Clostridium difficile-associated disease in Ireland

Clostridium difficile as a notifiable disease

New cases of *Clostridium difficile*-associated disease (CDAD) in persons two years or older have been notifiable in Ireland under the disease category acute infectious gastroenteritis (AIG) since 4th May 2008. Recurrent CDAD cases are not currently notifiable.

There were 4,359 notifications of acute infectious gastroenteritis (AIG) in 2009, of which 1,897 (44%) were new CDAD cases, giving a national crude incidence rate (CIR) of 44.7 new CDAD cases per 100,000 population. All cases were laboratory confirmed. This represents a decrease from 56.9 cases per 100,000 population reported in 2008 (table 1). Regional variation was observed in the incidence of CDAD (table 1); however, this most likely reflects differences in diagnosis and reporting rather than true variation in disease incidence.

As in 2008, new cases of CDAD in 2009 were more prominent in female patients (57.6%) and older age groups. The mean age of cases was 71 years (range 2-102 years) (figure 1) and 1418 cases (74.7%) were reported in the over 65 year age category. Of note, the 75-84 year age group had the highest number of cases (615, representing 43% of the over 65 year age group).

The majority of CDAD cases (67%) were notified by healthcare institutions. Patients classified as 'hospital inpatient' had the highest occurrence of cases accounting for 64% of all cases notified. Of the remaining, 9% were classified as GP patients, 3% hospital outpatient, 2% as 'other' and 22% as either 'not specified' or 'unknown'. However, this data does not provide information on the origin or onset of CDAD; rather it represents the location of the patient at CDAD diagnosis. Information on the origin and onset of CDAD cases is collected as part of the enhanced surveillance system.

The seasonal trend is indistinguishable at present as only one complete annual data set is available. In addition, identification of seasonal patterns is hindered by late and batch notifications from institutions.

In 2009, nine *Clostridium difficile* outbreaks, all healthcare-associated, involving 50 patients were notified on CIDR (table 2). Six of these were linked to hospitals, two to nursing homes and one to a long-term care facility.

C. difficile Enhanced Surveillance

Although the information notified through CIDR has given important preliminary information on the burden of new cases of CDAD in Ireland, it represents an underestimate of the true burden of infection (capturing new cases only) and does not capture information on the origin or onset of cases. Since 1st August 2009, national collation of *C. difficile* enhanced surveillance commenced on a voluntary basis in Ireland. Information on case type, origin, onset and severity of CDAD is collected. CDAD case definitions proposed by the European Centre for Disease Control are employed. By the end of 2009, 33 hospitals were participating, corresponding to 30 acute public hospitals (seven regional, 21 general, two specialist hospitals) and three private hospitals.

From August to December 2009, there were 527 cases of CDAD reported to the enhanced surveillance project, 444 (84.3%) new cases and 79 (15%) recurrent CDAD. Of these, 337 (64%) originated within the participating hospital. This corresponds to an overall national CDAD incidence rate of 3.2 cases per 10,000 bed days used. This rate is based only on the number of cases that originated in the participating healthcare facility and is calculated using acute public hospital activity data from the National Hospitals Office at the Health Services Executive. There was a wide range in the incidence of CDAD infection among participating hospitals (range, 0 – 8.6 cases per 10,000 bed days used, median, 2.7 cases) with general hospitals showing a higher median incidence rate (CDAD rate = 3.8, n = 21) compared to tertiary hospitals (CDAD rate = 3.0, n = 7) over the five month period. This is likely due to the differences in patient case mix, *C. difficile* ribotypes, testing facilities and practices, antibiotic policies and surveillance resources between hospitals.

Most cases were in females (59%) and in the over 65 age group (74%). While the majority of cases were associated with healthcare facilities, specifically acute hospitals (78%), 15% of all CDAD cases were community-associated (figure 4). Ten percent of all healthcare-associated cases originated in nursing homes. Of note, while the majority of patients with CDAD had onset of symptoms in a healthcare facility (75%), predominantly in acute hospitals (acute hospitals 90%, nursing homes, 9%), a significant proportion of patients with CDAD had onset of symptoms in the community (24%) (figure 4).

