Clostridium difficile Infection (CDI) Protocol

Approved by Provincial IPC Surveillance Committee: April 2011
Revised: April 2023

Alberta Health Services
Infection Prevention & Control

Approved: June 2010
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Contents

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Introduction

Clostridium difficile is a gram-positive spore forming bacteria that is often associated with healthcare infections and outbreaks (Public Health Agency of Canada, 2022). Although the most common clinical manifestation of *C. difficile* Infection (CDI) is diarrhea, there is a wide spectrum of disease, from asymptomatic colonization through pseudomembranous colitis to toxic megacolon. Potentially severe complications such as pseudomembranous colitis or toxic megacolon may present with no diarrhea but signs of an acute abdomen (ex: distension, complaints of abdominal pain, tenderness on palpation) which may lead to death.

CDI can be spread from patient to patient via the hands of healthcare workers or through contact with contaminated equipment or other surfaces.

CDI often occurs as a result of three critical events: the disruption of the normal colonic flora, by antimicrobial agents or antineoplastic agents, an exposure to toxigenic strains of *C. difficile* and the presence of one or more host factors that increase their susceptibility to any hospital-acquired infection, like advanced age, more severe underlying illnesses and length of hospital stay.

In conjunction with the *C. difficile* Infection surveillance protocol, there are six supporting documents to assist in the interpretation and practical use of this protocol – CDI Protocol and General Surveillance Definitions (Appendix A and Appendix B), CDI surveillance Primary case algorithm (Appendix C) and case classification algorithm (Appendix D), Tool for sharing information with physicians (Appendix E), Collection tool – Information for consulting IPC physicians (Appendix F) and the ProvSurv User Guide (Alberta Health Services [AHS], 2018).

Goal

To decrease hospital-acquired and healthcare-associated CDI in Alberta Health Services (AHS) and Covenant Health facilities.

Objectives

1. To determine the incidence of recognized hospital-acquired, healthcare-associated and community-acquired CDI in the population under surveillance in AHS and Covenant Health facilities.
2. To use surveillance results to develop and evaluate Infection Prevention and Control (IPC) interventions which support safer patient care.
3. To establish quarterly and annual CDI incidence rates for trend analysis over time and to compare with internal and external benchmarks.
4. To detect outbreaks and clusters of disease within and across health zones and sites.
5. To describe secular trends and disease patterns, including morbidity and mortality.

Methodology

Cases eligible for surveillance are inpatients with either laboratory confirmed *C. difficile,* physician diagnosis of pseudomembranes on endoscopy (sigmoidoscopy or colonoscopy), histological/pathological diagnosis of CDI or physician diagnosis of toxin megacolon (symptomatic).

Reports of isolates originating from facilities under surveillance will be forwarded by laboratories to facility based IPC programs or designates. Confirmation must be obtained at the reporting facility where the patient is an inpatient, except in the case of direct patient transfers within provincial facilities under surveillance, where acquisition is being attributed to the sending facility.

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Revised: April 2023

Facility infection control professionals (ICPs) receiving *C. difficile* laboratory reports will determine if cases meet the Primary CDI case definition and are hospital-acquired, healthcare-associated or community-acquired and compile and record at least the minimum case information. Data from completed CDI surveillance will be entered into the provincial surveillance data management system (ProvSurv) in a timely manner.

Patient population

All individuals admitted to AHS and Covenant Health acute and acute tertiary rehabilitation care facilities, where inpatient care is provided 24 hours/day, 7 days a week, who are ≥ 1 year of age. Acute and acute tertiary rehabilitation facilities will be referred to as the "facilities under surveillance" in this protocol for simplicity. Please refer to Appendix B: General surveillance definitions for facilities that would be included under this term.

Case definition

A primary CDI case meets either 1, 2, or 3.

1. Lab confirmed positive toxin assay or positive polymerase chain reaction (PCR) for *C. difficile* test (by toxin gene(s);

And

Meets either **symptomatic** or **insufficient Information** definitions below at the time of admission or during hospitalization.

2. Physician diagnosis of pseudomembranes on endoscopy (sigmoidoscopy or colonoscopy) or histological/pathological diagnosis of CDI (symptomatic).
3. Diagnosed with toxic megacolon (symptomatic).

Symptomatic (symptoms related to CDI)

Laboratory confirmation of a positive toxin assay or positive polymerase chain reaction (PCR) for *C. difficile* toxin gene(s) in addition to at least one of the following – see Appendix A for examples of positive tests:

- Diarrhea – see Appendix A defined as one of the following:
  - 6 or more watery/unformed stools in a 36-hour period;

  or
  - 3 or more watery/unformed stools in a 24-hour period and this is new or unusual for the patient.
- Patients with ostomy bags will be assessed on an individual basis.
- Fever and abdominal pain **or** fever and ileus.

Insufficient information

After review of patient's medical record (e.g., patient chart, verbal communication), if the information about the frequency and consistency of stools is **not** available, **a positive *C. difficile* test will be considered as a case.**

- In other words, there is a belief that the patient meets definition for infection at the time of testing, but there is a lack of evidence in the chart to support the call.
- Documentation of antibiotic treatment of CDI cannot be used as a proxy for physician diagnosis or symptom documentation.
- The use of stool softeners/laxatives/enemas by a patient does not alter the case definition for CDI and cannot be used as a reason to discount CDI as the cause of diarrhea.

