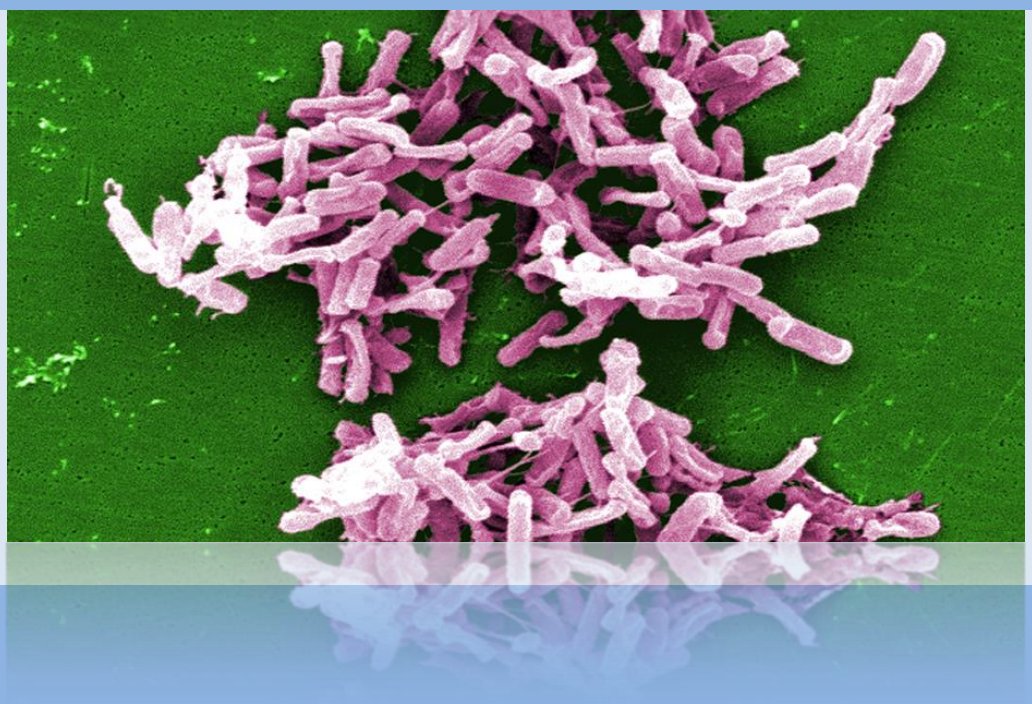
PICNet
PROVINCIAL INFECTION CONTROL NETWORK OF BRITISH COLUMBIA
A program of the Provincial Health Services Authority

British Columbia
Clostridium difficile Infection (CDI)
Toolkit and Clinical Management Algorithm



Prepared by the CDI Working Groups of British Columbia

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Acknowledgements

The Provincial Infection Control Network (PICNet), in collaboration with Infection Prevention and Control experts, developed this provincial toolkit and clinical management algorithm for the management of *Clostridium difficile* infections (CDI). The BC Ministry of Health asked PICNet to facilitate and support the development of the toolkit by identifying and bringing together key stakeholders for the development/consultation process. The result is a set of evidence-informed, provincial processes. This has been a collaborative project between the Ministry of Health, PICNet, and all the BC health authorities.

PICNet wishes to thanks the participants from the following two working groups for their contribution to the development of the toolkit.

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1. Introduction

Provincial Toolkit for the Prevention, Control and Management of *Clostridium difficile* Infection Cases and Outbreaks

Clostridium difficile remains the most important cause of healthcare associated diarrhea and is increasingly important as a community pathogen. A more virulent strain of *C. difficile* has been identified and has been responsible for severe cases of disease worldwide. In British Columbia *C. difficile* infection (CDI) rates within acute care facilities have been publicly available since April 2009. Higher rates in some facilities remain an ongoing challenge.

In March 2012, the BC Ministry of Health requested the Provincial Infection Control Network's (PICNet) assistance in developing consistent, evidence-informed, provincial processes for the management of *Clostridium difficile* infections (CDI). This toolkit provides recommendations regarding surveillance, case identification, clinical management, infection prevention and control (IPC), and environmental management.

This toolkit does not address the implementation of an antimicrobial stewardship program. Each health authority should have a program in place to monitor antibiotic use within their facilities, to minimize the frequency and duration of antimicrobial therapy and the number of antimicrobial agents prescribed. This will reduce the risk to patients of developing CDI.

The following components are included in the toolkit:

1. **Preventing and Controlling *Clostridium difficile* Infections: Measures, Roles and Responsibilities**
   This document provides a guide to the infection prevention and control (IPC) and operational measures that should be implemented in acute care settings to decrease cases of healthcare associated CDI and minimize the risk of transmission. The prevention and management of CDI requires a coordinated and consistent multidisciplinary organizational approach. This document will be relevant to Nursing, Administration, Infection Prevention and Control, Pharmacy, clinical staff, Support Services (e.g. environmental cleaning), patients and visitors. Change management resources and strategies to ensure sustainability should be a part of the control measures.

2. **Spot check for CDI Patient Management During Usual CDI Activity on Unit**
   This checklist is to be used to monitor implementation of CDI patient management measures during usual CDI activity on a nursing unit. The checklist may be completed by either a nurse leader/educator or Infection Control Professional (ICP). This is a tool to monitor infection control processes and **NOT** meant as a record for individual patient charts.

3. **Trigger tool for Acute Care Facilities**
   This tool is meant to be used primarily by unit nursing leaders with assistance from Infection Prevention and Control. The main objective of a trigger tool is to create a culture and system that minimizes the risk of transmission of CDI and the susceptibility of patients to CDI. Use of a trigger tool by patient care providers will develop an increased awareness to CDI cases and rates and can signal opportunities for increased infection control activities to prevent an outbreak. The trigger will activate a set of actions by a multi-disciplinary team to identify any changes in practice that require implementation in order to return the situation to normal.

4. **Trigger Tool — Best Practices Audit — Management of CDI in Acute Care Settings**
   This checklist is be used by nursing leaders/educators in discussion with IPC to monitor practice in patient care areas in response to a trigger. Control measures implemented in response to a trigger are designed to return the situation to normal.

5. **Patient Stool Record Chart**
   This chart is to be used to monitor patients with diarrhea and serve as a record towards their clinical assessment.

6. **CDI Staff Education Pamphlet**
   This pamphlet is intended for healthcare workers; to provide information on CDI testing, treatment, management and IPC measures.

7. **CDI Patient and Family Information Pamphlet**
   This pamphlet is intended for patients and their families; to provide general information about CDI, what to expect while in hospital regarding precautions, actions they can take while in hospital, and what they need to know after discharge.

8. **CDI Patient Room Discharge/Transfer Cleaning Checklist**
   This checklist is intended for use by Environmental Services/Housekeeping to ensure that rooms of CDI patients are appropriately cleaned on transfer or discharge to ensure all necessary steps are completed to make the room safe for the next admission. This process review is intended to be used in conjunction with a qualitative method of monitoring cleaning efficiency.

9. **CDI Clinical Management Algorithm**
   This document is intended for use by clinicians to ensure the correct treatment approach for patients with CDI is followed.

2. Preventing and Controlling *Clostridium difficile* Infections: Measures, Roles and Responsibilities

Introduction

Clostridium difficile infection (CDI) is the most frequent cause of healthcare associated infectious diarrhea. CDI presents as a spectrum of disease ranging from diarrhea to severe bowel complications that may result in death. Recent reports have highlighted the presence of a more virulent strain of *C. difficile* that poses a particular risk to the elderly. *C. difficile* is also emerging as a significant risk to pediatric and oncology patients and pregnant women.

Purpose

This document provides a guide to the infection prevention and control (IPC) and operational measures that should be implemented in acute care settings to decrease cases of healthcare associated CDI and minimize the risk of transmission. The prevention and management of CDI requires a coordinated and consistent multidisciplinary organizational approach. This document will be relevant to Nursing, Administration, Infection Prevention and Control, physicians, Pharmacy, clinical staff, Support Services (e.g. environmental cleaning), patients, and visitors. Change management resources and strategies to ensure sustainability should be a part of the control measures.

