



CDSC (NI)

***C. difficile* surveillance**

Quarter Ending March 2008

Surveillance of *C. difficile* associated diarrhoea (CDAD)

- ❖ **CDAD rates for hospital inpatients in Northern Ireland have decreased slightly during January – March 2008 (Figure 5).**
- ❖ **CDAD reports from ‘community’ patients for the January – March quarter have increased 33% compared to the previous quarter (Figure 1).**

C. difficile reporting

- ❖ Reports of *C. difficile* are obtained directly from each diagnostic laboratory through the normal laboratory surveillance programme, rather than collecting the data from individual Trusts.
- ❖ Line listings of cases are sent to the diagnostic laboratories who confirm the totals and the break down of patients by source (hospital inpatient/community) according to the information provided on laboratory request forms. Currently, mandatory surveillance is restricted to those individuals over 65 years of age.

January – March 2008: Quarter 1

All CDAD episodes (inpatient and community)

- ❖ During quarter 1, 2008, 349 episodes of *C. difficile* associated disease were reported in persons aged 65 years and over compared to 343 episodes the previous quarter (1.7% increase; Figure 1).
- ❖ The 2008 January - March total CDAD figures are higher than those reported in the same time period in 2007 and 2006 (15.6% and 3.3% respectively; Figure 1).
- ❖ Of the 349 episodes, 288 were known to have been a hospital inpatient in one of the listed hospitals in Appendix A Table 1 at the time of the sample being taken.
- ❖ The remaining 61 isolates reported were from ‘community’ samples which may include: GPs, nursing homes and other such non acute settings. The proportion of CDAD reports that are from the community have increased from 8.9% for the calendar year 2005 to 17.5% in the first quarter of 2008.

Inpatient episodes

- ❖ There has been a slight decrease in the number of inpatient cases reported in this quarter (9 cases, 3%) when compared to the previous quarter.
- ❖ Comparing the January – March 2008 period to the same quarter in 2007 there has been an increase in the number of cases reported (24 cases; 9.1% increase; Figure 2). However, figures for this quarter are still less than those reported for Quarter 1 in 2005 and 2006 (Figure 2). For a breakdown by Trust/hospitals see Figures 3 and 4.

Community episodes

- ❖ Community figures have risen this quarter when compared to quarter 4, 2007 (15 episodes; 32.6% increase; Figure 1 and Appendix A).
- ❖ When January – March 2008 is compared to the same quarter in 2007 it is clear that there is a significant rise in the number of episodes (23 cases; 60.5% increase; Figure 1). It should be noted that it is not possible to distinguish true ‘community’ episodes from those patients who may have recently been discharged from hospital.

Statistical Process Control charts

- ❖ Control charts are now being used for *C. difficile* surveillance to emulate the current practice for *S. aureus* reporting.

- ❖ Trends in rates since July 2005 are shown for each Trust configuration in appendix B. SPC charts allow the distinction to be made between natural variation and “special cause variation” where something unusual may be occurring. Further details on SPC charts can be found in appendix D.
- ❖ In Northern Ireland, this quarter, the rate of *C. difficile* patient episodes has fallen below the action limit of the chart, but remains above the warning limit (Figure 5).
- ❖ A particularly high number of cases continue to be reported in the Northern Trust who remain above their action limits for the third consecutive quarter (Appendix B).
- ❖ This quarter, a marked increase was also recorded in the Southern Trust who are touching their action limit (Appendix B).

