Enhanced Surveillance of *Clostridioides (Clostridium) difficile* Infection in Ireland: Q3 2022 National Report

Executive Summary

- During Q3 2022, a total of 450 cases of CDI were reported to the enhanced surveillance scheme from 55[1] acute public and private hospitals across Ireland now participating
- The national overall rate of CDI in hospitalised patients was 3.5 cases per 10,000 bed days used (BDU) [339 cases], which is similar to that reported for Q3 2021 [354 cases; rate = 3.7]
- There were 209 cases of CDI deemed to be hospital-acquired (HA-CDI), of which 192 were new, representing a national new HA-CDI rate of 2.0 [median rate = 1.1]
- With regard to acquisition, while *C. difficile* was mostly associated with acute hospitals (209; 46%), there were many cases associated with the community (147; 33%) whereby patients had no overnight stay in a healthcare facility (HCF) in the 12 weeks prior to symptom onset.
- CDI symptom onset occurred in the community for 48% of all cases (216):
    - 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 102 (23%) isolates during Q3 with data analysis on 102 isolates with confirmed sample dates within Q3. ST8 (15%), ST6 (12%) and ST11 (11%) were most frequently reported and 25 clusters were notified
- Ribotyping data was available for 19% (n=84) of cases, with ribotypes 002 and 014 (11% of ribotyped cases reported with equal frequency), 001 and 078 (10% each, reported with equal frequency) and 005 and 023 (8% each, reported with equal frequency) the most frequently reported

[1] Data for Q3 2022 was not returned by one tertiary hospital on behalf of five participating hospitals from HSE regional health area C

Part 1: National CDI Epidemiology Q3 2022

CDI data was reported to the enhanced surveillance programme from 55[2] of the 60 acute public and private hospitals across Ireland (***Appendix A***). There were 450 reported CDI cases in patients aged ≥2 years. Of those, 339 were reported in hospitalised patients, giving a national CDI rate in hospitalised patients of 3.5 cases per 10,000 bed days used (BDU), which is similar to that reported for Q3 2021 [354 cases; rate 3.7]. The majority were aged ≥65 years (65%) and were female (59%). ***Table 1*** displays the breakdown of all CDI cases for Q3 2022 compared with Q3 2021 case data, by case type, origin, onset and severity. In Q3 2022, ten cases of severe CDI were reported (2%), defined as requiring critical care admission or colectomy due to complications of CDI in ***Table 2***, with 11 cases (2%) for Q3 2021. Three cases required both colectomy and critical care admission; two other cases required colectomy and five other cases required critical care admission. CDI case definitions are summarised in ***Appendix B***.

CDI Case Type

The majority were categorised as new infections (88%), with 9% recurrent and for 3%, the CDI case type was unknown.

CDI Origin

The majority were categorised as healthcare-associated (HCA) CDI [n=254; 56%], with community-associated (CA) CDI accounting for 33% [n=147]. Of the community-associated cases, seven cases (5%) 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=37; 8%] or was unknown [n=12; 3%]. Of the 254 HCA-CDI cases, the origin was the reporting hospital, termed hospital-acquired (HA) for 209 (82%), a LTCF for 22 (9%) and 'other' or 'unknown healthcare facility' for 23 (9%).

CDI Onset

Patient locations at onset of CDI symptoms included; while admitted to a healthcare facility, termed healthcare-onset (HO) for 227 cases (50%), while residing in the community, termed community-onset (CO) for 216 cases (48%), and unknown patient location for seven cases (2%). Of 227 HO CDI cases, the reporting hospital was the onset location for 186 (82%), a LTCF for 26 (11%), other healthcare facilities for 11 (5%) and unknown healthcare location for four cases (2%).

[2] Data for Q3 2022 was not returned by one tertiary hospital on behalf of five participating hospitals from HSE regional health Area C.