Surveillance

- To standardize surveillance methodology across acute care settings, use the PICNet Surveillance protocol for *Clostridium difficile* infections.
- At a minimum, conduct surveillance for healthcare-associated CDI in all inpatient healthcare facilities, to detect outbreaks and monitor patient safety **(B-III).**
- Regular communication of unit specific healthcare-associated CDI rates to the unit/site Manager and staff is recommended.
- If an increase in CDI rates or if an outbreak is noted, stratify rates by patient location in order to target control measures **(B-III)**.

Patient/Case Identification

In British Columbia, the definition of a case of CDI is:

- presence of diarrhea (e.g. three liquid or loose stools within a 24-hour period) or toxic megacolon (i.e. abnormal dilation of the large intestine documented radiologically) without other known etiology, **AND** laboratory confirmation of the presence of *C. Difficile* toxin A and/or B (positive toxin, or culture with evidence of toxin production, or detection of toxin genes) **OR**
- diagnosis of typical pseudo-membranes on sigmoidoscopy or colonoscopy **OR**
- histological/pathological diagnosis of CDI with or without diarrhea

Please refer to the current PICNet Surveillance protocol.

- Testing for *C. difficile* or its toxins should be performed only on diarrheal (unformed) stool, (Bristol Stool Chart type 6 or 7) unless ileus due to *C. difficile* is suspected **(B-II).** Testing of stool from asymptomatic patients is not clinically useful, including use as a test of cure. It is not recommended. **(B-III)**
- Repeat testing during the same episode of diarrhea is of limited value and should be discouraged **(B-II)**.
- Laboratory testing methods are changing rapidly. Laboratory management should inform clinicians regarding the sensitivity/specificity and interpretation of testing methods used.
- Routine identification of asymptomatic carriers (patients or healthcare providers) for infection control purposes is not recommended **(A-III)** and treatment of such identified patients is not effective **(B-I)**.

Infection Prevention and Control Measures

Each facility should clarify roles and assign responsibilities for ensuring that the required prevention and control measures are consistently implemented.

Measures for Healthcare Providers, Patients, and Visitors

Healthcare Providers

- Institute a method (e.g. gastrointestinal illness algorithm) to immediately identify and implement Contact Precautions for patients with acute onset diarrhea even prior to a diagnosis being made.
- Use Contact Precautions employing gloves **(A-I)** and gowns **(B-III)** on entry to a room or immediate patient area of a patient with CDI.
- Emphasize compliance with the practice of hand hygiene **(A-II).** The superior efficacy of hand hygiene with soap and water over alcohol based hand rub (ABHR) for preventing the transmission of *C. difficile* has not been clinically proven **(C-III).** Instruct healthcare providers to utilize the first available method of hand hygiene unless their hands are visibly soiled, in which case soap and water is the preferred method. Accessibility to ABHR at the point of care is required.
- Use a transmission risk assessment to determine where to accommodate the patient. A private room is preferred **(B-III)**. If a single room is unavailable ensure Contact Precautions are employed within the patient's bed space and immediate surroundings. A dedicated personal commode is required. In some situations cohorting patients with CDI may be possible**(C-III).** Even in cohort rooms Contact Precautions and a dedicated personal commode are required for each patient bed space.

- Maintain Contact Precautions for the duration of diarrhea**.** Continuing Contact Precautions for 48-72 hours after stools normalize is recommended to provide preventative precautions in the event of a reoccurrence of diarrhea. A transmission risk assessment of each patient is required to determine the need for further extended precautions **(C-III).**
- As an important component of quality patient care; chart documentation should include date and type of precautions implemented and when precautions were discontinued, as well as inclusion of a Stool Chart.
- Develop ongoing education for health care providers about *C. difficile* infections that includes clinical presentation and infection control considerations.

Patients

- Encourage and provide patients with opportunities to perform hand hygiene before eating and after using the toilet.
- Provide education to the patient and family regarding the mode of transmission for CDI and the expected clinical course.
- Distribute a CDI patient information sheet to patients and families.
- Advise patients with CDI not to use patient kitchen.

Visitors

- Visitors should be educated on hand hygiene and the appropriate use of gloves and gowns while visiting the patient.
- Advise visitors not to visit any other patient(s), and not to utilize the patient kitchen, nourishment areas or patient lounges.

Environmental Cleaning and Disinfection

- Develop a schedule to regularly review and evaluate all cleaning practices by an individual external to the unit. This should include both process review and cleaning efficacy monitoring using a qualitative method (e.g. UV light).
- Identify and remove environmental sources of *C. difficile,* or items that facilitate spread of *C. difficile* spores (e.g. spray nozzles in patient toilet areas or dirty service rooms) **(B-II).**
- Use sporicidal agents to address environmental contamination in areas associated with increased rates of CDI **(B-II).** The following chemical agents have demonstrated some efficacy against *C. difficile* spores:
  - Sodium hypochlorite 1000 ppm - 5000 ppm
  - Hydrogen peroxide enhanced action formulation (HP-EAF) (4.5%)
  - Other sporicidal agents are under development

- All disinfectants must have a DIN number from Health Canada. The manufacturer's instructions for dilution and contact time must be followed.
- It should be noted that the use of sporicidal agents alone is not effective in reducing environmental contamination with *C. difficile*. Physical cleaning of surfaces is required in order to reduce the bioburden. If a sodium hypochlorite solution is used as the sporicidal agent, a pre-cleaning step using a detergent cleaner is required to remove soil. Twice daily cleaning of frequently touched surfaces in the patient's bed space and bathroom is recommended.
- Daily linen changes, or whenever linen is soiled, is recommended while Contact Precautions are in place.
- Routine environmental screening for *C. difficile* is not recommended **(C-III).**
- Follow the discharge/transfer cleaning audit tool (page 37) for room cleaning when the patient is removed from Contact Precautions as well as upon transfer/discharge.
- De-clutter patient areas to facilitate thorough cleaning of surfaces, and separation of clean and dirty items and equipment.
- Develop a regular cleaning schedule for commodes, with assigned responsibility, including inspection of surfaces (including the under-surfaces) for cleanliness and integrity.
- Label all equipment to provide an easy indicator when items have been cleaned. The purpose of this indicator is to avoid items that have not been cleaned being used with other patients and potentially leading to transmission of *C. difficile.* Clearly separate clean and dirty areas in utility rooms to minimize the possibility of cross contamination.
- Assess the effectiveness of patient waste systems (e.g. macerators, bedpan disinfectors) to include:
  - user compliance with appropriate loading and use
  - proper functioning through regular maintenance schedule, and
  - visual inspection of cleaned items.
- The responsibility for ensuring that patient waste systems function correctly and items are effectively cleaned must be clearly assigned to a person or group of people.
- If a macerator waste system is in use, dedicated bed and fracture pan supports are required and should be cleaned after each use. These items require autoclaving upon patient transfer/discharge or disposal as appropriate.

Trigger Tool

A CDI trigger point should be set for all inpatient units by the IPC program and be known by the clinical team on each ward. The main objective of a trigger tool is to create a culture and system that minimizes the risk of transmission of CDI and the susceptibility of patients to CDI. A trigger point is a sensitive point at which the unit and IPC program act on increases in CDI cases which

may be linked to deteriorations in infection control systems. The trigger will activate a set of actions by a multi-disciplinary team to identify any changes in practice that require implementation in order to return the situation to normal and prevent outbreaks.

Once a trigger point has been alerted use the Provincial Trigger Tool Initial Response and Trigger Tool Best Practices Audit Tools to ensure that increased attention and diligence is given to infection control measures.

Outbreak Management

Healthcare facility IPC teams and the Medical Health Officer (MHO), or designate, work collaboratively in the prevention, early detection and management of CDI outbreaks. The criteria for the definition of an outbreak should be pre-determined by each facility in consultation with the MHO or designate. These criteria may include a case number threshold, signs that measures taken are not managing to control the increasing number of new cases or a combination of both.

