Health and Wellness

Provincial Infection Prevention and Control Guidelines

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Provincial Infection Prevention and Control *Clostridium difficile* Guideline

September, 2010

The Provincial Infection Prevention and Control Strategy would like to acknowledge the contribution and expertise of the task group that developed this document:

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The committee would like to thank Mary LeBlanc RN, BN, CIC for reviewing this document.

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Glossary

Client/patient/resident: Any person receiving health care within a health care setting and for the purpose of this document will be referred to as a **patient.**

***Clostridium difficile (C. difficile)*:** A Gram - positive, spore forming anaerobic bacillus.

***Clostridium difficile* Infection (CDI):** (previously referred to as *Clostridium difficile* Associated Disease or CDAD) Symptoms may include, diarrhea, colitis, toxic mega colon and sepsis-like picture. Clostridium difficile causes antibiotic-associated pseudomembranous colitis and is the most important cause of health care-associated infectious diarrhea. C. *difficile* produces hardy spores that are resistant to destruction by many chemicals used for cleaning and disinfection. Spores are shed in feces, live in the environment for a long time, and may be transferred via the hands of health care workers.

Cluster: A grouping of cases of a disease within a specific time frame and geographic location suggesting a possible association between the cases with respect to transmission.

Cohorting: The sharing of a room or ward by two or more patients who are either colonized or infected with the same microorganism.

Contact: An individual who is exposed to a person colonized or infected with a microorganism in a manner that allows transmission to occur (e.g., roommate).

Contact Precautions: A type of **Additional Precautions** to reduce the risk of transmitting infectious agents via contact with an infectious person. Contact Precautions are used in addition to Routine Practices.

Contamination: The presence of an infectious agent on a body surface, clothing, gowns, gloves, bedding, toys, surgical instruments, dressings or other inanimate objects.

Direct Care (pertains to Home Care, Ambulatory Clinics, and LTC): Providing hands-on patient care, such as bathing, washing, turning, changing clothes/diapers, dressing changes, care of open wounds/lesions or toileting. Feeding and pushing a wheelchair are not classified as direct care.

Hand Hygiene: A process for the removal of visible soil and removal or killing of transient microorganisms from the hands. Hand hygiene may be accomplished using soap and running water (for removal of visible soil) or the use of an alcohol-based hand rub (when hands are not visibly soiled). Optimal strength of alcohol-based hand rubs is 60% to 90% alcohol. **For the removal of C. *difficile* from hands, soap and water is recommended because alcohol does not effectively kill C. *difficile* spores**.

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

Index Case: The first case in a defined group to come to the attention of the investigator.

Infection: The entry and multiplication of an infectious agent in the tissues of the host. Symptomatic or clinical infection is one resulting in clinical signs and symptoms of the disease.

Outbreak: For the purposes of this document, an outbreak is an increase in the number of cases above the number normally occurring in a particular health care setting over a defined period of time.

Personal Protective Equipment (PPE): Specialized clothing or equipment worn for protection against a hazard.

Precautions: Interventions to reduce the risk of transmission of microorganisms (e.g., patient-to-patient, patient-to-staff, staff-to-patient, contact with the environment, contact with contaminated equipment).

Relapse - refers to the return of the symptoms of CDI after a symptom-free period. If CDI symptoms recur within 2 months of the last infection the case should be counted as a relapse. This is common and occurs in about 30% of cases.

Routine Practices: The system of infection prevention and control practices to be used with **all** patients during **all** care to prevent and control transmission of microorganisms in **all** health care settings.

Surveillance: The systematic ongoing collection, collation and analysis of data with timely dissemination of information to those who require it in order to take action.

Infection Prevention and Control on PEI

1. Purpose

The purpose of this guideline is to provide direction for health care workers (HCWs) on the management of patients who are symptomatic with *Clostridium difficile* Infections (CDI), thereby reducing the risk of *C.difficile* transmission to other patients. The goal is to provide consistent information for all health care settings in PEI, recognizing that each facility/practice setting delivers a specific set of services and has unique challenges with physical layout and resources. Site specific policy and procedures are necessary to address these unique challenges in each practice area.

2. Background

Rates of transmission of *C. difficile* can be controlled by sound infection prevention and control practices in all health care settings. Interventions that focus on preventing cross transmission, including environmental cleaning and Routine Practices, have a great impact in controlling *C. difficile.*

Infection prevention and control programs that emphasize early identification of those having symptoms of CDI, and implementation of appropriate precautions to prevent transmission, reduce the prevalence and incidence of CDI, improve patient outcomes, and reduce health care costs.

3. Introduction

3.1 What is *Clostridium difficile*?

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. The toxic expression of these bacteria causes gastrointestinal illness for people in hospitals, personal care homes and in the community. These illnesses are called *C. difficile* infections (CDI) and include diarrhea, colitis, toxic mega colon, sepsis-like picture and death. The most common **clinical symptom** of *C. difficile* infection is diarrhea. It is almost never grossly bloody and ranges in consistency from soft unformed stools to watery or mucoid, and in frequency from 3 to 20 or more bowel movements per day. Other clinical symptoms include abdominal pain and cramping (22% of patients) and fever (28% of patients). Laboratory findings include leukocytosis in 50% of patients, and occult fecal blood in 26% of patients.

The most frequent cause of C.*difficile* infection is appropriate and inappropriate use of certain antibiotics (see section 3.3).

3.2 How is *Clostridium difficile* spread?

C. difficile spores are resistant to destruction by many environmental influences, including a number of chemicals commonly used in cleaning. This enables *C. difficile* to survive for months in the environment (in health care facilities as well as community settings). It is then spread by transfer of spores directly from the contaminated environment to the patient or on the hands of health care workers who fail to follow good hand hygiene and gloving practices. It can be acquired in both hospital and community settings.

Proper control is achieved through the physical removal of the spores from hands and the environment through consistent hand hygiene and thorough cleaning of the patient environment.

3.3 Risk Factors for *Clostridium difficile*

Certain people are at increased risk for acquiring CDI. The risk factors include:

- history of antibiotic usage (specifically clindamycin, ampicillin, amoxicillin, cephalosporins, and less frequently penicillin, erythromycin, trimethoprim and ciprofloxacin)
- 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

4. Testing for *Clostridium difficile* Cytotoxin

Testing is usually done based upon the clinical presentation of a patient. Stool is the most common specimen and should be collected as soon as possible after symptom onset.