Table 1. National CDI epidemiology: Q3 2022 versus 2021

	2022 Q3		2021 Q3	
	n	%	n	%
Total reported cases	**450**	-	**449**	-
CDI Case Type				
– New	395	*88%*	393	*88%*
– Recurrent	40	*9%*	33	*7%*
– Unknown	15	*3%*	23	*5%*
CDI Origin				
– Healthcare-associated (HCA)	**254**	***56%***	**220**	***49%***
Reporting hospital	209	*82%*	182	*83%*
Long term care facility	22	*9%*	23	*10%*
Other healthcare facility	21	*8%*	13	*6%*
Unknown healthcare facility	2	*1%*	2	*1%*
– Community associated (CA)	**147**	***33%***	**159**	***35%***
Ambulatory care*	7	*5%*	-	-
– Discharged 4 – 12 weeks from HCF	**37**	***8%***	**40**	***9%***
– Unknown origin	**12**	***3%***	**30**	***7%***
CDI Onset				
– Healthcare onset (HO)	**227**	***50%***	**224**	***50%***
Reporting hospital	186	*82%*	185	*83%*
Long term care facility	26	*11%*	22	*10%*
Other healthcare facility	11	*5%*	9	*4%*
Unknown location	4	*2%*	8	*4%*
– Community onset (CO)	**216**	***48%***	**212**	***47%***
– Unknown onset location	**7**	***2%***	**13**	***3%***
CDI Severity				
Critical care admission or colectomy	10	*2%*	11	*2%*

*Seven community-acquired cases received ambulatory care in Q3 2022 which was described as: Haematology (n=1); Haematology/Oncology (n=1); Hepatology (n=1); Oncology (n=1) and frequent Outpatient department attendance (n=3)

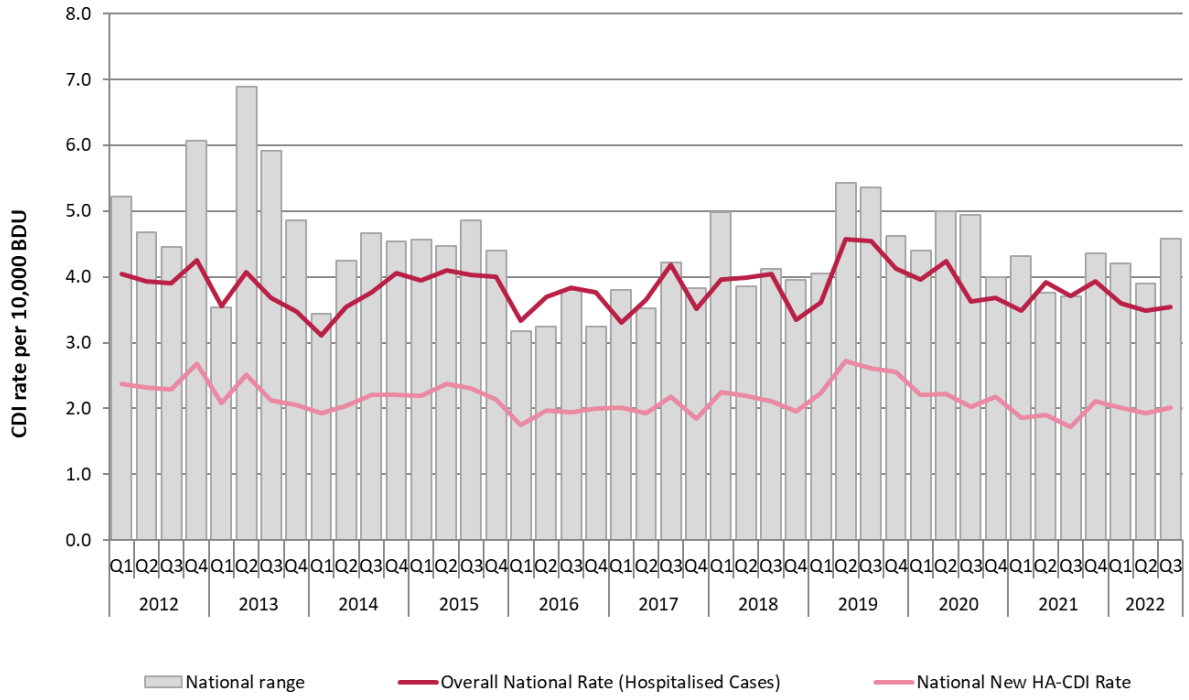
Table 2. Severity of illness: Q3 2022

		ICU Admission			Total
		Yes	No	Unknown	
Surgery (Colectomy)	Yes	3	2	-	**5**
	No	5	381	17	**403**
	Unknown	-	19	23	**42**
	Total	**8**	**402**	**40**	**450**