The decision to limit new admissions or close a portion of a unit, a unit, or facility may be required. Consultation with the MHO, or designate for the management of outbreaks by IPC, and the facility Administrator is required under the Public Health Act.

Role of the Hospital in CDI Outbreak Management

Each facility, in consultation with the MHO, should have a pre-determined set of criteria that constitutes an outbreak. If these criteria are met the MHO must be consulted under the Pubic Health Act. Mobilize the Outbreak Prevention and Management Team (OPMT). The OPMT is primarily responsible for operationalizing outbreak management utilizing the facility gastrointestinal outbreak process (may refer to PICNet Gastrointestinal Outbreak Guidelines);

- Responsible for clinical management of patients;
- Responsible for development and implementation of infection prevention and control policies and procedures in consultation with the MHO;
- Review current infection prevention and control best practice recommendations in outbreak management procedures;
- Emphasize the importance of hand hygiene to everyone. Instruct visitors and healthcare providers to utilize the first available method of hand hygiene unless their hands are visibly soiled, in which case soap and water is the preferred method. Accessibility to ABHR at the point of care is required. Efficacy of ABHR for removing C. difficile spores from the surface of hands is limited. The use of soap and water as soon as is available is recommended in outbreak settings.
- Increase education sessions for staff, patients, and visitors;
- Review disinfectant used to ensure that sporicidal agents with appropriate concentration and contact time are being utilized.

Role of Public Health in Acute Care Facility CDI Outbreak Management

- The MHO has legislated authority under the Public Health Act to give directions or orders regarding health hazards and infectious diseases in BC
- Assist in the investigation, confirmation, declaration and management of the outbreak;
- Provide support and consultation to Infection Prevention and Control staff at the hospital, if needed.
- Provide representation on the outbreak prevention and management team (OPMT)
- Provide guidance and assistance on surveillance and infection prevention and control policies and procedures required to control the outbreak
- Consult with the hospital to declare the outbreak over;
- Facilitate provincial assistance when local resources for outbreak control are exhausted.

Definitions of the Strength of Recommendations and the Quality of the Evidence

Strength of recommendation	Definition
A	Good evidence to support a recommendation for or against use
B	Moderate evidence to support a recommendation for or against use
C	Poor evidence to support a recommendation
Quality of evidence	
I	Evidence from at least 1 properly randomized, controlled trial
II	Evidence from at least 1 well-designed clinical trial without randomization, from cohort or case-controlled analytic studies (preferably from more than 1 center) from multiple time series, or from dramatic results from uncontrolled experiments
III	Evidence from opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

Adapted and reproduced from the Canadian Task Force on the Periodic Health Examination, 2009

3. Spot Check for CDI Patient Management During Usual CDI Activity on Unit

To be completed by a nurse leader/educator or ICP and given to unit manager/delegate. This information is **NOT** intended for the patient's chart. The Spot Check provides a "snapshot" of the practices that are in place.

Date: _____ Unit: _____ Patient Room #: _____

Accommodation	Yes	No	Comment/NA
Patient in private room?			
Appropriate placement based on transmission risk if private room not available			
Contact precaution signage over patient's bed and/or outside room?			
Personal Protective Equipment			
Cart with PPE outside patient's room?			
A laundry hamper is placed close to the patient's bed space as possible			
Gowns worn by HCW entering patient's room or bed space? (if observed)			
Gloves worn by HCW entering patient's room or bed space? (if observed)			
Gloves/gowns discarded prior to exiting patient's room or bed space? (if observed)			
Hand Hygiene			
Hand hygiene before patient/environment contact? (if observed)			
Hand hygiene after patient/environment contact? (if observed)			

ABHR accessible at point-of-care?			
Hand washing sink is accessible in the patient room?			
Dedicated patient equipment			
Is a commode chair is dedicated for the patient's use if dedicated toilet facilities unavailable?			
Dedicated transfer belt?			
Dedicated wheelchair?			
Dedicated blood Pressure (BP) cuff?			
Shared equipment is cleaned and disinfected after patient use?			
Disinfectant used : • Sodium hypochlorite 1000 ppm - 5000 ppm • Hydrogen peroxide enhanced action formulation (HP-EAF) (4.5%) • Other sporicidal agents • Ensure product has a DIN number and that manufacturer's instructions are followed for dilution and contact time			
Commode cleaned and disinfected after each use if unable to dedicate?			
Bladder scanner cleaned and disinfected after use?			
Pulse oximeter cleaned and disinfected after use?			

Portable vital signs monitor cleaned and disinfected after use?			
Wheelchair cleaned and disinfected after use if unable to dedicate?			
Other equipment used by patient (please list)			
Appropriate cleaning process is being used? (twice daily cleaning of high-touch and bathroom surfaces). If a sodium hypochlorite agent is used, a pre-cleaning step with a detergent cleaner is required to remove soil.			
Waste in commode bucket, bedpan is handled carefully and disposed in washer/disinfector unit?			
Dedicated commode chair is cleaned between uses as necessary?			

Signature of Nurse Leader/ICP: _____

It is recommended that these spot checks be kept by nursing leaders for a period of time (6 months) to enable the unit manager or delegate to review and evaluate the consistency of infection control practices over time.

4. Trigger Tool for Acute Care Facilities

A CDI trigger should be set for all inpatient units. It should be set by Infection Prevention and Control in consultation with the Unit Manager and be known by the clinical team on every ward. A trigger is not synonymous with the term "outbreak". A trigger is a more sensitive point at which the unit and/or infection control program notice increases in the incidence of CDI cases which may be linked to deteriorations in infection control systems. In these cases, increasing infection control practices may be required to ensure patient safety. A trigger uses the number of cases, or length of time between cases, as a measure of infection control systems. This tool is meant to be used primarily by unit nursing leaders with assistance from Infection Prevention and Control.

The main objective of a trigger tool is to create a culture and system that minimizes the risk of transmission of CDI and the susceptibility of patients to CDI. Trigger tools bring increased awareness to CDI cases and rates and can signal opportunities for increased infection control activities to prevent an outbreak. The trigger will activate a set of actions by a multi-disciplinary team to identify any changes in practice that require implementation in order to return the situation to normal, preventing an outbreak. If the pre-determined threshold for an outbreak should be reached however, consultation with the MHO or designate is required as per the Public Health Act.

Responsibilities	
Unit Charge Nurse or delegate	• Recognize and report clinical (cases) triggers to the Infection Control Practitioner, Physicians and Medical Director as appropriate for local communication structure • Works with IPC to lead implementation of the clinical actions required • Ensure audits are completed (i.e. hand hygiene audits, UV audits, equipment cleaning audits) • Report action plan and additional resources required to administration • Ensure that there are sufficient staff and resources (e.g. PPE) available to deal with patient care needs
Physicians	• Confirm that the clinical care of patients is compliant with local/provincial guidance, including observations, specialist referrals and antibiotic therapy • Refer to the Provincial Clinical Management Algorithm for CDI • Consult with Infectious Disease Physician or Pharmacist regarding specific antimicrobial prescribing practices, when appropriate

Responsibilities	
Infection Prevention and Control (IPC)	• Work with unit manager to set trigger points • Monitor surveillance data for increased rates of CDI • Work with unit manager and physicians to implement practice improvements as required • Notify MHO if the pre-determined outbreak threshold is met.
Pharmacist	• Review the antibiotic regimens of all patients in the ward to ensure that prescribing habits reduce the risk of CDI • Work with physicians to ensure that the Provincial Clinical Management Algorithm for CDI is followed
Unit Manager/Site Manager or delegate	• Work with IPC to set trigger points • Support implementation of practice improvements. • Ensure the ward team has the resources to provide a safe patient environment
Manager/Supervisor Environmental Services (Housekeeping)	• Ensure that adequate staffing and equipment are available to meet increased cleaning needs • Monitor compliance with increased cleaning requirements

How to determine your trigger:

