in Ontario have basic infection prevention and control systems or programs in place. If this is not the case, these settings must work with organizations that have infection prevention and control expertise, such as regional academic health science centers, regional infection control networks, public health units that have certified infection prevention and control staff and local infection prevention and control associations (e.g., Community and Hospital Infection Control Association – Canada chapters), to develop evidence-based programs.

In addition to the general assumption (above) about basic infection prevention and control, these best practices are based on the following assumptions and principles:

1. Health care settings routinely implement best practices to prevent and control the spread of infectious diseases.
2. Health care settings devote adequate resources to infection prevention and control.
3. Health care settings provide regular education and support to help staff consistently implement appropriate infection prevention and control practices. Effective education programs emphasize:
 - The risks associated with infectious diseases and their transmission via medical equipment and objects
 - The importance of immunization against vaccine-preventable diseases
 - Hand hygiene (including the use of alcohol-based hand rubs or hand washing)
 - Principles and components of Routine Practices
 - Assessment of the risk of infection transmission and the appropriate use of personal protective equipment, including safe application, removal and disposal
 - Appropriate cleaning and/or disinfection of care equipment, supplies and surfaces or items in the care environment
 - Individual staff responsibility to keep clients/patients/residents, themselves and fellow staff members safe
 - Collaboration between occupational health and safety and infection prevention and control

NOTE: Education programs should be flexible enough to meet the diverse needs of the range of health care providers and other staff who work in the health care setting. The local public health unit may be a resource and can provide assistance in developing and providing education programs for community settings.

4. All health care settings promote collaboration between occupational health and safety and infection prevention and control in implementing and maintaining appropriate infection prevention and control standards that protect workers.
5. **The facility is in compliance with the *Occupational Health and Safety Act*, R.S.O. 1990, c.O.1 and associated Regulations including the *Health Care and Residential Facilities - O. Reg. 67/93*.**
6. The facility is in compliance with the *Public Hospitals Act*, R.S.O 1990, c.P-40 and associated regulations, particularly the Communicable Disease Surveillance Protocols under *Public Hospitals Act Reg. 965*.
7. The facility is in compliance with the *Health Protection and Promotion Act* and its associated regulations.
8. The facility is in compliance with the *Personal Health Information Protection Act*, 2004 S.O. 2004, chapter 3, Sched. A.
9. The facility is in compliance with any other applicable legislation.
10. All health care settings have established communication with their local public health unit and have access to ongoing infection prevention and control advice and guidance.
11. All health care settings regularly assess the effectiveness of their infection prevention and control education programs and their impact on practices, and use that information to refine their programs.
12. All health care settings have a process for evaluating personal protective equipment (PPE) to ensure it meets quality standards where applicable.

Occupational Health and Safety

Health care facilities are required to comply with applicable provisions of the *Occupational Health and Safety Act* (OHSA) and its Regulations.⁴ Employers, supervisors and workers continue to have rights, duties and obligations under the OHSA. To obtain the specific requirements under the OHSA go to:

http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90o01_e.htm

The *Occupational Health and Safety Act* places duties on many different categories of individuals associated with workplaces, such as employers, constructors, supervisors, owners, suppliers, licensees, officers of a corporation and workers. A guide to the requirements of the *Occupational Health and Safety Act* may be found at:

<http://www.labour.gov.on.ca/english/hs/ohsaguide/index.html>

In addition, the OHSA section 25(2)(h) requires an employer to take every precaution reasonable in the circumstances for the protection of a worker.

Specific requirements for certain health care and residential facilities may be found in the *Regulation for Health Care and Residential Facilities*. Go to:

http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_930067_e.htm

There is a general duty for an employer to establish written measures and procedures for the health and safety of workers, in consultation with the joint health and safety committee or health and safety representative, if any. Such measures and procedures may include, but are not limited to, the following:

- Safe work practices;
- Safe working conditions;
- Proper hygiene practices and the use of hygiene facilities; and
- The control of infections.

At least once per year the measures and procedures for the health and safety of workers shall be reviewed and revised in the light of current knowledge and practice. The employer, in consultation with the joint health and safety committee or health and safety representative, if any, shall develop, establish and provide training and educational programs in health and safety measures and procedures for workers that are relevant to the workers' work.

A worker who is required by his or her employer or by the *Regulation for Health Care and Residential Facilities* to wear or use any protective clothing, equipment or device shall be instructed and trained in its care, use and limitations before wearing or using it for the first time and at regular intervals thereafter and the worker shall participate in such instruction and training. The employer is reminded of the need to be able to demonstrate training, and is therefore encouraged to document the workers trained, the dates training was conducted and materials covered during training. Under the *Occupational Health and Safety Act*, a worker must work in compliance with the Act and its regulations, and use or wear any equipment, protective devices or clothing required by the employer.

For more information, contact your local Ministry of Labour office. A list of local Ministry of Labour offices in Ontario may be found online at: <http://www.labour.gov.on.ca/>.

Glossary of Terms:

Routine Practices: The Health Canada/Public Health Agency of Canada term to describe the system of infection prevention and control practices recommended in Canada to prevent and control transmission of microorganisms in health care settings. In the United States these are called Standard Precautions. These practices describe prevention and control strategies to be used with all patients during all patient care, and include:

- Hand hygiene with an alcohol-based hand rub or with soap and water before and after any direct contact with a patient.
- The use of additional barrier precautions to prevent staff contact with a patient's blood, body fluids, secretions, excretions, non intact skin or mucous membranes:
- Gloves are to be worn when there is a risk of hand contact with a patient's blood, body fluids, secretions, excretions, non intact skin or mucous membranes; gloves should be used as an additional measure, not as a substitute for hand hygiene.
- Gowns are to be worn if contamination of uniform or clothing is anticipated.
- The wearing of masks and eye protection or face shields where appropriate to protect the mucous membranes of the eyes, nose and mouth during procedures and patient care activities likely to generate splashes or sprays of blood, body fluids, secretions or excretions.
- All equipment that is being used by more than one patient must be cleaned between patients according to recommendations.