Diarrhea is defined as:

- 3 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).

Testing for C.*difficile* should not be done on formed stool.

All positive C.*difficile* cytotoxin tests should be reported to Infection Prevention and Control (or designate) at the facility where the test originated as soon as possible.

Repeat 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. (See section 6 for more details).

Testing for C.*difficile* cytotoxin may be repeated if symptoms do not resolve despite treatment or to diagnose a relapse of CDI following a period of where symptoms were absent.

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.

5. Surveillance

Clostridium difficile infection is now a reportable disease under the *Public Health Act*: Notifiable and Communicable Disease Regulations for Prince Edward Island. This means that all positive results are reported by the lab to the Chief Health Office and a record will be kept.

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 should maintain a summary record. This information should be reviewed and analyzed on an ongoing basis to identify any clusters.

6. Infection Prevention and Control Measures

As C.*difficile* or its spores can survive for months in the environment, HCWs should anticipate that contact with any object in a room of a patient with CDI may result in contamination with C.*difficile* or its spores.

- Routine Practices (Appendix B) should be used for every patient regardless of disease status.
- Additional Precautions for C.*difficile* include Contact Precautions (Appendix C) which should be initiated with any patient **at the onset of symptoms** who is considered to be at risk for CDI and prior to receipt of test results.
- Infection control precautions that are in place in the health care setting are not necessary once the patient is discharged to the community. Good personal hygiene and hand washing with soap and water is recommended for both patients and their care givers while the patient has diarrhea.

6.1 Accommodation

- Patients suspected of having CDI should be placed in a private room with dedicated toileting facilities.
- Commodes and bedpans must be handled very carefully to reduce spread of contamination with *C. difficile* spores to the surrounding environment. If a bedside commode is being used, it must be dedicated to the patient and should be cleaned and disinfected twice daily, and when soiled. When precautions are discontinued, the commodes and bedpans must be terminally cleaned and disinfected before use by another patient.
- If possible, patients should have equipment dedicated to their room until discharge or terminal cleaning is complete (e.g., wheelchairs, BP cuffs, thermometers etc.)
- In some care settings where the number of cases exceeds the single room capacity or practicality, it may not be possible to move every CDI patient to a single room. If a single room is not available, priority for accommodation should be:
  - patients with confirmed CDI may be cohorted. Cohorting should only be intitiated or discontinued under the direction of Infection Prevention and Control or designate.
  - if the patient is in a multi-bed room
    - signage indicating the precautions to be used should be visibly displayed
    - an isolation cart should be easily accessible
    - a laundry hamper should be placed as close to the patient's bed space as possible
    - a commode chair should be dedicated for the patient's use
  - Handling of trays, linen and waste as per contact precautions.
  - If the dietary tray is being placed in a designated area (e.g., kitchenette) on the unit until the next pick up, it needs to be bagged using a two person bagging technique.
- In areas where dietary staff hand out trays, they may enter the patient room wearing a clean pair of gloves, place the tray in the room and then remove the gloves and dispose of them in the waste can at doorway in the room before leaving, and perform hand hygiene
- Dietery staff can pick up trays from a patient's room wearing a clean pair of gloves, bring the tray outside the room, place the tray on the cart and then remove the gloves and dispose of them in the nearest waste can. Perform hand hygiene. **No other activities are to be performed by the dietary staff when in the patient room. If the patient requires assistance, a nurse is to be notified.**

6.2 Hand Hygiene

- To remove C. *difficile* on the hands, hand washing with soap and water is thought to be most effective. Spores can be physically removed from the hands with mechanical friction and running water.
- If soap and water is not available, alcohol hand rub can be used as it will decrease the vegetative bacteria on the hands. In order to remove spores, wash hands with soap and water at the first opportunity.
- If possible, hand washing should be carried out at a sink other than the patient's sink due to the risk of re-contamination of the HCWs hands.
- Hand hygiene education should be provided to the patient, family members and visitors. Patients who are unable to perform hand hygiene independently should be assisted by the HCW.

6.3 Environmental Cleaning

- C. *difficile* spores can survive for prolonged periods in the environment and are resistant to most chemicals used in cleaning. One control measure involves physical removal of spores (elbow grease) from the environment. All horizontal surfaces in the room and all items within reach of patients with suspected or confirmed CDI should be cleaned and disinfected twice daily with a hospital-grade disinfectant.
- Particular attention should be paid to the cleaning of patient-specific items and frequently touched surfaces including bed side rails, telephone, call bells, light switches, door handles, faucets, commodes and toilets, grip bars etc.
- In patient care areas, the use of hypochlorite-based products (i.e., bleach) for disinfection after the room is cleaned with hospital-grade disinfectant may be considered, in consultation with infection prevention and control. Alternatively, the use of new disinfectant products with proven effectiveness against spores may be considered.
- Floor surfaces are not a significant source of transmission of C. *difficile* and do not require special cleaning procedures.
- Toilet brushes should not be used.
- All disposable items such as toilet paper and paper towels must be discarded upon discharge.

6.4 Visitors

- When entering the patient room or bed space, a gown and gloves are always to be worn. (Appendix C)
- Visitors must not use the patient's bathroom.
- Visitors should be taught how to perform hand hygiene