Part 2: Hospital-acquired CDI (HA-CDI) Epidemiology – Q3 2022

Data on HA-CDI was reported from 55[3] of the 60 acute public and private hospitals across Ireland. There were 209 HA-CDI cases in patients aged ≥2 years during Q3 2022. Of those, 192 were new HA-CDI cases, representing a national new HA-CDI rate of 2.0 [median rate = 1.1], higher than that reported for Q3 2021 [164 cases; rate = 1.7; median rate = 0.8]. ***Figure 1*** displays quarterly HA-CDI rates since 2012 and ***Table 3*** displays quarterly HA-CDI data from 2020 to 2022.

Figure 1. Quarterly national HA-CDI rates: 2012 – 2022



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 209 HA-CDI cases were categorised as new infections (192; 92%), with 17 (8%) recurrent cases.

CDI Onset

Patient locations at onset of HA-CDI symptoms included; while admitted to a healthcare facility, termed healthcare-onset (HO) for 180 cases (86%) and while residing in the community, termed community-onset (CO) for 29 cases (14%).

Of 180 HO-CDI cases, the reporting hospital was the onset location for 175 (97%), a LTCF for four cases (2%) and location was unknown for one case (0.5%).

[3] Data for Q3 2022 was not returned by one tertiary hospital on behalf of five participating hospitals from HSE regional health Area C.

Table 3. Quarterly HA-CDI data: 2020 – 2022

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
2020Q4	57	195	15	0	**210**	2.2	0 - 4	1.2
2021Q1	58[d]	167	20	1	**188**	1.9	0 - 4.3	1.0
2021Q2	58[d]	183	12	1	**196**	1.9	0 - 3.8	1.3
2021Q3	57[e]	164	17	1	**182**	1.7	0 - 3.7	0.8
2021Q4	57[e]	203	18	1	**222**	2.1	0 - 4.4	1.0
2022Q1	57[f]	191	22	2	**215**	2	0 - 4.2	1.3
2022Q2	60	200	18	3	**221**	1.9	0 - 3.9	1.2
2022Q3	55[g]	192	17	0	**209**	2.0	0 - 4.6	1.1

a Since Q1 2012, 97% of all tertiary and general hospitals participated in the enhanced surveillance system.
b The CDI rate is the number of **new** cases of CDI that were acquired in the reporting hospital - per 10,000 bed days used (BDUs).
c The national range corresponds to the 5th to 95th percentile of the data.
d Data was retrospectively submitted by the Hermitage Medical Clinic for Q1 & 2 2021.
e Since Q3 2021, the National Rehabilitation Hospital and Hermitage Medical Clinic have joined, bringing the total number of participating hospitals to 59. Data was not available from one tertiary and one specialist hospital for Q3 or Q4 2021.
f Since Q1 2022, Children's Health Ireland at Tallaght is reporting separately to Tallaght University Hospital bringing the total number of participating hospitals to 60. Data was not available from one tertiary, one general and one specialist hospital in Q1 2022
g Data 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
Data for Q3 2022 are provisional

Part 3: *C. difficile* Testing Methods – Q3 2022

All 55 hospitals participating in the enhanced CDI surveillance system during Q3 2022 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=44; 80%) or a single-step method using molecular polymerase chain reaction (PCR) test for *C. difficile* toxin gene (n = 11; 20%), as displayed in ***Table 4***, along with stratification by hospital type.