The full description of Routine Practices to prevent and control transmission of nosocomial pathogens can be found on the Public Health Agency of Canada website (<http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/99vol25/25s4/index.html>).

Hand Hygiene: A process for the removal of soil and transient microorganisms from the hands. Hand hygiene may be accomplished using soap and running water or the use of alcohol-based hand rubs. Optimal strength should be 60% to 90% alcohol.

Hospital grade disinfectant: A disinfectant that has a drug identification number (DIN) from Health Canada indicating approval for use in Canadian hospitals.

Staff: For purposes of this document, "staff" refers to anyone conducting activities within a health care setting that will bring him/her into contact with patients including: all health care providers (e.g., emergency service workers, physicians, nurses, allied health professionals, students), support services (e.g., housekeeping), and volunteers.

Outbreak Management Team (OMT): A multidisciplinary team including representatives from all areas within the health care setting that provide service to the affected patients and/or units. The OMT must include as a minimum representation from Infection Prevention and Control, Occupational Health and Safety, Administration, Nursing, Medical Staff, Support Services and may include external resources such as public health.

Best Practices Document for the Management of *Clostridium difficile* in all health care settings

1. Background

Clostridium difficile is a Gram positive, spore forming anaerobic bacillus. It is widely distributed in the environment and colonizes up to 3-5% of adult humans without causing symptoms (Bouza 2005). Certain strains can produce two toxins: toxin A, which is mainly responsible for diarrhea, and toxin B, a cytotoxin detected by diagnostic testing.

C. difficile produces spores that are resistant to destruction by many environmental influences, including a number of chemicals. Spread of *C. difficile* occurs due to inadequate hand hygiene and environmental cleaning; therefore, proper control is achieved through consistent hand hygiene and thorough cleaning of the patient environment.

C. difficile has been a known cause of health care associated (nosocomial) diarrhea for about 30 years. Reported rates range from 1 to 10 cases per 1000 discharges and 17 to 60 cases per 100, 000 bed-days (Simor 2002). *C. difficile* can cause asymptomatic infections or may result in severe, life-threatening disease. It can be acquired in both hospital and community settings.

Since 2000 there has been an increase in the rates of *C. difficile* in some health care settings (McDonald 2006). In some of these settings this has been associated with the appearance of an epidemic strain of *C. difficile*. Some characteristics of this strain include the presence of binary toxin, increased resistance to clindamycin and fluoroquinolones, and potential for increased adverse events. This strain has been associated with outbreaks in Europe, the United States and Canada. However, although this strain of *C. difficile* causes more severe disease, the infection prevention and control practices for this strain are the same as for other strains of *C. difficile*.

This increase in *C. difficile* associated disease (CDAD) has resulted in significant additional costs to the health care system. A recent study in U.S. hospitals estimated that each case of CDAD in a hospital was associated with \$3699.00 (USD) in excess health care costs and 3.6 extra days of hospitalization (McDonald 2006).

2. Risk Factors for *C. difficile*

Certain people are at increased risk for acquiring CDAD. These risk factors include:

- A history of antibiotic usage
- Bowel surgery
- Chemotherapy
- Prolonged hospitalization

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

- Increased age
- Serious underlying illness or debilitation

3. Testing for *C. difficile* Cytotoxin

- Laboratory testing for CDAD usually involves detection of the cytotoxin(s) (A and B) produced by *C. difficile*. Cultures for *C. difficile* are not routinely done.

- Stool sample collection should occur as soon as possible after the onset of symptoms.
- Quick turnaround time for *C. difficile* cytotoxin testing is essential and should be pre-arranged with the microbiology laboratory serving the facility.
- All positive *C. difficile* cytotoxin tests should be reported to Infection Prevention and Control at the facility where the test originated as soon as possible.
- A single negative test should not be relied on to rule out *C. difficile*. If a single test is negative, a second specimen should be sent.
- Repeat cytotoxin testing as a test of cure is not indicated. Cytotoxin may persist in stool for weeks and therefore is not helpful in determining duration of treatment or the discontinuation of infection control precautions.
- Testing for *C. difficile* cytotoxin may be repeated if symptoms do not resolve despite treatment or to diagnose a relapse of CDAD following a period of absence of symptoms.
- Testing for *C. difficile* cytotoxin should not be carried out on formed stools.
- Testing for *C. difficile* cytotoxin should not be done in children under the age of one (1) year, as it is normal flora in this age group.
(Gerding 1995; Labstract 2003)

4. Surveillance

The case definition of *Clostridium difficile* associated disease (CDAD) is:

- a) Laboratory confirmation of a positive toxin assay for *C. difficile* together with diarrhea

OR

- b) Visualization of pseudomembranes on sigmoidoscopy or colonoscopy, or histological/pathological diagnosis of pseudomembranous colitis.

Diarrhea is defined as:

- Three or more loose/watery bowel movements in a 24 hour period, and
- The bowel movements are *unusual* or *different* for the patient, and
- There is no other recognized etiology for the diarrhea (for example, laxative use, inflammatory bowel disease)

*Loose/watery: if the stool were to be poured into a container, it would conform to the shape of the container

The following definitions should be used to determine whether the case is nosocomial.

Nosocomial:

The infection was not present on admission (i.e. onset of symptoms > 72 hours after admission) or the infection is present at the time of admission but is related to a previous admission to the same facility within the last 4 weeks.

Non-nosocomial:

The infection was present on admission or < 72 hours after admission and there was no admission to the same facility within the last 4 weeks.

Each facility should establish a mechanism for counting and keeping track of the number of confirmed cases of *C. difficile* acquired within the facility and maintain a summary record. Infection Prevention and Control should review and analyze these data on an ongoing basis to identify any clusters. This record should be submitted as a report to the Infection Prevention and Control Committee and facility administration on a regular basis. Rates of *C. difficile* are best expressed as the number of new cases per 1000 patient admissions and/or the number of cases per 1000 patient days. Clusters of cases in one unit or area should be investigated.