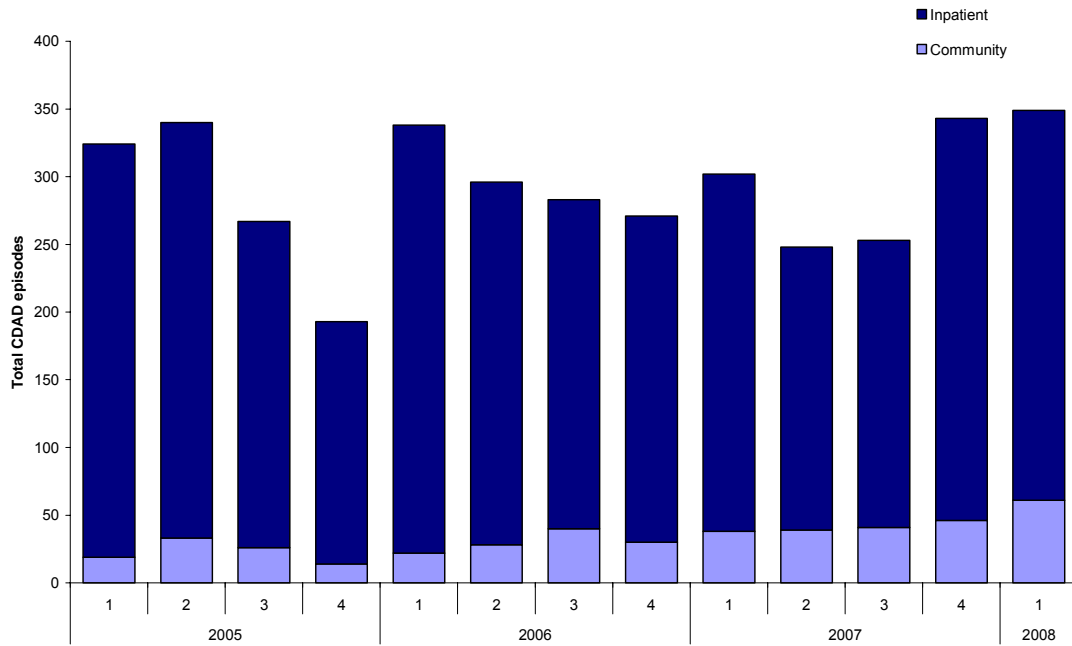


Figure 1: Total CDAD reports, inpatient and community, in Northern Ireland, by quarter (patients ≥ 65 years), between 2005 and 2008.

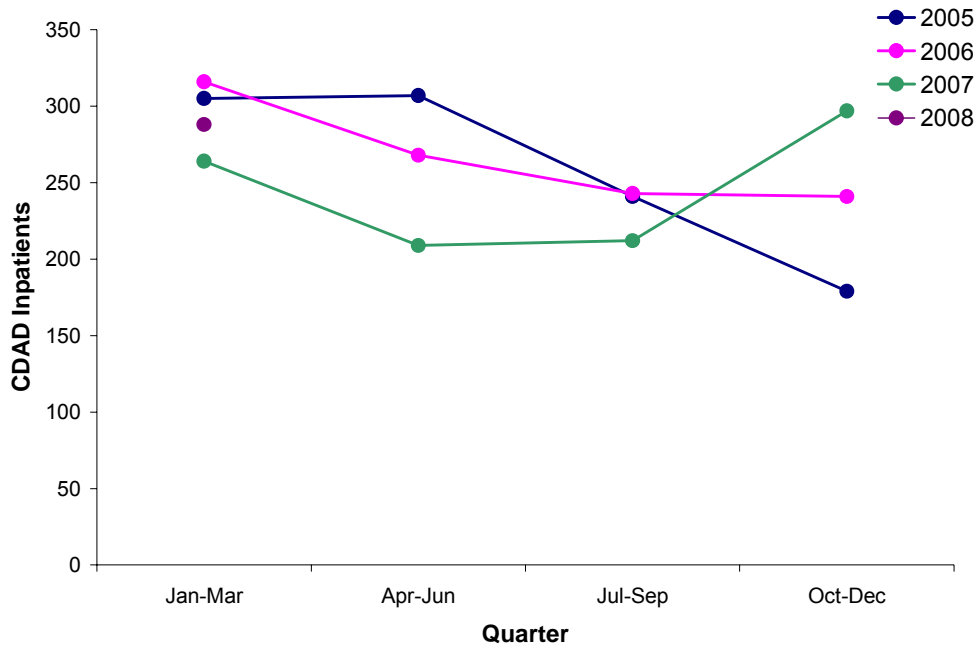


Figure 2: Total CDAD ‘Inpatient’ reports, Northern Ireland, by quarter (patients ≥ 65 years), between 2005 and 2008.

Rates of hospital inpatient *C. difficile* reports

- ❖ All Trusts provide appropriate denominator data (bed occupancy for patients ≥ 65 years) on a regular basis, making the calculation of *C. difficile* rates possible for their constituent hospitals (Figure 4). Notes on this denominator are included in Appendix C.
- ❖ Since 01 January 2008, Waterside wards 1, 2 and 3 and Sperrin Ward (Tyrone & Fermanagh) have been added to the Western Trust *C. difficile* surveillance scheme, as they are all care of the elderly wards.