There was a low incidence of severe CDAD (defined as admission to ICU or surgery due to complications arising from CDAD) reported in 2009 (1%, n = 5).

National Typing Project

In March 2009, HPSC in conjunction with St. Vincent's University Hospital and University College Dublin conducted a one month national *C. difficile* typing study. Participating healthcare facilities collected clinical details of all CDAD cases in March 2009, which included; case type, onset and origin of CDAD, antimicrobial exposure prior to diagnosis and case severity. In addition, faecal specimens from patients with CDAD were submitted for PCR ribotyping.

Information on 211 CDAD cases was submitted from 33 inpatient healthcare facilities. The national median CDAD rate in acute hospitals was 2/10,000 bed days used (range 0 - 13).
Seventy-nine percent of cases (166) were new and 18% (38) were recurrent. The median age of cases was 78 years and 76% of patients (160) had received antimicrobial therapy within eight weeks prior to CDAD diagnosis. Eighty-three percent of cases (176) were healthcare-associated, of which 13% (23) originated in nursing homes. Ten percent (21) of cases were community-associated.

Thirty-four percent of toxin-positive faecal specimens submitted (72) failed to grow *C. difficile* on culture. Of the 139 samples successfully cultured, the most common ribotypes encountered were; 027 (19%), 001 (16%), 106 (13%), 078 (10%) and 014 (8%).
Ribotypes 001 (21%), 027 (20.7%) and 106 (19.5%) predominated among new cases with 027 (37.5%), 001 (21%) and 078 (16.6%) among recurrent cases.

Conclusion

The collation of national data on *C. difficile* through both surveillance systems has provided a valuable insight into the burden of CDAD in Ireland.
Data to date suggests a decline in the number of new CDAD cases reported in 2009 compared to 2008, however, due to the large weekly variability in the data it is too soon to determine if this decline is significant.

Fifteen percent of all CDAD cases reported in 2009 were recurrent infections. Recurrence of CDAD is difficult to manage clinically, can result in severe infection, places a burden on already limited isolation resources and results in significant patient morbidity. Therefore, knowledge of the burden of recurrent CDAD in Ireland is important to help guide preventative strategies.

During 2009, 15% of all CDAD cases from hospital inpatients (including patients admitted through emergency departments and outpatient clinics) were associated with the community and 10% of cases were associated with nursing homes. This indicates that *C. difficile* is no longer an infection limited to the hospital setting. Moreover a quarter of all cases had onset of symptoms in the community. This information collected on the burden of CDAD outside acute hospitals will help to direct appropriate preventative and control programmes at a national level.

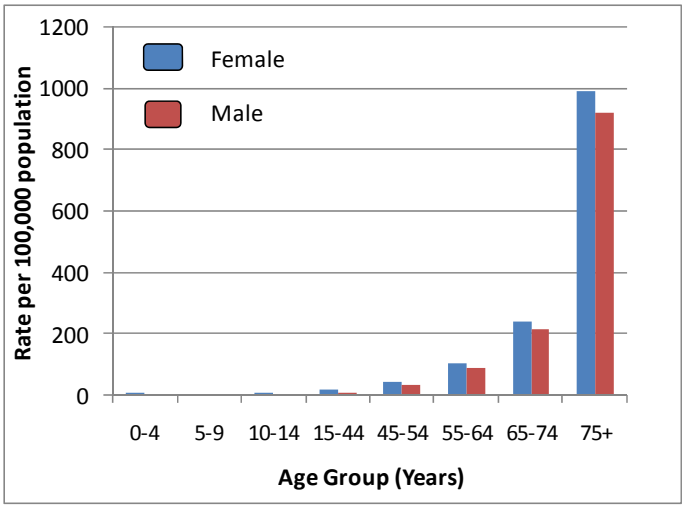
In March 2009, national *C .difficile* ribotype data was collected for the first time. In addition to highlighting the burden of CDAD outside acute care facilities, this study demonstrated the overall predominance of PCR ribotype 027 at this time.

