Enhanced Surveillance of *Clostridioides (Clostridium) difficile* Infection in Ireland: Q4 2024 National Report

Executive Summary

- This report includes enhanced surveillance of *C. difficile* infection (CDI) in Ireland for Q3 and Q4 2024 with a focus on Q4 2024, compared with Q4 2023, in the executive summary. This report compares these quarters in Table 1 and Figure 1
- During Q4 2024, a total of 605 cases of CDI were reported to the enhanced surveillance scheme, with 57 of the 62[1] acute Irish public and private hospitals now participating.
- The national overall rate of CDI in hospitalised patients in Q4 2024 was 4.5 cases per 10,000 bed days used (BDU) [460 cases], which is higher to that reported for Q4 2023 [444 cases; rate = 4.1]
- There were 272 cases of CDI deemed to be hospital-acquired (HA-CDI), of which 250 were new, representing a national HA-CDI rate of 2.5 [median rate = 1.0]
- With regard to acquisition, while *C. difficile* was mostly associated with acute hospitals (272; 45%), there were many cases associated with the community (153; 25%) and long-term care facilities (38; 11%)
- CDI symptom onset occurred in the community for 39% of all cases (n=238):
    - 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 Q3 and Q4 2024. ST2 (11%) ST8 (10%) and ST11 (8%) were most frequently reported with 159 clusters notified.

[1] Data for Q3 and Q4 2024 was not returned by four general hospitals and one private hospital.

Part 1: National CDI Epidemiology Q4 2024

CDI data was reported to the enhanced surveillance programme from 57[2] of the 62 participating acute public and private hospitals across Ireland (***Appendix A***). There were 605 reported CDI cases in patients aged ≥2 years. Of those, 460 were reported in hospitalised patients, giving a national CDI rate in hospitalised patients of 4.5 cases per 10,000 bed days used (BDU), which is higher to that reported for Q4 2023 [444 cases; rate 4.1]. The majority were aged ≥65 years (67%) and were female (57%). ***Table 1*** displays the breakdown of all CDI cases for Q4 2024 compared with Q4 2023 case data, by case type, origin, onset and severity. In Q4 2024, 14 cases (2%) of severe CDI were reported, defined as requiring critical care admission or colectomy due to complications of CDI in ***Table 2***. Three cases required both colectomy and critical care admission; three cases required colectomy and 8 other cases required critical care admission. CDI case definitions are summarised in ***Appendix B***

CDI Case Type

The majority were categorised as new infections (82%), with 9% recurrent and for 9%, the CDI case type was unknown.

CDI Origin

The majority were categorised as healthcare-associated (HCA) CDI [n=335; 55%], with community-associated (CA) CDI accounting for 25% [n=153]. Of the community-associated cases, three cases (2%) 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=51; 8%] or was unknown [n=66; 11%]. Of the 335 HCA-CDI cases, the origin was the reporting hospital, termed hospital-acquired (HA) for 272 (81%), a LTCF for 38 (11%) and 'other' or 'unknown healthcare facility' for 25 (8%) cases.

CDI Onset

Patient locations at onset of CDI symptoms included; while admitted to a healthcare facility, termed healthcare-onset (HO) for 314 cases (52%), while residing in the community, termed community-onset (CO) for 238 cases (39%), and unknown patient location for 53 cases (9%). Of 314 HO CDI cases, the reporting hospital was the onset location for 263 (84%), a LTCF for 33 (11%), other healthcare facilities for 14 (4%) and unknown healthcare location for four cases (1%).