Table 6.1 Precautions for *C.difficile* - Quick Reference

Precautions for MRSA	Hand Hygiene	Gloves	Gown	Mask (surgical)	Patient Placement	Patient Care Equipment	Cleaning *appropriate hospital grade disinfectant at proper concentration for recommended contact time*	Laundry	Garbage	Room Set-up	Patient Transport	Dietary
Acute Care	**Hand wash with soap and water** Before and after contact with patient or patient's environment, before aseptic procedure, after body fluid exposure - 4 moments of Hand Hygiene	When entering room or patient environment	When entering room or patient environment	As per routine practices.	Single room preferred. Consult infection control if alternate arrangements need to be made.	- Dedicate use of equipment for the patient when possible. - If it is not dedicated, clean and disinfect equipment before and after use on another patient. - When possible use single use items and discard after use. - Minimize supplies in room as these supplies will be discarded upon patient discharge.	Daily cleaning and frequently touched areas twice daily with a disinfectant that will kill spores. (See section 6.3 of the guideline for details)	- Deposit laundry into hamper (avoid touching outside areas with dirty laundry). - Laundry may be picked up in the usual manner and treated as all other laundry. - Gloves should be worn and hand hygiene performed.	- Double bagging not required - All bagged and tied waste from the patient's room is placed directly into the dirty utility room and treated as all other waste in accordance with the PEI waste management protocol.	*Inside room* - Laundry hamper - Waste can - Signage *Outside room* - Supplies and PPE - Hand hygiene supplies - Signage - Waste can	- Notify area receiving patient of precautions. - Open wounds/lesions must be covered with a dry, intact bandage. - Clean blanket and a clean gown for patient. - Patient must perform hand hygiene.	- Disposable dishes not required. - Trays will be treated as normal and placed on the cart to be brought to kitchen. - If tray staying in designated area (e.g., kitchenette) on the unit, tray must be placed into a bag.
Long Term Care	**Hand wash with soap and water** Before and after contact with patient or patient's environment, before aseptic procedure, after body fluid exposure - 4 moments of Hand Hygiene	When entering room or patient environment	When entering room or patient environment	As per routine practices.	Single room preferred. Consult infection control if alternative arrangements need to be made.	- Dedicate use of equipment for the patient when possible. - If it is not dedicated, clean and disinfect equipment before and after use on anther patient. - When possible use single use items and discard after use. - Minimize supplies in room as these supplies will be discarded upon patient discharge.	Daily cleaning and frequently touched areas twice daily with a disinfectant that will kill spores. (See section 6.3 of the guideline for details.)	- Deposit laundry into hamper (avoid touching outside areas with dirty laundry). - Laundry may be picked up in the usual manner and treated as all other laundry. - Gloves should be worn and hand hygiene performed.	- Double bagging not required. - All bagged and tied waste from the patient's room is placed directly into the dirty utility room or designated waste area and be treated as all other waste in accordance with the PEI waste management protocol.	*Inside patient care area:* - Laundry hamper - Waste can - Signage *Outside room* - Supplies and PPE - Hand hygiene supplies - Signage - Waste can (if using masks)	- Notify area receiving patient of precautions. - Open wounds/lesions must be covered with a dry, intact bandage. - Clean blanket and a clean gown for patient. - Patient must perform hand hygiene.	- Disposable dishes not required. - Trays will be treated as normal and placed on the cart to be brought to kitchen. - If tray staying in designated area (e.g., kitchenette) on the unit, tray must be placed into a bag.
Community Care Programs	**Hand wash with soap and water** Before and after contact with patient and patient's environment, before aseptic procedure, after body fluid exposure - 4 moments of Hand Hygiene	When at risk of contact with body fluids or mucus membranes (As per routine practices)	When at risk of clothing becoming contaminated (As per routine practices).	As per routine practices.	Risk assessment to be done, looking at patient's hygiene, ability to perform hand hygiene, and cognitive status.	Clean and disinfect all shared equipment between clients.	Frequently touched surfaces should be cleaned regularly.	Laundry can be cleaned in normal manner.	Garbage to be treated as normal as per PEI waste management protocol.	- No special room set up required for Community Care Facilities. **Ambulatory Clinics / Home Care** PPE is available to the worker prior to approaching patient (when required) and ability to dispose of PPE and perform hand hygiene within close proximity to treatment area is available.	- Notify area receiving patient of precautions. - Patient must perform hand hygiene with soap and water.	- Patient cleans hands prior to eating. - Dishes may be treated in the usual manner.

7.3 Transfers to Other Hospitals or Healthcare Facilities

When considering the transfer of any patient with C. *difficile* to another facility**, discharge planning and communication must begin in time to ensure proper communications and arrangements for the transfer have been made.**

It is the responsibility of the transferring team to inform the receiving facility of the patient's C. *difficile* diagnosis in advance to allow for appropriate placement of the patient.

7.4 Visits to Clinics and Specialist Departments

Notification of the patient's C. *difficile* diagnosis should be done prior to the appointment so that special arrangements can be made including:

- Patients known to be infected with C. *difficile* should be seen at the end of the working session, last on the list where possible.
- Where possible, staff should contain patient activity to one area. The room should be cleared of surplus equipment.
- Staff providing **direct care*** to the patient should wear gloves and gowns. The gown and gloves must be removed when contact with the patient has finished.
- If the patient is being transferred on a stretcher or wheelchair, this must be thoroughly cleaned and disinfected before being used for another patient.
- All equipment and horizontal surfaces that may have become contaminated should be cleaned and disinfected as described in section on environmental cleaning.
- Any used linen should be treated as dirty linen.
- After contact has finished, staff must clean their hands thoroughly using soap and water.

*** Direct Care (for Home Care and Ambulatory Clinics):**
Providing hands-on care, such as bathing, washing, turning patient, changing clothes/diapers, dressing changes, care of open wounds/lesions or toileting. Feeding and pushing a wheelchair are not classified as direct care.

8. Patient Discharge

- After discharge, patients with CDI are not a concern for other family members as person-to-person transmission within the home setting is rare.
- Good hand hygiene practices should always be used by the discharged patient and family members/HCWs. Hand hygiene information sheets can be given at discharge.

9. Discontinuation of Precautions for C. *difficile*

Patients with **suspected** CDI may, after consultation with Infection Prevention and Control or designate, have precautions discontinued once the diagnosis has been ruled out. If the patient continues to be symptomatic, Routine Practices should be maintained.

Patients with **confirmed** CDI:

- 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).
- Contact Precautions should be discontinued following a risk assessment only under the direction of Infection Prevention and Control or their designate.
- Retesting for C. *difficile* cytotoxin is **not** necessary to determine the end of isolation and should not be done.

10. Recurrence of Symptoms

Relapse refers to the return of the symptoms of CDI after a symtpom-free period. If CDI symptoms recur within 2 months of the last infection, the case should be counted as a relapse.

Recurrence of CDI is common and occurs in about 30% of cases. If diarrhea recurs, the patient should be immediately placed on Contact Precautions and re-tested for C.*difficile* cytotoxin.

11. Guidance for Health Care Workers

Health Care Workers, including when they are receiving antibiotics, are generally not at risk of acquiring CDI occupationally. HCWs must always follow Routine Practices, specifically hand hygiene before and after contact with all patients, and use Contact Precautions when caring for patients with CDI.
Health Care Workers should not consume food or beverages in patient/resident care areas.

Health Care Workers with acute diarrhea that is probably of an infectious etiology should not work.

12. Outbreak protocol

12.1 Confirm that there is an outbreak. Each new case of CDI warrants an investigation. However, an outbreak is considered to be an increase in the number of cases (infections) above the number normally occurring in a particular health care setting over a defined period of time.

