Enhanced Surveillance of *Clostridioides (Clostridium) difficile* Infection in Ireland: Q2 2024 National Report

Executive Summary

- This report includes enhanced surveillance of *C. difficile* infection (CDI) in Ireland for Q1 and Q2 2024 with a focus on Q2 2024, compared with Q2 2023, in the executive summary. This report compares these quarters in Table 1 and Figure 1
- During Q2 2024, a total of 582 cases of CDI were reported to the enhanced surveillance scheme, with 59 of the 61[1] acute Irish public and private hospitals now participating.
- The national overall rate of CDI in hospitalised patients in Q2 2024 was 4.2 cases per 10,000 bed days used (BDU) [447 cases], which is higher to that reported for Q2 2023 [379 cases; rate = 3.5]
- There were 293 cases of CDI deemed to be hospital-acquired (HA-CDI), of which 260 were new, representing a national HA-CDI rate of 2.4 [median rate = 1.0]
- With regard to acquisition, while *C. difficile* was mostly associated with acute hospitals (293; 50%), there were many cases associated with the community (142; 24%) and long-term care facilities (28; 8%)
- CDI symptom onset occurred in the community for 36% of all cases (n=211):
    - This emphasises the importance of considering CDI when evaluating any patient with potentially infectious diarrhoea in all healthcare settings, including hospitals, primary care and long-term care facilities (LTCF). Guidance on CDI for primary and long-term care settings is available at the following link:

      http://www.hpsc.ie/a-z/microbiologyantimicrobialresistance/clostridioidesdifficile/guidelines/File,14387,en.pdf
    - It also emphasises the importance for all microbiology laboratories in Ireland to implement the recommendations of the national *C. difficile* clinical guidelines to routinely include *C. difficile* testing for all faeces specimens that take the shape of the container submitted from patients aged ≥2 years, regardless of patient location or clinician request. Guidance on *C. difficile* testing is available in Section 2.5, pages 43 – 54 of the national *C. difficile* clinical guidelines.
- Whole genome sequencing was performed at the Irish *C. difficile* National Reference Laboratory (NRL) on isolates during Q1 and Q2 2024. ST11 (16%) ST8 (10%) and ST2 (9%) were most frequently reported with 121 clusters notified.

[1] Data for Q1 and Q2 2024 was not returned by one general hospital from HSE regional area F due to resource constraints

Part 1: National CDI Epidemiology Q2 2024

CDI data was reported to the enhanced surveillance programme from 59[2] of the 61 participating acute public and private hospitals across Ireland (***Appendix A***). There were 582 reported CDI cases in patients aged ≥2 years. Of those, 447 were reported in hospitalised patients, giving a national CDI rate in hospitalised patients of 4.2 cases per 10,000 bed days used (BDU), which is higher to that reported for Q2 2023 [379 cases; rate 3.5]. The majority were aged ≥65 years (69%) and were female (55%). ***Table 1*** displays the breakdown of all CDI cases for Q2 2024 compared with Q2 2023 case data, by case type, origin, onset and severity. In Q2 2024, 13 cases (2%) of severe CDI were reported, defined as requiring critical care admission or colectomy due to complications of CDI in ***Table 2***. Two cases required both colectomy and critical care admission; one case required colectomy and 10 other cases required critical care admission. CDI case definitions are summarised in ***Appendix B***

CDI Case Type

The majority were categorised as new infections (78%), with 8% recurrent and for 14%, the CDI case type was unknown.

CDI Origin

The majority were categorised as healthcare-associated (HCA) CDI [n=340; 58%], with community-associated (CA) CDI accounting for 24% [n=142]. Of the community-associated cases, eight cases (6%) were in contact with healthcare facilities for <48 hours, where ambulatory care was received. For the remainder, the origin either could not be determined [n=32; 5%] or was unknown [n=68; 12%]. Of the 340 HCA-CDI cases, the origin was the reporting hospital, termed hospital-acquired (HA) for 293 (86%), a LTCF for 28 (8%) and 'other' or 'unknown healthcare facility' for 19 (6%) cases.

