Enhanced Surveillance of *Clostridioides difficile* Infection in Ireland

Protocol

Version 4.1, August 2023

Version history

Issue	Reason for Update	Issuer	Approver	Effective Date
4.1	Incorporated feedback	TM	SF	August 2023
4.0	Update content	TM	KB, SF	March 2023
3.5	Following publication of National clinical guidelines			July 2014

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Key Concepts

What is a healthcare facility?

A healthcare facility is any acute care (e.g. hospital) or non-acute care (e.g. residential, long-term care, nursing home) facility in which skilled nursing care is provided and patients/residents are admitted at least overnight.

What is diarrhoea?

Diarrhoea is defined as three or more loose/watery bowel movements that take up the shape of their container (which are unusual or different for the patient[1]) in a 24-hour period.

What is the day three rule?

The day three rule is used to determine acquisition of infection for surveillance purposes. Day one is the date the patient/resident was admitted to the healthcare facility and where onset of infection arises anytime from day three onwards, the infection is deemed to be associated with that healthcare facility.

Abbreviations

CDI	*Clostridioides difficile* infection; *Clostridium difficile* infection
HCF	Healthcare facility
IPC	Infection prevention and control
LTCF	Long-term care facility
NH	Nursing home

Background

Clostridioides difficile infection (CDI) has been a notifiable infectious disease in Ireland since May 2008. Prior to 2012, only new cases of CDI were notifiable. Since January 2012 both new and recurrent cases of CDI are notifiable. Weekly reports from notifiable data are published by the HPSC at: http://www.hpsc.ie/hpsc/NotifiableDiseases/WeeklyIDReports/.

In August 2009 the HPSC launched a voluntary enhanced surveillance programme on all CDI cases which collects more detailed epidemiological information such as origin of infection, patient location at symptom onset, severity and ribotype are included. Participating hospitals are provided with quarterly local feedback reports and a national quarterly report is published on the HPSC website at

https://www.hpsc.ie/a-z/microbiologyantimicrobialresistance/clostridioidesdifficile/enhancedsurveillance/quarterlyreports/

[1] Department of Health National Clinical Effectiveness Committee. Surveillance, Diagnosis and Management of *Clostridium difficile* infection in Ireland. National Clinical Guideline No. 3. 2014; p.38

It is the responsibility of the reporting healthcare facility to ensure that all CDI cases that meet the case definition are notified to the relevant Department of Public Health, with most cases reported using Computerised Infectious Diseases Reporting (CIDR) and to also report to the enhanced CDI surveillance system to ensure consistency and accuracy across these databases.

Since 2017, surveillance information about CDI in Ireland has also been submitted to the European Centre for Disease Prevention & Control (ECDC) for inclusion in the European CDI surveillance programme. Select 'Healthcare–associated infections: *Clostridium difficile* infections' at:

https://www.ecdc.europa.eu/en/surveillance-atlas-infectious-diseases

and the latest ECDC *C. difficile* annual epidemiological report at:

https://www.ecdc.europa.eu/sites/default/files/documents/clostridioides-clostridium-difficile-infections.pdf

In addition to the legal requirement to notify all cases of CDI to the Department of Public Health, supported by the voluntary enhanced CDI surveillance scheme coordinated by the HPSC, acute public hospitals are also required to report data on a monthly basis about the number of new hospital-acquired cases of CDI. This information is collated by the Health Service Executive's (HSE) Business Information Unit (BIU) and is one of a suite of key performance indicators (KPIs) for acute public hospitals.

Table 1. *C. difficile* infection (CDI) surveillance data in Ireland

	Enhanced surveillance	CIDR	HSE-BIU
	hpsc	cidr	BIU acute
Cases	All cases	All cases	New Hospital-acquired CDI cases in acute public hospitals
Frequency	Quarterly	Real-time reporting	Monthly
Data	Case type Origin Onset Severity Ribotype	Case type	Case type: New Origin: *Hospital-acquired only*

Methodology

Who is included in CDI Enhanced Surveillance?

Case Definition of CDI:

A confirmed *C. difficile* infection (CDI) case is a patient two years or older, to whom one or more of the following criteria applies:

- Diarrhoeal* stools or toxic megacolon, with either a positive laboratory assay for *C. difficile* toxin A (TcdA) and / or toxin B (TcdB) in stools or a toxin-producing *C. difficile* organism detected in stool via culture or other means, e.g. a positive PCR result
- Pseudomembranous colitis (PMC) revealed by lower gastrointestinal endoscopy
- Colonic histopathology characteristic of *C. difficile* infection (with or without diarrhoea) on a specimen obtained during endoscopy, colectomy or autopsy.

** Diarrhoea is defined as three or more loose/watery bowel movements that take up the shape of their container (which are unusual or different for the patient[2]) in a 24-hour period.*

Every positive *C. difficile* laboratory result should be discussed with the healthcare professional caring for the patient to ascertain whether the patient with the positive laboratory test result for *C. difficile* meets the CDI case definition.

