



CDSC (NI)

***C. difficile* surveillance**

New Trust Configuration

Quarter Ending September 2007

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

Overall, CDAD reports in Northern Ireland have risen slightly during July – September 2007, but there has been no significant change.

July – September 2007: Quarter 3

Reports of *C. difficile* are obtained directly from the testing laboratory, rather than from each Trust individually. Line listings of cases are sent to the testing 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. During this quarter figures for the Legacy Altnagelvin Trust were not confirmed and as such are provisional.

Total numbers of CDAD reports

The number of *Clostridium difficile* patients episodes (≥ 65 years) and rates for April 2005-March 2006 and April 2006-March 2007 are presented in appendix A table 1 for reference.

During the third quarter of 2007 a total of 252 reports of *C. difficile* associated disease were reported in persons aged 65 years and over. Of these 252 episodes, 211 were known to have been a hospital inpatient in one of the Acute/Specialist/Legacy Trusts in Northern Ireland at the time of the sample being taken. The remaining 41 isolates reported were from 'community' samples which may include: GPs, private hospitals, hospices, hospitals provided by Community Trusts, or Psychiatric facilities (including those run by both Acute and Community Trusts).

The NI total of CDAD reports for this quarter has risen compared with the previous quarter (Table 1). However, the 2007 figures are still less than those reported in the same time period in 2005 and 2006 (Table 1; Figure 1). During this quarter the community figures have remained relatively unchanged when compared to the rest of 2007. However, CDAD reports from the community during January – June 2007 still remain higher than figures for the same period last year (33.3% increase). Slightly more inpatient cases have been reported this quarter (4 cases, 1.9%) when compared to the previous quarter, however this is not significant. The total number of CDAD reports from inpatients on the whole has decreased from January–June 2007 when compared to the same period in 2006 (17.6% reduction). Whilst the inpatient episodes are lower than in previous years, it is clear that the 'community' episodes have increased. It should be noted that it is not possible to distinguish in the 'community' episodes those patients who may have recently been discharged from hospital.

Statistical Process Control charts

Control charts have now been introduced for *C. difficile* surveillance to emulate the current practice for *S. aureus* reporting. Trends in rates since July 2005 are shown for each legacy Trust and the new 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.

For Northern Ireland as a whole *C. difficile* rates are fluctuating within normal parameters (Figure 5). Only the Northern Trust has breached the action limit this quarter.

Table 1: Total CDAD reports in Northern Ireland, by source and quarter (patients \geq 65 years)

Year	Quarter	Total 'community'	Total 'inpatient'	NI total
2005	1	19	305	324
2005	2	33	307	340
2005	3	26	241	267
2005	4	14	179	193
2006	1	22	316	338
2006	2	28	268	296
2006	3	40	241	281
2006	4	30	239	269
2007	1	40	262	302
2007	2	39	207	246
2007	3	41	211	252