[2] Data for Q3 & Q4 2024 was not returned by four general hospitals and one private hospital

Table 1. National CDI epidemiology: Q3 &Q4 2023 versus Q3 &Q4 2024

	2023 Q3		2023 Q4		2024 Q3		2024 Q4	
	n	%	n	%	n	%	n	%
Total reported cases	**534**	-	**582**	-	**606**	-	**605**	-
CDI Case Type								
– New	445	*83%*	497	*85%*	500	*83%*	495	*82%*
– Recurrent	51	*10%*	45	*8%*	48	*8%*	54	*9%*
– Unknown	38	*7%*	40	*7%*	58	*10%*	56	*9%*
CDI Origin								
– Healthcare-associated (HCA)	**306**	***57%***	**318**	***55%***	**335**	***55%***	**335**	***55%***
Reporting hospital	243	*79%*	273	*86%*	271	*81%*	272	*81%*
Long term care facility	25	*8%*	15	*5%*	41	*12%*	38	*11%*
Other healthcare facility	34	*11%*	21	*7%*	23	*7%*	24	*7%*
Unknown healthcare facility	4	*1%*	9	*3%*	0	*0%*	1	*0%*
– Community associated (CA)	**149**	***28%***	**190**	***33%***	**160**	***26%***	**153**	***25%***
Ambulatory care*	8	*5%*	8	*4%*	5	*3%*	3	*2%*
– Discharged 4 – 12 weeks from HCF	**52**	***10%***	**32**	***5%***	**41**	***7%***	**51**	***8%***
– Unknown origin	**27**	***5%***	**42**	***7%***	**70**	***12%***	**66**	***11%***
CDI Onset								
– Healthcare onset (HO)	**282**	***53%***	**290**	***50%***	**288**	***48%***	**314**	***52%***
Reporting hospital	226	*80%*	252	*87%*	240	*83%*	263	*84%*
Long term care facility	23	*8%*	19	*7%*	36	*13%*	33	*11%*
Other healthcare facility	25	*9%*	10	*3%*	9	*3%*	14	*4%*
Unknown location	8	*3%*	9	*3%*	3	*1%*	4	*1%*
– Community onset (CO)	**236**	***44%***	**259**	***45%***	**268**	***44%***	**238**	***39%***
– Unknown onset location	**16**	***3%***	**33**	***6%***	**50**	***8%***	**53**	***9%***
CDI Severity								
Critical care admission or colectomy	17	*3%*	17	*3%*	15	*2%*	14	*2%*

*5 community-acquired cases received ambulatory care in Q3 2024 which was described as: Nephrology/Dialysis (n=2); Oncology (n=2) Frequent OPD attender-unspecified (n=1). 3 community-acquired cases received ambulatory care in Q4 2024 which included; Haematology/Oncology (n=2); Medical (n=1).