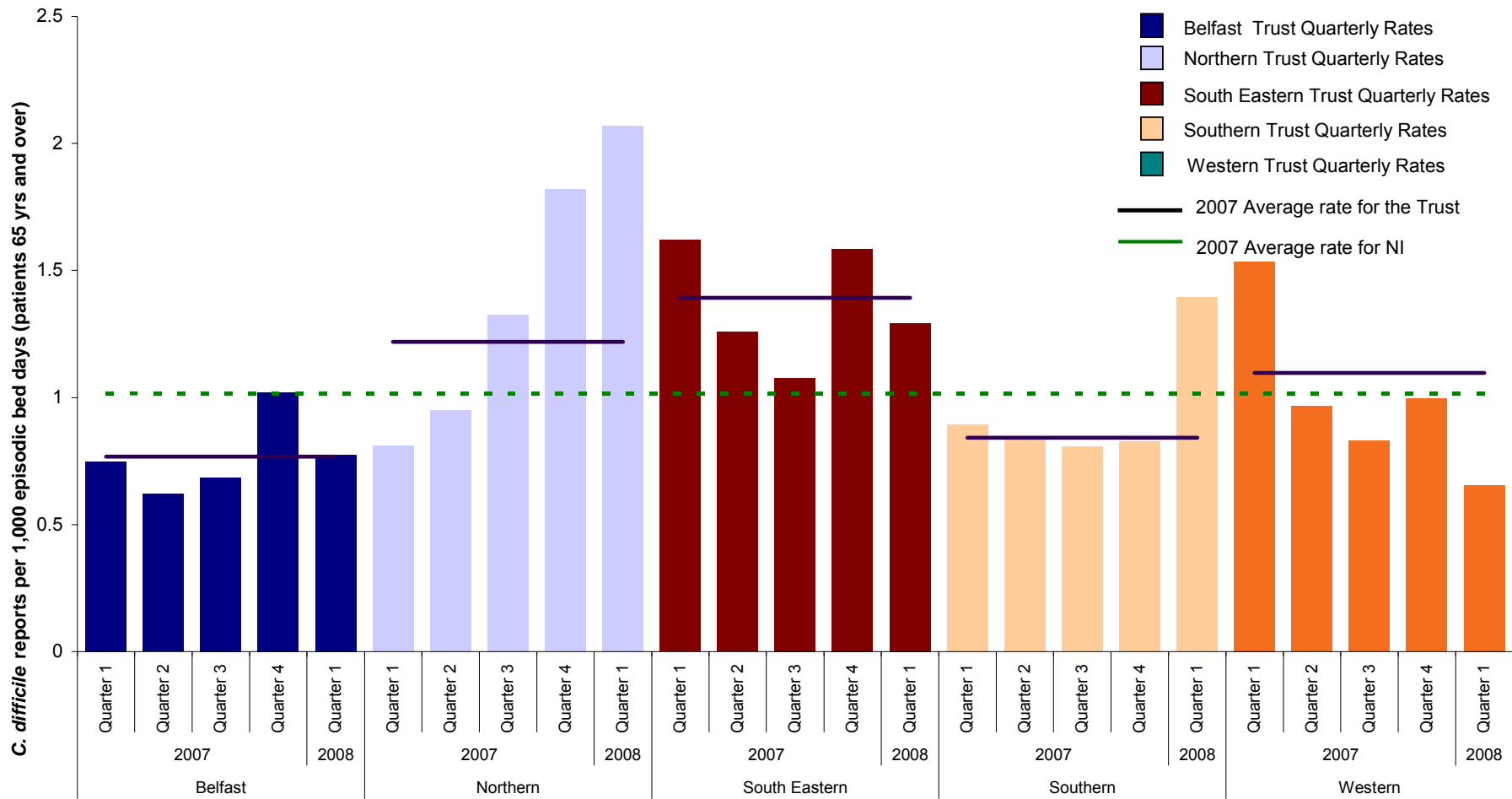


Figure 3: Quarterly rates of *Clostridium difficile* by Trust 1 January 2007 – 31 March 2008, compared with annual NI and Trust rates for 2007; inpatients ≥ 65 years.