For Information records (these are not primary records)

These **For Info** cases are recorded as *Symptomatic, Insufficient Info or Symptoms Not Meeting Definition*:

- An inpatient CDI case that occurs ≤ 8 weeks after a Primary CDI case (optional data entry);

or

- A positive *C. difficile* test from an outpatient, community or continuing care facility test location (optional data entry);

or

- For an inpatient positive *C. difficile* test – if after review of patient's healthcare record, the information about the frequency and consistency of stools is determined to be accurate and complete at the time of testing and symptoms do not meet CDI case definition, a positive *C. difficile* test is entered as For Info, Symptoms Not Meeting Definition (mandatory data entry).

Inclusion criteria

- For patients with multiple *C. difficile* tests, a positive *C. difficile* test performed while the patient is hospitalized is eligible to be considered for a primary CDI case every 8 weeks provided symptoms had resolved.
- Patients (>1 year of age) admitted at the time of a positive *C. difficile test*. This includes patients that are discharged from an AHS/Covenant Health facility prior to their test results being received but the laboratory specimen was collected during admission.
- Positive *C. difficile* tests collected on patients who were admitted at the time of specimen collection or who were subsequently admitted as an inpatient directly following their emergency department/urgent care centre visit where the specimen was collected will be used to make decisions on whether a case is a Primary CDI requiring case classification.

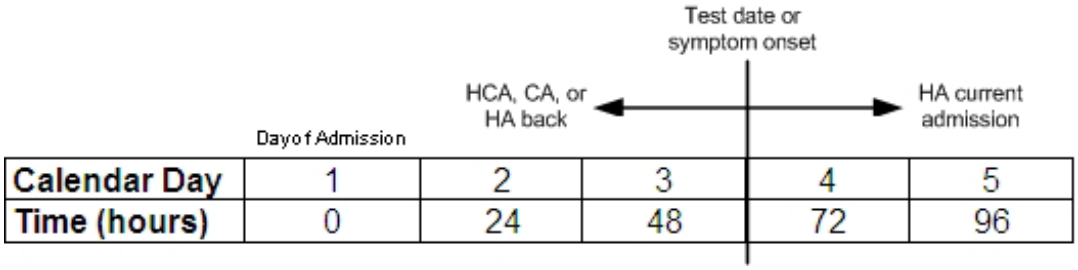
Exclusion criteria

- Patients that met CDI case definition will be excluded as surveillance cases if they have had a primary CDI case in the last 8 weeks.
- Patients with laboratory confirmed *C. difficile* test who were not admitted at the time of specimen collection or were not subsequently admitted as an inpatient following their emergency department visit are not eligible to be a primary case.
- Patients with laboratory confirmed *C. difficile* test who were admitted at the time of specimen collection but did not have diarrhea (that met case definition – see Appendix A or other conditions that met Symptomatic case definition.

Case classification

Each primary CDI case is classified independently from previous Primary CDI cases. Positive *C. difficile* tests not meeting CDI case definition are not used to classify Primary CDI cases – see Appendix D.

Hospital-acquired



Calendar Day	1	2	3	4	5
Time (hours)	0	24	48	72	96

- For a *Primary, Symptomatic* case, the patient's symptoms meeting CDI case definition occur in your hospital on or after the 4th calendar day of admission;

or

- A patient is readmitted to an AHS/Covenant Health facility under surveillance within 4 weeks of discharge from a facility where the admission was at least 4 calendar days;
  and
  The patient's symptoms meeting CDI case definition occur in your hospital prior to the 4th calendar day of readmission;

- For a *Primary, Insufficient Info* case, the positive *C. difficile* test date is on or after the 4th calendar day of admission;

or

- A patient is readmitted to an AHS/Covenant Health facility under surveillance within 4 weeks of discharge from a facility where the admission was at least 4 calendar days;
  and
  The positive *C. difficile* test date is prior to the 4th calendar day of readmission.

The primary CDI case is attributed to the AHS/Covenant Health facility under surveillance where patient was previously admitted if there are no other healthcare encounters (i.e. long-term care residence or dialysis) between the hospitalizations.

Healthcare-associated

- Does not meet the criteria for hospital-acquired;

and

- A resident of a long-term care facility in the past 4 weeks;
  or
- A patient with chronic renal insufficiency requiring dialysis (either hemodialysis or peritoneal dialysis);
  or
- There is one or multiple admissions in an AHS/Covenant Health facility under surveillance within the past 4 weeks with the most recent admission being <4 calendar days.

Community-acquired

Any Primary CDI case not meeting the criteria for the hospital-acquired or healthcare-associated will be considered community-acquired.

Other considerations for classification – delayed testing

To use the community-acquired, healthcare-associated, or "hospital-acquired to previous admission" case classification in cases where *C. difficile* test is ≥ 4 calendar days after admission, the patient's symptoms meeting CDI case definition must have been present within 4 calendar days of admission and have been ongoing until the *C. difficile* test date.