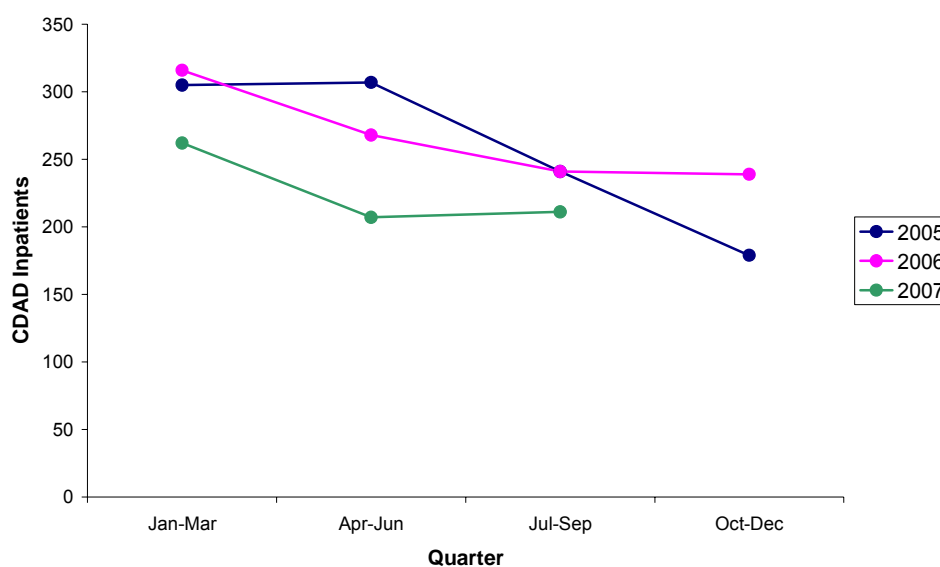


Figure 1: Total CDAD 'Inpatient' reports in Northern Ireland, by quarter (patients \geq 65 years)

Rates of hospital inpatient *C. difficile* reports

All Trusts provide appropriate denominator data (bed occupancy for patients \geq 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 the Appendix.

In this quarter Mullinure, a care of the elderly facility, has been added to the Southern Trust.