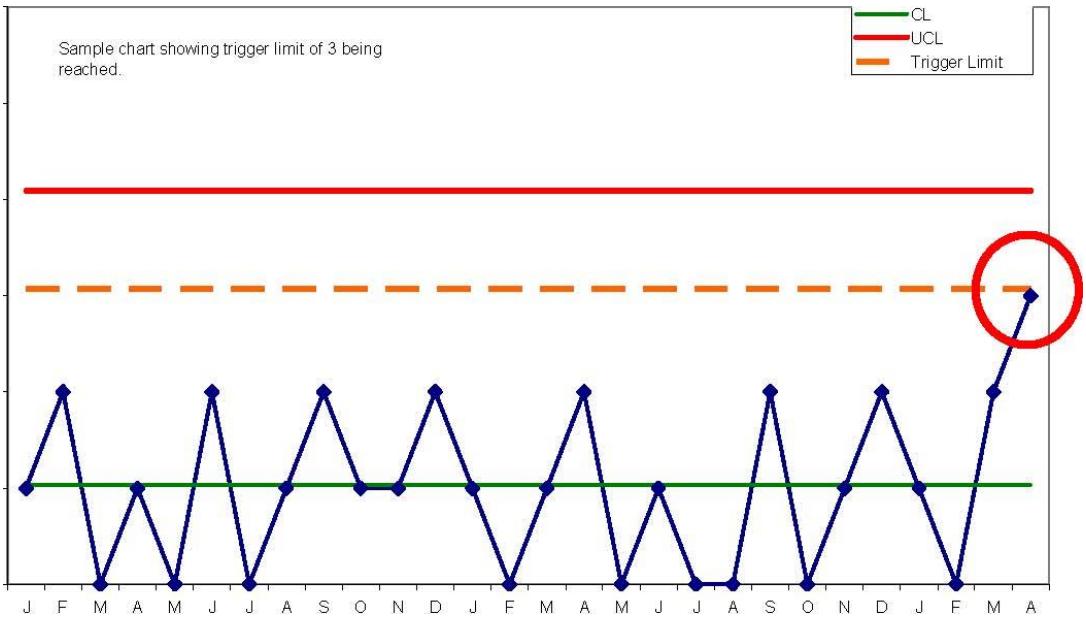
There are different ways to determine what a trigger threshold would be. Below are examples of three different methods that could be used. The method(s) chosen may vary by unit or facility type and size.

1. For smaller units who seldom have patients that develop CDI: look at the time between cases. Example: your unit has 2 or less cases per year at least 4 months apart. You may determine that each single case would constitute a trigger or 2 cases within a 7 day period would constitute a trigger. Choose a consistent time period that is easy for staff to remember and act upon.

2. For larger units who more commonly have patients develop CDI look back over the past 24 months and plot on a control chart the number of patients with confirmed CDI each month, or if possible to, by each week. Doing this by month or by week would allow for seasonal and normal variation of rates. This will provide you with a graph that identifies what seasonal/normal variation in rates would be. With this information you can determine the number for your trigger. It should be set below the upper limit of your normal variation. The recommended trigger point is two standard deviations above the mean. Some facilities in Canada have chosen to use 62% above the mean rate as a trigger point. If epidemiological support is not available within your health authority, consultation with PICNet or your local public health unit is available to set up this program.

3. You may have an internal IT system that generates automatic alerts for IPC when *C. difficile* incidents are climbing or be able to build that into your current system.

Sample Chart showing trigger limit of 3 being reached



Legend

	upper limit of what could be within normal variation
	trigger limit
	number of new cases per month
	mean number of new cases per month (may use weekly rates)
	trigger point (number of new cases; may be either 2 standard deviations above the mean or 62% of the mean)

Trigger Alert – Confirmation:

To be completed by the Unit Nursing Leader, delegate or ICP

1) Assess the trigger

a. Trigger threshold for this unit _____

b. Number of cases prompting this CDI trigger _____

2) Assess the patient data

a. Cases meet case definition for CDI? (see page 5 for definition). Yes _____ No _____

b. Have these cases been admitted to the facility for greater than 3 days? Yes ____ No ___

c. Number of patients who have confirmed CDI on this unit today

i. Date: _____

ii. Number:_____

d. Number of patients that have symptoms that could be CDI on this unit today ___

Trigger confirmed: Yes____ No_____

Likely to be a natural variation* in cases on this unit: Yes: _____ No: _____

Notes: _____

_____

Signature of Unit Manager:_____

Signature of ICP: _____

If the trigger not confirmed please stop here, sign the report, leave a copy with your unit manager and send a copy to your senior administrator and medical director. This will communicate to others that a potential issue has been investigated and is not a concern at this time. This also provides documentation that due diligence was taken. If trigger alert confirmed, complete **Initial Immediate Response Form.**

***** *Natural variation: normal or typical fluctuations in the number of cases for that unit/facility. Can be influenced by seasonal elements, bed occupancy rates, patient acuity etc.*

Trigger Alert Confirmed – Initial Immediate Response Form

To be completed by charge nurse or delegate in discussion with ICP to provide a forum for trouble shooting and problem solving

1. **All patients with symptoms suggestive of CDI or with confirmed CDI are in single rooms with own bathroom.**

   Yes: ____ No: ____ If not, why? _____

   _____

   _____

   _____

   In some cases where the number of CDI cases exceeds 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, patient placement should chose based upon the patient's attributes and risk of transmission (e.g. personal hygiene, continence status, cognitive abilities)

2. **Stool specimens have been sent on all patients with symptoms suggestive of CDI**

   Yes: ____ No: ____ If not, why? _____

   _____

   _____

3. **All patients with CDI or symptoms suggestive of CDI:**

   a) Have an up to date stool chart, with all stools passed recorded and described, i.e. using the Patient Stool Record Chart.

      Yes: ____ No: ____ If not, why? _____

      _____

      _____

      _____

   b) Have had reviews of their medications by physician/pharmacy, specifically the use of antibiotics, proton pump inhibitors, anti-motility agents and laxative therapy.

      Yes: ____ No: ____ If not why? _____

      _____

      _____

      _____

4. **Pharmacy has been notified to assess and ensure that all patients with confirmed CDI are on appropriate CDI specific antimicrobial therapy. (in smaller sites this may be a physician)**

   Yes: ____ No: ____ If not why? _____

   _____

5. **All patients with CDI have had a daily assessment of the severity (including hydration level and stool chart) of the CDI regardless of what other diagnoses they have.**

   Yes: ____ No: ____ If not why? _____

   _____

6. **All patients with CDI have been assessed for severity of illness and referred to a specialist (i.e. Infectious Disease, Internal Medicine, Gastroenterology or Surgeon) if appropriate. Please refer to the Provincial Clinical Management Algorithm.**

   Yes: ____ No: ____ If not why? _____

   _____

7. **Arrangements are in place to increase education for staff, patients and visitors.**

   Yes: ____ No: ____ If not why? _____

   _____

8. **Housekeeping supervisor is notified of need for extra CDI cleaning and to ensure that the appropriate disinfectant (hypochlorite based disinfectant or other products with sporicidal claim, e.g. 4.5% accelerated hydrogen peroxide) is used at the appropriate concentration. If a hypochlorite based disinfectant is used, pre-cleaning with a detergent cleaner is required to remove soil.**

   Yes: ____ No: ____ Comments: _____

   _____

9. **<u>In consultation with Infection Prevention and Control</u> and the facility administrator Consider closing the pod/area/unit to <u>new admissions</u> if:**
   a. There are inadequate facilities/environment to ensure the safety of patients.
   b. There are insufficient staff to provide a safe patient environment.
   c. Patients with CDI cannot be safely separated from patients who do not have CDI.

N.B. If the number of cases reach the pre-determined criteria for an outbreak then consultation with the MHO is mandatory under the Public health Act.

Unit Manager/Charge Nurse	ICP

A copy of this should be kept by unit manager and infection prevention and control.

A copy should also be sent to the facility administrator.

AND

Complete a Trigger Tool Best Practices Audit weekly until rates have returned to normal for unit.