5. Infection Prevention and Control Precautions for *C. difficile* Associated Disease

In addition to Routine Practices, Contact Precautions should be initiated for any patient who is considered to be at risk for CDAD *at the onset of symptoms* and prior to receipt of *C. difficile* cytotoxin testing results. Contact Precautions may be initiated by the health care provider (e.g., physician, nurse) as soon as CDAD is suspected.

If the patient is on antibiotic therapy, it should be discontinued at the onset of symptoms if the patient's condition permits (except metronidazole or vancomycin initiated as treatment for CDAD) (Simor 2002, Bouza 2005).

Necessary contact precautions include (Health Canada 1998, 1999):

5.1 Accommodation

- a) All patients suspected of having CDAD should be placed in a single room with dedicated toileting facilities (private bathroom or individual commode chair), if available.
- b) In some care settings where the number of cases exceeds single room capacity or practicality (as may occur in long-term care homes/facilities or during an outbreak), it may not be possible to move every CDAD patient to a single room. If a single room is not available, priority for accommodation should be:
 - i. Patients with *confirmed* CDAD may be cohorted. Cohorting should only be initiated or discontinued under the direction of Infection Prevention and Control.
 - ii. If the patient is in a multi-bed room/unit:
 - 1. Signage indicating the precautions to be used should be visibly displayed
 - 2. A barrier supply cart should be easily accessible
 - 3. A laundry hamper should be placed as close to the patient's bed space as possible
 - 4. A commode chair should be dedicated for the patient's use.

5.2 Contact Precautions

- a) Signage indicating that contact precautions are to be used should be posted on the door of any room of a suspected or confirmed CDAD patient or cohort of patients.
- b) Appropriate personal protective equipment (PPE), i.e. gloves and gown, must be donned by all persons prior to entering the room and discarded appropriately upon exit of the room. If an anteroom exists, it should be designated as either a "clean" or "dirty" area for donning or removal/disposal of PPE.

- c) Gloves must be worn for all contact with the patient and their environment. Gloves must be changed when moving from dirty to clean tasks for the same patient and removed and hand hygiene performed upon exiting the patient's room.
- d) Dedicated equipment (e.g., wheelchairs, lifts, scales, blood glucose meters, blood pressure cuffs, thermometers) should be provided for each suspected or confirmed CDAD patient.
- e) In the event that any equipment must be shared, thorough cleaning followed by disinfection of all such equipment with hospital-grade disinfectant, approved for use with the equipment, must occur before use with another patient.
- f) Temperatures should not be taken rectally. Rectal thermometers have been linked with the spread of CDAD (Gerding 1995).
- g) No special handling of trays, linen and waste is required for patients with *C. difficile*.
- h) All cases of CDAD should be reviewed at the time of diagnosis and regularly thereafter by Infection Prevention and Control to ensure that contact precautions are being used correctly.
- i) Commodes and bedpans must be handled very carefully to reduce spread of contamination with *C. difficile* spores from the commode/bedpan to the environment. Commode chairs must remain with the patient and should be cleaned and disinfected by housekeeping staff, when the room is cleaned. When precautions are discontinued commodes and bedpans must be cleaned with an appropriate process. If bedpans are used it is strongly recommended they be disposable and be emptied and disposed of in the patient's washroom.

5.3 Hand Hygiene

- a) Observe meticulous hand hygiene with either alcohol-based hand rub or soap and water.
- b) Soap and water is theoretically more effective in removing spores than alcohol-based hand rub.
- c) When hand washing sink is immediately available then hands should be washed with soap and water after glove removal.
- d) When hand washing sink is not immediately available then hands should be cleaned using an alcohol-based hand rub, after glove removal.
- e) Hand hygiene should not be carried out at a patient sink as this will re-contaminate the health care worker's hands.
- f) Education should be provided to the patient 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 health care provider.

5.4 Environmental Cleaning

- a) All horizontal surfaces in the room and all items within reach of patients with suspected or confirmed CDAD should be cleaned twice daily with a hospital-grade disinfectant.

- b)** Particular attention should be paid to the cleaning of patient-specific items and "high touch" surfaces including bed side rails, telephone, call bells, light switches, door handles, faucets, commodes and toilets etc.
- c)** Cleaning must be thorough, taking into account the following principles:
 - i. Work from clean items and surfaces to dirty ones.
 - ii. The physical act of friction is necessary to remove *C. difficile* spores.
 - iii. Do not spray or squirt disinfectant solution onto the surfaces to be cleaned (CDC 2004). Apply disinfectant solution directly to all cleaning cloths and ensure they are fully saturated prior to cleaning surfaces.
 - iv. Change cleaning cloths and mop heads frequently. Reduce contamination of disinfection solution and recontamination of cloths (e.g., avoid "re-entry" of used cloth into disinfectant solution).
 - v. Disposable toilet brushes should be used in the rooms of all patients with CDAD.
- d)** **Discharge/transfer cleaning must occur upon resolution of CDAD symptoms or when a CDAD patient has their accommodation changed or is discharged from a room. It is important to recognize that this includes any room from which a known or suspect CDAD patient is transferred when he/she is placed on precautions. The room, including the bathroom that was used by the patient, must be cleaned, using the following process:**
 - i. Prior to initiating discharge/transfer cleaning, all privacy, shower and window curtains must be taken down and sent for laundering.
 - ii. All disposable items including paper towels and toilet paper must be thrown away.
 - iii. Toilet brushes must be discarded as part of the discharge/transfer cleaning process.
 - iv. Until proper discharge/transfer cleaning has taken place, contact precautions should remain in effect.
- e)** In patient-care areas where there are multiple cases or ongoing transmission of *C. difficile*, use of hypochlorite-based products for disinfection after the room is cleaned with hospital-grade disinfectant may be considered, in consultation with Infection Prevention and Control and Occupational Health and Safety (CDC 2004). Alternatively, the organization may consider the use of new disinfectant products with in vitro evidence of sporicidal activity. Compatibility of products and occupational exposures must be considered.
- f)** Ensure clear communication with housekeeping/environmental services with respect to:
 - i. Cleaning protocols for *C. difficile*. Consider developing a checklist for housekeeping/environmental services staff that can be posted on the back of signage that indicates precautions to be used. The checklist can also be posted in a housekeeping closet.
 - ii. Notification and scheduling of *C. difficile* cleaning of a specific patient room/isolation area is required.
- g)** An audit tool should be developed and used to monitor the cleaning of areas where CDAD is present (see Appendix C).
- h)** Floor surfaces are not a significant source of transmission of *C. difficile* and do not require special cleaning procedures.

