Enhanced Surveillance of *Clostridioides (Clostridium) difficile* Infection: Ireland – Q2 2019 National Report

Executive Summary

- During Q2 2019, a total of 562 cases of *C. difficile* infection (CDI) were reported to enhanced surveillance from 56 acute public and private hospitals across Ireland[1]
- The national overall rate of CDI in hospitalised patients was 4.6 cases per 10,000 bed days used (BDU) [461 cases], higher than that reported for Q2 2018 [402 cases; rate = 4.0]
- There were 306 cases of CDI deemed to be hospital-acquired (HA-CDI), of which 275 were new, representing a national new HA-CDI rate of 2.7 [median rate = 2.0]
    - In response to this rate of new HA-CDI which had increased for the third consecutive quarter and is contemporaneous with increased detection of *C. difficile* ribotype 002, this has prompted further investigation and communication with the acute hospital system early in Q3 2019
- With regard to acquisition, while *C. difficile* was mostly associated with acute hospitals (306; 54%), there were many cases associated with the community (114; 20%) and long-term care facilities (LTCF) (45; 8%)
- CDI symptom onset occurred in the community for 33% of all cases (187):
    - 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 29% of cases, with ribotypes 002 (41% of ribotyped cases), 014 (8%), 015 (8%) and 078 (8%) the most frequently reported

[1] Total number of hospitals has increased to 57 with Cork University Maternity Hospital reporting separately since Q12019.

Part 1: National CDI Epidemiology – Q2 2019

CDI data was reported to the enhanced surveillance programme from 56 acute public and private hospitals across Ireland (***Appendix A***). There were 562 reported CDI cases in patients aged ≥2 years. Of those, 461 were reported in hospitalised patients, giving a national CDI rate in hospitalised patients of 4.6 cases per 10,000 bed days used (BDU), which is higher that reported for Q2 2018 [402 cases; rate = 4.0]. The majority were aged ≥65 years (70%) and were female (58%). Thirteen cases of severe CDI were reported (2%), defined as requiring critical care admission or colectomy due to complications of CDI, versus 12 cases (2%) for Q2 2018. ***Table 1*** displays the breakdown of all CDI cases for Q2 2019 versus Q2 2018, by case type, origin, onset and severity. 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=385; 69%], with community-associated (CA) CDI accounting for 20% [n=114]. For the remainder, the origin either could not be determined [n=33; 6%] or was unknown [n=30; 5%]. Of 385 HCA-CDI cases, the origin was the reporting hospital, termed hospital-acquired (HA) for 306 (79%), a LTCF for 45 (12%), 'other' or 'unknown healthcare facility' for 34 (9%).

CDI Onset

Patient locations at onset of CDI symptoms included; while admitted to a healthcare facility, termed healthcare-onset (HO) for 355 cases (63%), while residing in the community, termed community-onset (CO) for 187 cases (33%) and unknown patient location for 20 cases (4%). Of 355 HO CDI cases, the reporting hospital was the onset location for 288 (81%), a LTCF for 46 (13%), other healthcare facilities for 13 (4%) and unknown for eight (2%).

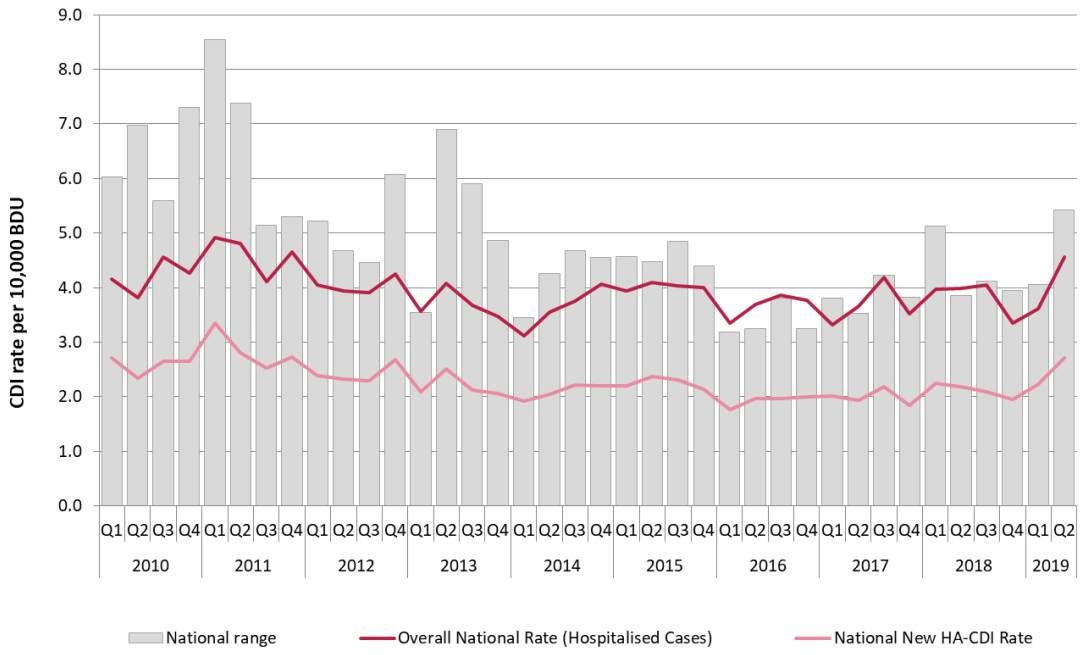
Table 1. National CDI epidemiology: Q2 2019 versus Q2 2018