Enhanced surveillance data should be collected on **all patients** who meet the case definition for a CDI (new or recurrent) regardless of the patient's location:

- Inpatients of acute hospitals
- Patients attending acute hospital services without overnight stay e.g. haemodialysis units, day procedure units, outpatient department, emergency department (ED) attendees etc.
- Residents of non-acute healthcare facilities (e.g. residential care, LTCF or nursing home)
- Patients attending general practitioners (GPs)

Who should be tested for CDI?

C. difficile testing should be considered for any patient aged two years or older with new-onset diarrhoea that is potentially infectious in origin.

Which specimens should be tested for *C. difficile*?

All faeces specimens submitted to the microbiology laboratory that take the shape of the specimen container (e.g. diarrhoea) should be tested for *C. difficile* irrespective of the specimen request form or the patient's location.

[2] Department of Health National Clinical Effectiveness Committee. Surveillance, Diagnosis and Management of *Clostridium difficile* infection in Ireland. National Clinical Guideline No. 3. 2014; p.38

C. difficile infection (CDI) should be considered for any patient/resident aged two years or older with potentially infectious diarrhoea and a faeces specimen submitted promptly for testing for *C. difficile*. While the case definition for the surveillance of CDI requires the patient to have had at least three episodes of diarrhoea in 24 hours to be counted as a CDI case, it is not recommended to delay testing for *C. difficile* until three episodes of diarrhoea have occurred.

What is the recommended test for CDI?

The Irish guidelines for surveillance, diagnosis and management of *C. difficile* were last updated in 2014. In the interim, latest European guidelines now recommend the use of a two-step test for the detection of *C. difficile*[3,4].

No single commercial test can be used as a stand-alone test for *C. difficile* detection, as a result of inadequate positive predictive values at low CDI prevalence. Therefore, the use of a two-step algorithm is recommended.

Faeces specimens with a positive result for glutamate dehydrogenase (GDH) enzyme immunoassay (EIA), nucleic acid amplification test (NAAT) or toxigenic culture, but without free toxin detected by toxins A and B EIA, need careful evaluation to differentiate active CDI from asymptomatic bowel carriage/colonisation with *C. difficile*.

Is repeat testing recommended?

Repeat testing for *C. difficile* is **not** advised in the following situations:

i. Where the patient has already had a positive laboratory result for *C. difficile* and is still receiving antimicrobial treatment for CDI
ii. As a test-of-cure following completion of antimicrobial treatment for CDI. Patients who have had CDI will often continue to have detectable *C. difficile* after completing treatment. If the patient's bowel habit has returned to the usual for that patient, there is no indication to send a repeat specimen

In some instances, a patient may have had a previous positive laboratory result for *C. difficile*, but on clinical assessment by the time of the positive result, the diarrhoea had resolved and clinically CDI was not evident. In the event that diarrhoea recurs, a repeat specimen for *C. difficile* testing may be indicated to determine the cause of the new-onset diarrhoea.

Recurrent CDI is not uncommon, affecting approximately 10% of patients. Recurrent CDI should always be considered when a patient with a history of CDI develops diarrhoea again, following completion of and response to the initial antimicrobial treatment course for CDI.

Such patients should have a further faeces specimen submitted to the microbiology laboratory to determine whether there is an infectious cause for the recurrent symptoms, with *C. difficile* testing to be included, irrespective of the specimen request form, patient's location or a prior positive laboratory result for *C. difficile.*

[3]Tschudin-Sutter, S. *et al*. Guidance document for prevention of *Clostridium difficile* infection in acute healthcare settings. Clinical Microbiology and Infection. 2018;24:1051-54. https://doi.org/10.1016/j.cmi.2018.02.020
[4] Crobach, M.J.T. *et al*. European Society of Clinical Microbiology and Infectious Diseases: update of the diagnostic guidance document for *Clostridium difficile* infection. Clinical Microbiology and Infection. 2016;22:S63-S81. http://dx.doi.org/10.1016/j.cmi.2016.03.010

How is the Data Collected?

The enhanced surveillance data can be entered directly into the Excel database which may be downloaded from the HPSC website at:

https://www.hpsc.ie/a-z/microbiologyantimicrobialresistance/clostridioidesdifficile/enhancedsurveillance/

- Participants should complete enhanced surveillance data on each CDI case, whether new or recurrent infection, in a patient meeting the CDI case definition.
- The completed Excel database should be submitted **quarterly** via e-mail to the following HPSC e-mail address: cdifficiledatahpsc@hpsc.ie **Please only send the current quarter's data to the HPSC each quarter.**
- For new participants intending to join the enhanced CDI surveillance programme, please contact cdifficiledatahpsc@hpsc.ie at the HPSC for encryption requirements.
- Please ensure that ALL CDI cases reported in the voluntary enhanced surveillance system have also been notified to the Department of Public Health, in keeping with Infectious Diseases (Amendment) Regulations (December 2018). Please use the **same identifiers** and **dates** when notifying a case and reporting to the enhanced CDI surveillance system, to ensure these cases can be linked in the databases.
- When a hospital is sending their isolates to the new *C. difficile* National Reference Laboratory for whole genome sequencing, please ensure **same specimen identifiers** are reported to both institutes

What Enhanced Information is Reported?