5.5 Visitors

- a) Visitors should receive instruction from the patient's nurse on *C. difficile*, the importance of hand hygiene and how to properly carry this out.
- b) If a visitor is providing care for the patient or having significant contact with the patient's immediate environment, gloves and gown should be worn. The visitor should receive instruction from the patient's nurse on the correct use of personal protective equipment.
- c) Information sheets on proper hand hygiene and use of PPE may be helpful (Appendix D).
- d) Visitors must not use the patient's bathroom.
- e) Visitors should not go into other patients' rooms or bed spaces.
- f) Animals used in visitation programs must be screened by a veterinarian to ensure that the animal is in good health and has all necessary immunizations. Patients/residents, handlers and health care providers must wash their hands after handling the pet and before any other activities.

5.6 Patient Transfer

- a) Both transportation services and the receiving department must be notified that the patient is on contact precautions prior to transport.
- b) Transfer of a patient with CDAD to another unit or facility must be accompanied by notice that the patient has CDAD. Infection Prevention and Control should also be notified prior to transfer of patients with CDAD, to enable appropriate accommodation, application of contact precautions and follow-up.
- c) Suspected or confirmed CDAD does not preclude a patient from being transferred within the health care system; for example, to a long-term care home/facility. The receiving facility must be able to comply with requirements for accommodation (as in Section 1) and contact precautions (as in Section 2).
- d) Precautions for staff accompanying a patient with CDAD on transfer include (see Appendix A):
 - Gown and gloves
 - Cleaning of all equipment (stretcher, bed, wheelchair) used for the transfer before use with another patient/resident.

5.7 Patient Discharge

- a) After discharge, patients with CDAD are not a concern for other family members, as person-to-person transmission within the home setting is rare.
- b) Good hand hygiene practices should always be exercised by the discharged patient and family members/staff. Educational tools for patients and family regarding proper hand hygiene should be considered.

5.8 Discontinuation of Precautions for *C. difficile*

a) Patient with suspected CDAD

- i. Patients on precautions for suspected CDAD may, after consultation with Infection Prevention and Control, have the precautions discontinued when two (2) negative tests have been reported.
- ii. If CDAD is still suspected the clinician should evaluate the patient and consider other diagnostic modalities (e.g. colonoscopy/sigmoidoscopy). Precautions should be maintained until such evaluation has taken place.

b) Patient with confirmed CDAD

- i. Contact precautions may be discontinued when the patient has had at least 48 hours without symptoms of diarrhea (e.g., formed or normal stool for the individual).
- ii. Contact precautions should be discontinued only under the direction of Infection Prevention and Control.
- iii. Retesting for *C. difficile* cytotoxin is *not* necessary to determine the end of isolation and should not be done.

6. Treatment of *C. difficile*

Do not treat symptom-free carriers of *Clostridium difficile* (Bouza 2005, Gerding 1995).

Treatment of patients with CDAD should be initiated based on the individual patient risk factors and symptoms.

Treatment should include:

- **Cessation of antibiotic therapy if possible.** If this is not possible, consultation with an infectious disease physician should be considered.
- Rehydration of the patient
- Avoidance of antimotility agents such as loperamide
- Recommended 1st line therapy for mild to moderate CDAD:
 - Metronidazole 250 mg orally every 6 hours OR 500 mg orally every 8 hours for a minimum of 10 days
- Recommended 1st line therapy for severe CDAD:
 - Vancomycin 125 - 250 mg orally every 6 hours for a minimum of 10 days
 - Severe CDAD is defined as either the presence of pseudomembranous colitis on endoscopy, **or** CDAD infection requiring treatment in an intensive care unit, **or** the presence of at least two of: age >60 years, temperature >38.5°C, white blood cell count >15,000.
- Use vancomycin also if:
 - Metronidazole is ineffective
 - The patient is pregnant
 - The patient is allergic to metronidazole
 - True resistance to metronidazole is shown
- Patients with recurrent CDAD: may be retreated with the same agent used to treat the initial episode of CDAD
- Patients with multiple recurrences or refractory disease despite appropriate treatment: consultation with a physician knowledgeable in the treatment of CDAD (e.g., Infectious Disease Physician, Gastroenterologist, General Surgeon, Medical Microbiologist) should occur
- Monitor patients throughout the course of treatment for signs and symptoms of complications such as peritonitis, dehydration or electrolyte abnormalities

7. Recurrence of Symptoms

- Relapse refers to the return of the symptoms of CDAD after a symptom-free period. With CDAD, cases should be counted as a relapse if symptoms recur within 2 months of the last infection.
- Recurrence of CDAD is common and occurs in about 30% of cases. If diarrhea recurs, the patient should be immediately placed on Contact Precautions, re-tested for *C. difficile* cytotoxin and re-initiation of therapy considered as outlined above.
- If a patient has recurrent CDAD, consideration may be given to leaving the patient in single room accommodation even after resolution of symptoms.

8. Staff Education

- a) All direct patient care staff and individuals who provide service on the patient care unit (e.g., housekeeping, food services, maintenance) should be provided with information on CDAD, and the measures to prevent and control transmission. This information should be readily available to all staff on all shifts.
- b) Educational information can be provided through policies, procedures, posters, pamphlets, algorithms and signage.
- c) Health Care Workers, including when they are receiving antibiotics, are not at risk of acquiring CDAD occupationally. Health Care Workers must always follow Routine Practices, specifically hand hygiene before and after contact with all patients, and use contact precautions when caring for patients with CDAD.
- d) Health Care Workers must not consume food or beverages in patient/resident care areas.
- e) Health Care Workers with acute diarrhea that is probably of an infectious etiology should not work.