CDI Onset

Patient locations at onset of CDI symptoms included; while admitted to a healthcare facility, termed healthcare-onset (HO) for 320 cases (55%), while residing in the community, termed community-onset (CO) for 211 cases (36%), and unknown patient location for 51 cases (9%). Of 320 HO CDI cases, the reporting hospital was the onset location for 252 (79%), a LTCF for 19 (6%), other healthcare facilities for 10 (3%) and unknown healthcare location for six cases (2%).

[2] Data for Q1&Q2 2024 was not returned by one general hospital from HSE regional area F due to resource constraints

Table 1. National CDI epidemiology: Q1&Q2 2023 versus Q1&Q2 2024

	2023 Q1		2023 Q2		2024 Q1		2024 Q2	
	n	%	n	%	n	%	n	%
Total reported cases	**487**	-	**502**	-	**557**	-	**582**	-
CDI Case Type								
– New	428	*88%*	422	*84%*	448	*80%*	454	*78%*
– Recurrent	40	*8%*	43	*9%*	53	*10%*	48	*8%*
– Unknown	19	*4%*	37	*7%*	56	*10%*	80	*14%*
CDI Origin								
– Healthcare-associated (HCA)	**288**	***59%***	**284**	***57%***	**305**	***55%***	**340**	***58%***
Reporting hospital	228	*79%*	232	*82%*	257	*84%*	293	*86%*
Long term care facility	34	*12%*	23	*8%*	24	*8%*	28	*8%*
Other healthcare facility	25	*9%*	24	*8%*	24	*8%*	18	*5%*
Unknown healthcare facility	1	*0%*	5	*2%*	0	*0%*	1	*0%*
– Community associated (CA)	**151**	***31%***	**155**	***31%***	**149**	***27%***	**142**	***24%***
Ambulatory care*	7	*5%*	9	*6%*	8	*5%*	8	*6%*
– Discharged 4 – 12 weeks from HCF	**24**	***5%***	**31**	***6%***	**48**	***9%***	**32**	***5%***
– Unknown origin	**24**	***5%***	**30**	***6%***	**55**	***10%***	**68**	***12%***
CDI Onset								
– Healthcare onset (HO)	**276**	***57%***	**264**	***53%***	**276**	***50%***	**320**	***55%***
Reporting hospital	186	*67%*	189	*72%*	224	*81%*	252	*79%*
Long term care facility	26	*9%*	14	*5%*	23	*8%*	19	*6%*
Other healthcare facility	11	*4%*	18	*7%*	25	*9%*	10	*3%*
Unknown location	4	*1%*	4	*2%*	8	*3%*	6	*2%*
– Community onset (CO)	**192**	***39%***	**220**	***44%***	**250**	***45%***	**211**	***36%***
– Unknown onset location	**19**	***4%***	**18**	***4%***	**31**	***6%***	**51**	***9%***
CDI Severity								
Critical care admission or colectomy	18	*4%*	27	*5%*	11	*2%*	13	*2%*

*8 community-acquired cases received ambulatory care in Q1 2024 which was described as: Nephrology/Dialysis (n=3); Oncology (n=3) Haematology (n=1); Medical OPD (n=1). 8 community-acquired cases received ambulatory care in Q2 2024 which included Oncology (n=4); Haematology (n=3); Nephrology/Dialysis (n=1).