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Data collection and data entry

Mandatory data entry

All mandatory cases are recorded in the provincial data entry system (ProvSurv). Only Primary CDI cases are counted for surveillance. Mandatory data entry includes:

- All *Primary, Symptomatic* or *Primary, Insufficient Info* cases.
- Inpatient positive *C. difficile* test classified as *Symptoms Not Meeting Definition* that occurs > 8 weeks from a Primary case must be entered as a **For Info**

Minimum case information

Basic demographic, facility and microbiological data will be collected on all Primary cases and must include:

- Name (first, middle, last);
- Date of birth;
- Gender;
- Alberta Personal Healthcare Number (PHN) or Unique Lifetime Identifier (ULI);
- Connect Care Medical Record Number (MRN);
- Record Type (Primary or **For Info)**, Symptom Status (Symptomatic, Insufficient Info, or Symptoms Not Meeting Definition) and case classification (i.e., hospital-acquired, healthcare-associated, community-acquired);
- Admission date to reporting facility;
- Reporting zone and facility name;
- Encounter service and area (or Acquired in Area for hospital-acquired cases);
- Evidence related to CDI diagnosis;
- Culture date or date of endoscopy, laboratory name (if appropriate) and accession number (if appropriate); and
- Adverse outcomes: admission to intensive care unit due to CDI; colectomy due to CDI; death.

Other considerations for data entry

Each ICP or IPC designate will be responsible for timely entry of the surveillance data into ProvSurv. It is expected that the minimum data set is collected and entered into ProvSurv in a timely manner after factoring in time of collection, to time to reach laboratory, work-up and distribution to ICPs and/or IPC offices. As a recommendation, data entry should be completed within 1-2 weeks of receiving the laboratory report by an ICP or an IPC designate.

Adverse outcomes

CDI attributable death – All cases of death within 30 days of diagnosis of a Primary CDI case that occur in hospital where the Primary CDI cases occurred will be assessed by a designated IPC physician or medical officer of health to determine if the death was attributable to CDI. The *Tool for Sharing Information with IPC Physicians* may be used – see Appendix E. In addition, an administrative data linkage will be performed to identify all CDI deaths and ICU admissions within 30 days of diagnosis of a Primary CDI case, regardless of where this occurred. ICU admissions and deaths that occur in hospital will be sent back to ICPs and their designated IPC physician or medical officer of health for assessment if death and/or ICU admission was attributable to CDI.

Cause of death will be determined by the following criteria:

Criteria	Outcome
Directly related	CDI was the cause of death. The patient had no other condition that would have caused death during this admission.
Contributed to death	CDI exacerbated an existing disease condition that led to the patient's death.
Not related to death	The patient died but death was not related to CDI.
Unable to determine	Causality between CDI and death cannot be determined.

CDI colectomy and/or intensive care unit admission

Information on intensive care unit admission and colectomy due to CDI is collected for 30 days after the positive *C. difficile* test date or at the time of discharge if less than 30 days.

Criteria	Outcome
Intensive care unit admission	Patient admitted to intensive care unit for complications of CDI.
Colectomy	Patient had surgical removal of part or entire colon as a complication of CDI.

Denominator data

Denominators (numbers of inpatient admission and inpatient days) are provided by AHS Analytics.

The data is abstracted from Admission, Discharge and Transfer (ADT) Data using a standard methodology and is provided to IPC. Inpatient admissions and inpatient days cannot be excluded for inpatients <1 year of age, therefore as a proxy the Neonatal Intensive Care Unit denominators and newborn denominators in maternal or labor and delivery units are excluded.

Denominators are presented by month, which are aggregated for the fiscal quarter of the report. Denominators used for reporting can be accessed on the Tableau Workbooks.

Rate calculations

Incidence rates for AHS/Covenant Health hospitalized patients	Calculations
Hospital-acquired CDI	$\frac{\text{Number of hospital-acquired CDI cases}}{\text{Number of patient-days}} \times 10{,}000$
Healthcare-associated CDI	$\frac{\text{Number of healthcare-associated CDI cases}}{\text{Number of admissions}} \times 1{,}000$
Community-acquired CDI	$\frac{\text{Number of community-acquired CDI cases}}{\text{Number of admissions}} \times 1{,}000$
Total CDI	$\frac{\text{Total number of CDI cases in AHS/Covenant Health}}{\text{Number of admissions}} \times 1{,}000$

Comparator rates

Internal and external surveillance rates are used as comparators. The internal rates are the historical rates for the province or zone from the previous fiscal year. The external rates are provided by the Canadian Nosocomial Infection Surveillance Program (CNISP) which are created from data submitted by large and tertiary acute care facilities and therefore may not provide appropriate comparison for smaller acute care facilities.

Reporting

Communication and dissemination of surveillance reports is an integral part of surveillance, to inform IPC practice within AHS and Covenant Health facilities and provide support for interventions that improve the quality of patient care delivered. Responsibility for compiling, reporting, and disseminating data and reports is shared between provincial IPC Surveillance and Standards and the provincial IPC program. Formal reports are generated routinely (usually quarterly) using reconciled and validated data and are available on SharePoint. The reports contain Information on the facility, zone and provincial level and are presented to the provincial IPC Surveillance, Evaluation, Quality Improvement and Research committee for approval (Alberta Health Services, 2023). Operational reports are created by local ICPs or their designate and may or may not consist of reconciled and validated data, as they are often created with real-time, as is, data. Additional CDI information can be accessed on the Tableau workbooks.

