Enhanced Surveillance of *Clostridioides (Clostridium) difficile* Infection in Ireland: Q4 2020 National Report

Executive Summary

- Extraordinarily, this report includes enhanced surveillance of *C. difficile* infection (CDI) in Ireland from Q4 2019 to Q4 2020 with a focus on Q4 2020, compared with Q4 2019, in the summary. Analysis of quarters 1-3 of 2020 will be incorporated in the upcoming annual report. Unfortunately, the management of COVID-19 has impacted this surveillance system, resulting in a delay in the reporting of these quarterly datasets. We acknowledge the impact COVID-19 has had on our colleagues involved in both infection prevention, control and surveillance of CDI across Ireland and are very grateful for the effort they have made in preparing and returning the data included herein. This report compares the most recent Q4 2020 case epidemiology with Q4 2019 and also describes in Table 1, Figure 1 and Figure 2 that of the intervening quarters
- During Q4 2020, a total of 408 cases of CDI were reported to the enhanced surveillance scheme from 57 acute public and private hospitals across Ireland
- The national overall rate of CDI in hospitalised patients was 3.6 cases per 10,000 bed days used (BDU) [320 cases], lower than that reported for Q4 2019 [429 cases; rate = 4.1]
- There were 202 cases of CDI deemed to be hospital-acquired (HA-CDI), of which 186 were new, representing a national new HA-CDI rate of 2.1 [median rate = 1.2]
- With regard to acquisition, while *C. difficile* was mostly associated with acute hospitals (202; 50%), there were many cases associated with the community (123; 30%) and very few associated with long-term care facilities (LTCF) (9; 2%)
- CDI symptom onset occurred in the community for 49% of all cases (198):
    - This emphasises the importance of considering CDI when evaluating any patient with potentially infectious diarrhoea in all healthcare settings, including hospitals, primary care and 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
- Ribotyping data was available for just 20% of cases, with ribotypes 014 (17% of ribotyped cases), 002 (10%) and 023 (9%) the most frequently reported. We are very pleased to report that the Public Health Laboratory at Cherry Orchard hospital will act as the national reference laboratory service for CDI from October 2021

Part 1: National CDI Epidemiology Q4 2020

CDI data was reported to the enhanced surveillance programme from 57 acute public and private hospitals across Ireland (***Appendix A***). There were 408 reported CDI cases in patients aged ≥2 years. Of those, 320 were reported in hospitalised patients, giving a national CDI rate in hospitalised patients of 3.6 cases per 10,000 bed days used (BDU), which is lower than that reported for Q4 2019 [429 cases; rate 4.1]. The majority were aged ≥65 years (65%) and were female (56%). ***Table 1*** displays the breakdown of all CDI cases for Q4 2020 compared with the previously unreported Q4 2019 – Q3 2020 case data, by case type, origin, onset and severity. A reduction in the total number of reported CDI cases over time from Q4 2019 to Q4 2020 was evident and will be discussed in greater detail in the 2020 annual report. In Q4 2020, 11 cases of severe CDI were reported (3%), defined as requiring critical care admission or colectomy due to complications of CDI in ***Table 2***, versus seven cases (1%) for Q4 2019. CDI case definitions are summarised in ***Appendix B***.

CDI Case Type

The majority were categorised as new infections (87%), with 8% recurrent and for 6%, the CDI case type was unknown.

CDI Origin

The majority were categorised as healthcare-associated (HCA) CDI [n=227; 56%], with community-associated (CA) CDI accounting for 30% [n=123]. For the remainder, the origin either could not be determined [n=31; 8%] or was unknown [n=27; 7%]. Of the 227 HCA-CDI cases, the origin was the reporting hospital, termed hospital-acquired (HA) for 202 (89%), a LTCF for nine (4%) and 'other' or 'unknown healthcare facility' for 16 (7%).

CDI Onset

Patient locations at onset of CDI symptoms included; while residing in the community, termed community-onset (CO) for 198 cases (49%), while admitted to a healthcare facility, termed healthcare-onset (HO) for 197 cases (48%) and unknown patient location for 13 cases (3%). Of 197 HO CDI cases, the reporting hospital was the onset location for 171 (87%), a LTCF for 13 (7%), other healthcare facilities for eight (4%) and unknown healthcare location for five (3%).

