

***Clostridium difficile* Infection (CDI)**

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1. Introduction

Clostridium difficile infection (CDI), also known as *Clostridium Difficile* Associated Disease (CDAD), remains the single most frequently occurring healthcare associated infection (HAI) in hospitals in developed countries.¹ Almost all cases follow the use of antibiotics, and the major reservoir of infection is infected patients in hospitals or long-term care facilities. *Clostridium difficile* infection is found in the stool of 15–25% of patients with antibiotic-associated diarrhoea and more than 95% of patients with pseudomembranous colitis (PMC).²

In 2008, the Australian Health Ministers endorsed the recommendation for *Clostridium difficile* (*C.difficile*) infections to be a target for national surveillance. The main reasons for establishing national surveillance of CDI were that higher rates can be attributed to the overuse of antibiotics, ineffective infection control processes such as poor levels of hand hygiene and environmental cleanliness, and to have an early warning system for severe strains of CDI already present in Europe and North America, which have significantly higher morbidity and mortality.

This surveillance module is based on the Australian Commission on Safety and Quality in Healthcare “Draft Data Set Specification Surveillance of Healthcare Associated Infections: *Staphylococcus aureus* Bacteremia and *Clostridium difficile* infection (CDI)”, version 3.0 Jul/Aug 2010.³

2. Aim

To accurately monitor *C.difficile* infection within the Victorian healthcare system.

3. Methodology

Each laboratory identified *C.difficile toxin* positive specimen should be reviewed by a healthcare worker trained in Infectious Diseases/Infection Control to determine if the clinical criteria listed in the CDI criteria are applicable.

Setting

All public hospitals including public psychiatric hospitals but excluding residential aged care beds/facilities.

Requirements

Refer to the [Type 1 VICNISS Performance Indicators](#) and [Type 2 VICNISS Performance Indicators](#) on the VICNISS website for required CDI surveillance activities. For further information also refer to the [VICNISS Type 1 Surveillance Manual \(section 4.1\)](#) and the [VICNISS Type 2 Surveillance Manual \(section 4.3\)](#) on the VICNISS website.

CDI surveillance must be performed hospital-wide continuously.

Criteria for CDI

A CDI case is defined as a case of diarrhoea, that is, an unformed stool that takes the shape of the container, AND meets the following criteria:

- The stool sample yields a positive result in a laboratory assay for *C.difficile* infection toxin A and/or B, or
- A toxin producing *C.difficile* organism is detected in the stool sample by culture or other means.

Hospital identified CDI is:

A case diagnosed in a patient attending a public hospital (that is, it includes positive specimens obtained from admitted patients and those attending the Emergency Department, Outpatient departments, Haemodialysis units etc).

Exclusions:

- Patients less than 2 years old. This reflects the common asymptomatic carriage of *C.difficile* in infants.
- Cases where a known previous positive test has been obtained within the last 8 weeks. Additional positive tests for the same patient should not be included again within eight weeks of the last positive test.
- To reduce the likelihood of including duplicate positive test results when patients are transferred from another healthcare facility Infection Control Professionals (ICP) are encouraged to look-back and liaise with the transferring facility to ascertain if this event has already been reported to VICNISS or is a new case. This look-back is dependent on health facility infrastructure and resources and may not always be possible. If not possible or not already reported, report as a new case.

Note:

1. Repeat testing for *C.difficile* infections is not recommended, but recurrence and relapse does occur and multiple tests may on occasion be performed during one episode.
2. An additional positive test obtained from a specimen collected from the same patient more than 8 weeks since the last positive test is regarded as a new case.
3. If initial *C.difficile* toxin assay is negative however subsequent test (e.g. repeat toxin assay or PCR) is positive this toxin producing isolate must be reported.

CDI and cases of severe disease

The CDI case definition does not differentiate between severe and non-severe cases.

A severe case is defined as a CDI case patient who meets any of the following surveillance criteria within 30 days of symptom onset:

- history of admission to an intensive care unit for treatment of complications from CDI (for example vasopressor therapy for shock);
- history of surgery for treatment of toxic megacolon, perforation or refractory colitis; or
- death caused by CDI.