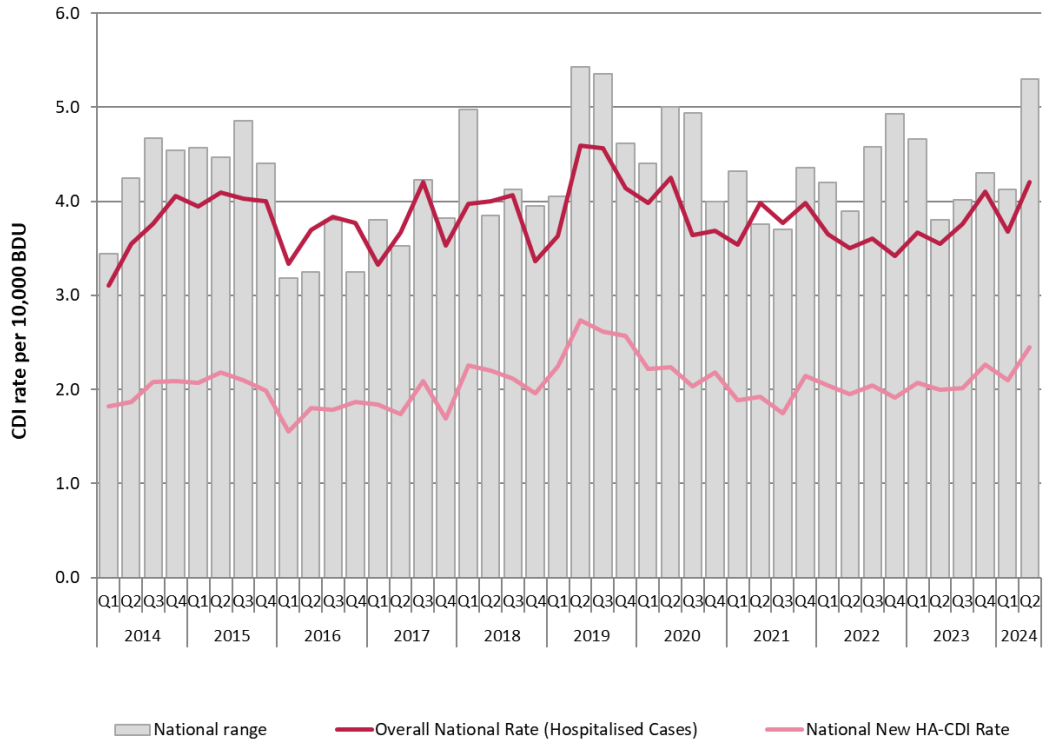
Table 2. Severity of illness: Q2 2024

		ICU Admission			Total
		Yes	No	Unknown	
Surgery (Colectomy)	Yes	2	1	-	**3**
	No	8	435	-	**443**
	Unknown	2	35	99	**136**
	Total	**12**	**471**	**99**	**582**

Part 2: Hospital-acquired CDI (HA-CDI) Epidemiology – Q2 2024

Data on HA-CDI was reported from 59[3] of the 61 acute public and private hospitals across Ireland. There were 293 HA-CDI cases in patients aged ≥2 years during Q2 2024. Of those, 260 were new HA-CDI cases, representing a national new HA-CDI rate of 2.4 [median rate = 1.0], similar than that reported for Q2 2023 [213 cases; rate = 2.0; median rate = 1.3]. ***Figure 1*** displays quarterly HA-CDI rates since 2014 and ***Table 3*** displays quarterly HA-CDI data from 2022 to 2024.

Figure 1. Quarterly national HA-CDI rates: 2014 – 2024



The overall national CDI rate represents all CDI diagnosed in hospitalised patients per 10,000 BDU, while the HA-CDI rate represents **new** cases of hospital-acquired CDI per 10,000 BDUs. Raw data for this graph is provided in Table 3. The national range is represented by the 5th to 95th percentile of the CDI rate.

CDI Case Type

The majority of 293 HA-CDI cases were categorised as new infections (260; 89%), with 24 (8%) recurrent cases and for nine cases (3%) the case type was unknown.

CDI Onset

Patient locations at onset of HA-CDI symptoms included; while admitted to a healthcare facility, termed healthcare-onset (HO) for 255 cases (87%) and while residing in the community, termed community-onset (CO) for 38 cases (13%).

[3] Data for Q1& Q2 2024 was not returned by one general hospital from HSE regional area F due to resource constraints

Of 255 HO-CDI cases, the reporting hospital was the onset location for 246 cases (96%), a LTCF for four cases (2%), other healthcare facility for 2 cases (1%) and location was unknown for three cases (1%).