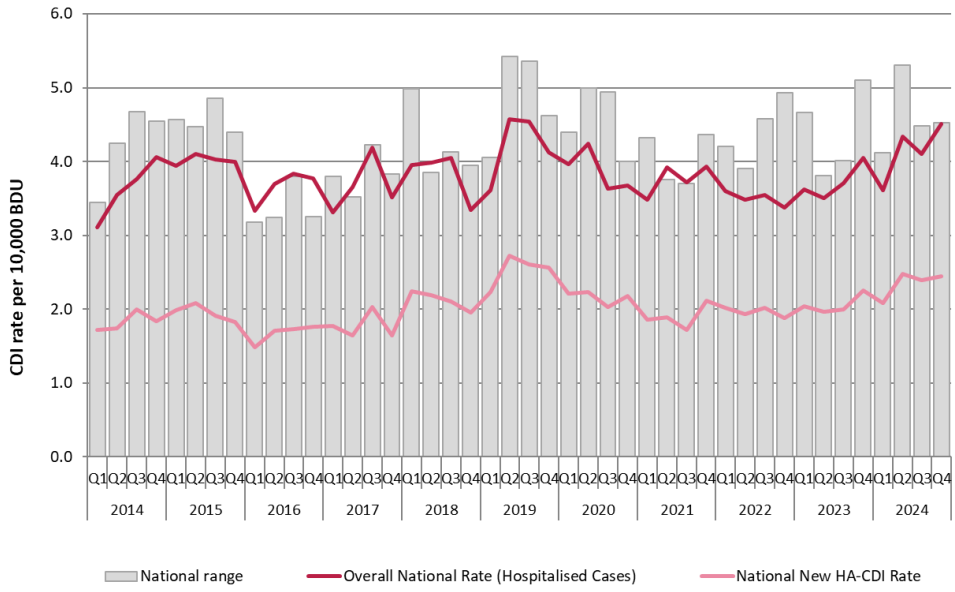
Table 2. Severity of illness: Q4 2024

		ICU Admission			Total
		Yes	No	Unknown	
Surgery (Colectomy)	Yes	3	3	-	**6**
	No	7	457	-	**464**
	Unknown	1	44	90	**135**
	Total	**11**	**504**	**90**	**605**

Part 2: Hospital-acquired CDI (HA-CDI) Epidemiology – Q4 2024

Data on HA-CDI was reported from 57 of the 62 acute public and private hospitals across Ireland. There were 272 HA-CDI cases in patients aged ≥2 years during Q4 2024. Of those, 250 were new HA-CDI cases, representing a national new HA-CDI rate of 2.5 [median rate = 1.0], similar than that reported for Q4 2023 [273 cases; rate = 2.3; median rate = 1.2]. ***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 272 HA-CDI cases were categorised as new infections (250; 92%), with 20 (7%) recurrent cases and for two cases (1%) 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 239 cases (88%) and while residing in the community, termed community-onset (CO) for 33 cases (12%).

Of 239 HO-CDI cases, the reporting hospital was the onset location for 232 cases (97%), a LTCF for two cases (1%), other healthcare facility for 1 case and location was unknown for four cases (2%).

Table 3. Quarterly HA-CDI data: 2023 – 2024

YearQ	Number of participating hospitals	Number of cases reported				CDI rate per 10,000 BDUs		
		New	Recurrent	Unknown	Total	Rate	Range[c]	Median
2023Q1	55	212	14	2	**228**	2.0	0 - 4.7	1.4
2023Q2	53	213	14	4	**231**	2.0	0 - 3.8	1.3
2023Q3	59	216	24	3	**243**	2.0	0 - 4	0.9
2023Q4	60	247	22	3	**272**	2.3	0 - 5.1	1.2
2024Q1	59	236	19	5	**260**	2.1	0 - 4.1	1.0
2024Q2	59	269	25	9	**303**	2.5	0 - 5.3	1.0
2024Q3	57	251	19	1	**271**	2.4	0 - 4.5	1.4
2024Q4	57	250	20	2	**272**	2.5	0 - 4.5	1.0

Part 3: *C. difficile* Testing Methods – Q4 2024

All 57 hospitals participating in the enhanced CDI surveillance system during Q4 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=50;88%) or a single-step method using molecular polymerase chain reaction (PCR) test for *C. difficile* toxin gene (n=7;12%), as displayed in ***Table 4***, along with stratification by hospital type.

Table 4. *C. difficile* testing methods utilised in Q4 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	2	–	–	**3**
2 STEP: GDH AND TOXIN EIA with TOXIN PCR confirmation	4	7	1	–	**12**
2 STEP: GDH EIA AND Toxin PCR	3	–	–	–	**3**
2 STEP: PCR followed by confirmatory EIA toxn	13	3	8	8	**32**
Total	**23**	**12**	**13**	**9**	**57**

Part 4: *C. difficile* Irish National Reference Laboratory (NRL) Genomic Sequence results – Q3 & Q4 2024

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

The NRL received 356 *C. difficile* isolates in Q3 2024 and 352 *C. difficile* isolates in Q2 2024 (total n=708) spanning 24 hospitals nationally out of which 468(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).