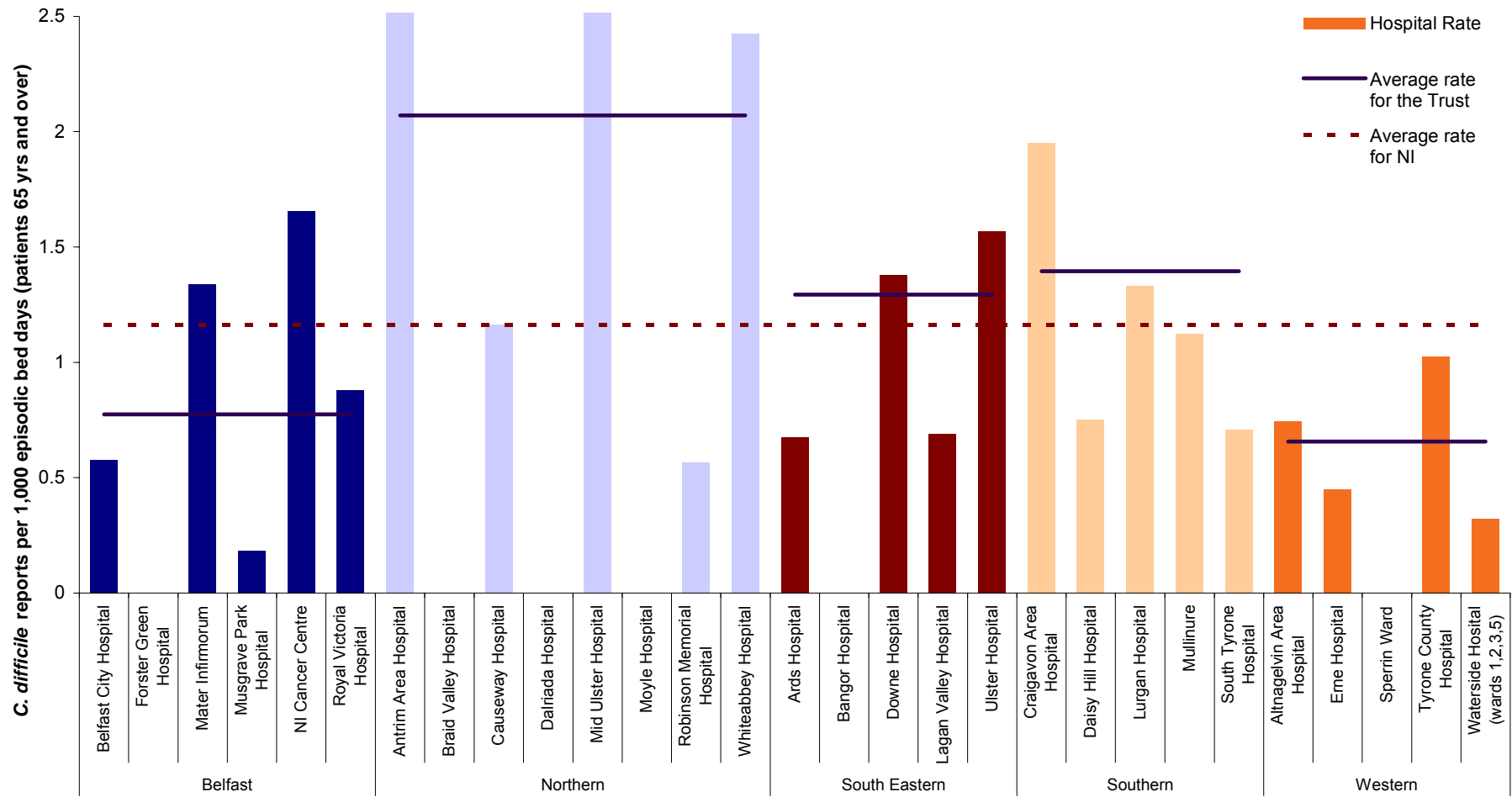


Figure 4: Rates of *Clostridium difficile* by individual Hospitals and new Trusts, 2008 Quarter 1 (inpatients \geq 65 years), including the quarterly Trust rate, gaps represent zero episodes (see appendix A Table 1).