9. Outbreaks of *C. difficile*

Definition:

Cases of CDAD occurring at a rate exceeding the normally expected baseline rate for the facility (or unit, floor, ward) during a specified period of time should be considered as an outbreak.

The definition of an outbreak for CDAD will depend on the endemic (or baseline) rate for the facility/home.

An outbreak should be declared when there is evidence of transmission of CDAD from patient to patient or when the endemic rate of CDAD for that area is exceeded.

9.1 Outbreak Management:

- Institute control measures as outlined in this document.
- Form a multidisciplinary Outbreak Management Team (OMT) to review the situation on an ongoing basis.
- Report the outbreak to your local public health unit as an outbreak of institutional gastroenteritis as required by the *Health Protection and Promotion Act, Ontario Regulation 559/91*.
- Communicate with other departments within the facility (e.g., Emergency, Outpatient Clinics), other facilities, health care providers, Regional Infection Control Networks and organizations that may be affected.
- Review and audit infection prevention and control strategies.
- Educate staff on the mode of transmission and precautions to be used
- Communicate with patients and families to inform them of the control precautions that have been implemented while maintaining patient confidentiality.
- Verify that contacts, who have been transferred to other units, do not have diarrhea. Consider searching for additional cases in recently discharged patients and in patients seen in outpatient clinics/settings
- If patients require transfer, notify the receiving facility or department that the transfer is from an outbreak area and advise the receiving facility/department of the precautions to be followed for management of the patient.
- In patient-care areas where there is evidence of *ongoing transmission* of *C. difficile*, use of hypochlorite-based products for disinfection after the room is cleaned with hospital-grade disinfectant may be considered, in consultation with Infection Prevention and Control and Occupational Health and Safety (CDC 2004). Alternatively, the organization may consider the use of new disinfectant products with *in vitro* evidence of sporicidal activity. Compatibility of products and occupational exposures must be considered.
- If all control measures are in place (cohorting, Contact Precautions, housekeeping, hand hygiene) and new cases of CDAD continue to be detected/diagnosed, the OMT should consider closing the affected unit to admissions until there are no further cases (i.e. there is a defined clean cohort of patients).
- An outbreak may be declared over when there are no new cases and the number of cases has returned to the endemic level.

After the outbreak a debriefing session should be conducted to discuss how the outbreak was handled, what can be learned from the outbreak and how future outbreaks can be prevented.

10. Evaluation

The facility program for prevention and control of CDAD should be evaluated on a regular basis by Infection Prevention and Control, and improvements made as necessary based on new research, data or standards.

Periodic audits of environmental cleaning protocols should be carried out by Infection Prevention and Control and environmental services/housekeeping staff.

Appendix A: Patient Transportation

Transporting a patient on Contact Precautions (one-person transfer, patient in wheel chair or stretcher):

- don appropriate PPE prior to entering patient's room
- place clean sheet over stretcher or wheel chair as instructed
- assist patient to stretcher /wheel chair
- use hospital grade disinfectant to wipe area on wheel chair or stretcher that will provide a clean area for your hands
- assist patient to wash their hands with alcohol-based hand rub
- remove gown and gloves
- **CLEAN HANDS**
- place a clean sheet over the patient
- place appropriate isolation sign on top of chart
- place chart on top of clean sheet
- ensure that receiving area is aware that patient has arrived
- if patient is also in Droplet or Airborne Precautions request a procedure/surgical mask for the patient, to contain respiratory secretions
- patients unable to tolerate mask should be provided with tissues and paper bag for tissue discard
- **CLEAN HANDS** after transport completed

Transporting a patient on Contact Precautions (multiple-person transfer, patient stays in bed):

Individual pushing the bed:

- don appropriate PPE prior to entering patient's room
- use hospital grade disinfectant to wipe area on the bed that will provide a clean area for your hands
- remove gown and gloves
- **CLEAN HANDS**
- place a clean sheet over the patient
- place appropriate isolation sign on top of chart
- place chart on top of clean sheet
- ensure that receiving area is aware that patient has arrived
- if patient is in Droplet or Airborne Precautions request a procedure/surgical mask for the patient, to contain respiratory secretions

- patients unable to tolerate mask should be provided with tissues and paper bag for tissue discard
- during transport, act as the “clean” person to push the bed, push elevator buttons, etc.
- **CLEAN HANDS** after transport completed

Caregivers/parents of small children

- assist patient to wash their hands with alcohol-based hand rub if this is possible
- assemble equipment required for the transfer (e.g., monitors, IV poles, etc.)
- remove PPE
- **CLEAN HANDS**
- don clean PPE and leave these on for the transfer
- during transport, act as the “dirty” person to administer patient care/child care as needed; DO NOT touch clean areas, such as elevator buttons, equipment in the receiving area
- remove PPE once patient/child is out of your care
- **CLEAN HANDS** before returning to your work area or waiting room

Appendix B: Sample Cleaning Protocol for Patient/Resident Rooms Contaminated With *Clostridium difficile*

DAILY CLEANING:

Use a fresh bucket, cloths and mop head

- Walls – check for visible soiling
- Horizontal Surfaces (tables, bed rails, call bells, work surfaces, mattresses/covers, doorknobs, sinks, light fixtures, chairs)
- Bathrooms
- Floors

CLEANING AT DISCHARGE/TRANSFER:

- Remove all dirty/used items from the room before cleaning the room (e.g., suction container, wheelchairs, medical supplies, disposable items). Items which can be cleaned must be cleaned before removing from the room. Medical supplies which can be reprocessed should be bagged and sent for reprocessing. Discard disposable items and items that cannot be reprocessed.
- Remove Bed Curtains and send for laundering.
- Work from top to bottom, and from clean area (e.g., windows) to dirty area (e.g., bathroom)
 - Walls – check for visible soiling
 - Horizontal Surfaces – bedrails and bed controls; call bell; overbed table; inside drawers; TV controls, soap dispenser, door handles, light switches, light cord, chairs, suction tube and outer container, pull cord in washroom, flow meters, stethoscope and column, telephone, IV poles, monitors, wheelchairs
 - Patient beds (includes mattresses/covers)
 - Bathrooms, including commodes/high toilet seat
 - Floors
- Discard glove box, bar soap if present, toilet paper, toilet brush, sharps container and replace with new items

Appendix C: Sample Checklist for Discharge/Transfer Cleaning

NOTE: This checklist is used with permission of Sunnybrook Health Sciences Centre and is provided to assist health care settings to develop their own tools.