The following outlines the information to be collected on the enhanced surveillance file:

Section 1 - Patient Details

Hospital Code (Mandatory)	This identifier (sent to you in advance upon joining the scheme) is unique to your hospital and should be documented on all your returns. Please use the 'H' code for CDI surveillance, rather than the identifier for EARS-Net
Patient ID	This identifier can be decided upon by the participating facility, but must be unique for a patient and be a valid identifier within the hospital laboratory information management system (LIMS). For patients attending an acute hospital this identifier would generally be their **hospital medical record number (MRN)** If you are reporting a recurrent CDI, a further new or recurrent CDI case for the same patient, please ensure to **use the same patient identifier** as the previous case(s). This will ensure that these patients can be linked in the database
Sex	Male/Female/Unknown
Date of birth (Mandatory)	Please use the format DD/MM/YYYY
Was the patient admitted to hospital?	Yes, No or Information not available
Date of admission	If patient was admitted to hospital, please provide the date of admission

Section 2 - Case Type

Case Type	The patient who meets the CDI case definition should then be categorised as either a **new case**, a **recurrent case** or an unknown case type. **** Please use the specimen date when calculating the interval since a previous positive *C. difficile* laboratory result **** **See Appendix 2 and Algorithm A**

If the case definition is not met, the laboratory result is not notifiable and is not included in the enhanced CDI surveillance system

Please use the **Specimen date** when calculating the interval since a previous positive result

*** The definition of a resolved case is that the patient has had no diarrhoea for at least 48 hours and has had a formed or normal stool for that patient.**

Section 3 - Specimen Details

Specimen ID	Enter your laboratory specimen number for the specimen result. **** Please ensure the same identifier is used when reporting a case to CIDR, to the National Reference Laboratory if whole genome sequencing is being carried out and to the enhanced surveillance system ****
Specimen date (Mandatory)	Please enter date specimen was taken
Origin of Specimen	Please enter where the faeces specimen was sent in from: • GP surgery • Residential care facility (e.g. nursing home/LTCF) • This hospital; (reporting hospital) • Other hospital; (another acute hospital) • Information not available

Section 4 - Onset of CDI Infection

Onset of CDI	Onset of CDI refers to the patient's location when the symptoms of CDI began. • **Healthcare onset** » Symptoms start during a stay in a healthcare facility (HCF). This includes nursing homes and LTCFs • **Community onset** » Symptoms start in a community setting, outside health care facilities • **Information not available** » If no information was available on onset of symptoms
Date of Onset	Date of onset of symptoms. This requires clinical evaluation: - For inpatients – review of stool chart and discussion with staff caring for the patient - For patients not attending the hospital (e.g. patient attending GP or residents of residential care facilities) discussion with staff caring for the patient/resident
Onset Facility (if in a HCF)	Please answer this question **ONLY** if the onset of CDI is known to be in a healthcare facility. Note the facility the onset of symptoms were in: • **This hospital:** Please select if onset of symptoms occurred in the reporting hospital. • **Other hospital:** Please select if onset of symptoms occurred in another acute hospital different to the reporting hospital (i.e. a transferred patient) • **Residential care facility** Please select if the onset of symptoms occurred in a residential care facility (e.g. nursing home or LTCF) • **Information not available**

Section 5 - Origin of CDI

Origin of CDI	Please specify the origin (healthcare or community-associated) of the CDI episode according to the definitions in **Appendix 3 and Algorithms B & C**
Origin Facility (if in a HCF)	Please answer this question **ONLY** if the case was known to be healthcare-associated. Please note the facility the CDI case originated in: • **This hospital:** Please select if CDI case is associated with the reporting hospital • **Other hospital:** Please select if CDI case is associated with another acute hospital different to the reporting hospital (i.e. a transferred patient) • **Residential care facility:** Please select if CDI case is associated with a residential care facility (e.g. nursing home or LTCF) • **Information not available**

Section 6 - Severity

Severity	For surveillance purposes, a case of CDI is severe if the patient was either: (i) **admitted to ICU*** for **treatment of CDI or its complications?** (e.g. for shock requiring vasopresser therapy) *Admission to ICU for a reason other than CDI, with subsequent diagnosis of CDI while in the ICU is **not** included, unless the patient has severe CDI that requires ongoing ICU care for CDI management AND/OR (ii) the patient underwent **surgery as a consequence of CDI complications**? (e.g. surgery for toxic megacolon (colectomy), perforation or refractory colitis) Yes, No or Information not available

