Enhanced Surveillance of *Clostridioides (Clostridium) difficile* Infection: Ireland – Q3 2019 National Report

Executive Summary

- During Q3 2019, a total of 582 cases of *C. difficile* infection (CDI) were reported to enhanced surveillance from 57 acute public and private hospitals across Ireland
- The national overall rate of CDI in hospitalised patients was 4.5 cases per 10,000 bed days used (BDU) [465 cases], higher than that reported for Q3 2018 [403 cases; rate = 4.0]
- There were 296 cases of CDI deemed to be hospital-acquired (HA-CDI), of which 268 were new, representing a national new HA-CDI rate of 2.6 [median rate = 1.6]
- With regard to acquisition, while *C. difficile* was mostly associated with acute hospitals (296; 51%), there were many cases associated with the community (147; 25%) and long-term care facilities (LTCF) (46; 8%)
- CDI symptom onset occurred in the community for 40% of all cases (232):
    - 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 25% of cases, with ribotypes 002 (38% of ribotyped cases), 014 (8%) and 078 (6%) the most frequently reported

Part 1: National CDI Epidemiology – Q3 2019

CDI data was reported to the enhanced surveillance programme from 57 acute public and private hospitals across Ireland (***Appendix A***). There were 582 reported CDI cases in patients aged ≥2 years. Of those, 465 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 that reported for Q3 2018 [403 cases; rate = 4.0]. The majority were aged ≥65 years (66%) and were female (58%). ***Table 1*** displays the breakdown of all CDI cases for Q3 2019 versus Q3 2018, by case type, origin, onset and severity. Seven cases of severe CDI were reported (1%), defined as requiring critical care admission or colectomy due to complications of CDI in ***Table 2***, versus 13 cases (2%) for Q3 2018. CDI case definitions are summarised in ***Appendix B***.

CDI Case Type

The majority were categorised as new infections (86%), with 10% recurrent and for 4%, the CDI case type was unknown.

CDI Origin

The majority were categorised as healthcare-associated (HCA) CDI [n=373; 64%], with community-associated (CA) CDI accounting for 25% [n=147]. For the remainder, the origin either could not be determined [n=35; 6%] or was unknown [n=27; 5%]. Of 373 HCA-CDI cases, the origin was the reporting hospital, termed hospital-acquired (HA) for 296 (79%), a LTCF for 46 (12%), 'other' or 'unknown healthcare facility' for 31 (8%).

CDI Onset

Patient locations at onset of CDI symptoms included; while admitted to a healthcare facility, termed healthcare-onset (HO) for 336 cases (58%), while residing in the community, termed community-onset (CO) for 232 cases (40%) and unknown patient location for 14 cases (2%). Of 336 HO CDI cases, the reporting hospital was the onset location for 265 (79%), a LTCF for 44 (13%), other healthcare facilities for 17 (5%) and unknown for 10 (3%).

Table 1. National CDI epidemiology: Q3 2019 versus Q3 2018

	National CDI Epidemiology Q1 2019 vs Q1 2018	Q3 2019	Q3 2018
CDI case type	**Total reported cases:**	**582**	**532**
	New	502	457
	Recurrent	56	49
	Unknown	24	26
CDI origin	**Healthcare-associated (HCA):**	**373**	**312**
	Reporting hospital	296	233
	Long term care facility (LTCF)	46	51
	Other healthcare facility	31	27
	Unknown healthcare facility	-	1
	Community associated (CA)	**147**	**142**
	Discharged within 4 – 12 weeks from healthcare facility	**35**	**48**
	Unknown origin	**27**	**30**
CDI onset	**Healthcare onset (HO):**	**336**	**283**
	Reporting hospital	265	214
	LTCF	44	48
	Other healthcare facility	17	17
	Unknown location	10	4
	Community onset (CO)	**232**	**226**
	Unknown onset location	**14**	**23**
CDI severity	**Critical care admission or colectomy**	**7**	**13**