Data quality

The purpose of evaluating the quality of data is to ensure that CDI-related events are being monitored efficiently and effectively. The evaluation should involve the assessment of the program (i.e. the protocol, and reporting) and system (i.e. electronic data collection tool) attributes, including relevance, simplicity, flexibility, data quality, acceptability, consistency, representativeness, timeliness and stability. Additionally, with the increasing use of technology, informatics concerns for surveillance systems need to be addressed. These include evaluating hardware and software, using a standard user interface, applying standard data formatting and coding, performing quality checks and adhering to confidentiality and security standards.

A standardized approach is used to reconcile and validate the data provincially. The first component of data reconciliation and validation of data in ProvSurv ensures that demographic data is valid and reliable. The second component entails ensuring that the CDI-related events are entered in a manner that is consistent with the protocol definitions. At this latter stage, outliers are identified, and requests are sent to the ICP to verify that the data was correctly entered, and the definitions were consistently applied according to the provincial surveillance protocol. Final designation of cases is a collaborative effort between the facility-based ICPs and the epidemiologists/analysts of the IPC Surveillance and Standards team.

Further use of statistical software for validating records is still in development. Algorithms are continuously being updated and added to ensure capture of as many discrepancies as possible. In addition to this current process of data review, there will be data audits using external data sources to determine the validity and reliability of the data in ProvSurv. The data in ProvSurv will also serve to inform decisions made by the IPC Surveillance and Standards team to improve surveillance processes and methodologies.

Data quality working group

The IPC Surveillance Data Quality Working Group reports to the IPC Surveillance, Evaluation, Quality Improvement and Research committee and is responsible for developing, reviewing and updating indicator protocols to include the precise methodology for data collection to ensure consistency. Decisions from the Data Quality Working Group on specific protocol questions are communicated to provincial ICPs through the Data

Quality Forum and will be included in the protocol User Guide. These decisions will be supplemental to the protocol and will be incorporated into the protocol when revised.

Protocol revision history

Date	Details
April 2011	Protocol approved by Surveillance Committee.
April 2012	
December 2014	
March 2017	
March 2018	
March 2019	Updated reference style changed to APA.
Spring 2020	Updated definitions and flowcharts for clarity. Updated to new template and reposted to web page.
April 2021	Changed all except first occurrence of *Clostridium difficile* to *C. difficile; updated references.*
April 2022	Updated references.
April 2023	Added administrative linkage process that validates death/ICU occurrence. Clarified that deciding whether charting is accurate and complete is to be performed at the time of testing. For clarity – Symptomatic definition changed from "Laboratory confirmation of a positive toxin for *C. difficile* (toxin assay, PCR) ..." to "Laboratory confirmation of a positive toxin assay or positive polymerase chain reaction (PCR) for *C. difficile* toxin gene(s)..." – see Appendix A for examples of positive tests. Reordered case definition so it was clear that 2 and 3 were not a part of insufficient information. Reworded symptomatic definition from "Fever and abdominal pain and/or ileus" to "Fever and abdominal pain or fever and ileus". Clarified what is meant by inpatient CDI test in inclusion criteria. Fixed bullets in hospital-acquired definition. Changed reporting process from IPC Surveillance Committee to IPC Surveillance, Evaluation, Quality Improvement and Research Committee. Updated LTC definition. Updated references

References

Alberta Health Services. (2018). CDI User Guide. Retrieved April 2023, from https://provsurv.healthy.bewell.ca/provhelp/cdiug/cdi-surv-001.html

Alberta Health Services. (2023). *Infection Prevention and Control Alberta Health Services and Covenant Health, Action Plan Provincial Surveillance Program.*

Centers for Disease Control and Prevention. (2023). National Healthcare Safety Network: Dialysis Event Surveillance Protocol. Retrieved April 2023, from http://www.cdc.gov/nhsn/PDFs/pscManual/8pscDialysisEventcurrent.pdf.

Government of Alberta. (2008). Continuing Care Strategy: Aging in the Right Place. Retrieved April 2023, from https://open.alberta.ca/publications/9780778574224.

Government of Alberta. (2022). Alberta Health Facility and Functional Centre Definitions and Facility Listing. Retrieved April 2023, from https://open.alberta.ca/publications/alberta-health-facility-and-functional-centre-definitions-and-facility-listing.

Public Health Agency of Canada. (2014). Canadian Nosocomial Infection Surveillance Program: Healthcare Associated *Clostridium difficile* infections in Canadian Acute Care Hospitals – Surveillance Report January 1st, 2007 to December 31st, 2012.Retrieved April 2023, from http://www.phac-aspc.gc.ca/id-mi/c-difficile-sum-res-eng.php.