Hypervirulent CDI

Hypervirulent strains of *C.difficile* are not yet known to be established in Australian healthcare facilities however there have been reported cases in some States. Detection and notification of cases due to specific hypervirulent strains is an important prevention and control strategy.

The key symptom of hypervirulent CDI is severe disease. Referral for strain typing should be considered if combinations of these clinical criteria for severity are present in a case of *C.difficile* infection.

- Age >60 years
- Temperature >38.3°C
- Serum albumin <25g/L
- Peripheral white blood cell count >15,000 cells/ml
- Deteriorating renal function
- Elevated serum lactate
- Endoscopic evidence of pseudomembranous colitis or treatment in the intensive care unit
- Subtotal colectomy performed
- Toxic megacolon diagnosed

CDI Case Exposure Classification

Each CDI case requires review to further classify the exposure into one of the following categories:

- **Healthcare associated, health facility onset**
Symptom onset in this public hospital more than 48 hours after admission
- **Healthcare associated, community onset**
Symptom onset in the community or within 48 hours of admission to this public hospital, provided that symptom onset was within 4 weeks of the last discharge from a healthcare facility in which skilled nursing care is provided, excluding residential aged care.
- **Community associated**
Symptom onset in the community or within 48 hours of admission to this public hospital provided that symptom onset was more than 12 weeks after the last discharge from a healthcare facility in which skilled nursing care is provided, excluding residential aged care.
- **Indeterminate exposure**

Case does not fit any of the above criteria for exposure setting (that is, onset in community between 4 and 12 weeks of discharge from a healthcare facility in which skilled nursing care is provided, excluding residential aged care).

- **Unknown**

Exposure setting cannot be determined because of a lack of data.

Denominator Data

- Occupied bed-days (OBDs) are used for denominators.
- OBDs will be provided by the Victorian admitted episodes dataset (VAED), Department of Health, Victoria.
- *OBDs (monthly)* is the sum of all bed-days from the first day of the month to the last day of the month inclusive. If a patient was either admitted or separated from the hospital during the period, the number of bed-days that will be included in the OBDs figure will be only those that were incurred during this period.

Numerator Data

- All patients attending or admitted to a public hospital are monitored for CDI (excludes residential aged care facilities) including the emergency department, outpatient department, haemodialysis unit etc.
- A patient presenting with CDI to a public hospital from a residential aged care bed/facility is counted. For the purpose of assessing acquisition of CDI a resident from a residential aged care bed/facility should be assessed the same as “from own home”.
- Report each CDI identified in the hospital that meets VICNISS criteria during the selected month for surveillance.
- A VICNISS web based data collection form (web form) [Clostridium difficile Infection \(Numerator\)](#), is to be completed for all CDI cases that meet the criteria outlined above.
- For further explanation of required data fields see [Instructions for Completion of CDI Data Form](#) on the VICNISS website. These data will be used to calculate CDI rates.
- For more information on how to register and obtain access to web forms please see the [Web Based Data Collection Forms \(Web Forms\) User Guide](#) on the VICNISS website.

4. Data Analysis

CDI data are analysed and reported quarterly. Both the **hospital** and **health service** level reporting will use the denominator: sum of **ALL care types provided by VAED**, multi stay AND day stay.

Healthcare associated CDI

The following equation is used:

$$\frac{\text{No. of patients with healthcare associated CDI for the surveillance period}}{\text{Total OBDs for the surveillance period}} \times 10,000$$

Healthcare associated Hypervirulent CDI

The following equation is used:

$$\frac{\text{No. of patients with a healthcare associated hypervirulent CDI for the surveillance period}}{\text{Total OBDs for the surveillance period}} \times 10,000$$

For both equations, the numerator is multiplied by 10,000 for convenience as this removes decimal points in the final answer. The rate is now expressed as the number of patients with CDI per 10,000 OBDs.

Community associated and Indeterminate CDI

Numbers of community associated and indeterminate exposure *C.difficile* infections will be reported.

Proportion of strains that are hypervirulent

The proportion of all strains that are tested for hypervirulence that return a positive test for hypervirulence will also be reported.