	National CDI Epidemiology Q1 2019 vs Q1 2018	Q2 2019	Q2 2018
CDI case type	**Total reported cases:**	**562**	**528**
	New	492	450
	Recurrent	51	48
	Unknown	19	30
CDI origin	**Healthcare-associated (HCA):**	**385**	**308**
	Reporting hospital	306	250
	Long term care facility (LTCF)	45	39
	Other healthcare facility	30	17
	Unknown healthcare facility	4	2
	Community associated (CA)	**114**	**135**
	Discharged within 4 – 12 weeks from healthcare facility	**33**	**46**
	Unknown origin	**30**	**39**
CDI onset	**Healthcare onset (HO):**	**355**	**286**
	Reporting hospital	288	233
	LTCF	46	36
	Other healthcare facility	13	12
	Unknown location	8	5
	Community onset (CO)	**187**	**217**
	Unknown onset location	**20**	**25**
CDI severity	**Critical care admission or colectomy**	**13**	**12**

Part 2: Hospital-acquired CDI (HA-CDI) Epidemiology – Q2 2019

Data on HA-CDI was reported from 56 acute public and private hospitals across Ireland. There were 306 HA-CDI cases in patients aged ≥2 years during Q2 2019. Of those, 275 were new HA-CDI cases, representing a national new HA-CDI rate of 2.7 [median rate = 2.0], higher than that reported for Q2 2018 [221 cases; rate = 2.2; median rate = 1.4]. ***Figure 1*** displays quarterly HA-CDI rates since 2010 and ***Table 2*** 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 2. The national range is represented by the 5th to 95th percentile of the CDI rate.

CDI Case Type

The majority of 306 HA-CDI cases were categorised as new infections (275; 90%), with 31 (10%) recurrent cases.

CDI Onset

Patient locations at onset of HA-CDI symptoms included; while admitted to a healthcare facility, termed healthcare-onset (HO) for 275 cases (90%), while residing in the community, termed community-onset (CO) for 29 cases (9%) and was unknown for two cases (1%).

Of 275 HO-CDI cases, the reporting hospital was the onset location for 265 (96%), a LTCF for three cases (1%), another hospital for one case (0.5%) and was unknown for six cases (2%).

Table 2. 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
2017Q3	56	212	27	0	**239**	2.2	0 - 4.2	1.5
2017Q4	56	184	26	4	**214**	1.8	0 - 3.8	1.2
2018Q1	55	229	18	0	**247**	2.2	0 - 5.1	1.3
2018Q2	56	221	29	0	**250**	2.2	0 - 3.9	1.4
2018Q3	56	209	23	0	**232**	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]	275	31	0	**306**	2.7	0 - 5.4	2.0

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 Q2 2019 is provisional

Part 3: *C. difficile* Testing Methods – Q2 2019

All 56 hospitals participating in the enhanced CDI surveillance system during Q2 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=30; 54%) or a single-step method using molecular polymerase chain reaction (PCR) test for *C. difficile* toxin gene (n = 26; 46%), as displayed in ***Table 3***, along with stratification by hospital type.

Table 3. *C. difficile* testing methods utilised in Q2 2019, by hospital type

Test Category	Hospital Type				Total
	General	Private	Specialist	Tertiary	
1 STEP: PCR for toxin gene	10	3	7	6	**26**
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**
2 STEP: Combined GDH with toxin EIA, followed by PCR**	4	4	1		**9**
2 STEP: GDH EIA, followed by confirmatory PCR	3		1		**4**
2 STEP: PCR, followed by confirmatory toxin EIA	6		1	3	**10**
Total	**26**	**11**	**10**	**9**	**56**

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 – Q2 2019

Ribotyping data was available for just 29% 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 (41% of ribotyped cases), 014, 015 and 078 (each 8%) 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
Dublin Midlands	Adelaide & Meath & National Children's Hospital, Tallaght	Tertiary
	Coombe Women and Infant's University Hospital	Specialist
	Midland Regional Hospital Portlaoise	General
	Midland Regional Hospital Tullamore	General
	Naas General Hospital	General
	St James's Hospital	Tertiary
	St Luke's Hospital, Dublin	Specialist
Ireland East Hospital Group	Cappagh National Orthopaedic Hospital, Dublin	Specialist
	Mater Misericordiae University Hospital	Tertiary
	Midland Regional Hospital Mullingar	General
	National Maternity Hospital, Holles Street	Specialist
	Our Lady's Hospital, Navan	General
	Royal Victoria Eye & Ear Hospital, Dublin	Specialist
	St Columcille's Hospital, Loughlinstown	General
	St Luke's General Hospital, Kilkenny	General
	St Michael's Hospital, Dun Laoghaire	General
	St Vincent's University Hospital	Tertiary
	Wexford General Hospital	General
RCSI Hospital Group	Beaumont Hospital	Tertiary
	Cavan General Hospital	General
	Connolly Hospital, Blanchardstown	General
	Louth County Hospital, Dundalk	General
	Our Lady of Lourdes Hospital, Drogheda	General
Saolta Hospital Group	Letterkenny General Hospital	General
	Mayo General Hospital, Castlebar	General
	Portiuncula University Hospital, Ballinasloe	General
	Roscommon University Hospital	General
	Sligo General Hospital	General
	University College Hospital Galway	Tertiary
South/South West Hospital Group	Bantry General Hospital	General
	Cork University Hospital	Tertiary
	Cork University Maternity Hospital	Specialist
	Kerry General Hospital, Tralee	General
	Lourdes Orthopaedic Hospital, Kilcreene, Kilkenny	Specialist
	Mallow General Hospital	General
	Mercy University Hospital, Cork	General
	South Infirmary - Victoria University Hospital, Cork	General
	South Tipperary General Hospital, Clonmel	General
	Waterford Regional Hospital	Tertiary
UL Hospital Group	Croom Hospital	Specialist
	Ennis Hospital	General
	Nenagh Hospital	General
	St John's Hospital	General
	University Hospital, Limerick	Tertiary
	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