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Sentinel community *Clostridium difficile* infection (CDI) surveillance in Scotland, April 2013 to March 2014

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ABSTRACT

Surveillance of *Clostridium difficile* infection (CDI) in Scotland does not currently distinguish between CDI cases from hospitals and the community. Therefore, the incidence of CDI in the community is unknown, and the burden of disease and the relationship with the hospital/healthcare setting is not well understood.

A one-year sentinel community surveillance programme was initiated in collaboration with five Scottish health boards in 2013 (representing 36% of all CDI cases reported in Scotland). Inclusion criteria were all cases aged ≥15 years with a CDI diagnosis in the community or within 48 h following admission to hospital. CDI cases were categorised according to definitions used by the European Centre for Disease Prevention and Control.

256 CDI cases met the inclusion criteria, of which 158 (62%) were community-associated cases (CA-CDI). This represented 26% of all cases reported during the surveillance period by the participating health boards (n = 614). The overall CA-CDI incidence rate was 9.9 per 100 000 population per year. CA-CDI cases were more likely to be female and younger, compared to hospital acquired cases (HA-CDI). The total proportion of cases that had onset in the community was 27%. Ribotypes 015, 002, 078 and 005 were the most common types isolated from both CA-CDI and HA-CDI cases. There were no statistically significant differences between the proportion of types that were either CA-CDI or HA-CDI. Of the CA-CDI cases, 37% had not received antibiotics in the 12 weeks preceding CDI diagnosis, 4% were resident in care homes, and the case-fatality rate for CA-CDI cases was 5.6% (with a 30-day mortality rate for CA-CDI of 0.44 per 100 000 population per year).

This study has shown that a substantial proportion of CDI cases reported in Scotland are community associated and that there are close links between the community and healthcare settings. It is therefore essential to monitor the trends in CDI in the community at a national level. The study also provides evidence for the need to examine the feasibility for development of interventions to reduce the burden in the community in addition to hospitals.

1. Introduction

The national mandatory *Clostridium difficile* infection (CDI) surveillance programme for Scotland is currently in its ninth full year, beginning in 2007. During this period, incidence rates have decreased to significantly lower levels in both age groups currently under surveillance (15–64 years and ≥65 years) [1].

CDI has mainly been associated with receiving healthcare [2], and surveillance in Scotland does not currently distinguish between CDI cases from acute hospitals, non-acute hospitals, and the community, as there is no standardised information on location of cases in the healthcare setting and recent healthcare history is not collected routinely [3].

This is especially relevant in Scotland as despite the remarkable decline observed in CDI incidence rates between 2007 and 2013, there has been a flattening of the trend since then in both age groups [1]. There have also been suggestions that community CDI is increasing [4]. However, it is not clear whether this is due to increasing awareness and testing of patients in the community.

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Studies undertaken within Scotland in previous years have shown that community-associated CDI (defined as no history of healthcare admission in the 12 weeks prior to onset of symptoms) [5] represented between 19% and 26% of cases aged ≥65 years of age [6,7]. These studies were carried out over five years ago and are limited geographically. Therefore, the incidence of CDI in the community in Scotland at this time is unknown, and the burden of disease and the relationship with the acute sector is not well understood. It is possible that any further reductions in incidence rates will require targeted interventions in both the community and hospital sectors.

In order to address this question further, a sentinel surveillance programme was initiated by Health Protection Scotland (HPS) in collaboration with five Scottish NHS boards (NHS administrative areas) to run for one year between April 2013 and March 2014 with the aims of (a) assessing the burden of CDI, (b) determining the outcome of disease in community patients, and (c) characterising the molecular epidemiology of CDI in the community and its association with the healthcare setting.

2. Methods

2.1. CDI case data collection

Data was collected by the participating NHS board on patient characteristics, location of sample, sample date, date of most recent discharge from hospital, and *C. difficile* ribotype. Optional data to be collected included care home residence, antibiotics given in the 12 weeks prior to sample date and mortality within 30 days of sample date. Inclusion criteria were all cases with a CDI diagnosis in the community or within 48 h following admission to hospital.