12.2 **Place each patient on Contact Precautions** and obtain a specimen as soon as possible after onset of symptoms.

12.3 **Form a multi- disciplinary outbreak management team** to review the situation and provide guidance and support. Members of the team should include representatives from the affected unit/ward such as the nurse manager and charge nurse. Other members of this team might include:
- administration
- physician
- infection control practitioner or designate
- environmental services
- employee health and communications may be required as ad hoc members

This team should meet regularly for the duration of the outbreak.

12.4 **Establish lines of communication:**
Communicate with the patients and their families regarding the reason for Contact Precautions, while maintaining patient confidentiality.

If patients from the affected unit require **transfer**, notify the receiving health care setting or department that the patient is coming from an outbreak unit.

- Maintain communication with local experts.
- Communicate daily with facility leadership and staff as to the progress of the outbreak.
- Determine key spokesperson for the media.
- Inform the laboratory of the outbreak and maintain ongoing communication.

12.5 **Implement staff education:**
Conduct in-service education on the affected floor/unit and other departments as necessary.
If the outbreak affects multiple areas of the facility, facility/program-wide education may be required.

12.6 **Review environmental cleaning and equipment cleaning practices** as well as management and storage of supplies. The use of hypochlorite-based products (i.e., bleach) for disinfection after the room is cleaned with hospital-grade disinfectant is recommended (ratio 1 part household bleach 5% to 9 parts water). This solution should be prepared daily Alternatively, the use of new disinfectant products with proven effectiveness against spores may be considered.

12.7 Review and audit infection prevention and control strategies and practices, such as hand hygiene and environmental cleaning.

12.8 Attempt to identify a source for the outbreak:

Conduct an investigation and review the patient record to attempt to determine the source of the outbreak (e.g., history of antibiotic usage, history of CDI, underlying illness).

A detailed investigation should be initiated to detect additional cases and possible links between cases, such as equipment, procedures or common staff assignments.

If the suspected source is another health care setting, that setting must be informed about the findings.

12.9 Cohorting of patients and staff:

Consult with infection control to determine if cohorting C.*difficile* (+) patients is appropriate in the particular outbreak situation. Consideration of this is based on a risk assessment. Consideration should be given to cohorting staff until the outbreak is resolved.

12.10 Consider closing a floor/unit to further admissions or transfers until the outbreak is resolved in consultation with ICP and the outbreak team.

12.11 An outbreak is declared over by the outbreak management team when there is evidence that no further transmission is occurring.

Appendices

Appendix A

Specimen Collection

Equipment Required	- sterile collection container
Procedure	- *C. difficile* should be in a plain stool container with no preservative - Specimens for *C. difficile* must be liquid stool which takes the shape of the container: **formed stool is not tested** - At least 3 ml of stool is required
Labeling of Specimens	-2 unique identifiers required e.g., name, PHN # on both the requisition and specimen -Record date and time collected on both requisition and specimen -Add any relevant clinical history and antibiotic usage
Transport of Specimen	-Specimen should be refrigerated -Specimen must reach lab within 48 hours of collection

Appendix B

Routine Practices

Hand Hygiene **Hand hygiene for C. *difficile* is performed using soap and water:** Before and after each patient contact Before performing invasive procedures Before preparing, handling, serving or eating food After care involving body fluids and before moving to another activity Before putting on and after taking off gloves and PPE After personal body functions (e.g., blowing one's nose) Whenever hands come into contact with secretions, excretions, blood and body fluids After contact with items in the patient's environment
Mask & Eye Protection or Face Shield Protect eyes, nose and mouth during procedures and care activities likely to generate splashes or sprays of blood, body fluids, secretions or excretions. Wear within 1 meter of a coughing patient.
Gown Wear a long-sleeved gown if contamination of uniform or clothing is anticipated.
Gloves Wear gloves when there is a risk of hand contact with blood, body fluids, secretions, excretions, non-intact skin, mucous membranes or contaminated surfaces or objects. Wearing gloves is NOT a substitute for hand hygiene. Perform hand hygiene before and after removing gloves.
Environment All equipment that is being used by more than one patient must be cleaned between patients. All touched surfaces in the patient's room must be cleaned daily.
Linen & Waste Handle soiled linen and waste carefully to prevent personal contamination and transfer to other patients.
Sharps Injury Prevention NEVER RECAP USED NEEDLES. Place sharps in sharps containers. Prevent injuries from needles, scalpels and other sharp devices.
Patient Placement/Accommodation Use a single room for a patient who contaminates the environment when possible. Perform hand hygiene after leaving the room.

Appendix C

Health Care Facility (Acute and Long Term Care) Precautions Table

Hand Hygiene **Hand hygiene for C. *difficile* is performed using soap and water:** • Before and after each patient contact • Before performing invasive procedures • Before preparing, handling, serving or eating food • After care involving the body fluids of a patient and before moving to another activity • Before putting on and after taking off gloves and other PPE • After personal body functions (e.g., blowing one's nose) • Whenever hands come into contact with secretions, excretions, blood and body fluids • After contact with items in the patient's environment • Whenever there is doubt about the necessity for doing so
Patient Placement • Use a single room with own toileting facilities. • If this is not possible, alternative placement of patients only to be done only in consultation with infection control or designate. • Door may remain open.
Gloves • Wear gloves when entering room or patient environment. • Wearing gloves is NOT a substitute for hand hygiene. • Perform hand hygiene before and after removing gloves.
Gown • Wear a long-sleeved gown when entering room or patient environment.
Masks • As per Routine Practices
Environment • Dedicate routine equipment to the patient (e.g., stethoscopes, commodes). • Disinfect all equipment that comes out of the room or patient environment. • Regular daily cleaning and all frequently touched surfaces in the patient's room must be cleaned BID with disinfectant that will kill spores.
Visitors • Visitors must wear gloves and a long-sleeved gown. • Visitors must perform hand hygiene before entry and after leaving the room or patient environment.