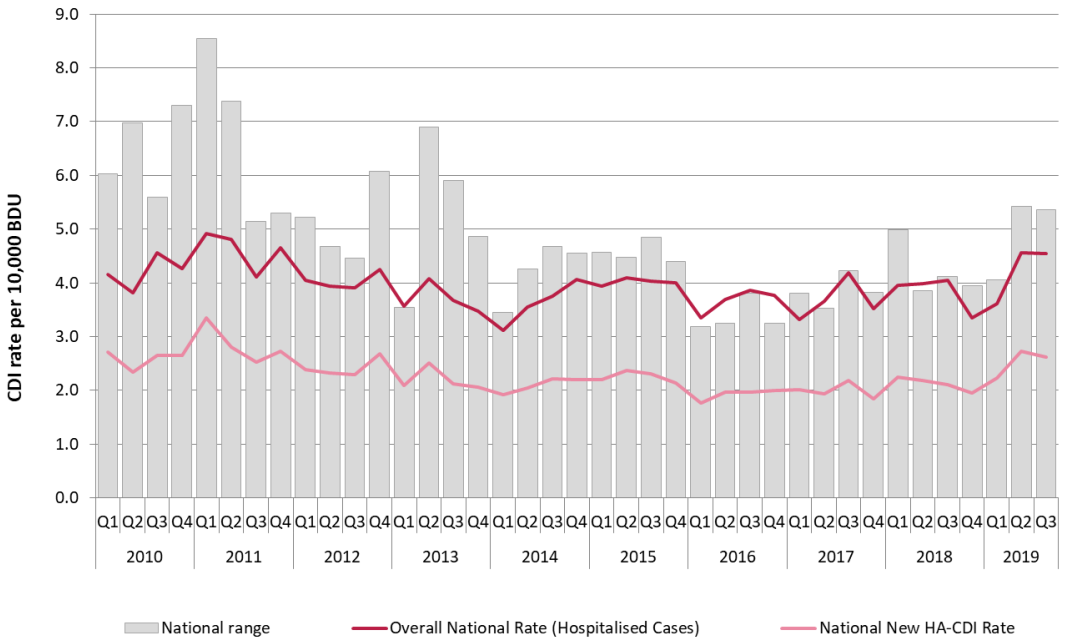
Table 2. Severity of illness: Q3 2019

Surgery (Colectomy)	ICU Admission			Total
	Yes	No	Unknown	
Yes	-	1	-	**1**
No	4	493	-	**497**
Unknown	2	41	41	**84**
Total	**6**	**535**	**41**	**582**

Part 2: Hospital-acquired CDI (HA-CDI) Epidemiology – Q3 2019

Data on HA-CDI was reported from 57 acute public and private hospitals across Ireland. There were 373 HA-CDI cases in patients aged ≥2 years during Q3 2019. Of those, 268 were new HA-CDI cases, representing a national new HA-CDI rate of 2.6 [median rate = 1.6], higher than that reported for Q3 2018 [233 cases; rate = 2.3; median rate = 1.2]. ***Figure 1*** displays quarterly HA-CDI rates since 2010 and ***Table 3*** displays quarterly HA-CDI data from 2017 to 2019.

Figure 1. Quarterly national HA-CDI rates: 2010 – 2019



The national overall 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 296 HA-CDI cases were categorised as new infections (268; 90%), with 26 (9%) recurrent cases. For two (1%) CDI cases, 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 259 cases (87.5%) and while residing in the community, termed community-onset (CO) for 37 cases (12.5%).

Of 259 HO-CDI cases, the reporting hospital was the onset location for 246 (95%), a LTCF for two cases (1%), another hospital for two cases (1%) and was unknown for nine cases (3%).

Table 3. Quarterly HA-CDI data: 2017 – 2019

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
2017Q4	56	184	26	4	**214**	1.8	0 - 3.8	1.2
2018Q1	55	229	18	0	**247**	2.2	0 - 5	1.3
2018Q2	56	221	29	0	**250**	2.2	0 - 3.9	1.4
2018Q3	56	210	23	0	**233**	2.1	0 - 4.1	1.2
2018Q4	55	188	25	0	**213**	2	0 - 4	0.9
2019Q1	55[d]	218	22	0	**240**	2.2	0 - 4.1	1.4
2019Q2	56[d]	276	31	0	**307**	2.7	0 - 5.4	2.0
2019Q3	57	268	26	2	**296**	2.6	0 - 5.4	1.6

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 Since Q1 2019, Cork University Maternity Hospital report separately bringing the total number of participating hospitals to 57
Data for Q3 2019 is provisional

Part 3: *C. difficile* Testing Methods – Q3 2019

All 57 hospitals participating in the enhanced CDI surveillance system during Q3 2019 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=38; 67%) or a single-step method using molecular polymerase chain reaction (PCR) test for *C. difficile* toxin gene (n = 19; 33%), as displayed in ***Table 4***, along with stratification by hospital type.

Table 4. *C. difficile* testing methods utilised in Q3 2019, by hospital type

Test Category	Hospital Type				Total
	General	Private	Specialist	Tertiary	
1 STEP: PCR for toxin gene	8	1	6	4	**19**
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	5	1	-	**9**
2 STEP: GDH EIA, followed by confirmatory PCR	4	-	-	-	**4**
2 STEP: PCR, followed by confirmatory toxin EIA	9	2	3	5	**19**
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 – Q3 2019

Ribotyping data was available for just 25% of CDI cases reported to CDI enhanced surveillance, a reflection on the continued absence of a national funded *C. difficile* reference laboratory service, a recommendation of national *C. difficile* guidelines since 2008. Ribotypes 002 (38% of ribotyped cases), 014 (8%) and 078 (6%) were the most frequently reported. The lack of a robust, prospective system to capture *C. difficile* typing data limits understanding of the epidemiology of this important healthcare-associated infection.

Acknowledgments

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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