Table 3. Quarterly HA-CDI data: 2022 – 2024

YearQ	Number of participating hospitals[a]	Number of cases reported				CDI rate per 10,000 BDUs[b]		
		New	Recurrent	Unknown	Total	Rate	Range[c]	Median
2022Q3	55[g]	192	17	0	**209**	2.0	0 - 4.6	1.1
2022Q4	53[h]	176	18	0	**194**	1.9	0 - 4.9	1.0
2023Q1	59[i]	212	14	2	**228**	2.1	0 - 4.7	1.4
2023Q2	60	213	14	4	**231**	2.0	0 - 3.8	1.3
2023Q3	59	215	24	3	**242**	2	0 - 4	0.9
2023Q4	59	245	22	4	**271**	2.3	0 - 4.3	1.2
2024Q1	59	233	19	5	**257**	2.1	0 - 4.1	1.0
2024Q2	59	260	24	9	**293**	2.4	0 - 5.3	1.0

g Data for Q3 2022 was not available from one tertiary hospital on behalf of five participating hospitals (one tertiary, three general and one specialist hospital) from HSE regional health Area C
h In Q4 2022, the Rotunda Hospital has joined, bringing the total number of participating hospitals to 61. Data for Q4 2022 was not returned by eight hospitals: two tertiary, four general and one specialist hospital in HSE regional Area C and one private hospital in Area F
i Data for Q1 2023 was not returned by one tertiary hospital from HSE regional Area D and one general hospital from HSE regional Area F
Data for Q1 & Q2 2023 are provisional.

Part 3: *C. difficile* Testing Methods – Q2 2024

All 59 hospitals participating in the enhanced CDI surveillance system during Q2 2024 reported use of a *C. difficile* testing method recommended by the updated National Clinical Guidelines for Surveillance, Diagnosis & Management of *C. difficile* Infection in Ireland (2014). This includes either one of a variety of two-step testing methods (n=54;89%) or a single-step method using molecular polymerase chain reaction (PCR) test for *C. difficile* toxin gene (n=7;11%), as displayed in ***Table 4***, along with stratification by hospital type.

Table 4. *C. difficile* testing methods utilised in Q2 2024, by hospital type.

Test Category	Hospital Type				Total
	General	Private	Specialist	Tertiary	
1 STEP: PCR for *C difficile* toxin gene	2	–	4	1	**7**
2 STEP: GDH AND Toxin EIA	1	1	–	–	**2**
2 STEP: GDH AND TOXIN EIA with TOXIN PCR confirmation	5	8	1	–	**14**
2 STEP: GDH EIA AND Toxin PCR	3	–	–	–	**3**
2 STEP: PCR followed by confirmatory EIA toxn	16	3	8	8	**35**
Total	**27**	**12**	**13**	**9**	**61**

Part 4: *C. difficile* Irish National Reference Laboratory (NRL) Genomic Sequence results – Q1 & Q2 2024

1. Whole-genome sequencing profile of *C. difficile* isolates matched with HPSC enhanced surveillance data.

The NRL received 306 *C. difficile* isolates in Q1 2024 and 321 *C. difficile* isolates in Q2 2024 (total n=627) spanning 28 hospitals nationally out of which 416 (66%) matched with the enhanced surveillance programme at the HPSC as displayed in ***Table 5***. (Please note not all isolates sent to NRL are notifiable CDI cases, isolates can be sent for epidemiological studies, further investigation and so forth. Reason for typing is not currently recorded).