2.2. Epidemiological categories

Using the date of most recent hospital discharge and date of CDI diagnosis, CDI cases were categorised according to the following definitions adapted from Kuijper et al. [5] and the European Centre for Disease Control and Prevention (ECDC).

In this sentinel surveillance, healthcare facility relates to hospitals (acute and non-acute).

Community onset (CO)

Symptoms starting in a community setting, outside healthcare facilities.

Community-associated case (CA)

This is a CDI case patient with onset of symptoms while outside a healthcare facility, and without discharge from a healthcare facility within the previous 12 weeks (community-onset, community-associated (CO–CA)) or with onset of symptoms within 48 h following admission to a healthcare facility (HO) without residence in a healthcare facility within the previous 12 weeks (healthcare-onset, community-associated (HO-CA)).

Healthcare-associated case (HA)

This is a CDI case patient with onset of symptoms in the community within 4 weeks following discharge from a healthcare facility (community-onset, healthcare-associated (CO-HA)) or with onset of symptoms within 48 h following admission to a healthcare facility (HO) and within 4 weeks following discharge from a healthcare facility (hospital onset, healthcare-associated (HO-HA)).

Unknown case (U)

This is a CDI case patient who was discharged from a healthcare facility 4–12 weeks before the onset of symptoms. These may be either community onset (CO–U) or hospital onset (HO–U).

2.3. Community incidence rate calculations

The recently published Scottish mid-year population estimate for 2013 was used as the denominator to calculate the incidence and mortality rates (per 100 000 population per year) for CA-CDI.

2.4. Identification of isolates for ribotyping

Boards were requested to send community isolates collected under the sentinel surveillance programme for typing to the Scottish *Salmonella, Shigella* and *C. difficile* Reference Laboratory (SSSCDRL). Typing was carried out as outlined previously elsewhere [8]. Ribotypes identified as CA-CDI in this study were compared with HA-CDI ribotypes from isolates previously collected under the Snapshot Programme (a surveillance scheme for ribotypes identified within Scotland).

2.5. Identification of hospital cases/ribotypes

Presumed hospital cases were determined by using a CDI data extract from the Electronic Communication of Surveillance in Scotland (ECOSS) database. The extract comprised all validated and published CDI cases and all isolates submitted for ribotyping under the Snapshot Programme from the participating NHS boards between April 2013 and March 2014. Any case or ribotype identified in the sentinel database as being CO–CA, HO-CA, CO-HA, CO–U or HO–U were removed from the ECOSS extract leaving a list of cases presumed to be hospital onset, healthcare-associated. This list was used to compare patient characteristics (age and sex) with CA-CDI cases/ribotypes. Chi square test and Mann Whitney U test were used to determine statistical significance as appropriate with the analysis performed in SPSS.

3. Results

3.1. Overall response

Five NHS boards completed the sentinel surveillance data collection for the one year period. These five NHS boards accounted for 36% of the Scottish population (mid-year 2013 population) and 36% of all CDI cases published by HPS during the surveillance period (614 of 1699 patients aged ≥15 years). The number of presumed hospital cases/ribotypes identified was 383 and 71, respectively.

Overall, 272 CDI cases were submitted as part of the sentinel community surveillance programme. Cases were excluded due to being below the age of 15 (n = 3), being a duplicate (n = 2), or did not meet the submission criteria (n = 11). This left 256 cases for analysis, which represents 42% of all CDI cases reported by HPS for these five NHS health boards in the sentinel surveillance period (n = 614 in patients aged ≥15 years).

3.2. Patient characteristics

Of the 256 included CDI cases from the sentinel community surveillance, 172 (67%) were female with a median age of 74 (as did males). The majority of cases were in the elderly (range 19–101).

3.3. Epidemiology of community-associated CDI

CA-CDI incidence rates and proportions for each of the five NHS boards, overall and for Scotland are given in Table 1. Overall, within the five NHS boards there were 158 out of 256 (61.7%) community-associated cases (categorised as either CO–CA or HO-CA),