Enhanced Surveillance of *Clostridium difficile* Infection: Ireland – Q3 2018 National Report

Executive Summary

- During Q3 2018, a total of 530 cases of *C. difficile* infection (CDI) were reported to enhanced surveillance from 56 acute public and private hospitals across Ireland.
- The national overall rate of CDI in hospitalised patients was 4.1 cases per 10,000 bed days used (BDU) [402 cases], similar to that reported for Q3 2017 [406 cases; rate = 4.2]
- There were 232 cases of CDI deemed to be hospital-acquired (HA-CDI), of which 209 were new, representing a national new HA-CDI rate of 2.1 [median rate = 1.3]
- All hospitals reported using a *C. difficile* testing method recommended in the 2014 updated national clinical guidelines for *C. difficile*
- Ribotyping data was available for 25% of cases, with ribotypes 002, 014 and 015 the most frequently reported
- With regard to acquisition, *C. difficile* was mostly associated with acute hospitals (232; 44%). However, many cases were associated with long-term care facilities (LTCF) (50; 9%) and the community (142; 27%)
- CDI symptom onset occurred in the community for 43% of all cases (226):
    - 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/Gastroenteric/Clostridiumdifficile/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
- The excellent participation in enhanced surveillance since its launch in 2009 indicates the commitment of the microbiology laboratories, multi-disciplinary infection prevention and control and antimicrobial stewardship teams, along with hospital management to understanding the epidemiology of this important infection and minimising the risk of patients acquiring CDI as an unintended consequence of healthcare

Part 1: National CDI Epidemiology – Q3 2018

CDI data was reported to the enhanced surveillance programme from 56 acute public and private hospitals across Ireland (***Appendix A***). There were 530 reported CDI cases in patients aged ≥2 years. Of those, 402 were reported in hospitalised patients, giving a national CDI rate in hospitalised patients of 4.1 cases per 10,000 bed days used (BDU), which is similar to that reported for Q3 2017 [406 cases; rate = 4.2]. The majority were aged ≥65 years (65%) and were female (59%). Thirteen cases of severe CDI were reported (2.5%), defined as requiring critical care admission or colectomy due to complications of CDI, comparable to 14 cases (2.6%) for Q3 2017. ***Table 1*** displays the breakdown of all CDI cases for Q3 2018 versus Q3 2017, 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 (86%), with 9% recurrent and for 5%, the CDI case type was unknown.

CDI Origin

The majority were categorised as healthcare-associated (HCA) CDI [n=310; 58%], with community-associated (CA) CDI accounting for 27% [n=142]. For the remainder, the origin either could not be determined [n=48; 9%] or was unknown [n=30; 6%]. Of 310 HCA-CDI cases, the origin was the reporting hospital, termed hospital-acquired (HA) for 232 (75%), a LTCF for 50 (16%) and 'other' or 'other healthcare facility' for 27 (9%).

CDI Onset

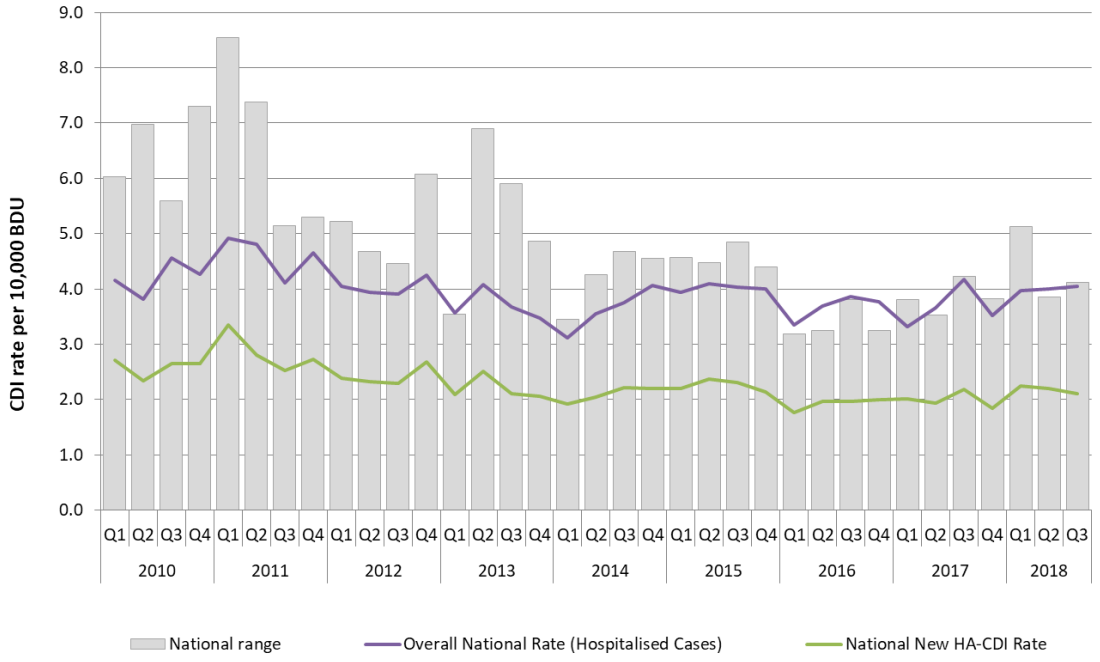
Patient locations at onset of CDI symptoms included; while admitted to a healthcare facility, termed healthcare-onset (HO) for 281 cases (53%), while residing in the community, termed community-onset (CO) for 226 cases (43%) and unknown patient location for 23 cases (4%). Of 281 HO CDI cases, the reporting hospital was the onset location for 213 (76%), a LTCF for 47 (17%), other healthcare facilities for 17 (6%) and unknown for four (1%).

