Clostridium difficile in urology

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ABSTRACT

INTRODUCTION The objective was to determine the incidence of *Clostridium difficile* infection in a UK urology ward from 2000 to 2005, and correlate and compare the data with other specialty wards and national figures.

PATIENTS AND METHODS Urology patients with a positive stool culture for *C. difficile* between 2000 and 2005 were identified from a hospital database. The medical records of these patients were reviewed and data such as antibiotic use, urological diagnosis and elective/emergency status of the patient were recorded and analysed. The number of *C. difficile* cases on an elderly care ward, an acute medical ward and an acute surgical ward were also recorded for this period. Data on the number of admissions and occupied bed-days on all 4 wards were compared.

RESULTS There were 33 cases of *C. difficile* on the urology ward between 2000 and 2005. The incidence of this infection varied between 10.2 and 48.4 cases per 10,000 patient episodes (mean 21.0). There was a significant difference between the number of *C. difficile* cases per 1000 patient days between the urology ward and the acute medical ward ($P = 0.002$) and the elderly care ward ($P = 0.03$).

CONCLUSIONS There is no evidence to suggest that there has been an increase in the incidence of *C. difficile* in a UK urology ward. The rates on the urology ward were lower than the national average, and significantly lower than those rates on an acute medical ward and an elderly care ward. There is a 0.21% chance of a patient testing positive for *C. difficile* during their stay on a urology ward.

KEYWORDS

Clostridium difficile – Urology – UK

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The incidence of *Clostridium difficile* infection is increasing in the UK,¹ and has been estimated to cost the National Health Service more than £160 million a year.² In 1990, there were 1172 reported cases of *C. difficile* infection in England, and this number has risen sharply to 51,690 in 2005.¹ In June 2005, a national enquiry was launched to look into outbreaks of *C. difficile* at two UK hospitals. The aim of this study was to determine the rates of *C. difficile* infection in a urology ward.

C. difficile is a Gram-positive, spore-forming anaerobic bacillus that can be found in the normal faecal flora of up to 5% of the adult population.^{3–5} This can be increased to 20–50% for those patients who are hospitalised.^{6–8} In about a third of those colonised,⁷ *C. difficile* produces protein exotoxins that have a cytotoxic action on the bowel mucosa, creating a wide spectrum of symptoms from uncomplicated diarrhoea to pseudomembranous colitis with toxic megacolon.

Patients and Methods

The Solent Department of Urology in Portsmouth has 30 in-patient beds and serves a local population of over 500,000. From January 2000 until December 2005, patients with a positive toxin assay were identified through a computerised hospital database. Stool samples were sent to the laboratory if a patient had an episode of diarrhoea whilst an in-patient and these were routinely tested for *C. difficile* toxins. Enzyme-linked immunosorbent assays were performed on these specimens (detecting only toxin A prior to June 2002, and both toxins A and B from June 2002 onwards). Patients with multiple separate positive stool cultures within the same hospital episode were treated as one case of *C. difficile*. Medical records were then reviewed to extract clinical and laboratory data. Data on the use of antibiotics, the urological diagnosis and the elective/emergency status

Table 1 Total number of admissions, occupied bed-days and cases of *Clostridium difficile* on Solent Urology ward

Year	Total number of urological admissions	Occupied bed-days in urology	<i>C. difficile</i> cases (total)	<i>C. difficile</i> cases per 1000 patient-days	Incidence of <i>C. difficile</i> per 10,000 patient-episodes
2000	2436	NA*	4	NA*	16.4
2001	2929	8185	3	0.37	10.2
2002	2087	8662	3	0.35	14.4
2003	2688	9060	13	1.43	48.4
2004	2281	9709	4	0.41	17.5
2005	3188	8375	6	0.72	18.8

*These data are not available for 2000.

of the patient during the episode in which *C. difficile* infection was diagnosed were obtained. Data on the number of urological admissions and occupied bed-days between 2000 and 2005 were recorded. These data were compared with figures from one elderly care ward, one acute general surgical ward and one acute medical ward. Using the same computerised hospital database, the number of *C. difficile* cases on each of these wards was examined.

Results

There were 42 positive stool samples in total for the period 2000–2005 on the urology ward. Several of the samples had been taken from the same patient within the same hospital episode and, therefore, they were counted as one case of *C. difficile*. This left 33 urology cases in six years, 13 (39%) of which were in 2003 (Table 1). The ages of these patients ranged from 23–95 years (mean, 75.0 years). Only six of the 33 (18%) patients were under the age of 65 years. Twenty-one patients (64%) were 75 years old and over. The incidence of *C. difficile* found on the urology ward varied

between 10.2–48.4 cases per 10,000 patient-episodes over the 6 years (mean, 21.0 cases).

Twenty-six out of the possible 33 medical records (79%) were reviewed, as the remainder of the clinical notes were missing from the archives. Of these 26 patients, 15 were emergency admissions (58%) and 11 were admitted for elective procedures (42%). Only one patient was admitted from a nursing home. Ten of the elective patients (91%) received antibiotics at the time of operation and 8 received postoperative antibiotics for 2–12 days (mean, 4.5 days). Only one elective patient did not receive any antibiotics during their stay. Of the 15 emergency patients, 12 received antibiotics during their hospital stay (80%). All 22 patients receiving antibiotics (85%) were given broad-spectrum antibiotics (co-amoxiclav, cephalosporins, gentamicin and ciprofloxacin).