Appendix D

Home Care Precautions Table
(Modified Contact Precautions in addition to Routine Practices)

Hand Hygiene **Hand hygiene for C. *difficile* is performed using soap and water:** • Before and after each patient contact • Before performing invasive procedures • Before preparing, handling, serving or eating food • After care involving body fluids and before moving to another activity • Before putting on and after taking off gloves and PPE • After personal body functions (e.g., blowing one's nose) • Whenever hands come into contact with secretions, excretions, blood and body fluids • After contact with items in the patient's environment
Gown • When providing **direct care*** • Wear a long-sleeved gown if contamination of uniform or clothing is anticipated.
Gloves • When providing **direct care**** • Wear gloves when there is a risk of hand contact with blood, body fluids, secretions, excretions, non-intact skin, mucous membranes or contaminated surfaces or objects. • Wearing gloves is NOT a substitute for hand hygiene. • Perform hand hygiene before and after removing gloves.
Masks • As per Routine Practices
Equipment • All equipment that is being used by more than one patient must be cleaned between patients.
Linen & Waste • Handle soiled linen and waste carefully to prevent personal contamination and transfer of organisms to other patients. • Wash cloths separately if heavily soiled with stool. • Waste to be disposed of as per Island Waste Watch Guideline.

Direct Care*: Providing hands-on care, such as bathing, washing, turning patient, changing clothes/diapers, dressing changes, care of open wounds/lesions or toileting. Feeding and pushing a wheelchair are not classified as direct care.

Appendix E

Clinics Precautions Table
(Modified Contact Precautions in addition to Routine Practices)

Hand Hygiene **Hand hygiene for C. *difficile* is performed using soap and water:** • Before and after each patient contact • Before performing invasive procedures • Before preparing, handling, serving or eating food • After care involving body fluids and before moving to another activity • Before putting on and after taking off gloves and PPE • After personal body functions (e.g. blowing one's nose) • Whenever hands come into contact with secretions, excretions, blood and body fluids • After contact with items in the patient's environment
Gown • When providing **direct care*** • Wear a long-sleeved gown if contamination of uniform or clothing is anticipated.
Gloves • When providing **direct care**** • Wear gloves when there is a risk of hand contact with blood, body fluids, secretions, excretions, non-intact skin, mucous membranes or contaminated surfaces or objects. • Wearing gloves is NOT a substitute for hand hygiene. • Perform hand hygiene before and after removing gloves.
Masks • As per Routine Practices
Equipment • All equipment that is being used by more than one patient must be cleaned between patients.
Linen & Waste • Handle soiled linen and waste carefully to prevent personal contamination and transfer of organisms to other patients. • Wash clothes separately if heavily soiled with stool. • Waste to be disposed of as per Island Waste Watch Guideline.
Patient placement/Accommodation • If possible, schedule the patient's appointment as the last of the day. • If stool unable to be contained, patient must be placed directly into an exam room.

Direct Care*: Providing hands-on care, such as bathing, washing, turning patient, changing clothes/diapers, dressing changes, care of open wounds/lesions or toileting. Feeding and pushing a wheelchair are not classified as direct care.

Appendix F

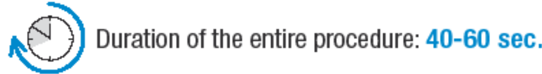
Hand hygiene instruction sheets

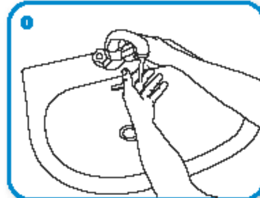
F1 - How to hand wash
F2 - How to hand rub
F-3 - 4 moments for Hand Hygiene

Appendix F1

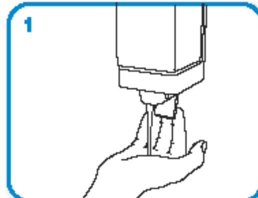
How to handwash?

WASH HANDS ONLY WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB!

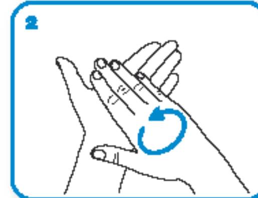




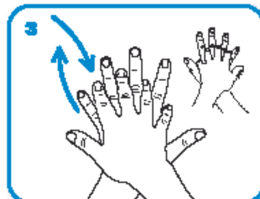
Wet hands with water



apply enough soap to cover all hand surfaces.

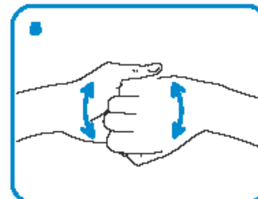


Rub hands palm to palm,



right palm over left dorsum with interlaced fingers and vice versa,

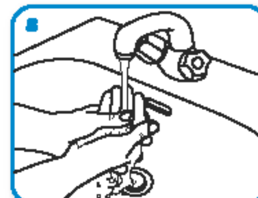
palm to palm with fingers interlaced,



backs of fingers to opposing palms with fingers interlocked,

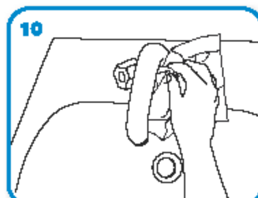
rotational rubbing of left thumb clasped in right palm and vice versa,

rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa.

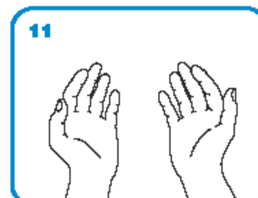


Rinse hands with water,

dry hands thoroughly with a single use towel,



use towel to turn off faucet.



Your hands are now safe.

WORLD ALLIANCE *for* PATIENT SAFETY

WHO acknowledges the Hôpitaux Universitaires de Genève (HUG), in particular the members of the Infection Control Programme, for their active participation in developing this material.

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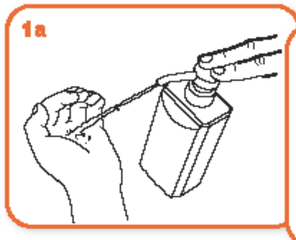
Appendix F2

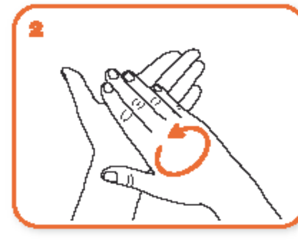
How to handrub?

RUB HANDS FOR HAND HYGIENE! WASH HANDS ONLY WHEN VISIBLY SOILED!

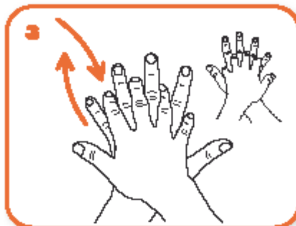
Duration of the entire procedure: **20-30 sec.**



Apply a palmful of the product in a cupped hand, covering all surfaces.