5. Trigger Tool — Best Practices Audit Management of CDI in Acute Care Settings

Site Audited: _____

Date: _____

It is recommended that this tool be used by nursing leaders or educators or Infection Control to monitor practice in patient care areas in response to a trigger.

	Completed		
Accommodation	**Yes**	**No**	**Comments**
In some cases where the number of CDI cases exceeds 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, patient placement should be chosen based upon the patient's attributes and risk of transmission (e.g. personal hygiene, continence status, cognitive abilities).			
All patients suspected of having CDI are immediately placed in a single room with dedicated toilet facilities (i.e. private bathroom or individual commode chair)			
• Each patient has been placed based upon a transmission risk assessment.			
• Contact Precautions and personal commodes are in place for each patient			
• Signage indicating the precautions is visibly displayed			
• Consider allocating staff specifically to care for the CDI patients or the patients without CDI			
Contact Precautions	**Yes**	**No**	**Comments**
• Appropriate PPE (gloves and gowns are worn by all persons entering the room and discarded properly)			
• Equipment is dedicated (e.g. wheelchairs, lift slings, BP cuffs, tourniquet)			
• In the event that equipment must be shared, there is a process to ensure that cleaning occurs prior to use on another patient, Whenever possible use a sporicidal agent for additional effect.			

• Verify that frequency of hand hygiene audits have been increased			
• Verify that all staff responsible for delivering food have had instructions to place tray onto over bed table and leave room without touching anything in patient's room			
Education	**Yes**	**No**	**Comments**
• Verify that staff have had increased education sessions and access to a staff education pamphlet (e.g. Provincial Staff Education pamphlet)			
• Verify that education has been provided to each patient on the need and procedure for hand hygiene as well as an information pamphlet (e.g. Patient Education pamphlet).			
• Verify that the patient has access to ABHR or soap and water to clean their hands before eating and after using the toilet.			
• Verify that visitors have been provided education on hand hygiene, circumstances in which gloves/gowns are worn, the need to visit only one patient and not to utilize nourishment areas or patient lounges.			
Environmental Cleaning	**Yes**	**No**	**Comments**
• Verify that notification and scheduling of CDI cleaning of specific patient rooms/bed spaces is communicated to housekeeping			

• Verify that housekeeping supervisors have reviewed cleaning procedures with housekeeping staff and including: a) The appropriate disinfectant: – Sodium hypochlorite 1000 - 5000 ppm – If a sodium hypochlorite agent is used pre-cleaning with a detergent cleaner is required – Hydrogen peroxide enhanced action formulation (HP-EAF) (4.5%) – Other sporicidal agents – Ensure product has a DIN number from Health Canada and follow manufacturer's instructions for dilution and contact time b) Cleaning cloths are changed frequently and must be changed between rooms. Used cloths are not re-dipped into disinfectant solution c) Dedicated toilet brushes are used for the rooms of patients with CDI d) There is a schedule for a minimum of daily commode cleaning with assigned responsibility e) If a macerator system is used, supports are cleaned between uses f) Frequency of garbage pickup is increased g) Frequency of soiled linen pickup is increased			
• **There is a checklist** of items for twice daily cleaning that includes: all horizontal surfaces and frequently touched items such as bed rails, telephones, call bells, light switches, door handles, faucets, commodes and toilets within the patient's environment. This is initialled by housekeeping after each clean.			

Discontinuation of Precautions	Yes	No	Comments
• Contact Precautions are discontinued in consultation with Infection Prevention and Control once symptoms of diarrhea (normal stool for the individual) have resolved for 48 – 72 hours.			
• There is a method to formally notify housekeeping of the need to "discharge/transfer clean" or "specific CDI clean" the room once precautions are discontinued.			
Patient Discharge	**Yes**	**No**	**Comments**
• Education is provided to the patient and family regarding good hand hygiene practices, what to expect regarding symptoms and any follow-up required.			
• There is a method to ensure discharge/transfer cleaning of room is done prior to admission of another patient			

Signature of Auditor: _____

Please submit copies of the completed audit report to the facility administrator, unit manager, and infection prevention and control.

6. Patient Stool Record Chart

Patient Name: _____

Patient ID Number: _____

Room/Bed Number: _____

Date	Time	Type/Description (Please refer to key and tick all that apply)										Colour	No BM	Initials
		1	2	3	4	5	6	7	M	B	O			
M= Mucous present B = Blood present O = Offensive odour														

Key: Bristol Stool Chart

Type 1 	Separate hard lumps like nuts (hard to pass)
Type 2 	Sausage-shaped but lumpy
Type 3 	Like a sausage but with cracks on its surface
Type 4 	Like a sausage or snake, smooth but soft
Type 5 	Soft Blobs with clear-cut edges (passed easily), formed
Type 6 	Fluffy pieces with ragged edges, mushy stool, semi-liquid
Type 7 	Watery, no solid pieces—entirely liquid

Diarrhea = abnormally frequent watery stools (type 6 or 7)
Send specimen after 3rd episode of diarrhea in 24 hours

7. *Clostridium difficile* Infection — Staff Education Pamphlet

What is *Clostridium difficile*?

Clostridium difficile is a toxin producing bacteria. Approximately 5% of the population normally carry *C. difficile* in their bowel without symptoms of infection. Infection is commonly associated with antibiotic usage, (either while on the antibiotics, or up to 3 weeks later.) The antibiotics alter the normal bacterial population of the bowel and allow the *C. difficile* to multiply. The toxins secreted by the *C. difficile* cause bowel inflammation so that the bowel leaks fluid and the result is watery diarrhea. *C. difficile* infection has also been associated with other medications, such as chemotherapeutic agents and proton pump inhibitors.

The symptoms may include:

- Watery diarrhea
  - may be mild to profuse
  - a distinct smell, commonly described as a "barnyard smell" may be present
  - sometimes blood may be present
- Fever
- Loss of appetite
- Nausea
- Abdominal pain and tenderness, cramping
- High white blood cell count

How is *C. difficile* spread?

C. difficile is primarily spread through hand contact. Healthcare providers who do not change gloves and wash hands immediately following the handling of feces can transmit the bacteria to other patients. Patients sharing bathrooms also need to be reminded to wash after using the bathroom and prior to meals. Equipment that goes from patient to patient can also spread *C. difficile*. As *C. difficile* is a spore forming bacteria, it can remain in the environment and contaminate commodes and toilet areas and frequently touched surfaces.

Why is *C. difficile* a problem?

C. difficile is a common hospital problem due to the widespread use of antibiotics. As antibiotics destroy bacteria, they interfere with the normal flora of the bowel and it is replaced with *C. difficile* bacteria. Although *C. difficile* infection can occur in the community or anywhere antibiotics are used, the concern in a healthcare setting is that the bacteria may spread to other vulnerable patients.

Testing, Treatment and Management

C. difficile is diagnosed by the presence of *C. difficile* toxin, or the gene that codes for the toxin, in the stool. Send a stool specimen to the laboratory in a dry container. The sensitivity of the testing methods varies, so a negative test result does not always rule out *C. difficile* infection. If a patient develops diarrhea and may have *C. difficile*, implement Contact Precautions immediately. Do not wait for test results.

Do *C. difficile* positive patients need precautions?

When patients have diarrhea, place patients in a private room, and use Contact Precautions when caring for them. This includes the used of gloves and gowns when entering the patient's room or environment. Enhanced housekeeping is required to remove the spores from the environment. Extra attention should be given to bedrails, call bells and toilet flushers – places where soiled hands are likely to contact. Commodes should be assigned to the patient and not shared. Meticulous hand hygiene and cleaning of shared equipment is an important to preventing spread.

Contact Precautions may be discontinued in consultation with Infection Prevention and Control once stool consistency has returned to what is normal for that patient. Often Contact Precautions are continued until after (48–72 hours) stools normalize to provide increased prevention measures in the event that diarrhea reoccurs.

Follow up stool specimens are not needed as patients may continue to test positive for toxin in their stool for several weeks after successful treatment.