Checklist for Discharge Cleaning of All Rooms

1. All dirty/used items removed? Yes ___ No ___
 Suction container, etc. Yes ___ No ___
 Disposable items Yes ___ No ___

2. Are the curtains removed before starting to clean if visibly soiled? Yes ___ No ___

3. Are clean cloths, mop, (all supplies) and solution used to clean the room? Yes ___ No ___

4. Do you fill one bucket of the disinfectant so it is the correct strength? Yes ___ No ___

5. Check to see if the mattress and pillows and chairs are not torn. Yes ___ No ___
 If they are torn, do you report it to the PCM and have them replaced? Yes ___ No ___

6. There is to be no double dipping with used cloths. Yes ___ No ___

7. Do you use several cloths to clean a room? Yes ___ No ___

8. Do you always work from top to bottom? Yes ___ No ___

9. Do you clean all surfaces and allow for the appropriate contact time? (10 min)
 Mattress Yes ___ No ___
 Pillow Yes ___ No ___
 BP cuff Yes ___ No ___
 Bedrails and bed controls Yes ___ No ___
 Call bell Yes ___ No ___
 Stethoscope and column Yes ___ No ___
 Flow meters Yes ___ No ___
 Suction tube and outer container Yes ___ No ___
 Pull cord in washroom Yes ___ No ___
 Overbed table Yes ___ No ___
 Inside drawers Yes ___ No ___
 TV control Yes ___ No ___
 Soap/alcohol-based hand rub dispensers Yes ___ No ___
 Door handles Yes ___ No ___
 Light switches Yes ___ No ___
 Light cord Yes ___ No ___
 Chair Yes ___ No ___

10. Do you clean phone well? Yes ___ No ___

11. Are the following cleaned thoroughly before being used by another patient?
 Commodes/high toilet seat Yes ___ No ___
 Wheelchairs Yes ___ No ___
 Monitors Yes ___ No ___
 IV poles Yes ___ No ___

13. If the sharps container is 2/3 full, was it replaced? Yes ___ No ___
14. Is the outer canister of the suction container and red tubing cleaned? Yes ___ No ___
15. Is all tape removed from the surfaces? Yes ___ No ___
16. Is the sheepskin washed between patients? Yes ___ No ___
17. Is the lift mesh or sheet washed between patients? Yes ___ No ___

Additions When Cleaning a Room for a Patient on Additional Precautions

1. Are the curtains removed before starting to clean the room that was used for additional precautions? Yes ___ No ___
2. Is glove box discarded? Yes ___ No ___
3. Are the following discarded?
Patient's bar soap Yes ___ No ___
Toilet paper Yes ___ No ___
4. Is the sharps container replaced? Yes ___ No ___

NOTE: Avoid stockpiling items in the room in order to prevent wastage.

Appendix D: Patient Education Information Samples

NOTE: These patient education tools are used with permission of the Ottawa Hospital and are provided to assist the health care setting in developing their own patient education information.

ANTIBIOTIC-ASSOCIATED DIARRHEA
PATIENT INFORMATION

If you have received antibiotics while in hospital, or have been prescribed antibiotics that you are to take following discharge from hospital, please review this information sheet on antibiotic-associated diarrhea. If you have any questions, ask your nurse, doctor, or pharmacist.

Taking an antibiotic causes diarrhea in up to one third of people who need them. Most often, the diarrhea is mild. Sometimes, a more serious type of diarrhea associated with taking antibiotics is caused by the *Clostridium difficile* bacterium.

Why can diarrhea occur with antibiotics?

Bacteria are normally present in your bowel. Diarrhea can occur because antibiotics kill some of the bacteria that usually live in your bowel. This upsets the normal balance. Harmful bacteria such as *Clostridium difficile*, if present in your bowel, can overgrow leading to diarrhea and other symptoms. The risk of *Clostridium difficile* is higher if you have been in the hospital.

What are the symptoms?

Diarrhea from antibiotics is usually mild, consisting of loose and/or frequent bowel movements. Symptoms of *Clostridium difficile* may be more severe and may include:

- Watery diarrhea that may contain mucus and/or blood
- Abdominal pain or tenderness
- Loss of appetite
- Nausea
- Fever

What should you do if you get diarrhea?

If you are taking an antibiotic and have mild diarrhea, and it is not bothersome, continue to take the antibiotic as prescribed. The diarrhea should go away after the antibiotic is finished.

CALL YOUR DOCTOR IF you have any of the following symptoms:

- Diarrhea which is bothersome or severe, or which is bloody
- Abdominal pain
- Fever
- Diarrhea which continues after the antibiotic is finished
- Diarrhea which starts after you have finished taking the antibiotic(s).

Remind your doctor that you have recently been on antibiotics.

DO NOT take anti-diarrhea medications that you can buy without a prescription (example Imodium or Kaopectate) without first checking with your doctor. These may cause a more serious health condition.

How can you take care of yourself?

- Follow your doctor's advice regarding rest, activity, medication and diet.
- Wash your hands frequently, especially after using the washroom.
- If your doctor prescribes a new antibiotic for your diarrhea, take all of the medicine as prescribed.
- Be sure that you drink plenty of fluids to keep hydrated.



INFECTION PREVENTION AND CONTROL PROGRAM

PATIENT INFO

CLOSTRIDIUM DIFFICILE

WHAT IS CLOSTRIDIUM DIFFICILE (C DIFF)?

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

WHAT IS C DIFF DISEASE?

C diff disease occurs when antibiotics kill your good bowel bacteria and allow the C diff to grow. When C diff grows, it produces substances (toxins). These toxins can damage the bowel and may cause diarrhea. C diff disease is usually mild but sometimes can be severe. In severe cases, surgery may be needed and in extreme cases C diff may cause death. C diff is the most common cause of infectious diarrhea in hospital.

