Epidemiological investigation of *Clostridium difficile* infection mandatory surveillance reports in patients with established renal failure in England

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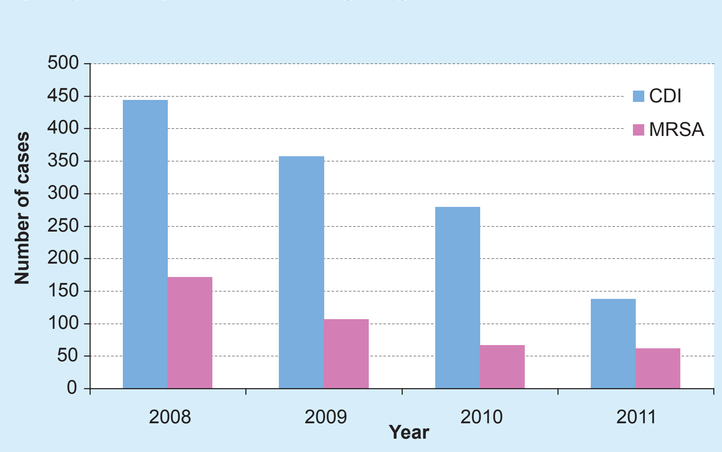
Introduction and Purpose

- The English Department of Health mandated public reporting of *C. difficile* infection (CDI) in patients aged 2 years and over in April 2007.
- Recent studies allude to CDI being an increasing problem in patients on renal replacement therapy (RRT), an already high risk group for healthcare associated infections (HCAI), with blood stream infections traditionally being the main concern [1].
  - However the number of RRT patients reported with CDI is 3.0 times higher (range 2.2-4.2/y) than those reported with MRSA (Figure 1).
- RRT was once thought to be a driver for meticillin resistant *Staphylococcus aureus* (MRSA) bacteraemia reports; now only 5% MRSA bacteraemia cases are in patients undergoing RRT (from 7% in 2006).
- We review patient characteristics and trends of CDI in RRT patients, as reported to the English mandatory surveillance scheme since 2008, to better target interventions.

Figure 1: Count of CDI and MRSA bacteraemia cases per year in patients undergoing RRT



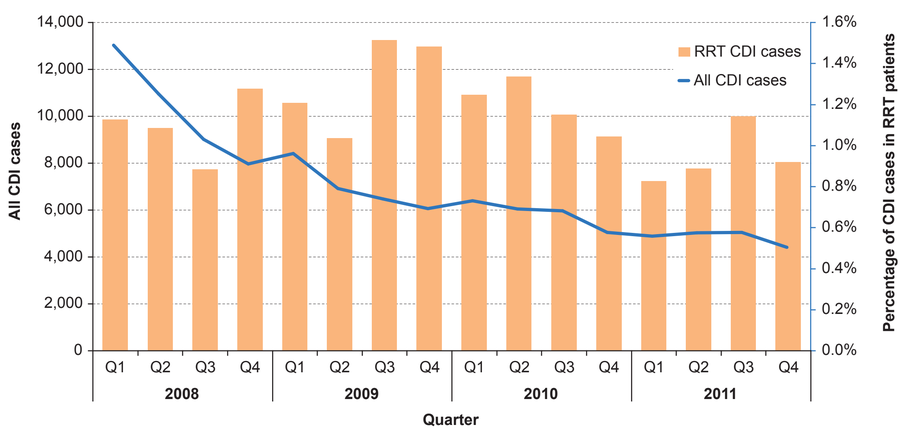
Methods

- An enhanced *C. difficile* dataset is provided by NHS acute Trusts in England via the web enabled HCAI Data Capture System. All NHS acute Trusts are mandated to report all *C. difficile* positive diarrhoeal specimens tested in their laboratories that meet the case definition [2]. Risk factor data submission, such as whether the patient was in established renal failure and the episode category, are voluntary and can be added at anytime.
- Completed data including sex, age, episode category (new or repeat/relapse infection) and whether the patient had established renal failure were extracted from the CDI surveillance database.
- Renal population data were obtained from the most recent UK Renal Registry (UKRR) annual report 2010 [3] for use as a RRT population baseline, specifically the patients starting RRT in 2009.
- Examination of patient characteristics between national CDI reports and the RRT population were made using Stata v11 [4].

Results

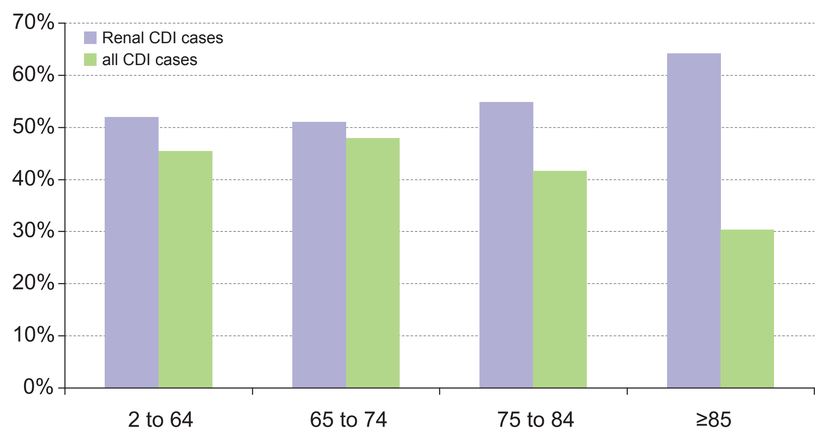
- More than 140,000 CDI cases have been reported to the mandatory surveillance scheme, the number of CDI cases decreased by 50% from January 2008 to December 2011 (Figure 2).