Table 4. *C. difficile* testing methods utilised in Q3 2022, by hospital type

Test Category	Hospital Type				Total
	General	Private	Specialist	Tertiary	
1 STEP: PCR for toxin gene	4	-	5	2	**11**
2 STEP: GDH EIA, followed by confirmatory *C. difficile* toxin EIA	3	3	-	-	**6**
2 STEP: Combined GDH with toxin EIA, followed by PCR*	4	6	1	-	**11**
2 STEP: GDH EIA, followed by confirmatory toxin PCR	3	-	1	-	**4**
2 STEP: PCR, followed by confirmatory toxin EIA	10	3	4	6	**23**
Total	**24**	**12**	**11**	**8**	**55**

PCR for *C. difficile* toxin gene: Polymerase chain reaction (PCR) for the detection of TcdA and/or TcdB genes
GDH EIA: Enzyme immunoassay (EIA) for the detection of glutamate dehydrogenase (GDH) of *C. difficile*
GDH AND TOXIN EIA: Enzyme immunoassay (EIA) for the detection of both *C. difficile* GDH and *C. difficile* toxin TcdA and/or TcdB
***2 STEP: Combined GDH with toxin EIA, followed by confirmatory PCR:** Addition of confirmatory PCR if the initial toxin EIA is negative

Part 4: *C. difficile* Irish National Reference Laboratory (NRL) Genomic Sequence results – Q3 2022

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

A total of 57 cases of CDI reported to the enhanced surveillance system at HPSC (13% of total reported cases) matched with data from NRL whole genome sequencing (WGS) of CDI isolates in Q3 2022, as displayed in ***Table 5***.

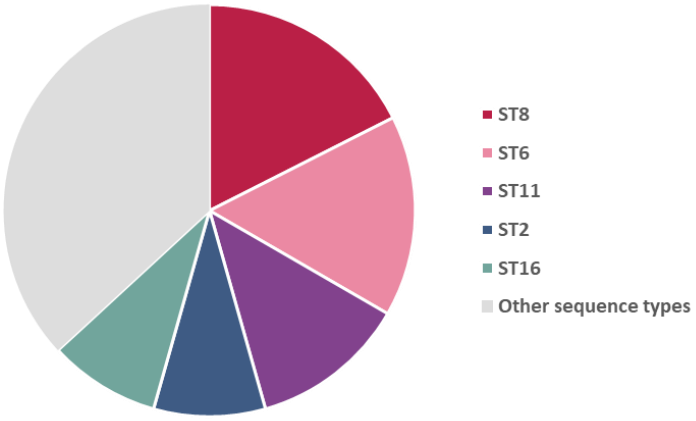
Of these 57 cases, the majority (98%; n=56) were new infections. A high proportion (72%; n=41) had an origin associated with a healthcare facility and 18% (n=10) were associated with infection in the community.

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=57), Q3 2022

	Total cases		ST8		ST6		ST11	
	n	%	n	%	n	%	n	%
Total reported cases with sequence typing	**57**	-	10	*18%*	9	*16%*	7	*12%*
CDI toxin genotype								
***tcdA* positive**	54	*95%*	10	*100%*	9	*100%*	6	*86%*
***tcdB* positive**	57	*100%*	10	*100%*	9	*100%*	7	*100%*
***tcdC* positive**	46	*81%*	10	*100%*	9	*100%*	0	-
***cdtA/cdtB* positive**	10	*18%*	0	-	0	-	7	*100%*
CDI cases identified as part of clusters	24	*42%*	3	*30%*	3	*33%*	6	*86%*
CDI Case Type								
– New	56	*98%*	10	*100%*	9	*100%*	7	*100%*
– Recurrent	1	*2%*	-	-	-	-	-	-
– Unknown	-	-	-	-	-	-	-	-
CDI Origin								
– Healthcare-associated (HCA)	41	*72%*	7	*70%*	6	*67%*	6	*86%*
– Community associated (CA)	10	*18%*	2	*20%*	3	*33%*	-	-
– Discharged 4-12 weeks from HCF	5	*9%*	1	*10%*	-	-	-	-
– Unknown	1	*2%*	-	-	-	-	1	*14%*
CDI Severity								
Critical care admission or colectomy	1	*2%*	0	-	0	-	0	-

A total of 20 different sequence types (Jolley *et. al.,* 2018) were detected for the matched isolates – see ***Figure 2***. ST8 (18% of matched isolates), ST6 (16%) and ST11 (12%) were the most frequently detected sequence types.