Section 7 – Outcome (captured on CIDR only – please inform your local department of Public Health)

Outcome	For **hospitalised patients*** only **('Patient admitted to hospital?' field must be 'Yes')** (i) Still inpatient at time of reporting (ii) Discharged (iii) Died To be completed at the time of making enhanced surveillance returns. Patient outcome at 30 days is to be recommended as the outer limit for definition. *Please check patient admission system for this information.
Date of Discharge	Complete only if 'Patient admitted to hospital?' field is 'Yes'
Date of Death	Complete only if 'Patient admitted to hospital?' field is 'Yes' and the Outcome is 'Died'

Section 8 – Ribotype

Sequence type	Please enter the sequence type data if available • Please use the format 'STXX' e.g. ST11 • Do not include additional text
Ribotype	Please enter the ribotype data if available • Only include the actual ribotype. Do not include additional text • Also, please only report the ribotype if the isolate from that particular specimen was ribotyped. Please do not report the ribotype associated with a previous specimen from that patient that was ribotyped ** If the ribotype data for a particular quarter is not available when returning your quarterly data, then please forward this on when available and highlight this in your email **

Section 9 - Treatment

Treatment of CDI	Please record if a patient was prescribed one of the following antimicrobial treatments for CDI: (i) Enteral metronidazole (PO/NG/PR) (ii) Enteral vancomycin (PO/NG/PR) (iii) Fidaxomicin (iv) Other antimicrobial specifically for CDI treatment (e.g. tigecycline, parenteral (IV) metronidazole)
Treatment other, please specify	Complete only if 'Treatment of CDI' is '(iv) Other'

Additional Information

Laboratory Testing Method Used:

On a quarterly or an annual basis, the following additional information will be sought from participants:

There are a variety of tests on the market for the detection of *C. difficile*. To aid in the interpretation of both local and national CDI trends, information on laboratory testing methods will be collected annually. If using the Excel data collection tool, a drop-down box is provided in the 'Hospital Data' worksheet.

From Q1 2019 we are changing the collection of this information to facilitate reporting once annually. Please select the test method used by your laboratory for each quarter of the year **and return with the quarter 4 returns each year.** If it is easier to return this information with the quarterly file, please continue to do so.

Information on Frequency of Testing:

To adjust for differences in the frequency of *C. difficile* testing across hospitals, information is captured on the number of faecal specimens tested for *C. difficile* in your laboratory for your hospital annually. From Q1 2019 we are changing the collection of this information to facilitate reporting once annually. Please select the number of specimens tested by your laboratory for each quarter of the year **and return with the quarter 4 returns each year**. If it is easier to return this information with the quarterly file, please continue to do so.

HPSC Contact Details

We welcome comments and feedback on any aspect of this project. Please contact either Dr. Susanna Frost, or Tara Mitchell by phone or email as follows:

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Appendix 1: Case Definitions for Enhanced Surveillance of *Clostridioides difficile* Infection

CASE CLASSIFICATION

A. Possible *Clostridioides difficile* infection (CDI) Case
N/A
B. Probable CDI Case
N/A
C. Confirmed CDI case

For surveillance purposes, a confirmed CDI case is a patient two years or older, to whom one or more of the following criteria applies:

- Diarrhoeal* stools or toxic megacolon, with either a:
  - Positive laboratory assay for *C. difficile* toxin A (TcdA) and/or toxin B (TcdB) in stools OR
  - Toxin-producing *C. difficile* organism detected in stool via culture or other means
- Pseudomembranous colitis (PMC) revealed by lower gastrointestinal endoscopy
- Colonic histopathology characteristic of *C. difficile* infection (with or without diarrhoea) on a specimen obtained during endoscopy, colectomy or autopsy

*** Diarrhoea is defined as three or more loose/watery bowel movements (which are unusual or different for the patient) in a 24-hour period**

CASE TYPE

- **New Case of CDI:**
  - The first episode of CDI, **OR**
  - A subsequent episode of CDI with onset of symptoms more than eight weeks after the onset of a previous episode
- **Recurrent Case of CDI:**
  - A patient with an episode of CDI that occurs **within eight weeks** following the onset of a previous episode **provided that CDI symptoms from the earlier episode resolved with or without therapy**

ONSET

- **Healthcare onset** » Symptoms start during a stay in a healthcare facility
- **Community onset** » Symptoms start in a community setting, outside healthcare facilities
- **No information available** » If no information was available on onset of symptoms

ORIGIN

- **Healthcare-associated case**. This is a CDI patient with either:
  - Onset of symptoms at least 48 hours following admission to a healthcare facility (healthcare-onset, healthcare-associated), OR
  - With onset of symptoms in the community within four weeks following discharge from a healthcare facility (community-onset, healthcare-associated).