The following equation is used:

$$\frac{\text{No. of } C.\text{difficile} \text{ isolates tested for hypervirulence that return positive for hypervirulence}}{\text{No. of } C.\text{difficile} \text{ isolates}} \times 100$$

This is expressed as a percentage.

5. References

1. Sunenshine R and McDonald L (2006). *Clostridium difficile*-associated disease: new challenges from an established pathogen. *Cleveland Clinic Journal of Medicine* 73(2):187–197.
2. Cruickshank M, Ferguson J, editors. *Reducing Harm to Patients from Healthcare associated Infection: The Role of Surveillance*: Australian Commission on Safety and Quality in Health Care, 2008.
3. Australian Commission on Safety and Quality in Healthcare “Draft Data Set Specification Surveillance of Healthcare Associated Infections: *Staphylococcus aureus* Bacteraemia and *Clostridium difficile* infection”, version 3.0 July/August 2011.

Instructions for Completion of CDI Data Form

Please refer to the table below for instructions on each VICNISS data field.

CLOSTRIDIUM DIFFICILE INFECTION (CDI) (NUMERATOR)

A [web form](#) is to be completed for each patient with CDI.

Data Field	Instructions for Data Collection
Hospital Code Number	Enter the VICNISS assigned hospital code number.
<i>Treating Unit</i>	<i>Optional field.</i> <i>Record the name of the medical unit treating the patient with CDI.</i>
<i>Treating Ward</i>	<i>Optional field.</i> <i>Record the name of the Ward in which the patient with CDI is located.</i>
MRN (UR No.)	Enter the patient UR Number. This is the alphanumeric patient identifier assigned by the hospital and may consist of a combination of numbers, letters, spaces, dashes or leading zeroes, e.g., 000-123-A.
Sex	Select Male or Female to indicate the gender of the patient.
DOB	Enter the date of the patient's birth using this format: day/month/year (DD/MM/YYYY).
Date Attended or Admitted to this Public Hospital	Enter the date patient attended or was admitted to the public hospital using this format DD/MM/YYYY.
Specimen Collection Date	Enter the date that the positive specimen was collected using this format DD/MM/YYYY.
Toxin Producing <i>C.difficile</i> Detected (e.g. toxin assay or PCR)	If <i>C.difficile</i> toxin was detected from the specimen select Yes. NOTES: If initial toxin assay is negative and subsequent test (e.g. repeat toxin assay or PCR) is positive this toxin producing isolate must be reported. If <i>C.difficile</i> toxin or toxin producing isolate was not detected a data collection form does not need to be submitted to VICNISS.
<i>C.difficile</i> Culture	If the specimen was cultured for <i>C.difficile</i> select the appropriate result, Positive or Negative. If the specimen is not cultured, select Culture Not Done.
Was <i>C.difficile</i> hyper-virulent strain detected? If 'Yes', indicate which strain	Select Yes or No to indicate if the hypervirulent strain was detected. If the specimen was not tested for hypervirulence, select Hypervirulence Test Not Done If hypervirulent strain was detected, specify which strain – select Ribotype 027, or Ribotype 078, or Other. If Other, specify the type of hypervirulent strain.