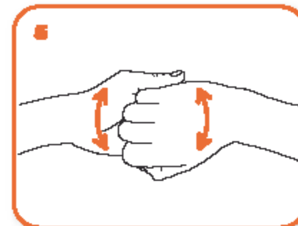


Rub hands palm to palm,

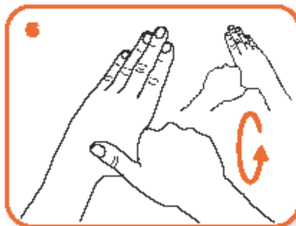


right palm over left dorsum with interlaced fingers and vice versa,

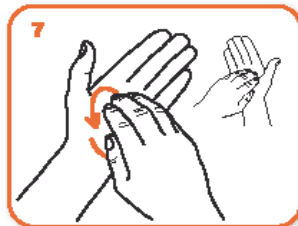
palm to palm with fingers interlaced,



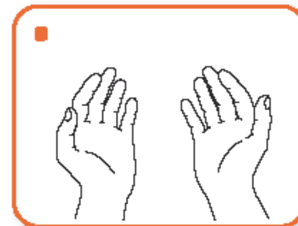
backs of fingers to opposing palms with fingers interlocked,



rotational rubbing of left thumb clasped in right palm and vice versa,



rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa.



Once dry, your hands are safe.

WORLD ALLIANCE *for* PATIENT SAFETY

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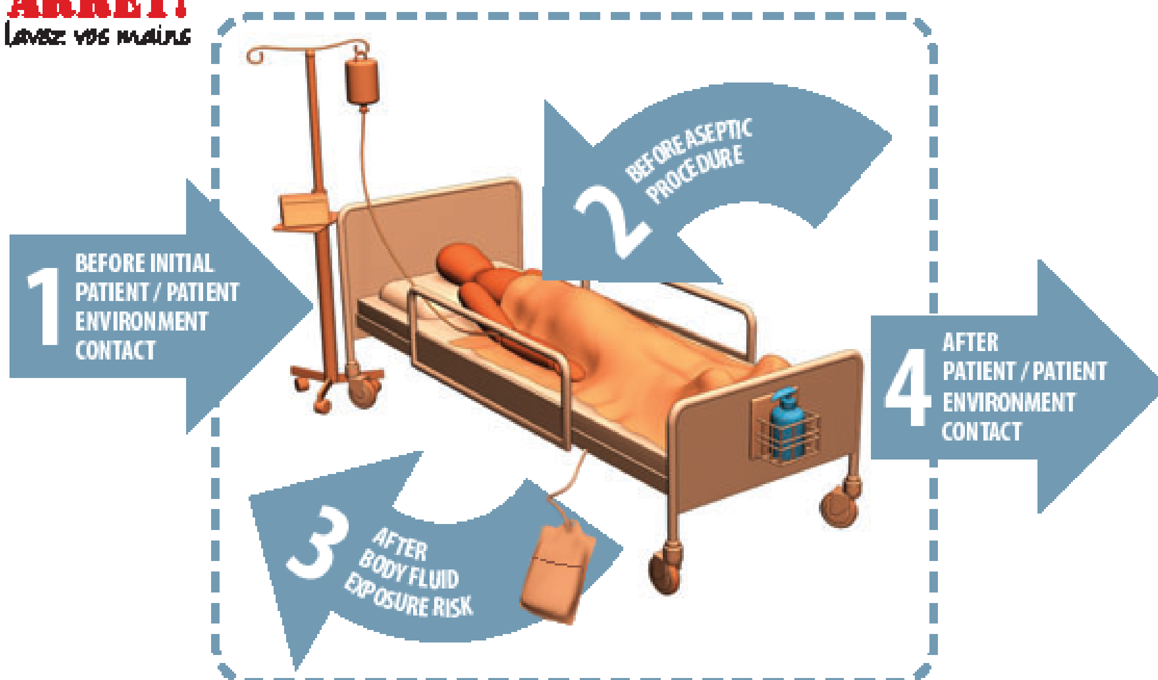
Appendix F3

Your 4 Moments for Hand Hygiene



Moment		
1 BEFORE initial patient / patient environment contact	WHEN?	Clean your hands when entering: • before touching patient or • before touching any object or furniture in the patient's environment
	WHY?	To protect the patient/patient environment from harmful germs carried on your hands
2 BEFORE aseptic procedure	WHEN?	Clean your hands immediately before any aseptic procedure
	WHY?	To protect the patient against harmful germs, including the patient's own germs, entering his or her body
3 AFTER body fluid exposure risk	WHEN?	Clean your hands immediately after an exposure risk to body fluids (and after glove removal)
	WHY?	To protect yourself and the health care environment from harmful patient germs
4 AFTER patient / patient environment contact	WHEN?	Clean your hands when leaving: • after touching patient or • after touching any object or furniture in the patient's environment
	WHY?	To protect yourself and the health care environment from harmful patient germs

Adapted from WHO poster "Your 5 moments for Hand Hygiene," 2006.

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Appendix G

Sample Information Sheets

Appendix G1

Clostridium difficile (C. *difficile*) INFORMATION for the GENERAL PUBLIC

What is *Clostridium difficile* (*C. difficile*)?

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

What is *C. difficile* infection?

C. difficile infection occurs when certain antibiotics kill your normal bowel bacteria and allow the *C. difficile* to grow. The use of antibiotics increases the chances of developing *C. difficile* diarrhea because antibiotics alter the normal levels of good bacteria found in the intestines and colon. When there are fewer good bacteria, *C. difficile* can thrive and produce toxins that can cause an infection. These toxins can damage the bowel and may cause diarrhea. *C. difficile* infection is usually mild but sometimes can be severe. In severe cases, surgery may be needed. *C. difficile* is the most common cause of infectious diarrhea in hospital.

The main symptoms of *C. difficile* infection are:

- watery diarrhea
- fever
- abdominal pain or tenderness

Who gets *C. difficile*?

C. difficile infection 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 infection.

How does the doctor know that someone has *C. difficile*?

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

How is *C. difficile* treated?

Treatment depends on how sick a person is with the infection. People with mild symptoms may not need treatment. For more severe infection, an antibiotic is given.

How does *C. difficile* spread?

When a person has *C. difficile* infection, 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 or long-term care facility.

If a person has *C. difficile* diarrhea, they will be moved to a private room until they are free from diarrhea for at least 2 days. Activities outside the room will be restricted. Everyone who enters the room will wear a gown and gloves. Everyone MUST clean their hands when leaving the room. Hand hygiene with soap and water is the best method to remove C. *difficile* spores.