- **Community-associated case**. This is a CDI patient with either:
  - Onset of symptoms while outside a healthcare facility, and without discharge from a healthcare facility within the previous 12 weeks (community-onset, community-associated), OR
  - With onset of symptoms within 48 hours following admission to a healthcare facility without residence in a healthcare facility within the previous 12 weeks (healthcare-onset, community-associated).

- **Discharged 4 – 12 weeks from a healthcare facility**
  - This is a CDI patient who was discharged from a healthcare facility between four and 12 weeks before the onset of symptoms.

- **No information available**

SEVERE CDI Case

This is a CDI patient to whom any of the following criteria apply:

- Admission to an intensive care unit for treatment of CDI or its complications (e.g., for shock requiring vasopressor therapy)
- Surgery (colectomy) for toxic megacolon, perforation or refractory colitis
- Death within 30 days after diagnosis if CDI is either the primary or a contributive cause

Appendix 2: How to Determine CDI Case Type

If the case definition is met, it important to establish whether this is a first positive *C. difficile* test result or whether the patient has previously had a positive *C. difficile* test result:

a. if a first positive result, then this is a **notifiable new case of CDI**

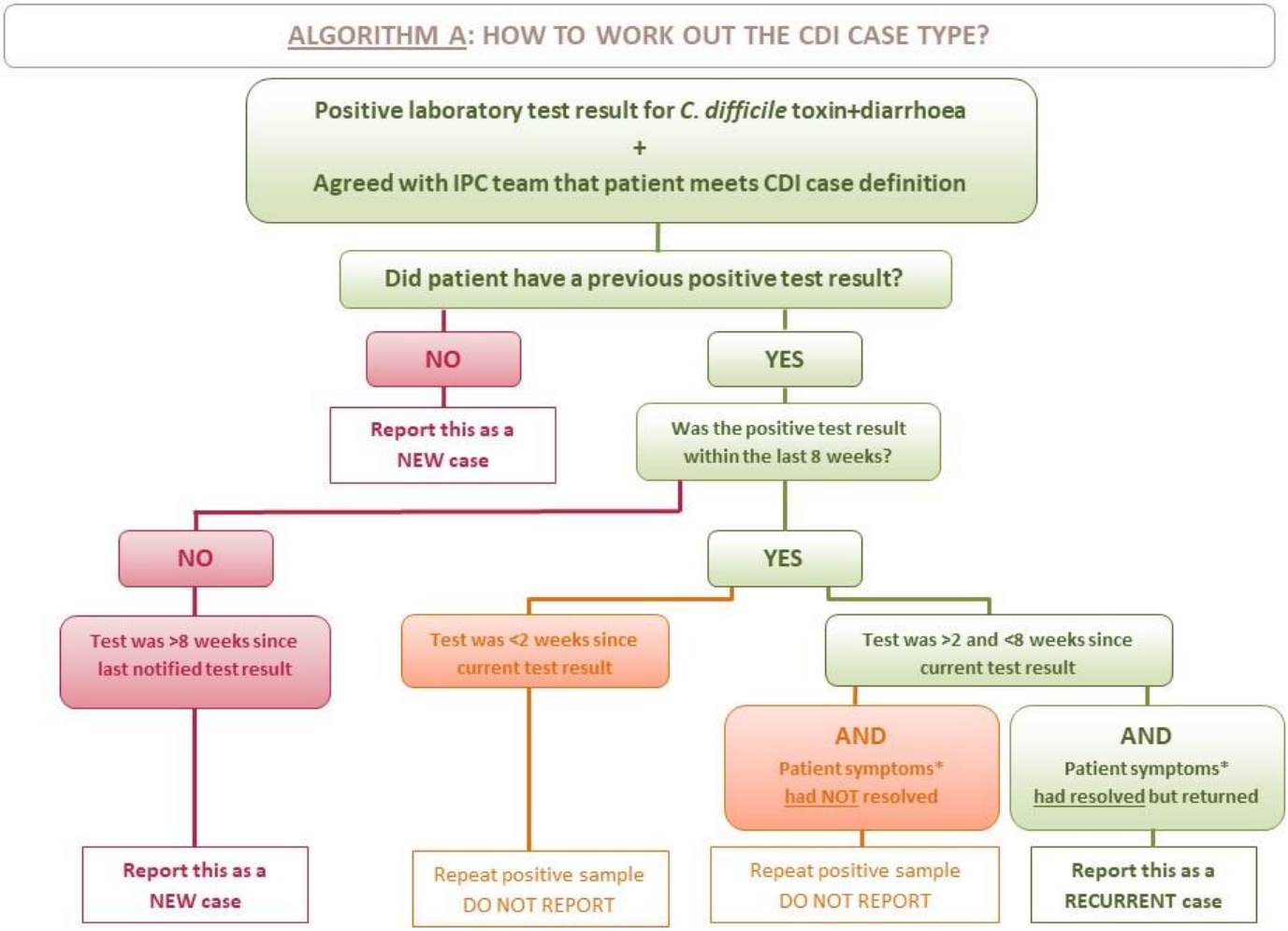
b. if the patient has previously had a positive result:

i. more than eight weeks prior and symptoms had resolved* then this is a **notifiable new case of CDI**
ii. less than eight weeks prior and symptoms had resolved* then this is a notifiable **recurrent case of CDI**
iii. and symptoms have not resolved, then this is a repeat positive specimen from the same CDI episode and is not notifiable
iv. less than two weeks prior, based on either the symptom end date or if that is not available, the first positive result date, then this is a repeat positive result and is not notifiable

