Introduction

Clostridium difficile infections (CDI) affect hospitalized patients but also individuals in the community. We describe and compare long-term trends in the provincial incidence rate of community-associated (CA) and healthcare-associated (HA) CDI.

Methods

Hospitalized patients with CA-CDI and HA-CDI were identified prospectively between 2008 and 2015 through the Quebec CDI surveillance program (QCISP), a network of 95 acute-care institutions using the following standardized case definition:

- **CA-CDI** are cases occurring within 3 days of admission or > 4 weeks after any inpatient or outpatient care.
- **HA-CDI** are cases occurring <3 days after admission and up to 4 weeks following discharge.

The type of laboratory assay to detect toxigenic C. difficile was left to the discretion of each center.

Only CA-CDI cases that require hospitalization are reported, whereas relapses (i.e. CDI recurrence <8 weeks of completing the previous treatment for CDI) are excluded from the program.

Statistical analysis:

Trends in the incidence of HA-CDI and CA-CDI were compared using time series with segmented regression and Poisson law.

Results

- **28,850 CDI** were detected between 2008 and 2015 in hospitalized patients: 4,481 CA-CDI (15.5%) and 24,369 HA-CDI (84.5%).
- The CA-CDI annual incidence rate increased by 35.2% from 0.51 to 0.58 per 100,000 population (Incidence rate ratio [IRR] per 4-week period, 1.005; 95% confidence interval [CI], 1.004 to 1.006; p=0.0001) (Figure 1, 2).
- The annual HA-CDI incidence rate remained stable from 6.6 to 7.0 per 10,000 patient-days (IRR per 4-week period, 1.00; 95% CI, 0.999 to 1.000; p=0.23) (Figure 1, 2).
- There was a significant difference between the trends in incidence of CA-CDI and HA-CDI (IRR, 1.005; 95% CI, 1.004-1.006; p=0.0001).
- An inflection point was described in the incidence of HA-CDI in April 2011 with a reduction in slope (change in trend, IRR, 0.997; 95% CI, 0.995 to 0.999; p=0.0007) (Table 1).
- By contrast, no concomitant change was seen in the trend of CA-CDI (A trend, IRR, 0.997; 95% CI, 0.992-1.002; p=0.2) (Table 1).

Discussion

- There is no clear explanation for the significant increase seen in the incidence of CA-CDI.
- Similar increasing trends also reported in other countries.
- E.g. in Finland between 2008-2013 CA-CDI rates had a significant annual increase of 4.3% whereas HA-CDI had a significant annual increase of 8.3%.
- In the UK an increase of 6% in the proportion of CA-CDI (from 7% during 1998 to 13% during 2010) in the context of an overall fall in 2009/10 of CDI.
- The US have also reported a shift from HA to CA-CDI with an increase in the proportion of CA-CDI from 8.3% to 26.7% per the period 2003-2014 and a decrease of HA-CDI from 73.5 to 53.3%.

Several hypothesis have been suggested to explain the increase in CA-CDI cases:

- Increased outpatient healthcare exposure and/or use of quinolones and proton pump inhibitors.
- Increased risk represented by potential reservoirs for C. difficile acquisition in the community either through person-to-person contact with colonized or infected persons (e.g. contact with high-risk populations such as elderly people living in LTCFs or hospitalized family members) or through zoonotic transmission.
- Use of more sensitive diagnostic assays (e.g. PCR).

Strengths of this study: (1) the large provincial sample and comprehensive data collection in the context of an established surveillance program; (2) data collected using a standardized case definition.

Limitations of this study: (1) only CDI hospitalized cases were included 2) despite a rigorous methodology, classification errors may have occurred.

Conclusions

- Between 2008 and 2015 most CDI cases (84.5%) remain related to healthcare and overall incidence in HA-CDI has been globally decreasing since 2011.
- However, the provincial incidence of hospitalized CA-CDI has significantly increased.
- Further studies are required to investigate the factors underlying this increase.

References