The main symptoms of C diff disease are:

- Watery diarrhea
- Fever
- Abdominal pain or tenderness

WHO GETS C DIFF?

C diff disease usually occurs during or after the use of antibiotics. Old age, presence of other serious illnesses and poor overall health may increase the risk of severe disease.

HOW WILL YOUR DOCTOR KNOW THAT YOU HAVE C DIFF?

If you have symptoms of C diff, your doctor will ask for a sample of your watery stool. The laboratory will test the stool to see if C diff toxins are present.

HOW IS C DIFF TREATED?

Treatment depends on how sick you are with the disease. People with mild symptoms may not need treatment. For more severe disease, an antibiotic is given.

HOW DOES C DIFF SPREAD?

When a person has C diff disease the germs in the stool can soil surfaces such as toilets, handles, bedpans, or commode chairs. When touching these items our hands can become soiled. If we then touch our mouth we can swallow the germ. Our soiled hands also can spread the germ to other surfaces.

HOW TO PREVENT SPREAD IN THE HOSPITAL?

If you have C diff diarrhea you will be moved to a private room until you are free from diarrhea for at least 2 days. Your activities outside the room will be restricted. Everyone who enters your room wears gown and gloves. Everyone **MUST** clean their hands when leaving your room.

Always wash your hands after using the bathroom. Cleaning hands is the most important way for everyone to prevent the spread of this germ. As well, a thorough cleaning of your room and equipment will be done to remove any germs.

WHAT SHOULD I DO AT HOME?

Healthy people like your family and friends who are not taking antibiotics are at very low risk of getting C diff disease.

Hand care

Wash your hands for 15 seconds:

- After using the toilet
- After touching dirty surfaces
- Before eating
- Before preparing meals.

Cleaning the house

Use either a household cleaner diluted according to the instructions or diluted household bleach:

- Wet the surface well and clean using good friction
- Allow the surface to air dry
- Pay special attention to areas that may be soiled with stool such as the toilet and sink. If you see stool remove first and then clean as described above.

Cleaning clothes/other fabric

Wash clothes/fabric separately if they are heavily soiled with stool:

- Rinse stool off,
- Clean in a hot water cycle with soap
- Dry items in the dryer if possible.

Cleaning dishes:

- Regular cleaning, you can use the dishwasher or clean by hand with soap and water.

It is very important that you take all your medication as prescribed by your doctor. You should not use any drugs from the drugstore that will stop your diarrhea (e.g., Imodium). **If diarrhea persists or comes back, contact your doctor.**

For more information on diarrhea, you can read the patient guide: *Antibiotic-Associated Diarrhea*.

If you want to know more about *Clostridium difficile* disease:

Health Canada: <http://www.phac-aspc.gc.ca/c-difficile/index.html>

Centers for Disease Control and Prevention

http://www.cdc.gov/ncidod/dhqp/id_CdiffFAQ_general.html



PROGRAMME DE PRÉVENTION ET DE CONTRÔLE DES INFECTIONS RENSEIGNEMENTS POUR LES PATIENTS

CLOSTRIDIUM DIFFICILE (C. difficile)

QU'EST-CE QUE LE CLOSTRIDIUM DIFFICILE?

Clostridium difficile (*C. difficile*) est l'un des nombreux microbes (bactéries) qui se trouve dans les selles.

QU'EST-CE QUE L'INFECTION PAR *C. difficile*?

C'est lorsque des antibiotiques tuent les bonnes bactéries qui vivent dans vos intestins et permettent à la *C. difficile* de se multiplier. En se multipliant, *C. difficile* produit des toxines qui peuvent irriter vos intestins et causer de la diarrhée. L'infection par *C. difficile* est en général bénigne, mais elle peut parfois être grave. Dans les cas graves, il peut être nécessaire de faire une chirurgie. Les infections extrêmement graves peuvent causer la mort. *C. difficile* est la cause la plus courante de la diarrhée infectieuse dans les hôpitaux.

Voici les principaux symptômes :

- diarrhée liquide;
- fièvre;
- mal de ventre ou sensibilité.

QUI PEUT ÊTRE INFECTÉ PAR *C. difficile*?

L'infection par *C. difficile* survient en général pendant ou après la prise d'antibiotiques. Les personnes âgées, qui souffrent d'autres maladies graves ou qui sont en mauvaise santé sont plus susceptibles d'avoir une infection grave.

COMMENT MON MÉDECIN SAIT-IL QUE JE SUIS INFECTÉ PAR *C. difficile*?

Si vous présentez les symptômes de l'infection, votre médecin demandera un échantillon de vos selles liquides. Le laboratoire analysera ensuite vos selles pour voir si elles contiennent des toxines libérées par *C. difficile*.

COMMENT TRAITE-T-ON L'INFECTION?

Le traitement varie selon la gravité de l'infection. Les personnes qui ont des symptômes légers n'auront peut-être pas besoin de traitement. Si l'infection est plus grave, il faut prendre des antibiotiques.

COMMENT SE TRANSMET L'INFECTION?

Les microbes présents dans les selles peuvent contaminer des surfaces comme les toilettes, les poignées, les bassins de lit ou les chaises percées. En touchant ces objets, nos mains peuvent être contaminées. Si nous touchons ensuite notre bouche, nous pouvons avaler les microbes. Nous pouvons aussi contaminer d'autres surfaces avec nos mains.

COMMENT PEUT-ON PRÉVENIR LA PROPAGATION DE L'INFECTION DANS L'HÔPITAL?

Si vous avez une diarrhée causée par *C. difficile*, nous vous transférerons dans une chambre privée. Vous resterez dans cette chambre jusqu'à ce que vous n'ayez plus de symptômes pendant au moins deux jours. Nous limiterons vos activités à l'extérieur de la chambre. Toutes les personnes qui entreront dans votre chambre devront porter une blouse d'hôpital et des gants. Elles **DEVONT** toutes se laver les mains à leur sortie. Il faut toujours se laver les mains après avoir été à la toilette. Le lavage des mains est la meilleure façon de prévenir la propagation du microbe. Nous nettoierons également votre chambre et l'équipement en profondeur pour éliminer tous les microbes.