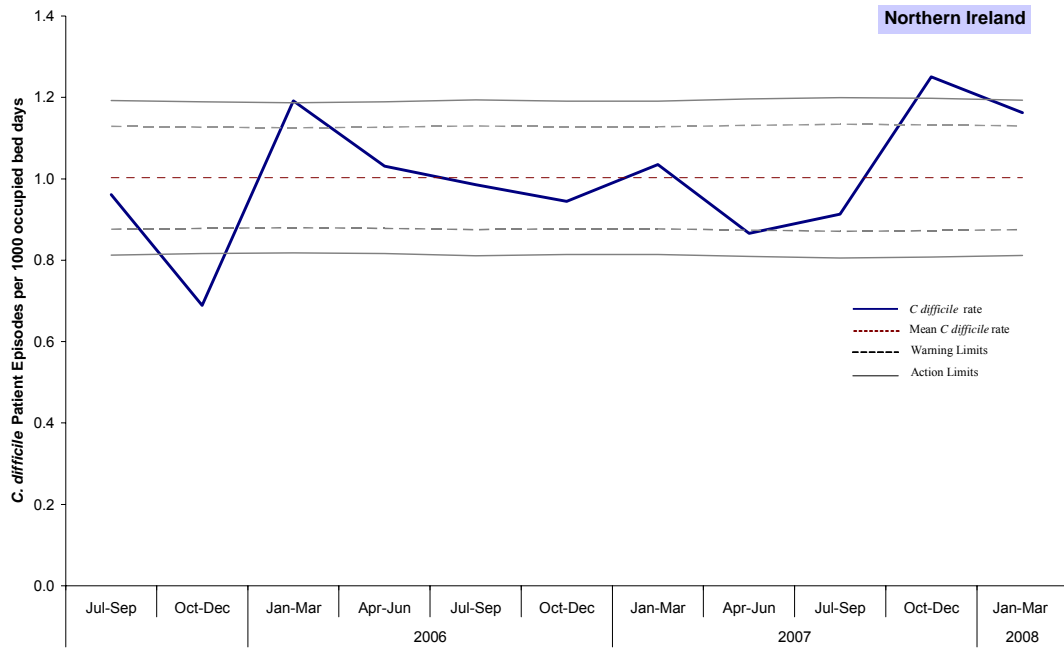


Figure 5: Statistical Process Control chart for quarterly *C difficile* rates in inpatients, in Northern Ireland (For Trust level see Appendix B).

Appendix A

Table 1: Quarterly number of *Clostridium difficile* patient episodes, patients 65 years and over, and rates by Hospital, January – March 2008