Figure 2: Count of all CDI cases and the percentage which are in RRT patients per quarter from Q1 2008 to Q4 2011



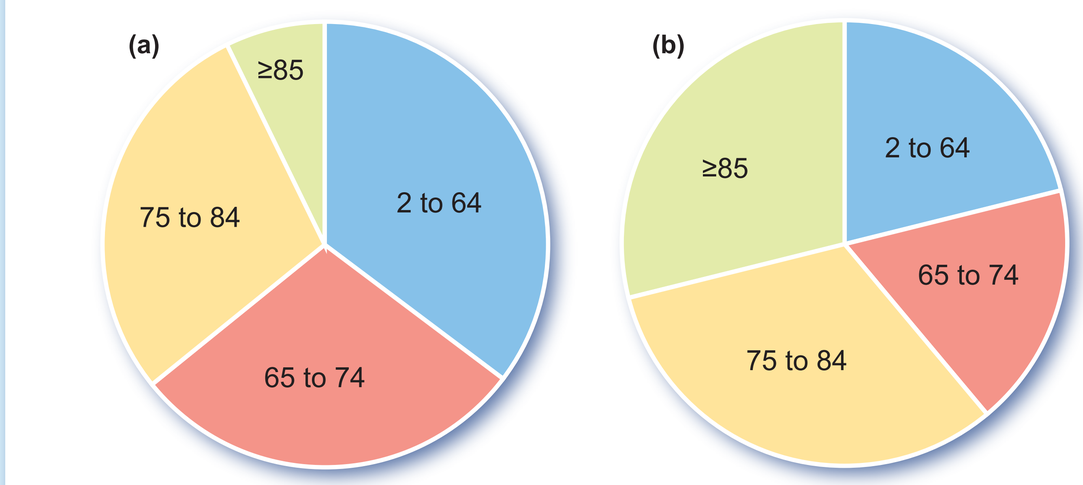
- Only 1% of reported cases are in patients undergoing RRT, the percentage of renal cases reported with CDI has remained fairly constant over time (Figure 2). This equates to a 59% reduction between 2008 and 2011. By comparison the reduction of MRSA bacteraemia incidence in RRT patients over the same period is 64%, in line with the national reduction of 63%.

Figure 3: Proportion of male patients with CDI by age group in all CDI cases and in those undergoing RRT



- The annual episode number of CDI cases in patients undergoing RRT equates to approximately 7% of the UKRR published annual RRT uptake population (range 5.6% - 7.8%).
- The UKRR report that more men than women require dialysis and that it is more common in patients aged 65 years and over [3].
- Males accounted for 54% of the RRT CDI cases (range 55% in 2008 to 51% in 2009); this is lower than the 62% males reported for 2009 by the UKRR. However it is higher than the 41% male patients seen in all CDI reports (Figure 3), the greatest difference being seen in the ≥85y age group.

Figure 4: Age group breakdowns of RRT patients with CDI (a) and all patients with CDI (b)



- Most renal CDI cases were in the 75-84y age group (Figure 4a), consistent with the RRT population but contrary to the national CDI data, where most cases occur in the ≥85y group (Figure 4b).
- A higher percentage of RRT CDI cases were repeat/relapse episodes (15%) compared with the national CDI data (9%), with the difference being greater within age group (Table 1).

Table 1: Episode category data by age group of RRT patients with CDI and all patients with CDI*

Age Group	Episode Category					
	Continuing Infection		New Infection		Repeat/Relapse	
	RRT CDI	all CDI	RRT CDI	all CDI	RRT CDI	all CDI
2 to 64	2%	1%	83%	92%	15%	6%
65 to 74	2%	2%	85%	90%	13%	8%
75 to 84	2%	2%	81%	88%	16%	10%
≥85	3%	2%	86%	88%	11%	9%
Total	**2%**	**2%**	**83%**	**89%**	**15%**	**9%**

*Information was completed in 70% cases

Conclusions

- Incidence of RRT and the occurrence of CDI in renal patients remained stable in England over time. A higher number of RRT patients are affected with CDI when compared to the numbers reported with MRSA bacteraemia; reflecting the greater burden of CDI compared to MRSA.
- Fluctuations in patient characteristics have been noted in renal CDI cases, however it should be noted that the population undergoing RRT is different from the routine hospital admission population.
- The numbers of CDI reports in patients undergoing RRT are falling, the reduction is greater in the RRT CDI cases compared with the national CDI reports. Whereas RRT MRSA bacteraemia numbers have reduced by the same proportion as the national MRSA reports. This may indicate that more work can be done to reduce CDI in this small population compared with bloodstream infections which appears to be levelling off.
- With the higher repeat/relapse CDI results in RRT patients, investigations will be undertaken to identify whether a resistant strain may be affecting this patient group. Other healthcare related risk factors, such as multiple healthcare interactions may be important.
- Additional understanding of differences between national and renal CDI cases may be beneficial to these units. Further work is planned to review patient risk factors affecting infection and will look more closely at RRT population rates.

Acknowledgements

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References

1. National Kidney Care Audit Vascular Access Report 2011. Available online at http://www.ic.nhs.uk/webfiles/Services/NCASP/audits%20and%20reports/NHS_IC_VA_Report_2011_Interactive_03082011_FINAL.pdf
2. PL CMO (2008) 1: Changes to the mandatory healthcare associated infection surveillance system for *Clostridium difficile* infection (CDI) from 1 January 2008. Available online at http://www.dh.gov.uk/en/Publicationsandstatistics/Lettersandcirculars/Professionalletters/Chiefmedicalofficerletters/DH_082107
3. UK Renal Registry: Thirteenth Annual Report (2010) http://www.renalreg.com/Reports/2010.html
4. StataCorp. 2009. Stata Statistical Software: Release 11. College Station, TX: StataCorp LP.

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