In clinical practice, it is not possible to differentiate between a relapse involving the same strain and re-infection with a different strain. The term ‘recurrent’ is used as to capture both.

See **Algorithm A** of this protocol to help determine the case type of a CDI case when filling out the enhanced surveillance data.

Algorithm A to Determine Case Type



* If a patient's symptoms are not available then the specimen collected date may be used as a proxy date

Appendix 3: How to Determine Origin of Infection

A healthcare facility is any acute care (e.g. hospital) or non-acute care (e.g. residential, long-term care, nursing home) facility in which skilled nursing care is provided and patients/residents are admitted at least overnight.

- **Healthcare-associated case (also must answer the 'Origin Facility' field)**

»This is a CDI case with either:

  - Onset of symptoms at least 48 hours following admission to a healthcare facility* (i.e. infection arising day three onwards – where date of admission = day one) (healthcare-onset, healthcare-associated)

    OR

  - With onset of symptoms in the community within four weeks following discharge from a healthcare facility (community-onset, healthcare-associated)

- **Community-associated case**

»This is a CDI case with either:

  - Onset of symptoms while outside a healthcare facility and without discharge from a healthcare facility within the previous 12 weeks (community-onset, community-associated)

    OR

  - With onset of symptoms within 48 hours following admission to a healthcare facility (i.e. symptom onset on day one or day two of admission) without residence in a healthcare facility within the previous 12 weeks (healthcare-onset, community-associated)

- **Discharged 4 – 12 weeks from a healthcare facility**

»This is a CDI case with either:

  - Onset of symptoms while outside a healthcare facility, but who was discharged from a healthcare facility 4 – 12 weeks before the onset of symptoms

    OR

  - With onset of symptoms within 48 hours following admission to a healthcare facility (i.e. symptom onset on day one or day two of admission) but who was discharged from a healthcare facility 4 – 12 weeks before the onset of symptoms