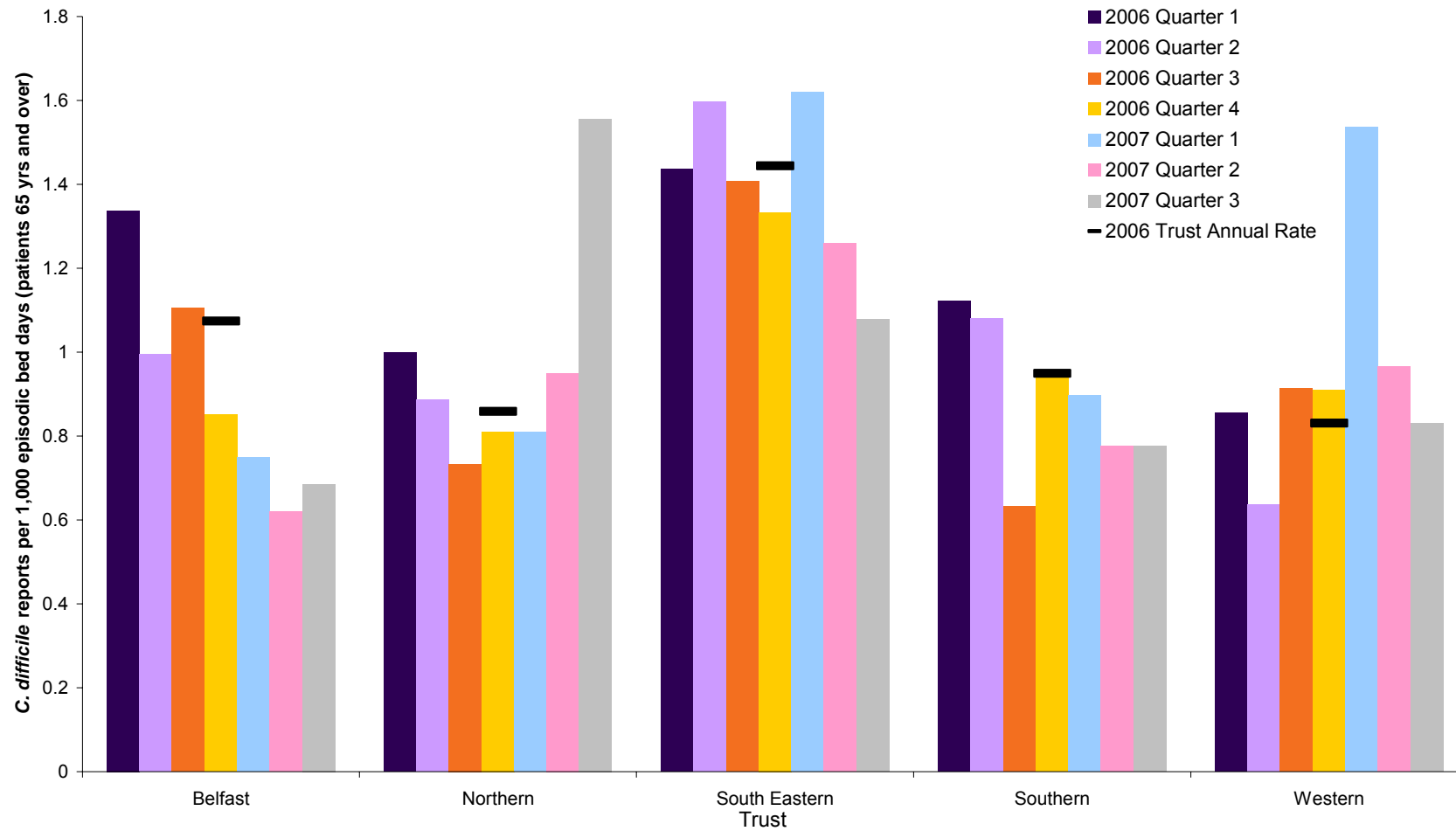


Figure 2: Quarterly rates of *Clostridium difficile* by Trust 1 January 2006 – 30 September 2007, annual rate for 2006; inpatients ≥ 65 years.