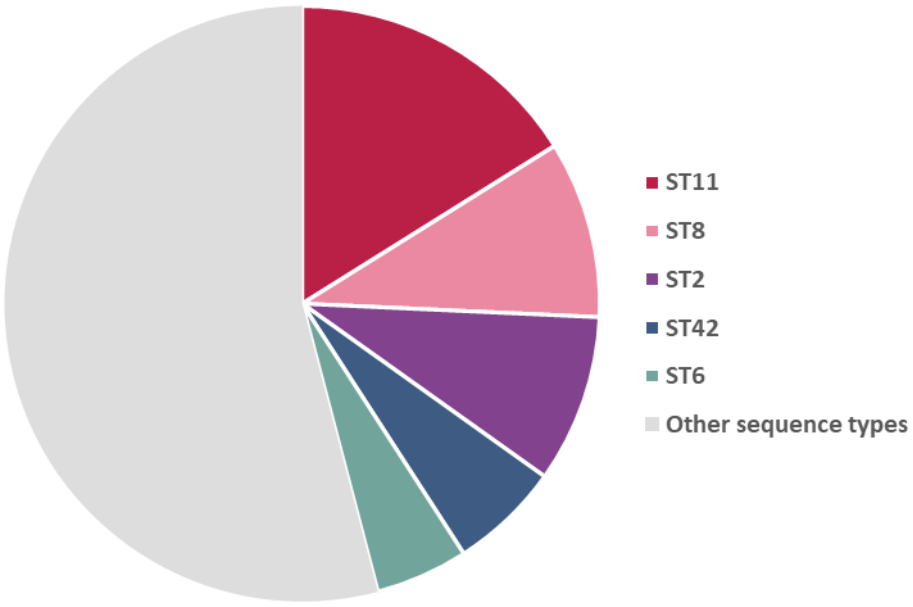
Of these 416 cases, the majority (88%; n=368) were new infections. A high proportion (75%; n=310) had an origin associated with a healthcare facility and 17% (n=71) were associated with infection in the community.

Table 5. *C. difficile* genotypic profile of most frequent whole-genome sequence types by epidemiological variables for matched CDI cases (Source: HPSC enhanced surveillance & NRL whole genome sequencing results; n=416), Q1 & Q2 2024

	Total cases		ST11		ST8		ST2	
	n	%	n	%	n	%	n	%
Total reported cases with sequence typing	**416**	-	67	*16%*	40	*10%*	38	*9%*
CDI toxin genotype								
***tcdA* positive**	377	*91%*	53	*79%*	38	*95%*	34	*89%*
***tcdB* positive**	391	*94%*	49	*73%*	40	*100%*	37	*97%*
***tcdC* positive**	352	*85%*	18	*27%*	40	*100%*	38	*100%*
***cdtA/cdtB* positive**	89	*21%*	-	-	-	-	-	-
CDI cases identified as part of clusters	121	*29%*	21	*31%*	12	*30%*	11	*29%*
CDI Case Type								
– New	368	*88%*	62	*93%*	34	*85%*	33	*87%*
– Recurrent	26	*6%*	2	*3%*	5	*13%*	2	*5%*
– Unknown	22	*5%*	3	*4%*	1	*3%*	3	*8%*
CDI Origin								
– Healthcare-associated (HCA)	310	*75%*	55	*82%*	31	*78%*	28	*74%*
– Community associated (CA)	71	*17%*	8	*12%*	6	*15%*	8	*21%*
– Discharged 4-12 weeks from HCF	26	*6%*	3	*4%*	2	*5%*	1	*3%*
– Unknown	9	*2%*	1	*1%*	1	*3%*	1	*3%*
CDI Severity								
Critical care admission or colectomy	7	*2%*	2	*3%*	2	*5%*	-	-

A total of 55 different sequence types (Jolley *et. al.*, 2018) were detected for the matched isolates – see ***Figure 2***. ST11 (16% of matched isolates), ST8 (10%) and ST2 (9%) were the most frequently detected sequence types.

Figure 2. Most frequently detected *C. difficile* sequence types of matched cases, Q1&Q2 2024 (Source: NRL)



For genomic data, please refer to the Public Health Laboratory website, for the *C. difficile* 2023 NRL annual report.

The continued development of the Irish national reference laboratory service will add significantly to the understanding of the epidemiology of this significant infection and ultimately influence its control and preventative actions, both here in Ireland and internationally.