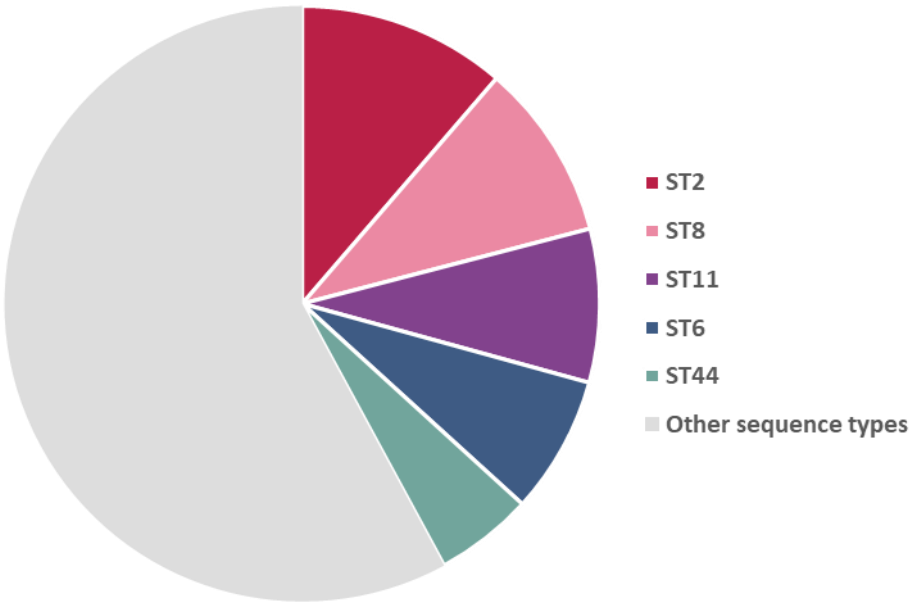
Of these 468 cases, the majority (93%; n=434) were new infections. A high proportion (72%; n=338) had an origin associated with a healthcare facility and 20% (n=95) were associated with infection in the community.

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=468), Q3 & Q4 2024

	Total cases		ST2		ST8		ST11	
	n	%	n	%	n	%	n	%
Total reported cases with sequence typing	**468**	-	53	*11%*	45	*10%*	39	*8%*
CDI toxin genotype								
***tcdA* positive**	440	*94%*	53	*100%*	43	*96%*	28	*72%*
***tcdB* positive**	464	*99%*	53	*100%*	44	*98%*	39	*100%*
***tcdC* positive**	409	*87%*	53	*100%*	45	*100%*	8	*21%*
***cdtA/cdtB* positive**	73	*16%*	-	-	-	-	39	*100%*
CDI cases identified as part of clusters	275	*59%*	25	*47%*	37	*82%*	35	*90%*
CDI Case Type								
– New	434	*93%*	48	*91%*	44	*98%*	31	*79%*
– Recurrent	29	*6%*	3	*6%*	1	*2%*	7	*18%*
– Unknown	5	*1%*	2	*4%*	-	-	1	*3%*
CDI Origin								
– Healthcare-associated (HCA)	338	*72%*	40	*75%*	30	*67%*	28	*72%*
– Community associated (CA)	95	*20%*	11	*21%*	9	*20%*	7	*18%*
– Discharged 4-12 weeks from HCF	29	*6%*	2	*4%*	6	*13%*	2	*5%*
– Unknown	6	*1%*	-	-	-	-	2	*5%*
CDI Severity								
Critical care admission or colectomy	8	*2%*	1	*2%*	1	*2%*	1	*3%*

A total of 63 different sequence types (Jolley *et. al.,* 2018) were detected for the matched isolates – see ***Figure 2***. ST2 (11% of matched isolates), ST8 (10%) and ST11 (8%) were the most frequently detected sequence types.

Figure 2. Most frequently detected *C. difficile* sequence types of matched cases, Q3 &Q4 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

The HPSC & National Reference Laboratory Service for *C. difficile* would like to sincerely thank all who have contributed to this report, especially Surveillance Scientists, Infection Prevention and Control Nurses, Infection Prevention and Control Teams, Medical Scientists, Clinical Microbiologists, along with all the staff of the Departments of Public Health.

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
	Tipperary University Hospital	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	-	
	UPMC Sports Surgery Clinic	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