Public Health Agency of Canada. (2022). Canadian Nosocomial Infection Surveillance Program (CNISP) Surveillance for *Clostridium difficile* infection (CDI) CDI Surveillance Protocol. RetrievedApril 2023 , from https://ipac-canada.org/photos/custom/Members/CNISPpublications/CNISP%202022%20CDI%20Protocol_EN.pdf

The Kidney Foundation of Canada. (n.d.). Peritoneal Dialysis. Retrieved April 2023, from https://kidney.ca/Kidney-Health/Living-With-Kidney-Failure/Dialysis.

Appendix A: CDI protocol-specific definitions

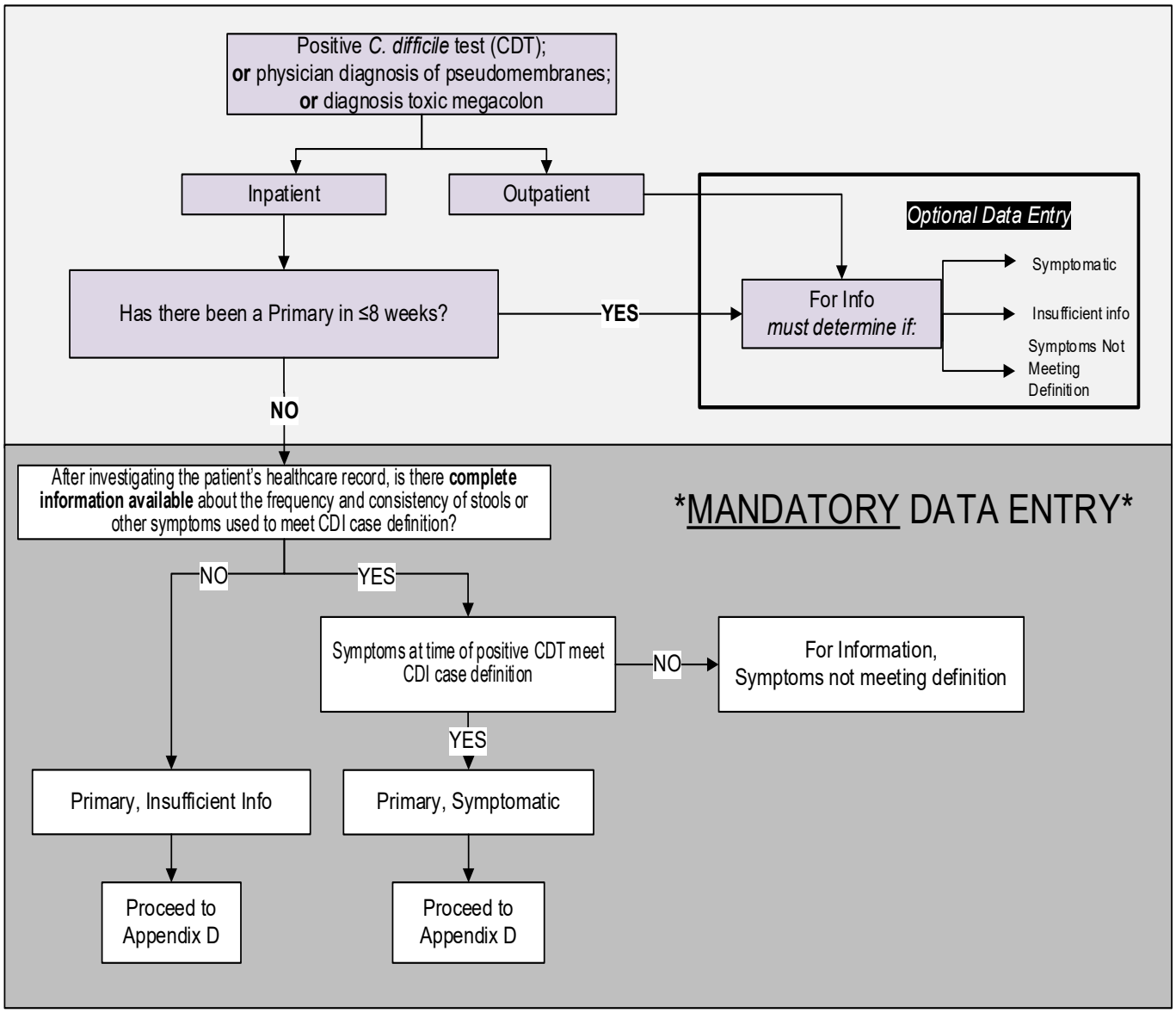
Terms	Definitions
Dialysis	Hemodialysis patients require a vascular access, which can be a catheter or a graft or enlarged blood vessel that can be punctured to remove and replace blood. Peritoneal dialysis works on the same principle as hemodialysis, but the blood is cleaned while still inside the patient's body, rather than in a machine. A catheter is surgically inserted in the abdomen, usually below and to one side of the navel. Because of frequent hospitalizations and receipt of antimicrobial drugs, dialysis patients are also at high risk for infection with antimicrobial-resistant bacteria (Centers for Disease Control and Prevention, 2023; The Kidney Foundation of Canada, n.d.).
Diarrhea	Public Health Agency of Canada [PHAC], 2014; PHAC 2022): • 6 or more watery/unformed stools in a 36-hour period; or • 3 or more watery/unformed stools in a 24-hour period and this is new or unusual for the patient; • Patients with ostomy bags will be assessed on an individual basis.
Positive C. difficile tests	A person will be considered to have a positive *C. difficile* test if any of the following are reported: • Toxin assay positive. • Positive. Testing performed with C. DIFF QUIK CHEK COMPLETE* (Enzyme Immunoassay). • Positive. Testing performed with C. DIFF QUIK CHEK COMPLETE* (Enzyme Immunoassay) and polymerase chain reaction (PCR). • Positive. Test for *C. difficile* toxin gene POSITIVE by polymerase chain reaction (PCR). • Positive. (Toxin production was not detected). Screened for *C. difficile* by toxin gene polymerase chain reaction (PCR). • PCR CONFIRMATORY TESTING: PCR test for *C. difficile* toxin B gene **POSITIVE**. • Inconclusive. Unable to confirm presence of *C. difficile* toxin. Sample referred for Toxin PCR testing. PCR test for *C. difficile* toxin B gene ***POSITIVE*** (Abnormal). • *Clostridioides difficile* (Abnormal).