Data Field	Instructions for Data Collection
<p>Infection Detected</p> <p>Healthcare associated, healthcare facility onset</p> <p>Healthcare associated, community onset</p> <p>Community associated</p> <p>Indeterminate exposure</p> <p>Unknown</p>	<p>Select the box to indicate when CDI symptom onset occurred:</p> <p>Symptom onset in this public hospital more than 48 hours after admission</p> <p>Symptom onset in the community or within 48 hours of admission to this public hospital, provided that symptom onset was within 4 weeks of the last discharge from a healthcare facility in which skilled nursing care is provided, excluding residential aged care.</p> <p>Symptom onset in the community or within 48 hours of admission to this acute care hospital provided that symptom onset was more than 12 weeks after the last discharge from a healthcare facility in which skilled nursing care is provided, excluding residential aged care.</p> <p>Case does not fit any of the above criteria for exposure setting (that is, onset in community between 4 and 12 weeks of discharge from a healthcare facility in which skilled nursing care is provided, excluding residential aged care.</p> <p>Exposure setting cannot be determined because of lack of data.</p>
<p>Have any of the following occurred within 30 days of CDI symptom onset:</p> <p>Admission to an ICU for treatment of complications from CDI</p> <p>Surgery for treatment of toxic megacolon, perforation or refractory colitis</p> <p>Death caused by CDI</p>	<p>As a measure of severity of disease indicate if any of the following have occurred within 30 days of symptom onset:</p> <p>Select No if patient was not admitted to ICU. Select Yes if patient was admitted to ICU for treatment of complications from CDI e.g. requires vasopressor therapy for shock, within 30 days of symptom onset.</p> <p>Select No if patient did not require surgery. Select Yes if patient did require surgery for treatment of toxic megacolon, perforation or refractory colitis e.g. colectomy, within 30 days of symptom onset.</p> <p>Select No if patient did not die as a result of CDI within 30 days of symptom onset. Select Yes if patient did die as a result of CDI within 30 days of symptom onset.</p>

CLOSTRIDIUM DIFFICILE INFECTION (CDI) (NUMERATOR)

If you have any queries regarding the completion of this form please contact VICNISS

THIS DATA MUST BE SUBMITTED ELECTRONICALLY USING A VICNISS WEBFORM

This data collection form is to be completed for patients with a toxin positive *C.difficile* specimen admitted to or attending a public hospital (excludes residential aged care facilities) including the emergency department, outpatient department, haemodialysis unit etc.

Hospital Details <i>(Optional datafields in grey text)</i>		
Hospital Code Number:	Treating Unit:	Treating Ward:
Patient Identification <i>(Do not attach a bradma label)</i>		
MRN (UR No.):	Sex: M <input type="checkbox"/> F <input type="checkbox"/>	DOB: / /
Date Attended or Admitted to Public Hospital: / /		
Infection Details		
Specimen Collection Date: / /		
Toxin Producing <i>C.difficile</i> Detected (e.g. toxin assay or PCR): Yes <input type="checkbox"/> No <input type="checkbox"/> ⇒ If 'No', this data collection form does not need to be submitted to VICNISS		
<i>C.difficile</i> Culture: Positive <input type="checkbox"/> Negative <input type="checkbox"/> Culture Not Done <input type="checkbox"/>		
Was <i>C.difficile</i> Hyper-virulent Strain Detected: Yes* <input type="checkbox"/> No <input type="checkbox"/> Hypervirulence Test Not Done <input type="checkbox"/>		
*If 'Yes', indicate which strain: <input type="checkbox"/> Ribotype 027 <input type="checkbox"/> Ribotype 078 <input type="checkbox"/> Other ⇒ please specify _____		
Infection Detected <i>Please select one of the following:</i>		
<input type="checkbox"/> 1. Healthcare associated, healthcare facility onset Symptom onset in this public hospital more than 48 hours after admission.		
Or:		
<input type="checkbox"/> 2. Healthcare associated, community onset Symptom onset in the community or within 48 hours of admission to this public hospital, provided that symptom onset was within 4 weeks of the last discharge from a healthcare facility in which skilled nursing care is provided, excluding residential aged care.		
Or:		
<input type="checkbox"/> 3. Community associated Symptom onset in the community or within 48 hours of admission to this public hospital provided that symptom onset was more than 12 weeks after the last discharge from a healthcare facility in which skilled nursing care is provided, excluding residential aged care.		
Or:		
<input type="checkbox"/> 4. Indeterminate exposure Case does not fit any of the above criteria for exposure setting (that is, onset in community between 4 and 12 weeks of discharge from a healthcare facility in which skilled nursing care is provided, excluding residential aged care.		
Or:		
<input type="checkbox"/> 5. Unknown Exposure setting cannot be determined because of a lack of data.		
Severity of Illness –		
Have any of the following occurred within 30 days of CDI symptom onset:		
Admission to an ICU for treatment of complications from CDI:	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Surgery for treatment of toxic megacolon, perforation or refractory colitis:	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Death caused by CDI:	Yes <input type="checkbox"/>	No <input type="checkbox"/>