Figure 2. Most frequently detected *C. difficile* sequence types of matched cases, Q3 2022 (Source: NRL)



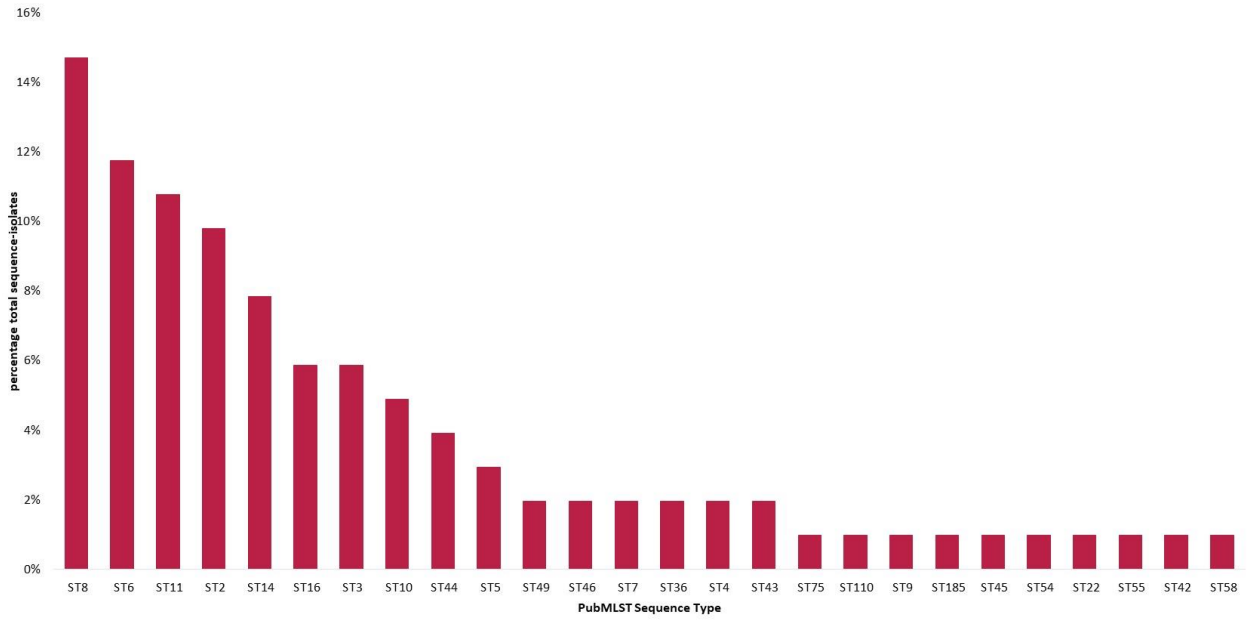
2. *C. difficile* whole-genome sequencing results for all isolates referred to the NRL, Q3 2022

The NRL received 102 *C. difficile* isolates in Q3 2022. This included 57 (56%) *C. difficile* isolates 'matched' and 45 (44%) 'unmatched' isolates with the *C. difficile* national enhanced surveillance scheme. Inability to match the datasets was primarily due to inadequate data submitted on the NRL request form e.g. a different sample number reported to the enhanced surveillance system to that submitted to NRL, lack of DOB or sample date etc. However, matching has improved compared to Q2 2022 data (2%) and we hope this improvement will continue as clients become more familiar with the *C. difficile* NRL request forms and the need to provide accurate matching information to both systems.

The NRL cultured 102 (23% of total CDI reported to HPSC) isolates (1 per case) submitted in Q3, 2022 from 18 diagnostic hospital laboratories nationally. These were all whole genome sequenced and analysed using cgMLST. Please note, ribotyping is not part of the Irish NRL *C. difficile* service. Of the 102 *C. difficile* isolates confirmed with sample dates within Q3 2022, all (100%) were phenotypically susceptible to both metronidazole & vancomycin (EUCAST 2022 criteria).