Appendix B: General surveillance definitions

Terms	Definitions
Encounter types	Type of AHS/Covenant Health healthcare location or facility where the patient is located at the time of identification. The following encounter types are referred to in acute care surveillance protocols (Government of Alberta, 2008; Government of Alberta, 2022).
Continuing care	An integrated range of services supporting the health and wellbeing of individuals living in their own home, a supportive living or long-term care setting. Continuing care clients are not defined by age, diagnosis or the length of time they may require service, but by their need for care.
Long-term care	Long term care facilities include auxiliary hospitals and nursing home that are reserved for those with unpredictable and complex health needs who require 24-hour nursing care. Residents of long-term care facilities usually have multiple chronic and/or unstable medical conditions. Specialized services such as respite, palliative care, case management, rehabilitation therapy, as well as services for advanced Alzheimer's and dementia are available at these facilities. A list of certified long-term care facilities in Alberta Health Services can be found on the COMMON-PROVINCIAL Surveillance drive. In this file, if the site has "LTC" listed in the "Accommodation Subtype II" column, it will qualify as a LTC site. If the site has "LTC" AND another type (i.e. subacute in LTC) listed in the column we would assume they are from a site that offers LTC.
Auxiliary hospital	A facility designated for the provision of medical services to in-patients who have long-term or chronic illnesses, diseases or infirmities. Services may include acute palliative programs, geriatric day programs or day/night programs. They may include functional centres such as long-term care, medical or clinical areas.
Emergency	Emergency Departments take care of people that are very sick or injured on a priority basis by providing medical care, which may include assessment, treatment, stabilization to prepare people for transport to a higher level of care facility (if needed) and follow-up care, including referrals to a family doctor or specialist (if needed). This option can be used to capture outpatient encounters when a patient visited the emergency department at a facility and did not subsequently get transferred to an inpatient unit, but rather returned back to his/her home setting.
Inpatient acute care	Refers to a General Hospital**:** According to the *Hospitals Act*, a general hospital is defined as a "hospital providing diagnostic services and facilities for medical or surgical treatment in the acute phase for adults and children and obstetrical care" (Government of Alberta, 2022). General hospitals have several functional centres. Each functional centre is associated with in-patient, outpatient, or diagnostic and therapeutic services.
Inpatient mental health/rehab	A designated mental health facility providing diagnosis and treatment for mental illness and addiction in the acute phase for adults and children. Inpatient services refer to a person admitted to and assigned a bed in a facility by order of a physician for provision of diagnostic and/or treatment services. They would have a patient/group room in which inpatient services are provided within the patient's room or within a common group room within the designated mental health facility. AHS facility examples include Glenrose Rehabilitation Hospital, Centennial Centre for Mental Health and Brain Injury.
Infection window period	The 7-days during which all site-specific infection criteria must be met. It includes the day of the first positive diagnostic test (i.e., lab specimen collection, imaging test, procedure or exam, physician diagnosis and initiation of treatment) that is an element of the site-specific infection criterion, was obtained, the three calendar days before and the three calendar days after. For site-specific infection criteria that do not include a diagnostic test, the first documented localized sign or symptom that is an element of National Healthcare Safety Network infection criterion,