Table 1. National CDI epidemiology: Q4 2019 – Q4 2020

	2019		2020							
	Q4		Q1		Q2		Q3		Q4	
	n	%	n	%	n	%	n	%	n	%
Total reported cases	**556**	-	**486**	-	**391**	-	**422**	-	**408**	-
CDI Case Type										
– New	483	*87%*	397	*82%*	343	*88%*	373	*88%*	354	*87%*
– Recurrent	42	*8%*	65	*13%*	35	*9%*	29	*7%*	31	*8%*
– Unknown	31	*6%*	24	*5%*	13	*3%*	20	*5%*	23	*6%*
CDI Origin										
– Healthcare-associated (HCA)	**354**	***64%***	**301**	***62%***	**222**	***57%***	**232**	***55%***	**227**	***56%***
Reporting hospital	287	*81%*	250	*83%*	184	*83%*	194	*84%*	202	*89%*
Long term care facility	35	*10%*	34	*11%*	16	*7%*	21	*9%*	9	*4%*
Other healthcare facility	26	*7%*	16	*5%*	19	*9%*	17	*7%*	14	*6%*
Unknown healthcare facility	6	*2%*	1	*0%*	3	*1%*	0	*0%*	2	*1%*
– Community associated (CA)	**127**	***23%***	**121**	***25%***	**115**	***29%***	**122**	***29%***	**123**	***30%***
– Discharged 4-12 weeks from HCF	**33**	***6%***	**34**	***7%***	**29**	***7%***	**44**	***10%***	**31**	***8%***
– Unknown origin	**42**	***8%***	**30**	***6%***	**25**	***6%***	**24**	***6%***	**27**	***7%***
CDI Onset										
– Healthcare onset (HO)	**318**	***57%***	**278**	***57%***	**208**	***53%***	**222**	***53%***	**197**	***48%***
Reporting hospital	270	*85%*	235	*85%*	175	*84%*	184	*83%*	171	*87%*
Long term care facility	31	*10%*	31	*11%*	14	*7%*	22	*10%*	13	*7%*
Other healthcare facility	11	*3%*	5	*2%*	15	*7%*	12	*5%*	8	*4%*
Unknown location	6	*2%*	7	*3%*	4	*2%*	4	*2%*	5	*3%*
– Community onset (CO)	**224**	***40%***	**191**	***39%***	**165**	***42%***	**190**	***45%***	**198**	***49%***
– Unknown onset location	**14**	***3%***	**17**	***3%***	**18**	***5%***	**10**	***2%***	**13**	***3%***
CDI Severity										
Critical care admission or colectomy	7	*1%*	7	*1%*	9	*2%*	8	*2%*	11	*3%*