Acknowledgments

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Appendix A: National CDI Enhanced Surveillance Participating Hospitals

Hospital Group	Hospital Name	Category	Type of Hospital	Area
Dublin Midlands	Coombe Women and Infant's University Hospital	Specialist	-	B
	Midland Regional Hospital Portlaoise	General	Model 3	B
	Midland Regional Hospital Tullamore	General	Model 3	B
	Naas General Hospital	General	Model 3	B
	St James's Hospital	Tertiary	Model 4	B
	St Luke's Hospital, Dublin	Specialist	-	B
	Tallaght University Hospital	Tertiary	Model 4	B
Ireland East Hospital Group	Cappagh National Orthopaedic Hospital, Dublin	Specialist	-	A
	Mater Misericordiae University Hospital	Tertiary	Model 4	A
	Midland Regional Hospital Mullingar	General	Model 3	B
	National Maternity Hospital, Holles Street	Specialist	-	C
	National Rehabilitation Hospital, Dun Laoghaire	Specialist	-	C
	Our Lady's Hospital, Navan	General	Model 3	A
	Royal Victoria Eye & Ear Hospital, Dublin	Specialist	-	C
	St Columcille's Hospital, Loughlinstown	General	Model 2	C
	St Luke's General Hospital, Kilkenny	General	Model 3	C
	St Michael's Hospital, Dun Laoghaire	General	Model 2	C
	St Vincent's University Hospital	Tertiary	Model 4	C
	Wexford General Hospital	General	Model 3	C
RCSI Hospital Group	Beaumont Hospital	Tertiary	Model 4	A
	Cavan General Hospital	General	Model 3	A
	Connolly Hospital, Blanchardstown	General	Model 3	A
	Louth County Hospital, Dundalk	General	Model 2	A
	Our Lady of Lourdes Hospital, Drogheda	General	Model 3	A
	Rotunda Hospital Dublin	Specialist	-	A
Saolta Hospital Group	Letterkenny University Hospital	General	Model 3	F
	Mayo University Hospital	General	Model 3	F
	Portiuncula University Hospital	General	Model 3	F
	Roscommon University Hospital	General	Model 2	F
	Sligo University Hospital	General	Model 3	F
	University Hospital Galway	Tertiary	Model 4	F
South/South West Hospital Group	Bantry General Hospital	General	Model 2	D
	Cork University Hospital	Tertiary	Model 4	D
	Cork University Maternity Hospital	Specialist	-	D
	University Hospital Kerry	General	Model 3	D
	Lourdes Orthopaedic Hospital, Kilcreene, Kilkenny	Specialist	-	C
	Mallow General Hospital	General	Model 2	D
	Mercy University Hospital, Cork	General	Model 3	D
	South Infirmary - Victoria University Hospital, Cork	General	Model 2	D
	South Tipperary General Hospital, Clonmel	General	Model 3	C
	University Hospital Waterford	Tertiary	Model 4	C
UL Hospital Group	Croom Hospital	Specialist	-	E
	Ennis Hospital	General	Model 2	E
	Nenagh Hospital	General	Model 2	E
	St John's Hospital	General	Model 2	E
	University Hospital Limerick	Tertiary	Model 4	E
	University Maternity Hospital Limerick	Specialist	-	E
Private Hospitals	Aut Even, Kilkenny	Private	-	
	Beacon Hospital, Dublin	Private	-	
	Blackrock Clinic	Private	-	
	Bon Secours, Cork	Private	-	
	Bon Secours, Galway	Private	-	
	Bon Secours, Glasnevin	Private	-	
	Bon Secours, Tralee	Private	-	
	Galway Clinic	Private	-	
	Hermitage Medical Clinic, Dublin	Private	-	
	Mater Private, Dublin	Private	-	
	Mater Private, Cork	Private	-	
	St Vincents Private Hospital	Private	-	
Children's Health Ireland	Children's Health Ireland at Tallaght	Specialist	-	
	Children's Health Ireland at Temple St	Specialist	-	

Appendix B
Case Definitions for Surveillance of *Clostridioides difficile* Infection

***For surveillance purposes, a confirmed Clostridioides 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.
- 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