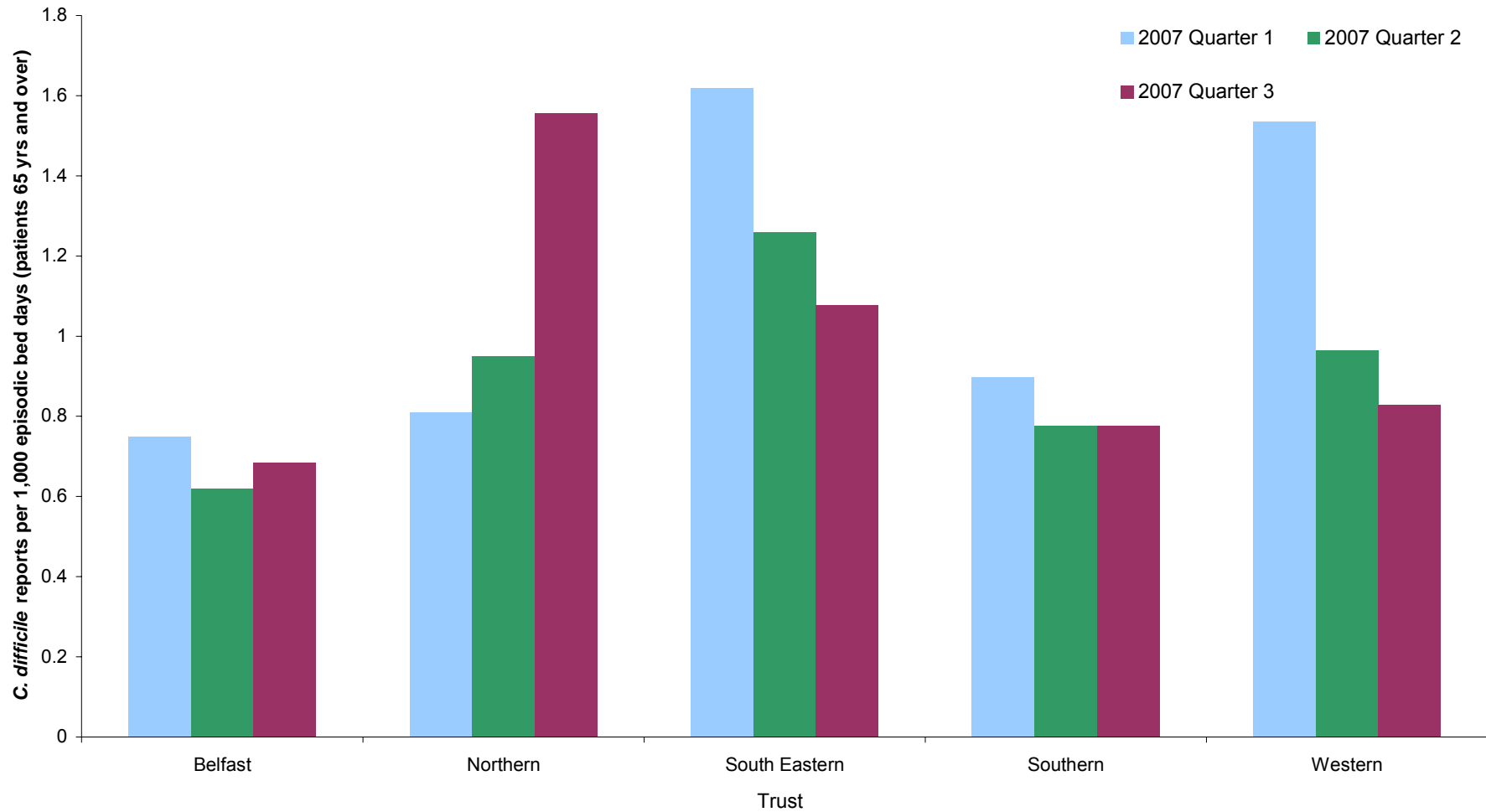


Figure 3: Quarterly rates of *Clostridium difficile* by Trust, 2007 Quarter 1, 2007 Quarter 2 and 2007 Quarter 3. Inpatients ≥ 65 years (see appendix A Table 2).