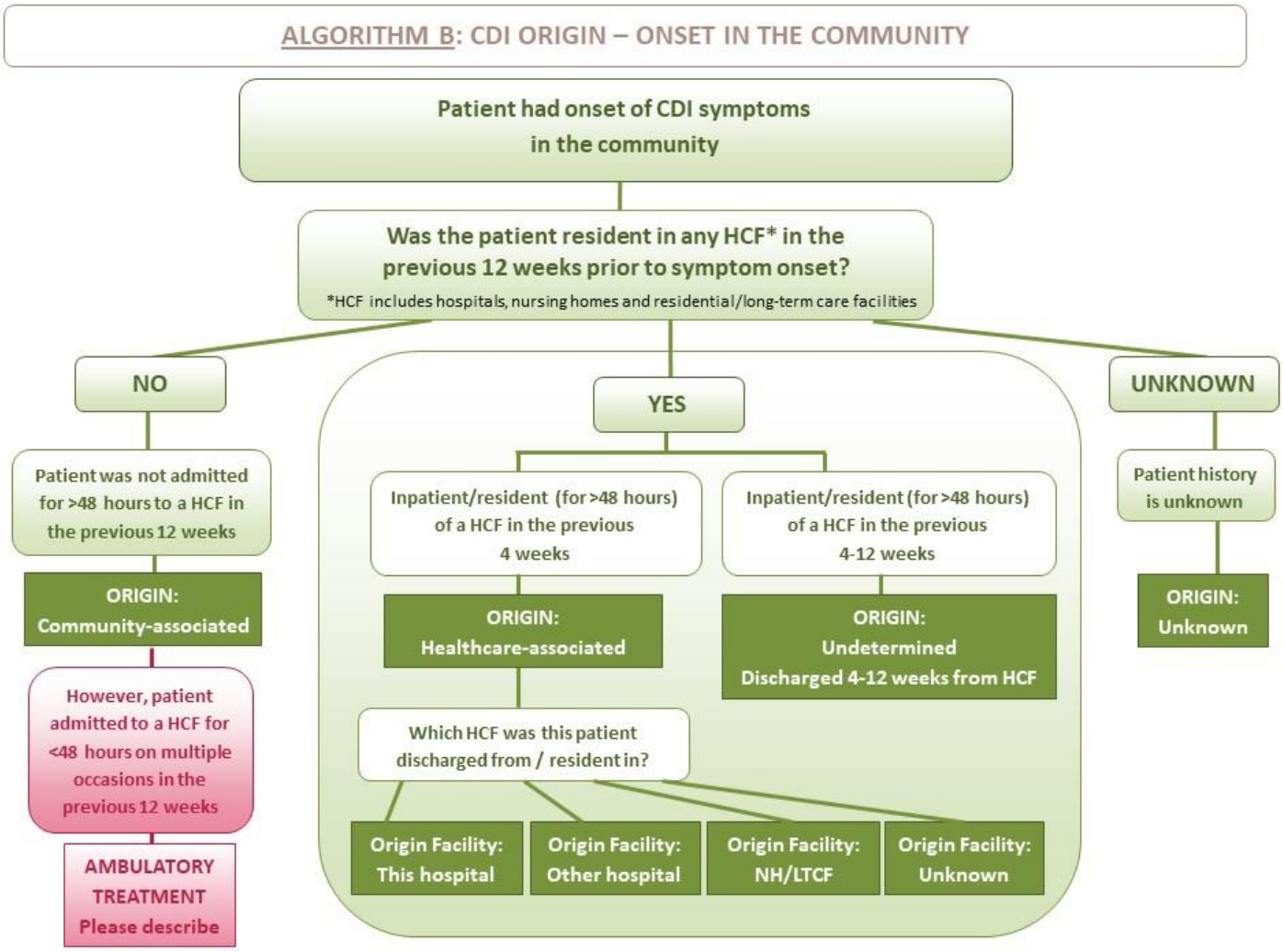
- **Information not available**

» If no information was available on a CDI case patient regarding origin of infection

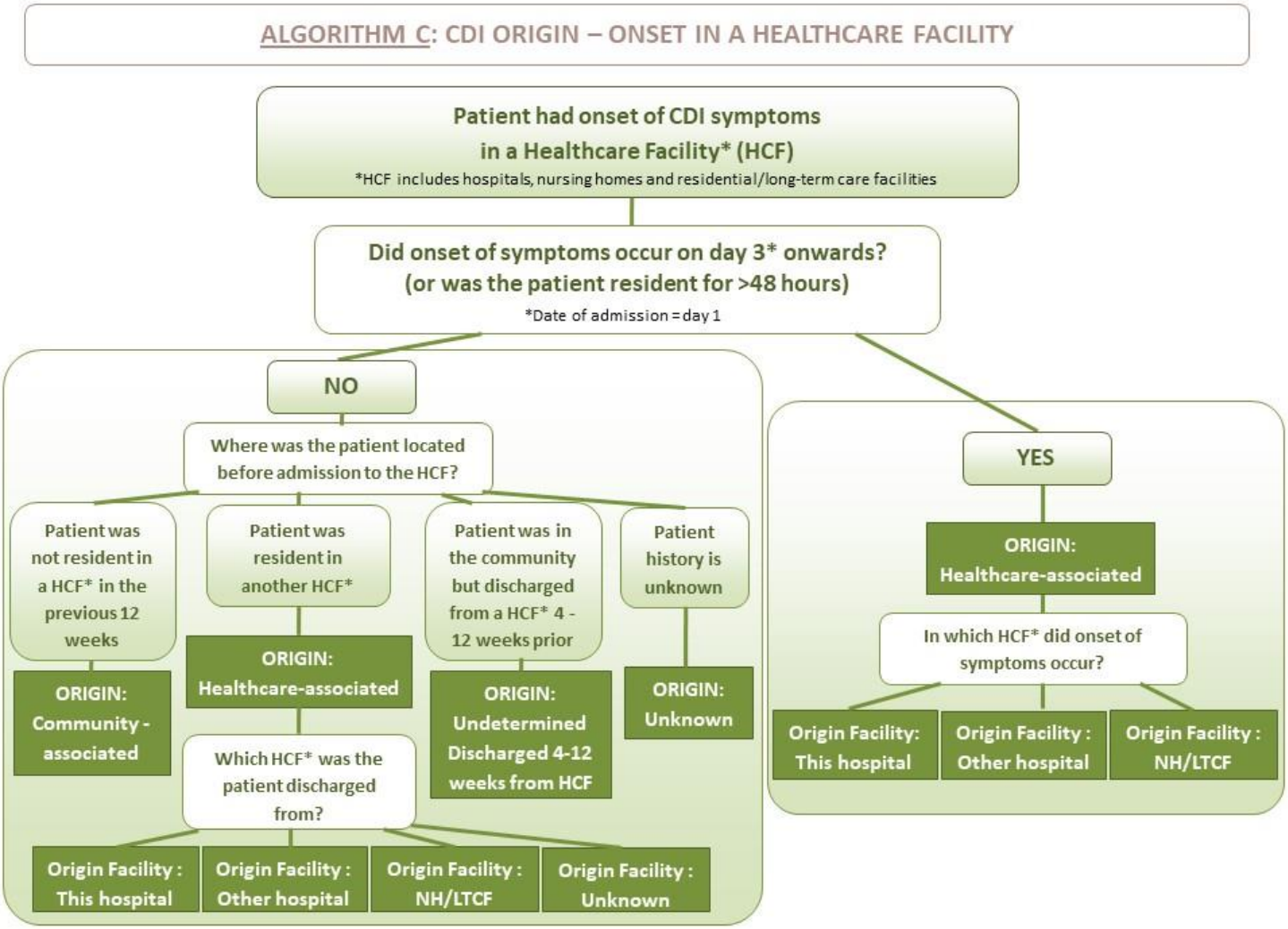
See **Algorithms B & C** on pages 18 and 19 of this protocol to help determine the origin of infection of a CDI case when filling out the enhanced surveillance data. The starting point of these algorithms is "Where did the onset of symptoms start?"