National guidelines for the surveillance, diagnosis, management, and prevention and control of CDAD in Ireland are available for download (http://www.hpsc.ie/hpsc/A-Z/Gastroenteric/Clostridiumdifficile/) and hospital antibiotic stewardship guidelines available at http://www.hpsc.ie/hpsc/A-Z/MicrobiologyAntimicrobialResistance/StrategyforthecontrolofAntimicrobialResistanceinIrelandSARI/AntibioticStewardship/Publications/. All healthcare professionals must promote practices known to reduce the incidence of CDAD including; antimicrobial stewardship and compliance with infection prevention and control measures. These measures are outlined in the national guidelines.

Table 1. Number of notified cases, crude incidence rate of CDAD in Ireland by HSE area, 2009, and total number with estimated crude incidence rate for 2008.

HSE Area	No. of cases	*CIR incl. 95% C.I.
East	705	47 [43.5 - 50.5]
Midlands	44	17.5 [12.3 - 22.7]
Mid West	184	51 [43.6 - 58.4]
North East	84	21.3 [16.7 - 25.9]
North West	133	56.1 [46.6 - 65.6]
South East	251	54.5 [47.8 - 61.2]
South	237	38.2 [33.3 - 43.1]
West	259	62.5 [54.9 - 70.1]
Total 2009	**1897**	**44.7 [42.7 - 46.7]**
Total 2008**	**1624**	**56.9 [54.6 - 59.2]****

* Rates calculated using 2006 census data
** Using the number of notifications over the 35 week period in 2008, the estimated CIR for a 52 week period was calculated



*Rates calculated using 2006 census data

Figure 1: Age and Sex distribution of CDAD in Ireland, 2009

Table 2. *C. difficile* outbreaks reported in Ireland in 2009 by HSE area

HSE Region	Outbreak location	Total number ill
East	Nursing Home	6
Mid-West	Hospital	3
Mid-West	Hospital	19
North East	Hospital	7
North East	Nursing Home	2
North East	Hospital	4
South	Comm. Hosp /Long-stay unit	2
South	Hospital	3
West	Hospital	4

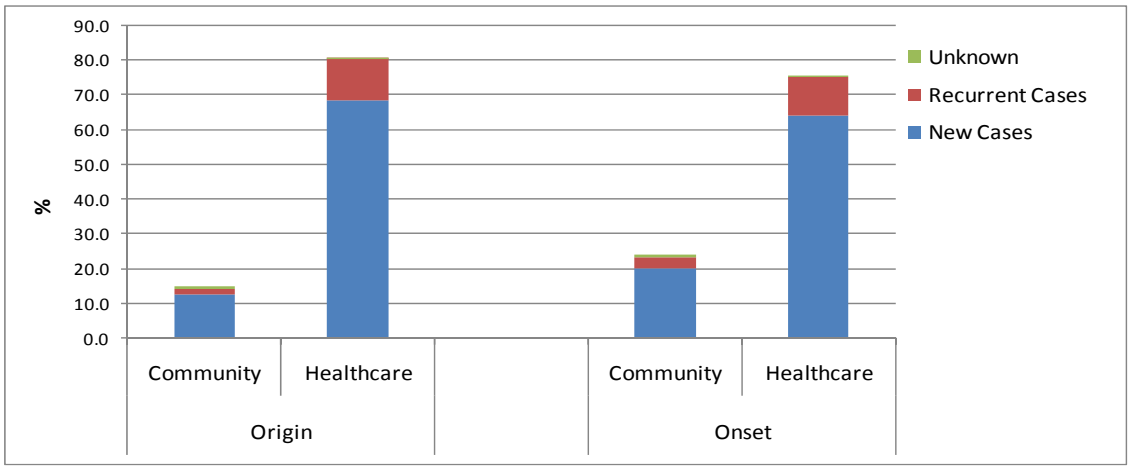


Figure 2. Origin and Onset of CDAD Cases by Case Type, Aug – Dec 2009