The person with *C. difficile* must always wash their 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 the room and equipment will be done to remove any germs.

What to do at home?

Heathy people like family and friends who are not taking antibiotics are at very low risk of getting *C. difficile* infection.

Hand Care

Wash 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

No special cleaning is required. The dishwasher can be used, or clean dishes by hand with soap and warm water.

Should any medication be taken?

It is very important that all medication is taken as prescribed by the doctor. Drugs from the drugstore that will stop diarrhea should not be used. (e.g., Imodium).
If diarrhea persists or comes back, a doctor should be contacted.

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

Health Canada: http://www.phac-aspc.gc.ca/c-difficile/index.html
http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/diseases-maladies/cdifficile-eng.php

Centers for Disease Control and Prevention:
http://www.cdc.gov/ncidod/dhqp/id_CdiffFAQ_general.html

Appendix G2

Clostridium difficile (C. *difficile*)
INFORMATION FOR HEALTH CARE WORKERS

The Issue
Clostridium difficile, commonly called *C. difficile*, is a bacterium that causes diarrhea and other serious intestinal conditions. It is the most common cause of infectious diarrhea in hospitalized patients in the industrialized world.

Background
C. difficile is one of the most common infections found in hospitals and long-term care facilities.

C. difficile bacteria are found in feces. This organism is a spore-forming, Gram-positive, anaerobic bacillus that causes diarrhea and colitis in humans and in a number of animal species. Its spores can survive outside the human body for weeks to months on environmental surfaces and devices, including bedrails, commodes, thermometers, improperly sterilized endoscopes, bathing tubs, etc. People can become infected if they touch items or surfaces that are contaminated with fecal traces, then touch their mouth or nose. Health care workers can spread the bacteria to other patients or contaminate surfaces through hand contact.

The use of antibiotics increases the chances of developing *C. difficile* diarrhea because antibiotics alter the normal levels of good bacteria found in the intestines and colon. When there are fewer good bacteria, *C. difficile* can thrive and produce toxins that can cause an infection. In hospital and long-term care settings, the combination of a number of people receiving antibiotics and the presence of *C. difficile* can lead to frequent outbreaks.

Transmission of *C. difficile*
Transmission of *C. difficile* occurs when the organism or its spores are ingested orally. This may occur because of direct contact, person to person spread on hands, or from the environment. Nosocomial transmission has been documented, and outbreaks have been reported in both hospitals and long term care facilities

Symptoms of *C. difficile*

The symptoms of *C. difficile* include:
- watery diarrhea (at least three bowel movements per day for two or more days)
- fever
- loss of appetite
- nausea
- abdominal pain or tenderness

Diagnosis of *C. difficile*

Lab confirmation of a suspected case of *C. difficile* infection consists of a positive result of one of the following tests:
- endoscopy for colonic pseudomembranes
- stool culture for *C. difficile* with toxin production
- stool enzyme immunoassay for either Toxin A or Toxin B
- stool cytotoxicity assay positive for Toxin B

Health Risks of *C. difficile*

Healthy people are not usually vulnerable to *C. difficile*. Seniors and people who have other illnesses or conditions being treated with antibiotics and certain other stomach medications are at the greatest risk of infection.

Most commonly the infection causes diarrhea, which can lead to serious complications including dehydration and colitis. The spectrum of clinical outcomes can range from asymptomatic colonization of the colon, to the more severe manifestations of C. *difficile* infection, such as pseudomembranous colitis, toxic megacolon, and colonic perforation. In rare cases, it can be fatal.

For people with mild symptoms, no treatment is needed. The symptoms usually clear up once the patient stops using antibiotics. In severe cases, medication and even surgery may be needed.

Minimizing risk

Hospitals and long-term care facilities appear to be the major reservoirs for *C. difficile*. The organism can be cultured from residents with and without diarrhea, from the environment of infected residents, to include bedpans, bedrails, bedside commodes, wheelchairs, etc., and from the hands of health care workers caring for these residents.

The spores of the organism can survive for weeks and months in the environment.

Residents with active diarrhea are much more infectious than those who are asymptomatic.

Washing your hands often with soap and water is your best defense against *C. difficile*. Follow these tips to prevent spread of the bacteria.

- If you work in a hospital or a long-term health care facility, or visit someone there, wash your hands often, especially after using the toilet. Most health care facilities now provide an alcohol-based hand sanitizer at the entrance. Be sure to use it.

- Use antibiotics only when necessary for serious infections. Be sure to take the full course of antibiotics, even after you start to feel better. If even some of the bacteria survive, they may become resistant to the antibiotic, making the infection harder to treat.

Appendix G3

Clostridium difficile (C. *difficile*)
INFORMATION for the COMMUNITY CARE FACILITY/HOME

What is *Clostridium difficile* (*C. difficile*)?

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

What is *C. difficile* infection?

C. difficile infection occurs when certain antibiotics kill your good bowel bacteria and allow the *C. difficile* to grow. The use of antibiotics increases the chances of developing *C. difficile* diarrhea because antibiotics alter the normal levels of good bacteria found in the intestines and colon. When there are fewer good bacteria, *C. difficile* can thrive and produce toxins that can cause an infection. These toxins can damage the bowel and may cause diarrhea. *C. difficile* infection is usually mild but sometimes can be severe. In severe cases, surgery may be needed.

The main symptoms of *C. difficile* infection are:

- watery diarrhea
- fever
- abdominal pain or tenderness

Who gets *C. difficile*?

C. difficile infection 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 infection.

How does the doctor know that someone has *C. difficile*?

If a client has symptoms of *C. difficile*, the doctor will ask for a sample of the watery stool. The laboratory will test the stool to see if *C. difficile* toxins are present.

How is *C. difficile* treated?

Treatment depends on how sick a person is with the infection. People with mild symptoms may not need treatment. For more severe infection, an antibiotic is given.

How does *C. difficile* spread?

When a person has *C. difficile* infection, 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 Community Care Facility/Home?

In the community setting, the transmission of *C. difficile* is rare. The most important factor to decrease the possibility of transmission is hand hygiene. The person with *C. difficile* must always wash their hands after using the bathroom. Cleaning hands is the most important way for everyone to prevent the spread of this germ.

Heathy people like family and friends who are not taking antibiotics are at very low risk of getting *C. difficile* infection.