The urological diagnosis in those patients who developed *C. difficile* included cystectomy and formation of ileal conduit ($n = 5$; 19%), radical nephrectomy/nephroureterectomy ($n=4$, 15%), haematuria ($n=3$, 12%) and cystoscopy ($n = 3$; 12%). Others included stone disease ($n = 3$; 12%), acute urinary

Table 2 Comparison of the number of *C. difficile* cases per 1000 patient days on four wards, including the urology ward, within Portsmouth Hospitals Trust

Year	<i>C. difficile</i> cases per 1000 patient-days on:			
	Urology ward	Acute surgical ward	Acute medical ward	Elderly care ward
2001	0.37	0.21	1.23	1.67
2002	0.35	0.62	2.06	5.72
2003	1.43	0.92	2.61	2.03
2004	0.41	1.05	3.55	0.77
2005	0.72	1.84	2.44	2.58
Average	0.66	0.97	2.68	2.56

retention ($n = 2$; 8%), pyelonephritis ($n = 2$; 8%), TURP ($n = 2$; 8%) and palliation ($n = 2$; 8%). Those patients who underwent cystectomy all received antibiotics on induction of anaesthesia. This was either co-amoxiclav (first-line antibiotic) or cefuroxime (second-line antibiotic), in keeping with our local guidelines.⁹ All three patients admitted with haematuria did not receive any antibiotics during their hospital stay.

Table 2 illustrates the number of *C. difficile* cases per 1000 patient days on the urology ward, an acute surgical ward, an acute medical ward and an elderly care ward. There was a significant difference between the number of cases on the urology ward and the acute medical ward ($P = 0.002$) as well as the elderly card ward ($P = 0.05$). There was no significant difference between the urology ward and the acute surgical ward.

Discussion

C. difficile was first described by Hall and O'Toole in 1935;¹⁰ it was termed 'difficile' due to difficulties in culturing the bacterium. After the introduction and increasing use of broad-spectrum antibiotics in the latter half of the 20th century, its association with antibiotic-associated diarrhoea was soon recognised and, in 1978, its association with pseudomembranous colitis was described.^{11,12} The incidence of this bacterium and its associated disease has since increased. Today, it plays an important and expanding role in healthcare-associated infections, contributing to prolonged hospital stays, increased financial burdens and clinical morbidity and mortality.

In the UK, *C. difficile* has been subject to mandatory surveillance since 2004. National data for 2004 revealed the rate of positive *C. difficile* reports per 1000 patient days in patients over 65 years of age to be 1.90.¹⁵ This had increased to 2.22 in 2005, and locally (Portsmouth Hospitals Trust) this figure was 2.85, above the national average.¹⁵ The rates on the urology ward, however, were much lower (average 0.66 from 2001–2005). This equated to a 0.21% chance of a patient testing positive for *C. difficile* in stool samples during their hospital admission.

The wide-spread use of antibiotics is the single most important factor in the development of the infection.^{14–18} Cephalosporins, aminoglycosides and quinolones have all been shown to be principal causative agents of *C. difficile* associated diarrhoea.^{14,19,20} Matters are made worse with long courses of antibiotics and antibiotic 'cocktails'.²¹ In this study, 85% of patients had received broad-spectrum antibiotics which have been shown to be associated with *C. difficile* (cephalosporins, gentamicin, co-amoxiclav and ciprofloxacin). Increasing age, long hospital stays, admission from nursing homes, severe underlying diseases and

the use of anti-ulcer medications are other important aetiological factors.^{21–26} In this study, the incidence of *C. difficile* was also observed to increase with age. Only 18% of positive stool samples were found in patients under 65 years of age, increasing to 48% in the 75–84-year-old age group.

Comparisons made between an elderly care ward and the urology ward showed there to be a statistically significant difference in the number of *C. difficile* cases reported per 1000 patient days. This could be explained by the higher average age of patients as the average age of patients with *C. difficile* on the elderly care ward was 80.9 years in comparison to 73.0 years on the urology ward. The number of patients admitted from nursing homes may also account for this significant difference. Of those patients who were found to have a positive stool sample on the urology ward, only one was admitted from a nursing home. Increasing age, however, is not accountable for the significant difference between the urology and acute medical wards (mean age, 75.0 and 72.3 years, respectively). This could be explained by the dissimilarity in patient admission status (*i.e.* elective or emergency). Admissions to both the urology and the acute surgical wards are a mix of elective and emergency patients whereas the acute medical ward only accepts emergencies. This may predispose to an increase in the use and number of antibiotics used, as well as the presence of more significant underlying pathologies, and therefore account for the significance between the rates of *C. difficile* on these wards. However, 42% of patients who developed *C. difficile* on the urology ward were admitted on an elective basis, and this high number may be attributable to the use of broad-spectrum antibiotics peri-operatively (91% of elective patients).

There is no significant evidence in our data to suggest that there has been an increase in *C. difficile* incidence on a busy UK urology ward. In 2003, there was an increase to 48.4 cases of *C. difficile* per 10,000 patient episodes from 10.2 cases in the previous year (average, 21.0 cases for the 2000–2005 period). The skew of this result may be accounted for by an 'outbreak' on the ward as seven of these cases occurred within a 2-month window. The remainder of the data are distributed evenly over the 6 years. In the first 2.5 years (until June 2002), when the enzyme-linked immunosorbent assays only detected toxin A, only 7 samples were positive. Since the introduction of new assay kits detecting both toxins A and B, 24 have been positive. Better diagnostic testing methods for *C. difficile* and the increased awareness of medical staff to this bacterium could both account for the rise in national and international *C. difficile* rates. It does not, however, influence our results. The over-use of broad-spectrum antibiotics, especially those which have been found to be associated with a higher incidence of *C. difficile*, still remains an important factor in the rising rates.

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