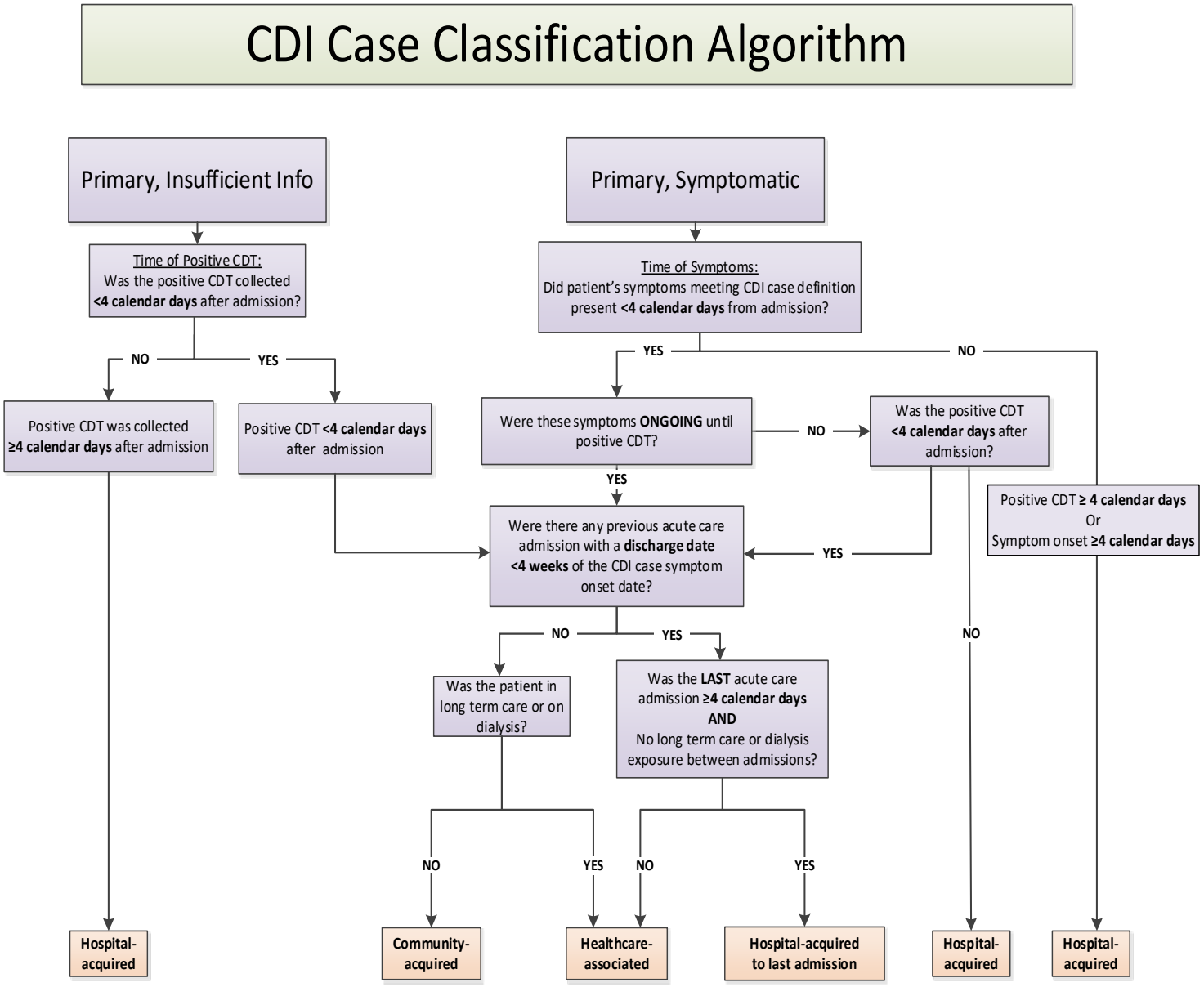
Terms	Definitions
	excluding SSIs, should be used to define the window (i.e., diarrhea, site specific pain, purulent exudate).
Infection prevention and control baseline	A comparator rate created for each acute care facility in the IPC Surveillance on-line dashboards and reporting modules, to guide efforts to reduce healthcare-associated infections. The IPC baseline is based on reported monthly rates for the previous fiscal year. The calculation excludes the monthly rates higher than 1 Standard Deviation above the 12-month average but includes all rates where the site had optimal performance. This calculation method biases the IPC baseline rate towards zero, to focus on the best patient safety outcomes.
Patient admission	A person admitted to and assigned a bed in a hospital by the order of a physician, for the provision of diagnostic or treatment services or both. Includes any time in the emergency department where the patient is subsequently transferred to an inpatient unit. This is the denominator used for non-hospital-acquired rates (see Rate Calculation Section) (Government of Alberta, 2022).
Patient days	As defined by AHS, this is used to create the denominator for hospital-acquired or hospital-identified cases. The total is equal to midnight census with patients admitted and discharged on the same day counted as a one day stay. It includes patients out on a pass. Day of admission is counted but the day of separation (discharge, death or transfer out of hospital) is not counted. Patient-days are included for inpatient encounters where discharge date is not recorded in the data source. Inpatient totals exclude the time patients are waiting in the emergency department for an inpatient bed (time from decision to admit to discharge from emergency department).
Emergency department inpatient days (EDIP)	As defined by AHS, denominators for provincial surveillance modules include these figures in the total patient-days. Includes the number of acute care inpatient patient-days utilized in the emergency department during the reporting period. The figures reflect the time from emergency department discharge (i.e. decision to admit) to emergency department departure for patients admitted to an acute care hospital. It is calculated as [(emergency department departure date and time – emergency department discharge date and time) ÷ 60 ÷ 24]. Figures exclude cases where the emergency department discharge date and time or emergency department departure date and time were not provided, or the value has a negative number.

Appendix C: CDI surveillance primary case algorithm



Note: For patients with multiple *C. difficile* tests, a positive *C. difficile* test performed while the patient is hospitalized is eligible to be considered for a Primary CDI case every 8 weeks provided symptoms had resolved.