See 'ECDC Case Type & Origin schematics' for optional additional materials to aid visualise timelines for case type and origin of infection.

Algorithm B - Onset of Symptoms in the Community



Algorithm C - Onset of Symptoms in Healthcare Facility



ECDC Case Type & Origin schematics

Figure 1. Designation of new CDI episodes as a recurrent case and/or a new case, based the date of positive laboratory tests for CDI

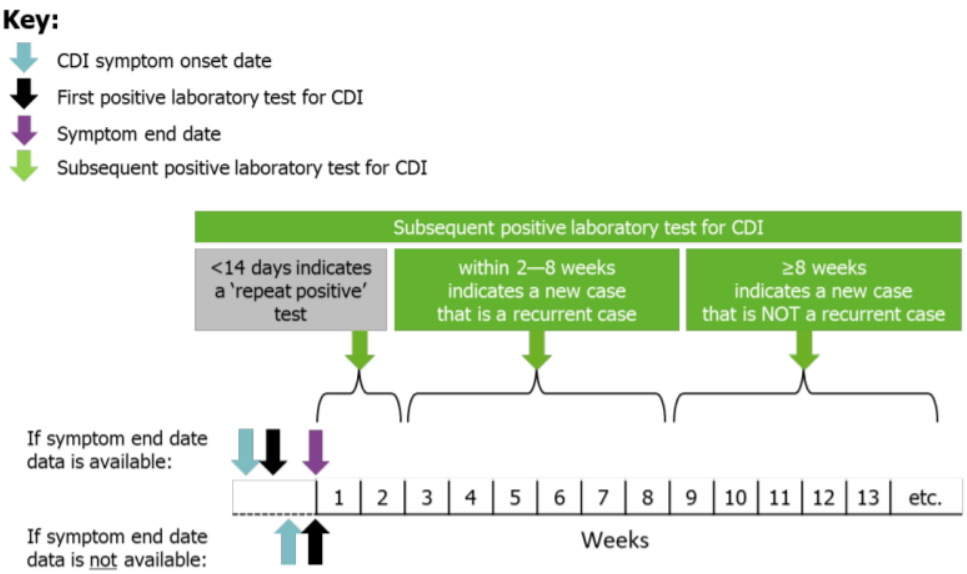
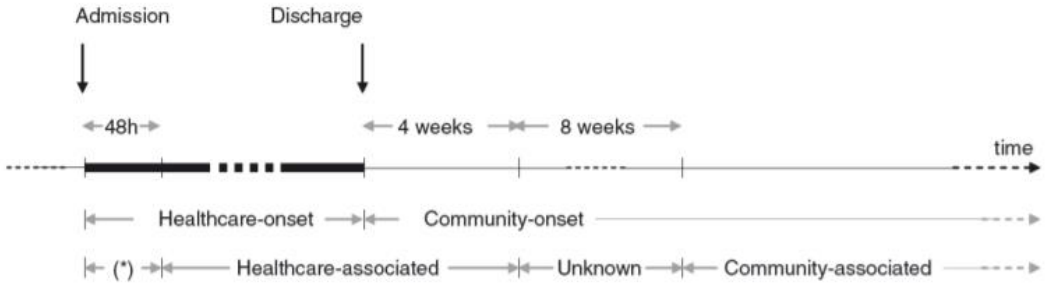


Figure 2. Designation of CDI cases as healthcare-associated or community-associated based on location and time of onset of symptoms



*48h — In practice, for this protocol, '48h' is interpreted as on the day of admission or on the following day; * — may be community-associated, healthcare-associated of have an unknown association, depending on the case's history.*

Source: Figure from Kuijper EJ, Coignard B, Tull P, ESCMID Study Group for Clostridium difficile, EU Member States, European Centre for Disease Prevention and Control (ECDC). Emergence of Clostridium difficile-associated disease in North America and Europe. Clin Microbiol Infect. 2006 Oct;12 Suppl 6:2-18. [1].