Hand Care

Wash 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. The dishwasher can be used, or clean dishes by hand with soap and water.

Medication

It is very important that all medication is taken as prescribed by the doctor. Drugs from the drugstore that will stop diarrhea should not be used. (e.g., Imodium).

If diarrhea persists or comes back, a doctor should be contacted.

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

Health Canada: http://www.phac-aspc.gc.ca/c-difficile/index.html
http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/diseases-maladies/cdifficile-eng.php

Centers for Disease Control and Prevention:
http://www.cdc.gov/ncidod/dhqp/id_CdiffFAQ_general.html

Appendix H1

Sample Outbreak line list form

Index Case______________________UNIT______Date________

C. *diff* - LINE LISTING FORM

Name	MRN	Unit #	Risk Factors	Antibiotic history	Isolation	Stool Specimen/tissue sample		Symptoms
						Taken:	Results:	
			antibiotic usage ☐ bowel surgery ☐ chemotherapy ☐ prolonged hospitalization ☐ increased age ☐ underlying illness ☐		start____ d/c_____	Date_____	Pos ☐ Neg ☐ Date________	Loose Stool: started______stopped____ Abd Cramps: started_____stopped_____ Toxic Mega Colon______
			antibiotic usage ☐ bowel surgery ☐ chemotherapy ☐ prolonged hospitalization ☐ increased age ☐ underlying illness ☐		start____ d/c_____	Taken: Date______	Results: Pos ☐ Neg ☐ Date________	Symptoms Loose Stool: started______stopped____ Abd Cramps: started_____stopped_____ Toxic Mega Colon______
			antibiotic usage ☐ bowel surgery ☐ chemotherapy ☐ prolonged hospitalization ☐ increased age ☐ underlying illness ☐		start____ d/c_____	Taken: Date______	Results: Pos ☐ Neg ☐ Date________	Symptoms Loose Stool: started______stopped____ Abd Cramps: started_____stopped_____ Toxic Mega Colon______
			antibiotic usage ☐ bowel surgery ☐ chemotherapy ☐ prolonged hospitalization ☐ increased age ☐ underlying illness ☐		start____ d/c_____	Taken: Date______	Results: Pos ☐ Neg ☐ Date________	Symptoms Loose Stool: started______stopped____ Abd Cramps: started_____stopped_____ Toxic Mega Colon______

Appendix H2

Sample Outbreak line list form

Index Case________________________UNIT_______Date_________

C. *diff* - LINE LISTING FORM

Name	MRN	Unit #	Risk Factors	Antibiotic history	Isolation	Stool Specimen/tissue sample		Symptoms
						Taken:	Results:	
			antibiotic usage ☐ bowel surgery ☐ chemotherapy ☐ prolonged hospitalization ☐ increased age ☐ underlying illness ☐		start____ d/c_____	Date_____	Pos ☐ Neg ☐ Date________	Loose Stool: started______stopped______ Abd Cramps: started_______stopped_____ Toxic Mega Colon_______
			antibiotic usage ☐ bowel surgery ☐ chemotherapy ☐ prolonged hospitalization ☐ increased age ☐ underlying illness ☐		start____ d/c_____	Taken: Date______	Results: Pos ☐ Neg ☐ Date________	Symptoms Loose Stool: started______stopped______ Abd Cramps: started_______stopped_____ Toxic Mega Colon_______
			antibiotic usage ☐ bowel surgery ☐ chemotherapy ☐ prolonged hospitalization ☐ increased age ☐ underlying illness ☐		start____ d/c_____	Taken: Date______	Results: Pos ☐ Neg ☐ Date________	Symptoms Loose Stool: started______stopped______ Abd Cramps: started_______stopped_____ Toxic Mega Colon_______
			antibiotic usage ☐ bowel surgery ☐ chemotherapy ☐ prolonged hospitalization ☐ increased age ☐ underlying illness ☐		start____ d/c_____	Taken: Date______	Results: Pos ☐ Neg ☐ Date________	Symptoms Loose Stool: started______stopped______ Abd Cramps: started_______stopped_____ Toxic Mega Colon_______

Appendix I

References

1. Association for Professionals in Infection Control and Epidemiology, Inc. Text of Infection Control & Epidemiology 2nd edition. 2005. Chapter 75-2.

2. Bouzo E, Munoz P, Alonzo R. Clinical manifestations, treatment and control of infections caused by *Clostridium difficile*. Clin Microbiol Infect 2005; 11 Suppl 4: 57-64.

3. Canadian Committee on Antibiotic Resistance. Infection Prevention and Control Best Practices for Long Term Care, Home and Community Care including Health Care Offices and Ambulatory Clinics, June, 2007.

4. Last, John M, Spasoff R, Harris S. A dictionary of Epidemiology. 4th edition. New York: Oxford University Press, 2001.

5. Canadian Patient Safety Institute et al. Canadian Hand Hygiene Campaign Tool Kit. Stop! Clean Your Hands. 2008.

6. Center for Disease Control and Prevention Website. Frequently asked questions. Information for Healthcare Providers. Released August 2004; Updated August 22, 2005. Accessed March 31, 2008.

7. Health Canada. Infection Control Guidelines: Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care, Can Commun Dis Rep, July 1999;25 Suppl 4:1-142. Available from: http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/99vol25/25s4/index.html

8. Mandell, G.L., Bennett, J.E., & Dolin, R. (2000). Mandell, Douglas, and Bennett's principles and practice of infectious diseases. Philadelphia, Pennsylvania: Churchill Livingstone - A Harcourt Health Sciences Company.

9. Provincial Infection Control Network of British Columbia (PICNet). Antibiotic Resistant Organisms Prevention and Control Guidelines, November 2008.

10. Ontario Ministry of Health and Long-Term Care. Best Practices for Surveillance of Health Care - Associated Infections in Patient and Resident Populations. June 2008. Available from: http://www.health.gov.on.ca/english/providers/program/infectious/diseases/ic_hai.html

11. Ontario Ministry of Health and Long-Term Care. Best Practices Document for the Management of *Clostridium difficile* in all health care settings. Published December 2004, Revised January 2009.
Available from: http://www.health.gov.on.ca/english/providers/program/infectious/diseases/best_prac/bp_cdiff.pdf

12. World Health Organization. Laboratory Biosafety Manuel. 3rd edition, 2004. P. 84
Available from: http://www.who.int/csr/resources/publications/biosafety/Biosafety7.pdf