Appendix D: CDI surveillance case classification algorithm



CDT : *C. difficile* test

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Appendix E: Tools for sharing information with infection control physicians (optional use)

All cases of death within 30 days of diagnosis of a Primary CDI case that occur in hospital where the Primary CDI case occurred will be assessed by a designated IPC physician or Medical Officer of Health (MOH) to determine if the death was attributable to CDI.

Entry into ProvSurv

- In the "Death" field, enter "Pending Review" until a physician has completed the chart review.
- In the "Death Date" field, enter the date as soon as it is known rather than waiting for completion of the chart review.

Contacting designated reviewer

At the time of writing (Dec. 2016), the responsible reviewers are:

Location (zone)	Reviewer
North	Site designated MOH
Calgary and Edmonton	Site IPC Physicians
Central	Zone designated IPC Physician
South	Site designated MOH

What the IPC physician will want to know?

- The basic demographic information you have entered into ProvSurv (name, DOB, PHN, etc.)
- The basic case information you have entered into ProvSurv (admission date, diagnosis date, symptoms, colectomy date, death date, etc.)
- Additional information
- Attending physician
- Narrative telling the story of what happened to the patient during hospitalization
- Sequence of health care access -- acute care, long term care, home, readmissions
- Dates of significant events
- Any ICU stays
- Course of deterioration
- Any other information to give context
- Any underlying or coincident diseases (e.g., severe CVA, terminal palliative cancer)
- Any pre-existing medical conditions (e.g., Cardiomyopathy, cirrhosis)
- Any noted deteriorations of pre-existing medical conditions
- Any incidence of intra-abdominal sepsis, bowel perforation, septic shock, lower GI bleed
- Any metabolic abnormalities (e.g., Hypokalemia, hypovolemic shock, acute renal failure)
- At time of CDI diagnosis
- Duration of diarrhea in days
- Number of bowel movements per day
- WBC count, albumin, creatinine
- Presence of abdominal pain
- Initial treatment regimen and response
- If treatment changed to Vancomycin, when and what dosing
- If colectomy performed, any resulting complications
- Any CT abdomen or flat plate abdomen showing ileus or bowel thickening
- At time of death, did patient have diarrhea or abdominal pain; indicate WBC count

- Primary cause of death indicated on death certificate and/or discharge summary
- Any other secondary, related, or contributing causes noted on death certificate and/or discharge summary

A tool for compiling this additional information for the IPC physician follows this overview. After the IPC physician has completed review:

- Update the “Death” field of the record in ProvSurv to reflect the decision: CDI directly related, contributed, not related, or unable to determine.
- Name the physician who completed the death review in the comments section of record in ProvSurv.

Appendix F: Collection tool – Information for consulting IPC physicians

For ICP's reference:

Patient name _____ Admission date _____

PHN _____ CDI diagnosis date _____

Local identifier _____ Death date _____

1. Attending physician's name

2. Presenting complaint on admission

3. Any known history of antibiotic use prior to admission (describe)

4. Underlying or coincident diseases (e.g., severe CVA, terminal palliative condition) or pre-existing medical conditions (e.g., cardiomyopathy, cirrhosis)

5. Any noted deteriorations in pre-existing medical conditions

6. Were there any:		
☐ Intra-abdominal sepsis	Date: _____	Comment: _____
☐ Bowel perforation	Date: _____	Comment: _____
☐ Septic shock	Date: _____	Comment: _____
☐ Lower GI bleed	Date: _____	Comment: _____

7. Metabolic abnormalities (e.g., hypokalemia, hypovolemic shock, acute renal failure)

8. **At** time of **CDI diagnosis, list or describe**

- ☐ Duration of diarrhea in days _____
- ☐ Number of bowel movements per day _____
- ☐ WBC count _____
- ☐ Albumin _____
- ☐ Creatinine _____
- ☐ Presence of abdominal pain _____
- ☐ Initial treatment regimen and response _____

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Infection Prevention & Control

For ICP's reference:

Patient name _____ Admission date _____

PHN _____ CDI diagnosis date _____

Local identifier _____ Death date _____

9. If treatment **changed** to vancomycin, when and what dosing _____

10. If colectomy performed, describe any resulting complications _____

11. If CT abdomen or flat plate abdomen showing ileus or bowel thickening, give date and description

12. At time of death, did patient have?
    - ☐ Diarrhea — Comment: _____
    - ☐ Abdominal pain — Comment: _____

13. At time of death, WBC count _____

14. Primary cause of death noon death certificate and/or discharge summary _____

15. Any secondary, related, or contributing causes noted on death certificate and/or discharge summary _____

16. Additional notes on death certificate and/or discharge summary_____

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For ICP's reference:

Patient name _____ Admission date _____

PHN _____ CDI diagnosis date _____

Local identifier _____ Death date _____

17. Narrative – tell the patient's "story" – for example:
    - Sequence of healthcare access (acute care, long term care, home, readmissions, etc.)
    - What happened over the course of admission - significant events and when, improvement and deterioration, transfers to ICU, etc.

Decision: ☐ CDI directly related ☐ CDI contributed ☐ Not related ☐ Unable to determine

Rationale:

Reviewed by: (MD) _____ Date: _____

Reviewed by: (ICP) _____ Date: _____

Date decision entered in ProvSurv:

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