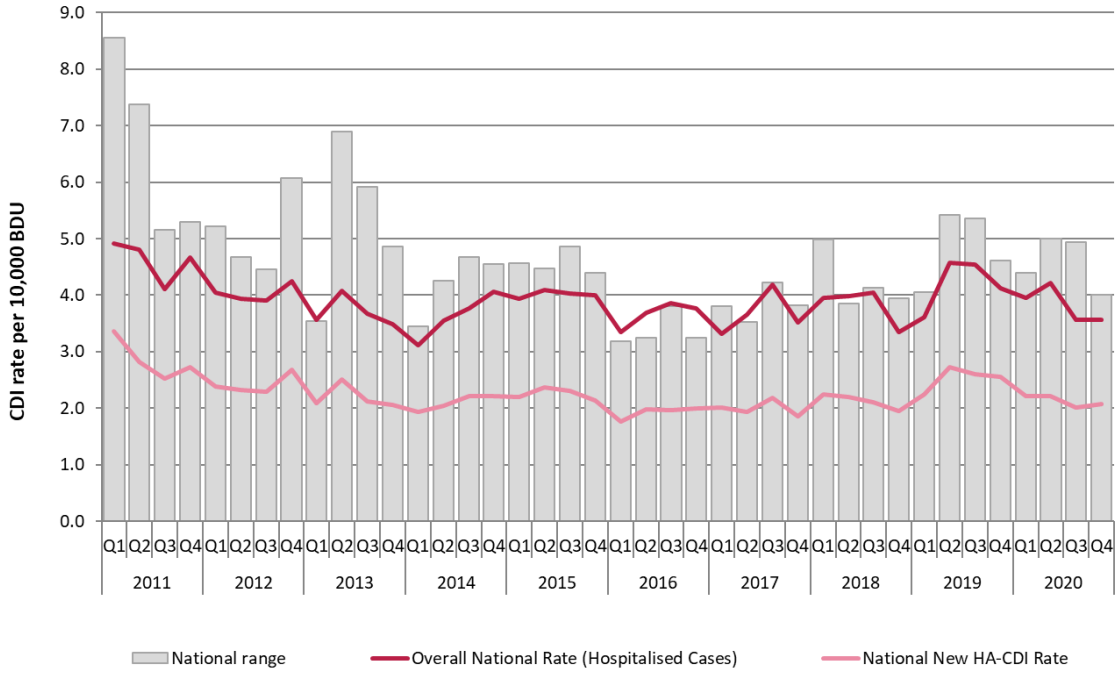
Table 2. Severity of illness: Q4 2020

		ICU admission			Total
		Yes	No	Unknown	
Surgery (Colectomy)	**Yes**	-	-	-	**-**
	No	10	343	1	**354**
	Unknown	1	30	23	**54**
Total		**11**	**373**	**24**	**408**

Part 2: Hospital-acquired CDI (HA-CDI) Epidemiology – Q4 2020

Data on HA-CDI was reported from 57 acute public and private hospitals across Ireland. There were 202 HA-CDI cases in patients aged ≥2 years during Q4 2020. Of those, 186 were new HA-CDI cases, representing a national new HA-CDI rate of 2.1 [median rate = 1.2], lower than that reported for Q4 2019 [267 cases; rate = 2.6; median rate = 1.4]. ***Figure 1*** displays quarterly HA-CDI rates since 2011 and ***Table 3*** displays quarterly HA-CDI data from 2019 to 2020.

Figure 1. Quarterly national HA-CDI rates: 2011 – 2020



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 202 HA-CDI cases were categorised as new infections (186; 92%), with 16 (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 166 cases (82%) and while residing in the community, termed community-onset (CO) for 36 cases (18%).

Of 166 HO-CDI cases, the reporting hospital was the onset location for 157 (95%), a LTCF for two cases (1%), another hospital for two cases (1%) and was unknown for five cases (3%).

Table 3. Quarterly HA-CDI data: 2019 – 2020

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
2019Q1	55	218	22	0	**240**	2.2	0 - 4.1	1.4
2019Q2	56	276	31	0	**307**	2.7	0 - 5.4	2.0
2019Q3	57	268	26	2	**296**	2.6	0 - 5.4	1.6
2019Q4	57	267	19	0	**286**	2.6	0 - 4.6	1.4
2020Q1	57	215	34	1	**250**	2.2	0 - 4.4	1.5
2020Q2	57	165	17	2	**184**	2.2	0 - 5	1.6
2020Q3	57	184	8	2	**194**	2.0	0 - 4.9	1.5
2020Q4	57	186	16	0	**202**	2.1	0 - 4	1.2

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.
Data for Q4 2019-Q4 2020 are provisional

Part 3: *C. difficile* Testing Methods – Q4 2020

All 57 hospitals participating in the enhanced CDI surveillance system during Q4 2020 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=41; 72%) or a single-step method using molecular polymerase chain reaction (PCR) test for *C. difficile* toxin gene (n = 16; 28%), as displayed in ***Table 4***, along with stratification by hospital type.