Table 1. National CDI epidemiology: Q3 2018 versus Q3 2017.

	National CDI Epidemiology Q3 2018 vs Q3 2017	Q3 2018	Q3 2017
CDI case type	**Total reported cases:**	**530**	**534**
	New	455	451
	Recurrent	49	60
	Unknown	26	23
CDI origin	**Healthcare-associated (HCA):**	**310**	**308**
	Reporting hospital	232	239
	Long term care facility (LTCF)	50	47
	Other healthcare facility	27	19
	Unknown healthcare facility	1	3
	Community associated (CA)	**142**	**138**
	Discharged within 4 – 12 weeks from healthcare facility	**48**	**51**
	Unknown origin	**30**	**37**
CDI onset	**Healthcare onset (HO):**	**281**	**295**
	Reporting hospital	213	233
	LTCF	47	39
	Other healthcare facility	17	16
	Unknown location	4	7
	Community onset (CO)	**226**	**221**
	Unknown onset location	**23**	**18**
CDI severity	**Critical care admission or colectomy**	**13**	**14**

Part 2: Hospital-acquired CDI (HA-CDI) Epidemiology – Q3 2018

Data on HA-CDI was reported from 56 acute public and private hospitals across Ireland. There were 232 HA-CDI cases in patients aged ≥2 years during Q3 2018. Of those, 209 were new HA-CDI cases, representing a national new HA-CDI rate of 2.1 [median rate = 1.3], similar to that reported for Q3 2017 [212 cases; rate = 2.2; median rate = 1.5]. ***Figure 1*** displays quarterly HA-CDI rates since 2010 and ***Table 2*** displays quarterly HA-CDI data from 2016 to 2018.



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.

Figure 1. Quarterly national HA-CDI rates: 2010 – 2018.

CDI Case Type

The majority of 232 HA-CDI cases were categorised as new infections (209; 90%), with 23 (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 202 cases (87%) and while residing in the community, termed community-onset (CO) for 30 cases (13%).

Of 202 HO-CDI cases, the reporting hospital was the onset location for 193 (96%), a LTCF for four cases (2%), another hospital for two cases (1%) and was unknown for three cases (1%).

Table 2. Quarterly HA-CDI data: 2016 – 2018

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
2016Q4	51	182	19	2	**203**	2.0	0 - 3.3	1.2
2017Q1	52	201	20	2	**223**	2.0	0 - 3.8	1.4
2017Q2	51	190	16	1	**207**	1.9	0 - 3.5	1.1
2017Q3	54	212	27	0	**239**	2.2	0 - 4.2	1.5
2017Q4	55	184	26	4	**214**	1.8	0 - 3.8	1.2
2018Q1	56	229	18	0	**247**	2.2	0 - 5.1	1.3
2018Q2	55	221	29	0	**250**	2.2	0 - 3.9	1.4
2018Q3	56	209	23	0	**232**	2.1	0 - 4.1	1.3

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 Q3 2018 is provisional

Part 3: *C. difficile* Testing Methods – Q3 2018

All 56 hospitals participating in the enhanced CDI surveillance system during Q3 2018 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=28; 50%) or a single-step method using molecular polymerase chain reaction (PCR) test for *C. difficile* toxin gene (n = 28; 50%), as displayed in ***Table 3***, along with stratification by hospital type.

Table 3. C. difficile testing methods utilised in Q3 2018, by hospital type.

Test Category	Hospital Type				Total
	General	Private	Specialist	Tertiary	
1 STEP: PCR for toxin gene	12	4	6	6	**28**
2 STEP: GDH EIA, followed by confirmatory C. difficile toxin EIA	2	3	0	0	**5**
2 STEP: Combined GDH with toxin EIA, followed by toxin EIA*	1	0	0	0	**1**
2 STEP: Combined GDH with toxin EIA, followed by PCR**	3	3	1	0	**7**
2 STEP: GDH EIA, followed by confirmatory PCR	4	0	1	0	**5**
2 STEP: PCR, followed by confirmatory toxin EIA	5	1	1	3	**10**
Total	**27**	**11**	**9**	**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 – Q3 2018

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, 014 and 015 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 Group	Tertiary
	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 Hospital Group	Children's University Hospital, Temple Street	Specialist

Appendix B
Case Definitions for Surveillance of *Clostridium difficile* Infection

***For surveillance purposes, a confirmed Clostridium 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.
- Pseudomembraneous 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