Clinical Key Points

Patients with *C. difficile* need to be assessed frequently for possible complications. Some individuals, especially the elderly and those with other health conditions (e.g. lupus, cancer) may deteriorate rapidly. Assess bowel sounds, frequency and character of diarrhea (stool chart), abdominal pain and distension, electrolyte balance and the patient's general hydration status at least daily. Refer to the CDI Clinical Management Algorithm

Pseudomembranous colitis (PMC) is the most serious condition caused by *C. difficile* that results in "inflammatory plaques" forming a yellowish membrane along the bowel wall. Occasionally a condition known as "*toxic megacolon"* where the bowel expands and can even perforate will occur. This may result in the need for surgery.

Therapy: *C. difficile* is treated by specific antibiotics active against it. In mild cases *C. difficile* associated diarrhea may subside when antibiotic therapy is withdrawn. Presently the first line of treatment is Metronidazole (Flagyl). Oral Vancomycin is used as a second line treatment for cases that do not respond to Metronidazole. Some patients with *C. difficile* may relapse and require repeated courses of therapy. Refer to the CDI Clinical Management Algorithm.

8. *Clostridium difficile* Infection – Patient and Family Information Pamphlet

What is *Clostridium difficile* infection?

Clostridium difficile, also known as "*C. difficile*", is a germ (bacteria) that can cause diarrhea. Most cases of *C. difficile* infection occur in patients taking antibiotics. The most common symptoms of a *C. difficile* infection include:

- Watery diarrhea
- Fever
- Loss of appetite
- Nausea
- Belly pain and tenderness, cramping

Who is most likely to get *C. difficile* infection?

Anyone can get *C. difficile*, especially while they are a patient in hospital but those who have taken antibiotics are at higher risk. The elderly and people with certain medical problems have a greater chance of becoming severely ill from *C. difficile*. *C. difficile* spores can live outside the human body for a very long time and may be found on things in the environment such as bed linens, bed rails, bathroom fixtures, and medical equipment. *C. difficile* spores can be spread from room to room on contaminated equipment and on the hands of doctors, nurses, other healthcare providers, patients and visitors. Individuals whose hands become contaminated with these spores can become ill if they if they eat or touch their mouths without cleaning their hands.

Can *C. difficile* infection be treated?

Yes, there are antibiotics that can be used to treat *C. difficile.* Some people may need several courses of antibiotics to clear the infection. Don't be afraid to ask your physician for information on your *C. difficile* treatment plan. In some severe cases, a person might have to have surgery to remove the infected part of the bowel.

What are some of the things that hospitals are doing to prevent *C. difficile* infections?

To prevent *C. difficile* infections, doctors, nurses, and other healthcare providers should:

- Only give patients antibiotics when it is necessary.
- Clean their hands with soap and water or an alcohol-based hand rub before and after caring for every patient. This can prevent *C. difficile* and other germs from being passed from one patient to another on their hands.
- Carefully clean hospital rooms and medical equipment that have been used for patients with *C. difficile*.

- Use Contact Precautions to prevent *C. difficile* from spreading to other patients. Contact Precautions mean:
  - Whenever possible, patients with *C. difficile* will have a single room or share a room only with someone else who also has *C. difficile*.
  - Healthcare providers will put on gloves and wear a gown over their clothing while taking care of patients with *C. difficile*.
  - Visitors need to clean their hands before entering and after leaving the room. They may also be asked to wear a gown and gloves if they are helping care for the patient. Ask the patient care providers for instructions.
  - When leaving the room, healthcare providers and visitors remove their gown and gloves and clean their hands.
- Patients on Contact Precautions are asked to stay in their hospital rooms as much as possible. They should not go to common areas, such as the patient kitchen, gift shop or cafeteria. They can go to other areas of the hospital for treatments and tests.
  - If it is important that you periodically walk around, ask your patient care provider where you can walk and if any special equipment is needed.

What can I do to help prevent *C. difficile* infections?

Only take antibiotics as prescribed by your doctor. Be sure to clean your own hands often, especially after using the bathroom and before eating. Don't be afraid to talk to doctors, nurses, and other healthcare providers about cleaning their hands with soap and water or an alcohol-based hand rub before and after caring for you.

Can my friends and family get *C. difficile* when they visit me?

C. difficile infection usually does not occur in persons who are not taking antibiotics. Visitors are not likely to get *C. difficile*. Still, to make it safer for visitors, they should:

- Clean their hands before they enter your room and as they leave your room
- Ask the healthcare provider if they need to wear gowns and gloves when they visit you.

What do I need to do when I go home from the hospital?

Once you are back at home, you can return to your normal routine. Often, the diarrhea will be better or completely gone before you go home. This makes giving *C. difficile* to other people much less likely. There are a few things you should do, however, to lower the chances of developing *C. difficile* infection again or of spreading it to others:

- If you are given a prescription to treat *C. difficile*, take the medicine exactly as prescribed by your doctor and pharmacist. Do not take half-doses or stop before you run out.
- Wash your hands often, especially after going to the bathroom and before preparing food.
- People who live with you should wash their hands often as well.

- If you develop more diarrhea or belly pain after you get home, tell your doctor immediately.
- Don’t share personal care items such towels, toothbrushes, bar soap.
- Clean bathrooms and other frequently touched surfaces regularly.
- Wash cleaning cloths after each use. Don’t reuse them to clean other surfaces.

Your doctor may give you additional instructions.

If you have questions, please ask your healthcare provider.

9. CDI Patient Room Discharge/Transfer Cleaning Checklist

Room: _____ Date: _____ Time: _____

Item	Yes	No	Comments/NA
1. Were all dirty/used items removed?			
a. Suction container and tubing			
b. All items at bedside removed, including:			
– IV bags			
– tubes lines drains			
– medications			
– personal items			
– toilet paper			
– gauze			
– tape			
– patient's personal bar soap			
– gloves			
2. Were the curtains removed before starting to clean?			
3. Were clean cloths, mop (all supplies) and fresh solutions used to clean the room?			

Item	Yes	No	Comments/NA
4. Was the correct disinfectant and concentration used for cleaning? – Sodium hypochlorite 1,000 ppm or 5,000 ppm, – Disinfection with sodium hypochlorite requires a pre-cleaning with a detergent cleaner, – Hydrogen peroxide enhanced action formulation (HP-EAF) (4.5%) – Other sporicidal agents – Ensure product has a DIN number and manufacturer's instructions are followed for dilution and contact time.			
5. Were pillow and mattresses cleaned and checked for tears (replaced if needed)?			
6. Were all cleaning cloths returned to housekeeping cart, placed in laundry or discarded after use?			
7. Were several cloths used to clean the room with **No** double dipping of cloths into disinfectant?			
8. Was cleaning always done clean to dirty?			
9. Were all surfaces cleaned allowing for correct contact time of disinfectant solution as above?			
a. Mattress			
b. Pillow (material pillows to laundry)			
c. BP cuff			
d. Bedrails and bed controls			
e. Call bell			
f. Stethoscope and column			
g. Flow meters (medical gas controls)			

Item	Yes	No	Comments/NA
h. Suction tube and outer container (liner disposed)			
i. Pull cord in washroom			
j. Toilet, sink and all washroom fixtures			
k. Over bed table			
l. Bedside table			
m. Locker or shelf for patient's personal items			
n. Inside drawers			
o. Bible			
p. TV Remote control/TV Controls			
q. Soap/Alcohol based hand rub dispensers			
r. Door handles			
s. Light switches			
t. Light cord			
u. Chair			
v. Telephone			
w. Television and TV handles			
x. Computers			
y. Wall mounted monitors (e.g. cardiac monitor)			
10. Were the following items cleaned and disinfected before use with another patient or removed from bed space? a. Commode/high toilet seat			
b. Wheelchairs			
c. Monitors			

Item	Yes	No	Comments/NA
d. IV poles/pumps			
11. If the sharps container was 3/4 full (or at full line) was it replaced?			
12. If there was a sheepskin used, was it sent to laundry or disposed?			
13. Was the lift mesh/sling sent to the laundry?			
14. Was the glove box discarded?			