Table 4. *C. difficile* testing methods utilised in Q4 2020, by hospital type

Test Category	Hospital Type				Total
	General	Private	Specialist	Tertiary	
1 STEP: PCR for toxin gene	7	-	6	3	**16**
2 STEP: GDH EIA, followed by confirmatory *C. difficile* toxin EIA	2	3	-	-	**5**
2 STEP: Combined GDH with toxin EIA, followed by toxin EIA*	1	-	-	-	**1**
2 STEP: Combined GDH with toxin EIA, followed by PCR**	3	6	1	-	**10**
2 STEP: GDH EIA, followed by confirmatory toxin PCR	3	-	-	-	**3**
2 STEP: PCR, followed by confirmatory toxin EIA	11	2	3	6	**22**
Total	**27**	**11**	**10**	**9**	**57**

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 toxin EIA:** Addition of a confirmatory toxin EIA test (using a different EIA kit) if the initial toxin EIA is negative
****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* Ribotyping – Q4 2020

Ribotyping data was available for just 20% of CDI cases reported to the CDI enhanced surveillance scheme. Ribotypes 014 (17% of ribotyped cases), 002 (10%) and 023 (9%) were the most frequently reported.

A new national funded *C. difficile* Reference Laboratory Service has been awarded to Public Health Laboratory, Cherry Orchard hospital and is expected to begin CDI whole genome-sequencing from October 2021. This very welcome step which had been recommended in the national *C. difficile* guidelines since 2008.

The establishment of a national reference laboratory service will add significantly to the understanding of the epidemiology of this important healthcare-associated infection and ultimately to its control and prevention, both here in Ireland and internationally.

Acknowledgments

The HPSC 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
Dublin Midlands	Adelaide & Meath & National Children's Hospital, Tallaght	Tertiary	Model 4
	Coombe Women and Infant's University Hospital	Specialist	-
	Midland Regional Hospital Portlaoise	General	Model 3
	Midland Regional Hospital Tullamore	General	Model 3
	Naas General Hospital	General	Model 3
	St James's Hospital	Tertiary	Model 4
	St Luke's Hospital, Dublin	Specialist	-
Ireland East Hospital Group	Cappagh National Orthopaedic Hospital, Dublin	Specialist	-
	Mater Misericordiae University Hospital	Tertiary	Model 4
	Midland Regional Hospital Mullingar	General	Model 3
	National Maternity Hospital, Holles Street	Specialist	-
	Our Lady's Hospital, Navan	General	Model 3
	Royal Victoria Eye & Ear Hospital, Dublin	Specialist	-
	St Columcille's Hospital, Loughlinstown	General	Model 2
	St Luke's General Hospital, Kilkenny	General	Model 3
	St Michael's Hospital, Dun Laoghaire	General	Model 2
	St Vincent's University Hospital	Tertiary	Model 4
	Wexford General Hospital	General	Model 3
RCSI Hospital Group	Beaumont Hospital	Tertiary	Model 4
	Cavan General Hospital	General	Model 3
	Connolly Hospital, Blanchardstown	General	Model 3
	Louth County Hospital, Dundalk	General	Model 2
	Our Lady of Lourdes Hospital, Drogheda	General	Model 3
Saolta Hospital Group	Letterkenny General Hospital	General	Model 3
	Mayo General Hospital, Castlebar	General	Model 3
	Portiuncula University Hospital, Ballinasloe	General	Model 3
	Roscommon University Hospital	General	Model 2
	Sligo General Hospital	General	Model 3
	University College Hospital Galway	Tertiary	Model 4
South/South West Hospital Group	Bantry General Hospital	General	Model 2
	Cork University Hospital	Tertiary	Model 4
	Cork University Maternity Hospital	Specialist	-
	Kerry General Hospital, Tralee	General	Model 3
	Lourdes Orthopaedic Hospital, Kilcreene, Kilkenny	Specialist	-
	Mallow General Hospital	General	Model 2
	Mercy University Hospital, Cork	General	Model 3
	South Infirmary - Victoria University Hospital, Cork	General	Model 2
	South Tipperary General Hospital, Clonmel	General	Model 3
	Waterford Regional Hospital	Tertiary	Model 4
UL Hospital Group	Croom Hospital	Specialist	-
	Ennis Hospital	General	Model 2
	Nenagh Hospital	General	Model 2
	St John's Hospital	General	Model 2
	University Hospital, Limerick	Tertiary	Model 4
	University Maternity Hospital	Specialist	-
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	-
	Mater Private, Dublin	Private	-
	Mater Private, Cork	Private	-
	St Vincents Private Hospital	Private	-
Children's Health Ireland	Children's University Hospital, Temple Street	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