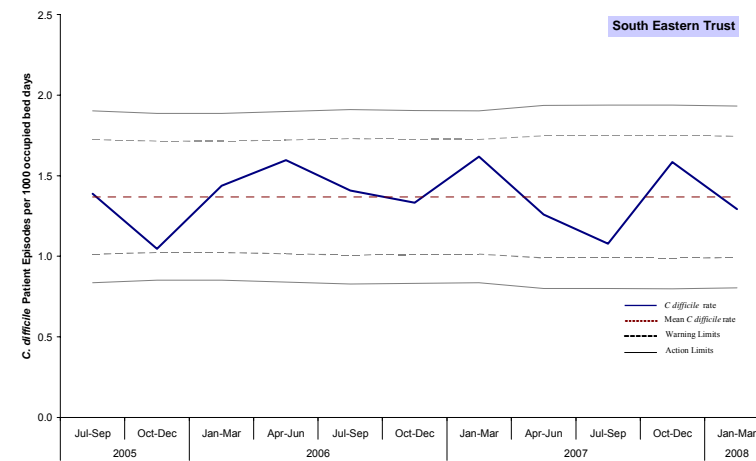
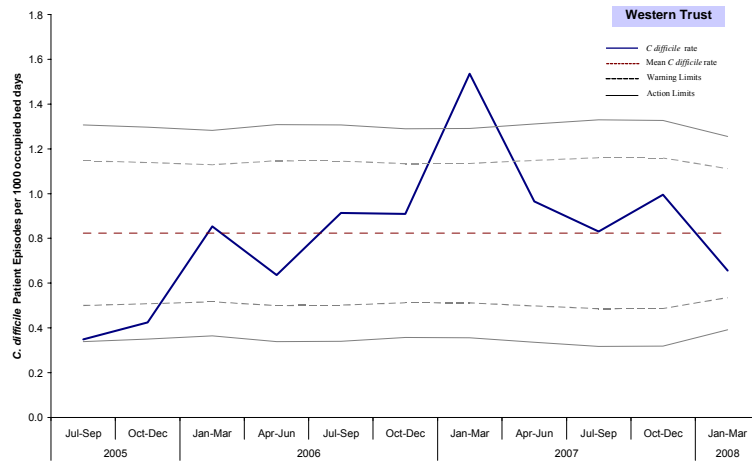
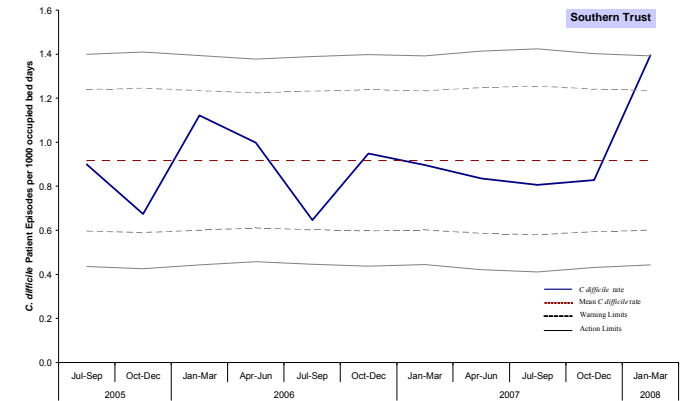
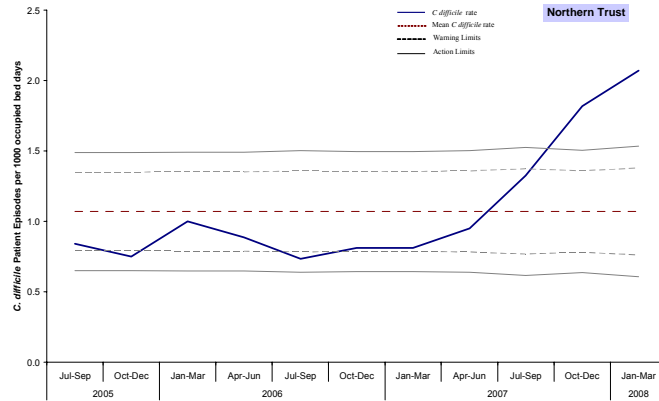
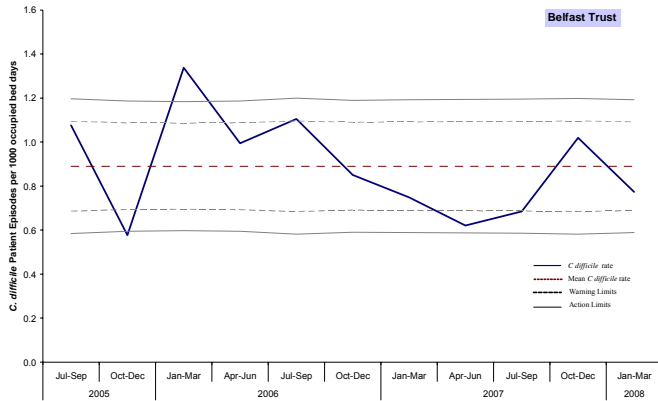
| Hospital | Jan-Mar 2008 | |
|---|------------------|--------------|
| | Episodes** | Rate |
| Belfast City Hospital | 18 (40) | 0.577 |
| Forster Green Hospital | 0 (0) | 0.000 |
| Mater Infirmorum | 17 (11) | 1.339 |
| Musgrave Park Hospital | 2 (5) | 0.184 |
| NICCO (formerly at Belvoir Park) | 5 (2) | 1.656 |
| Royal Victoria Hospital | 26 (28) | 0.879 |
| Belfast Health & Social Care Trust | 68 (86) | 0.774 |
| Antrim Area Hospital | 49 (58) | 3.097 |
| Braid Valley Hospital | 0 (0) | 0.000 |
| Causeway Hospital | 11 (11) | 1.164 |
| Dalriada Hospital | 0 (0) | 0.000 |
| Mid Ulster Hospital | 16 (16) | 2.578 |
| Moyle Hospital | 0 (0) | 0.000 |
| Robinson Memorial Hospital | 1 (0) | 0.566 |
| Whiteabbey Hospital | 16 (8) | 2.426 |
| Northern Health & Social Care Trust | 93 (93) | 2.070 |
| Ards Hospital | 1 (0) | 0.677 |
| Bangor Hospital | 0 (0) | 0.000 |
| Downe Hospital | 5 (2) | 1.377 |
| Lagan Valley Hospital | 5 (3) | 0.690 |
| Ulster Hospital | 39 (55) | 1.568 |
| South Eastern Health & Social Care Trust | 50 (60) | 1.293 |
| Craigavon Area Hospital | 31 (18) | 1.951 |
| Daisy Hill Hospital | 7 (2) | 0.752 |
| Lurgan Hospital | 9 (9) | 1.332 |
| Mullinure | 2 (0) | 1.122 |
| South Tyrone Hospital | 2 (0) | 0.708 |
| Southern Health & Social Care Trust* | 51 (29) | 1.395 |
| Altnagelvin Area Hospital | 14 (22) | 0.745 |
| Erne Hospital | 3 (5) | 0.449 |
| Sperrin Ward (T&F) | 0 (0) | 0.000 |
| Tyrone County Hospital | 7 (2) | 1.025 |
| Waterside (Wards 1, 2, 3, 5) | 2 (0) | 0.322 |
| Western Health & Social Care Trust* | 26 (29) | 0.656 |
| NI TOTAL | 288 (297) | 1.163 |
| NI Community TOTAL | 61 (46) | - |