Environmental Services Supervisor (or delegate) signature: _____

10. Provincial Clinical Management Algorithm for Patients with *Clostridium difficile* Infection

Clostridium difficile infection (CDI) is an infection that is increasing in significance in both healthcare settings and the community. CDI presents as a spectrum of disease, ranging from mild diarrhea increasing in severity to pseudomembranous colitis and toxic megacolon, which may result in mortality. This treatment algorithm is designed to improve the management of CDI in adults. More specifically, the goal is for timely, appropriate treatment initiation, and prompt, efficient identification of patients who require escalation of therapy and/or urgent surgical intervention.

This algorithm was developed by adapting the Vancouver Coastal Health Authority "*Clostridium difficile* Infection (CDI) Guideline" and comparing the effectiveness of various treatment interventions with a view to reduce complications and relapses of disease. It was based on the best available evidence and consensus of an expert working group with representatives from each health authority in British Columbia.

In addition to a timely and appropriate treatment plan, patients should be monitored closely by health care providers, and examined on a daily basis for signs and symptoms of progressing illness. Patients with CDI, particularly those over age 65 and/or with complex health conditions can deteriorate rapidly.

Recommended Monitoring

- At a minimum, daily vital signs (temperature, heart rate, and blood pressure).
- Daily assessment for presence and number of diarrheal episodes, volume of ostomy (where applicable) and consistency.
- Daily assessment of patient's hydration level.
- Daily abdominal examination by nurses and physicians to determine clinical resolution or progression to more severe disease.
- Baseline blood work for CBC and differential, electrolytes and creatinine or estimated glomerular filtration rate (eGFR), with retesting as clinically indicated. (Albumin may be obtained if patients are at risk of or suspected to have severe disease, and lactate monitored for those with fulminant disease).
- Increasing WBC (>15,000/mm3) or left shift, hypotension, acute kidney injury (with rising serum creatinine or declining eGFR), ileus, or toxic megacolon are indications for:
    - Treatment with vancomycin (or switching from oral metronidazole to vancomycin).
    - Consulting Infectious Diseases, Gastroenterology and/or General Surgery.
    - Further investigation (e.g. abdominal imaging, sigmoidoscopy)

- *C. difficile* testing should not be used to determine treatment endpoint, as tests may remain positive several months after the episode.
- Ensure adequate nutrition and hydration. Refer to a dietician, if necessary.

Clinical Key Points

- Clinical status should be improving within 4-6 days.
- Failure to improve in 6 days is considered treatment failure and should prompt consideration of either a change in therapy (e.g metronidazole to vancomycin) or an alternative diagnosis. No resistance to vancomycin has been documented in *C. difficile* and failure to respond to treatment may be a sign of a co-existing intestinal illness rather than refractory CDI
- Metronidazole IV is likely only to be beneficial in patients with a severe ileus or intractable vomiting in whom oral vancomycin might not reach the colon. While it is often added to oral vancomycin in severely ill patients, there are limited data in support of this approach.
- DO NOT use vancomycin IV for the treatment of CDI.
- Alternative therapies (e.g. cholestyramine, probiotics, or other antimicrobial agents) should not be used routinely and are discussed on page 6 of this document.
- Asymptomatic patients with a positive *C. difficile* test (e.g. patients whose symptoms have spontaneously resolved without treatment after the test was sent but before results were received) should not receive treatment.

CDI Clinical Management Algorithm

SUSPECTED OR CONFIRMED CDI
Unexplained and new onset of diarrhea (unformed or watery stools ≥ 3 in 24 h)
AND
1. Pending *C. difficile* test with high clinical suspicion **OR**
2. Positive *C. difficile* test **OR**

INSTITUTE CONTACT PRECAUTIONS

EVALUATE CDI SEVERITY
Assess and document patient's clinical status (vital signs, abd. exam, hydration etc.)
Obtain baseline CBC and differential, electrolytes, and serum creatinine

MILD to MODERATE
- WBC <15,000/mm^3 **and**
- Serum creatinine ≤1.5 times baseline

SEVERE (any of the following):
- WBC >15,000/mm^3 [#] **OR**
- Serum creatinine (SCr) SCr >1.5 times baseline, or SCr >135 µmol/L (if baseline unavailable) **OR**
- Pseudomembranous colitis

FULMINANT
(any of the following):
- Hypotension
- Ileus
- Megacolon
- Shock

FIRST EPISODE
- Review all antibiotics and discontinue unless clearly indicated, or document reason for continuation
- Discontinue all proton pump inhibitors (PPIs) unless clearly indicated or document reason for continuation
- Stop all anti-peristaltic & pro-motility agents
- **First-line: Vancomycin 125 mg PO/NG QID x 10-14 d [++] OR Second-line: Metronidazole 500 mg PO/NG TID x 10-14 d, if costs of Vancomycin prohibit use or on a case-by-case basis**
- If not clinically improving by day 4-6 while on oral **Metronidazole, change to Vancomycin**
- If symptoms worsen, re-evaluate for CDI severity and follow appropriate algorithm pathway

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

ANY EPISODE
- Review all antibiotics & discontinue unless clearly indicated or document reason for continuation
- Discontinue all PPIs unless clearly indicated and document reason for continuation
- Stop all anti-peristaltic & pro-motility agents
- **Vancomycin 125 mg PO/NG QID x 10-14 d [++] ***
- **If complete ileus OR critically ill, add Metronidazole 500 mg IV Q8H**
- **If unable to take PO/NG Vancomycin, consider adding Vancomycin 500 mg rectally Q6H ♣**
- Obtain specialist (ID, GI, and/or General Surgery) and ICU consult immediately as directed by level of care

FIRST RECURRENCE (MILD OR MODERATE)

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

SECOND OR FURTHER RECURRENCES

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

Footnotes for algorithm

^ May change to Vancomycin if patient intolerant to Metronidazole

++ Vancomycin IV is **not** effective for the treatment of CDI

☆ **In consultation with** Med Micro, ID, or GI, Fidaxomicin may be considered in:

- Mild or moderate disease not improving by day 4-6 **and** patient allergic to oral vancomycin
- Severe disease **and** patient allergic to oral vancomycin

\# In **patients** unable to mount a WBC response >15,000/mm^3, an increasing WBC with pronounced left shift may also be considered in these criteria; threshold of >15,000/mm^3 is based on expert opinion.

* Vancomycin doses of 125-500 mg may be considered; appropriate dose has not been established in clinical trials. However, there is no evidence that doses higher than 125 mg. are more effective. Prolonging full-dose therapy beyond 14 days should be avoided as there is no evidence of effectiveness and it is likely to delay reconstitution of normal intestinal bacteria.

⃠ Physician assessment for perforation risk is required prior to rectal tube placement.

† Tapering or pulse therapy regimens may vary considerably, as clinical data are limited. Specialist referral should be obtained in patients with more than 2 recurrences.

Note:

- Metronidazole tapering or Metronidazole pulse therapy is NOT recommended
- Prophylactic treatment for patients on antibiotics who have previously had *C. difficile* is NOT recommended. Consider Infectious Diseases consult.
- Consider obtaining Special Authority approval for vancomycin PO coverage by Pharmacare for outpatient treatment.

Antibiotics Used for *C. difficile* Infection

Metronidazole

Oral metronidazole is effective for the treatment of mild to moderate CDI disease. In the past, metronidazole was widely used in the treatment of CDI; however, recent observational reports and some clinical studies have suggested that metronidazole may not be as effective and may not act as rapidly as vancomycin for the treatment of severe CDI. Metronidazole oral suspension is poorly received in the pediatric population due to its offensive taste.

Vancomycin

Oral vancomycin is a highly effective CDI treatment for patients who cannot tolerate oral metronidazole or for those with severe disease. Vancomycin is more expensive than metronidazole. Orally administered vancomycin is not well absorbed from the gastrointestinal tract, allowing luminal drug levels to be very high. There is no evidence that doses higher than 125 mg QID are superior to the standard dosing.