QUE DEVRAIS-JE FAIRE À LA MAISON?

Il y a peu de risque que les personnes en santé, comme les membres de votre famille et vos amis qui ne prennent pas d'antibiotiques, soient infectées par la bactérie *C. difficile*.

Lavage des mains

Lavez vos mains pendant au moins 15 secondes :

- après avoir été à la toilette;
- après avoir touché des surfaces sales;
- avant de manger;
- avant de préparer les repas.

Nettoyage de la maison

À l'aide d'un produit nettoyant dilué selon les instructions ou d'eau de Javel diluée :

- lavez les surfaces en frottant bien fort;
- laissez les surfaces sécher à l'air;
- faites très attention aux endroits qui pourraient être souillés par des selles, comme la toilette et le lavabo. Si vous voyez des selles, enlevez-les d'abord avant de nettoyer la surface de la façon mentionnée.

Nettoyage des vêtements et d'autres tissus

Lavez les vêtements et autres tissus séparément s'ils ont été en contact avec des selles.

- Rincez le vêtement ou le tissu avec de l'eau pour enlever les selles.
- Lavez-le à l'eau chaude avec du savon.
- Faites-le sécher dans la sécheuse si possible.

Lavage de la vaisselle

- Utilisez le lave-vaisselle ou lavez-la à la main avec du savon et de l'eau.

Il est très important que vous preniez tous vos médicaments de la façon prescrite par votre médecin. Vous ne devez pas utiliser de médicaments contre la diarrhée vendus en pharmacie (par exemple Imodium). **Si la diarrhée continue ou recommence, communiquez avec votre médecin.**

Pour plus de renseignements sur la diarrhée, vous pouvez lire le guide destiné aux patients intitulé *Diarrhée associée à la prise d'antibiotiques*.

Consultez les sites suivants si vous voulez en savoir davantage sur l'infection par *C. difficile* :

Santé Canada : www.phac-aspc.gc.ca/c-difficile/index_f.html

Centers for Disease Control and Prevention (en anglais seulement):
www.cdc.gov/ncidod/dhqp/id_CdiffFAQ_general.html

References

- Aslam S, Hamill RJ, Musher DM. Treatment of *Clostridium difficile*-associated disease: old therapies and new strategies. *Lancet Infect Dis.* 2005; 5(9): 549-57.
- Bouza E, Munoz P, Alonso R. Clinical manifestations, treatment and control of infections caused by *Clostridium difficile*. *Clinical Microbiol Infect.* 2005; 11(Suppl 4): 57-64.
- Dharan S, Mourouga P, Copin P, Bessmer G, Tschanz B, Pittet D. Routine disinfection patients' environmental surfaces. Myth or reality? *J Hosp Infect.* 1999; 42(2): 113-17.
- Dial S, Delaney JAC, Barkun AN, Suissa S. Use of gastric acid-suppressive agents and the risk of community-acquired *Clostridium difficile*-associated disease. *JAMA.* 2005; 294(23): 2989-95.
- Gerding DN, Johnson S, Peterson LR, Mulligan ME, Silva J Jr. *Clostridium difficile*-associated diarrhea and colitis. *Infect Control Hosp Epidemiol.* 1995;16(8):459-77.
- Health Canada, Laboratory Centre for Disease Control, Division of Nosocomial and Occupational Infections. Routine practices and additional precautions for preventing the transmission of infection in health care. *Can Commun Dis Rep.* 1999;25 Suppl 4:1-142. Available online at: <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/99pdf/cdr25s4e.pdf>. Accessed April 11, 2006.
- Laboratory Centre for Disease Control, Bureau of Infectious Diseases, Health Canada. Hand washing, cleaning, disinfection and sterilization in health care. *Can Commun Dis Rep.* 1998; 24 Suppl 8:i-xi, 1-55, i-xi, 1-57. Available online at: <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/98pdf/cdr24s8e.pdf>. Accessed April 11, 2006.
- Mayfield JL, Leet T, Miller J, Mundy LM. Environmental control to reduce transmission of *Clostridium difficile*. *Clin Infect Dis.* 2000; 31(4): 995-1000.
- McDonald LC, Owings M, Jernigan DB. *Clostridium difficile* infection in patients discharged from US short-stay hospitals, 1996-2003. *Emerg Infect Dis.* 2006;12(3):409-415. Available online at: <http://www.cdc.gov/ncidod/EID/vol12no03/pdfs/05-1064.pdf>.
- Public Health Laboratories Ontario. *Clostridium difficile* toxin testing. *LabAbstract:* Ministry of Health and Long-Term Care; 2003.
- Sehulster LM, Chinn RYW, Arduino MJ, Carpenter J, Donlan R, Ashford D, Besser R, Fields B, McNeil MM, Whitney C, Wong S, Juranek D, Cleveland J. Guidelines for environmental infection control in health-care facilities: recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC). *Morbid Mortal Wkly Rep.* 2003;52(RR10);1-42. Available online at: <http://www.cdc.gov/mmwr/PDF/rr/rr5210.pdf>.
- Simor AE, Bradley SF, Strausbaugh LJ, Crossley K, Nicolle LE; SHEA Long-Term Care Committee. *Clostridium difficile* in long-term-care facilities for the elderly. *Infec Control Hosp Epidemiol.* 2002;23(11):696-702.
- Wafa N. Al-Nassir, Ajay K. Sethi, Michelle M. Nerandzic, Greg S. Bobulsky, Robin L. P. Jump, Curits J. Donskey. Comparison of Clinical and Microbiological Response to Treatment of *Clostridium difficile*-Associated Disease with Metronidazole and Vancomycin. *Clinical Infectious Diseases* 2008;47:56-62.
- Wilcox MH, Fawley WN, Wigglesworth N, Parnell P, Verity P, Freeman J. Comparison of the effect of detergent versus hypochlorite cleaning on environmental contamination and the incidence of *Clostridium difficile* infection. *J Hosp Infect.* 2003; 54(2): 109-14.