A total of 26 different sequenced types (STs) were detected. ST8 (15%), ST6 (12%), ST11 (11%) and ST2 (10%) were the commonest sequence types, as shown in ***Figure 3***. However, this differs from Q2 2022 data with double the variety of sequence types now detected (Q2 2022, n=13 : Q3 2022, n=26) and the order of predominance in which the sequence types were detected. However, 2 sequence types (ST11 & ST8) continue to be in the top 3 found in both quarters. This demonstrates the dynamic nature of *C. difficile* strains causing CDI, but the annual figures will provide more accurate information on these trends.

Figure 3. *C. difficile* sequence types of isolates, Q3 2022 (n=102; Source: NRL)



The toxigenic genotypes detected are shown in ***Table 6.*** Of note the virulence factors denoted by possesion of binary toxins (*cdtA&B* gene positivity*)* and deletion of the inhibitory *tcd*C gene was found in all of the ST11 strains, which accounted for 73% of hypervirulent strains detected in Q3 and truncation of the inhibitory *tcdC* gene was found in all of the ST11 strains.

Cluster identification was performed weekly using cgMLST. 25 clusters sent from 18 hospital laboratories in Q3 (cgMLST WGS allelic difference ≤2) were notified to clients & relevant Regional Public Health Depts for further investigation of a possible transmission event. Please note, while 38 (37%) Q3 isolates of *C. difficile* were identified in clusters, some of these clusters contained isolates from earlier in the year. ST11 accounted for the most (n=7) clusters, which was similar to Q2 data, followed by ST8 accounting for 4 clusters. The largest cluster involved 4 isolates submitted from 4 different hospital laboratories.

Table 6. *C. difficile* NRL WGS profile of all referred *C. difficile* isolates, Q3 2022 (n=102; Source: NRL)

	Total cases		ST8		ST6		ST11		ST2	
	n	%	n	%	n	%	n	%	n	%
Total CDI cases sequenced	102	-	15	*15%*	12	*12%*	11	*11%*	10	*10%*
CDI toxin genotype										
***tcdA* positive**	99	*97%*	15	*100%*	12	*100%*	10	*91%*	10	*100%*
***tcdB* positive**	102	*100%*	15	*100%*	12	*100%*	11	*100%*	10	*100%*
***tcdC* positive**	87	*85%*	15	*100%*	12	*100%*	-	-	10	*100%*
***cdtA/cdtB* positive**	14	*14%*	-	-	-	-	11	*100%*	-	-
CDI isolates identified as part of clusters	38	*37%*	6	*40%*	4	*33%*	8	*73%*	2	*20%*

Ribotyping of *C. difficile* infection cases, Q3 2022 (accessed in the UK)

Ribotyping data was available for 19% (n=84) of CDI cases reported to the CDI enhanced surveillance scheme. Ribotypes 002 and 014 (11% of ribotyped cases reported with equal frequency), 001 and 078 (10% each, reported with equal frequency) and 005 and 023 (8% each, reported with equal frequency) were the most frequently reported.

In total, 179 isolates in Q3 2022 have undergone at least one genomic typing method (n=84 cases with ribotyping; n=102 isolates with sequence typing, of which 57 matched with reported cases and seven of these cases reported both ribotyping and sequence typing). As WGS & ribotyping are not directly comparable and cgMLST WGS is a more discriminatory molecular typing tool, it is now preferable that all Irish *C.difficile* isolates are characterised using the WGS platform at the NRL for improved integration with the national enhanced surveillance data.

The continued development of this 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 due to the additional demands placed on those involved in HCAI surveillance in Ireland, caused by the impact of COVID-19: Microbiology Surveillance Scientists, Infection Prevention and Control Nurses, Microbiology Laboratory Scientists, Clinical Microbiologists, along with all the staff of the Departments of Public Health across Ireland.

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
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