* January – March 2008 now includes Waterside Wards 1, 2 and 3 and Sperrin Ward

** Figures in parentheses represent October-December 2007 data.

Appendix B

Trends in inpatient *C difficile* rates by trust and quarter (2005-2008)



Notes:

The number of CDAD patient episodes is defined as the total number of patients aged 65 years and over from whom a diarrhoeal specimen tested positive for *C. difficile* toxins A and toxin B during the relevant time period. If repeat specimens were collected from a single patient at least 28 days apart, the patient is considered to have had two episodes of CDAD; counted as two patient episodes.

The **rates** described in this report are patient episodes per 1,000 occupied bed days (patients aged 65 years and over). The denominator used for this calculation is derived from patient episode statistics obtained from each Trust individually on a quarterly basis. All rates have been calculated for both individual Trusts and Northern Ireland as a whole.

The more refined the criteria for selecting patients for the inclusion into the denominator, the more limitations there are on the accuracy of the data:

- The denominator supplied by each Trust is that of the number of 'episodic bed days' for patients aged 65 years and over. Patient age is according to the age of each patient at the end of episode and so is potentially an overestimate as patients who entered this age group during their stay would be included.
- The estimation of numbers below Trust level, that is, on a hospital basis, is less accurate than for an entire Trust. As with the use of age as an identifier, a patient's status and location can change during the course of an episode. In some Trusts there is the potential for patients to begin an episode in one hospital and be transferred to a different hospital, yet remain under the care of the same consultant. Therefore the use of patient location at the start or end of a patient episode has limitations and as such is subject to error.

This surveillance programme started on 1 January 2005 and during that year laboratories changed their testing methodology to conform to new national guidelines. Therefore, 2006 was the first year with all laboratories using identical testing methods and interpretation of 2005 data should be undertaken with caution.

Appendix D

Statistical Process Control charts:

The Statistical Process Control (SPC) chart is now commonly used for the reporting of MRSA rates throughout the UK and can be applied to *C difficile* surveillance. SPC charts assume that rates within a Trust will be largely similar over time. They present the occurrence of *C difficile* in a Trust in relation to what would be expected, based upon the mean rate for the Trust and calculated statistical process control limits.

The mean for each Trust has been calculated using the data from all quarters since July 2005. Control limits, derived from plus or minus 2 or 3 standard deviations from the mean, represent the range of variation in rates that might be expected to occur due to chance alone.

The warning limit is set at two standard deviations from the mean, whilst the action limit is set at three standard deviations from the mean. The limits vary slightly every quarter because of the varying occupancy in the hospitals within each trust.

Control limits were set up by using the following formulae:

$$\text{Warning Limit} = M \pm 2 \sqrt{\frac{E_i}{(N_i)^2}} \quad \text{Action Limit} = M \pm 3 \sqrt{\frac{E_i}{(N_i)^2}}$$

Where M is the Mean, N_i is the number of Occupied Bed-days per quarter and E_i is the expected number of reports calculated as $E_i = M \times N_i$

SPC charts allow the distinction to be made between natural variation and “special cause variation”, where something unusual is occurring in a Trust. If any of the following criteria are met then there is said to be “special cause variation” which should be investigated, as this could not statistically have occurred by chance alone:

- 1 value above the upper action limit, or below the lower action limit
- 3 consecutive values between the upper warning limit and upper action limit (or between lower limits)
- 8 consecutive values on the same side of the mean (either above or below)
- Any 12 of 14 consecutive values on the same side of the mean (either above or below)
- 8 consecutive values either increasing or decreasing