Fidaxomicin

A novel narrow spectrum, macrocyclic antibiotic has recently become available in Canada for treatment of C. difficile infections. It appears to have a good safety profile and has been shown to be non-inferior to vancomycin for initial treatment of CDI and is associated with fewer relapses. However, the antibiotic is very expensive and it's role in routine practice remains to be determined. Situations where fidaxomicin may be considered are:

- Mild or moderate disease not improving by day four to six on metronidazole AND patient allergic to oral vancomycin
- Severe disease AND patient allergic to oral vancomycin
- It is reasonable to consider fidaxomicin for initial therapy in outpatients who are at high risk of complications from relapse (e.g. patients requiring concomitant antibiotics or elderly patients) if they are able to afford the drug through extended health coverage.

In all circumstances in which fidaxomicin is being considered, specialist consultation (Infectious Disease, Medical Microbiology, Gastroenterology) is recommended.

Other Antibiotics

There are several other antibiotics with demonstrated activity against *C. difficile*, but they have only been studied in small clinical trials or case series. These agents, which include rifaximin, nitazoxanide, fusidic acid, linezolid, bacitracin, and tigecycline, should only be considered in rare situations and only in consultation with a specialist expert.

Alternative Therapies

Probiotics

Evidence supporting the routine use of probiotics for treatment of CDI is evolving. They may be considered as an adjunct to antimicrobial therapy in patients with recurrent disease. There has been no documented harm from probiotics, except a risk to the severely immunosuppressed. They should NOT be prescribed to immunocompromised patients, to patients in critical care settings, to patients with a central line in place nor to patients with bloody diarrhea or severe abdominal pain as there have been reports of bacteremia and fungemia associated with probiotics in such settings.

Fecal Transplants

Fecal transplant treatments have been used for cases of recurrent CDI with success in several randomized controlled trials. This treatment still has limited availability, and eligible patients should be referred to a provider with experience in the procedure until provincial infrastructure has been established.

An expert consult is required, and all patients must provide informed consent prior to treatment.

Cholestyramine

The ability of cholestyramine to bind to the toxins produced by *C. difficile* has been found to be negligible. In addition there is potential for adverse effects because it does bind with a variety of oral medications, including vancomycin. Therefore the use of cholestyramine and colestipol is not recommended for treatment of CDI.

Intravenous Immunoglobulin

There are no data to support the use of intravenous Immunoglobulin in the treatment of CDI.

11. References

Aas, J., Gessert, CE., Bakken, JS. Recurrent Clostridium difficile colitis: case series involving patients treated with donor stool administered via a nasogastric tube. Clinical Infectious Disease 2003;36:580–585.

Alfa, M., Lo, E., Wald, A., Dueck, C., DeGagne, P., & Harding, GKM., Improved eradication of Clostridium difficile spores from toilets of hospitalized patient using an accelerated hydrogen peroxide as the cleaning agent. BMC Infectious Diseases, 2010. 10: 268.

Boyce JM, Ligi C, Kohan C, Dumigan D, Havill NL. Lack of association between the increased incidence of *Clostridium difficile*-associated disease and the increasing use of alcohol-based hand rubs. *Infection Control & Hospital Epidemiology 2006; 27(5):479-483*

Butler, M., Bliss, D., Drekonja, D., Filice, G., Rector, T., et al. Effectiveness of Early Diagnosis, Prevention, and Treatment of *Clostridium difficile* Infection*. Comparative Effectiveness Review No. 31.* AHRQ Publication No. 11(12)-EHC051-EF. Agency for Healthcare Research and Quality (2011)

Cohen S, Gerding D, Johnson S, Kelly C, Loo V, McDonald L, Pepin J, & Wilcox M. Clinical practice guidelines for *Clostridium difficile* infection in adults: 2010 update by the society for healthcare epidemiology of America (SHEA) and the infectious diseases society of America (IDSA). *Infection Control & Hospital Epidemiology 2010; 31(5):431-55*

Cornely, O., Miller, M., Louie, T., Crook, D., & Gorback, S. Treatment of First Recurrence of *Clostridium difficile* Infection: Fidaxomicin Versus Vancomycin. Clinical Infectious Diseases 2012;55(S2):S154–61

Crook, D., Walker, S., Kean, Y., Weiss, K., Cornely, O., Miller, M., et al. Fidaxomicin Versus Vancomycin for *Clostridium difficile* Infection: Meta-analysis of Pivotal Randomized Controlled Trials. *Clinical Infectious Diseases 2012;55(S2):S93–103*

Drekonja, D., Butler, M., MacDonald, R., Bliss, D., Filice, D., & Rector, T. Comparative Effectiveness of *Clostridium difficile* Treatments. *Annals of Internal Medicine* 2011; 155 (12).

Enache-Angoulvant A, Hennequin C. Invasive *Saccharomyces* infection: a comprehensive review. *Clinical Infectious Disease* 2005;41:1559–1568.

Gerding D, Muto C, & Owens R. Treatment of *Clostridium difficile* Infection. *Clinical Infectious Disease 2008: 46 (Suppl1)*

Gordin FM, Schultz ME, Huber RA, Gill JA. Reduction in nosocomial transmission of drug-resistant bacteria after introduction of an alcohol-based handrub. *Infection Control & Hospital Epidemiology 2005; 26(7):650-653*

Gustafsson A, Lund-Tonnesen S, Berstad A, et al. Faecal short-chain fatty acids in patients with antibiotic-associated diarrhoea, before and after faecal enema treatment. *Scandinavian Journal of Gastroenterology* 1998;33:721–727.

Jabbar U, Leischner J, Kasper D, Gerber R, Sambol SP, Parada JP et al. Effectiveness of alcohol-based hand rubs for removal of *Clostridium difficile* spores from hands. *Infection Control & Hospital Epidemiology 2010; 31(6):565-570*

Knight N, Strait T, Anthony N, Lovell R, Norton HJ, Sautter R et al. *Clostridium difficile* colitis: A retrospective study of incidence and severity before and after institution of an alcohol-based hand rub policy. *American Journal of Infection Control 2010.*

Lewis, SJ. & Heaton, KW. Stool form scale as a useful guide to intestinal transit time. Scandinavian Journal of Gastroenterology, 1997; 32 (9) 920-924. Retrieved from: http://en.wikipedia.org/wiki/Bristol_stool_scale.

NHS, National Services Scotland. *Clostridium difficile* Infection (CDI) Trigger Tool 2011. Retrieved from: http://www.documents.hps.scot.nhs.uk/hai/infection-control/toolkits/cdi-trigger-tool-2011-11.pdf

Oughton MT, Loo VG, Dendukuri N, Fenn S, Libman MD. Hand hygiene with soap and water is superior to alcohol rub and antiseptic wipes for removal of *Clostridium difficile. Infection Control & Hospital Epidemiology 2009; 30(10):939-944*

Perez, J., Springthorpe, VS., & Sattar, SA., *Activity of selected oxidizing microbicides against the spores of Clostridium difficile: relevance to environmental control.* American Journal Infection Control, 2005. **33**(6): p. 320-5.

Venugopal, A and Johnson, S. Current State of *Clostridium difficile* Treatment Options. *Clinical Infectious Diseases 2012:55 (Suppl 2)*

Weiss, K., Allgren, R., & Walker, S. Safety Analysis of Fidaxomicin in Comparison With Oral Vancomycin for *Clostridium difficile* Infections. *Clinical Infectious Diseases 2012;55(S2):S110–15*

Wullt, M., Odenholt, I., & Walder, M., *Activity of three disinfectants and acidified nitrite against Clostridium difficile spores.* Infection Control and Hospital Epidemiology, 2003. **24**(10): p. 765-8.

Zar FA, Bakkanagari SR, Moorthi KM, Davis MB**.** A comparison of vancomycin and metronidazole for the treatment of *Clostridium difficile*-associated diarrhea, stratified by disease severity. *Clinical Infectious Disease: 2007:45(3):302-7*

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A program of the Provincial Health Services Authority

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