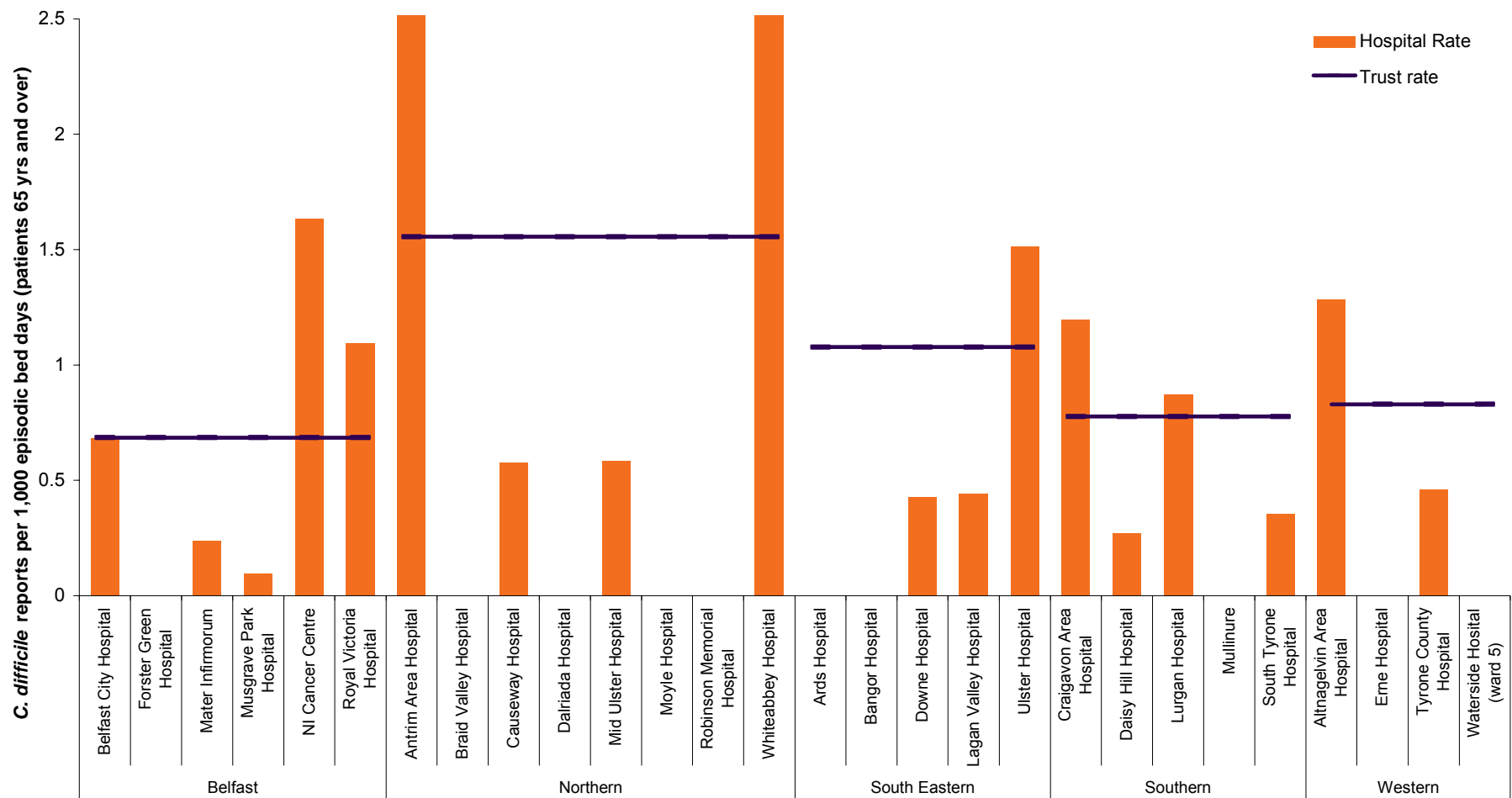


Figure 4: Rates of *Clostridium difficile* by individual Hospitals and new Trusts, 2007 Quarter 3 (inpatients \geq 65 years)

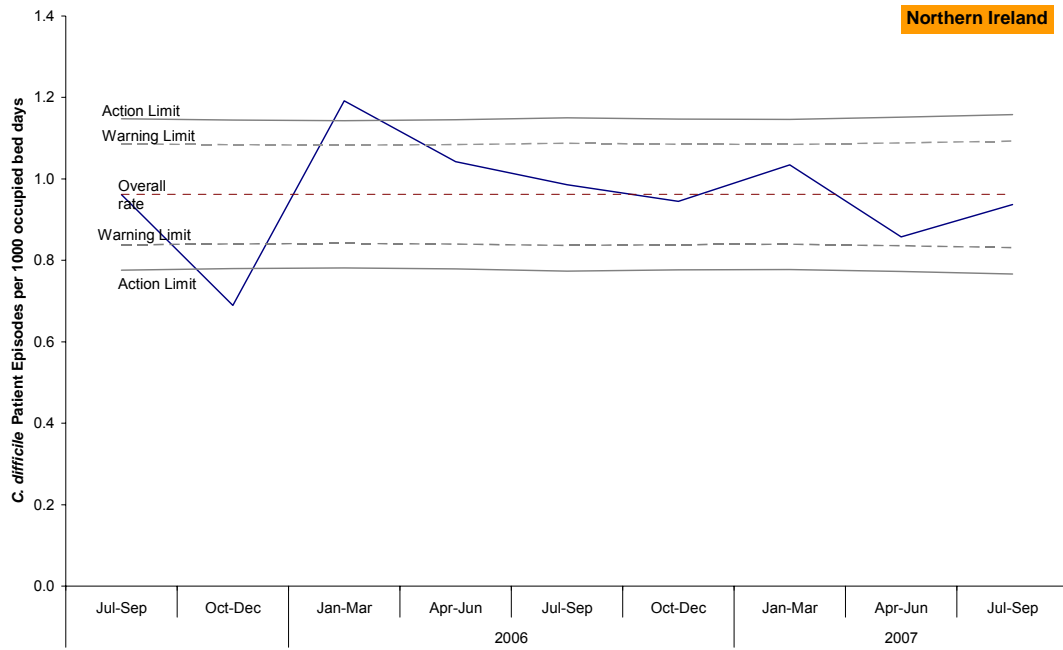


Figure 5: Statistical Process Control chart for quarterly *C difficile* rates in Northern Ireland.

Appendix A

Table 1: Number of *Clostridium difficile* patient episodes, patients 65 years and over, and rates by Hospital, 2005/06 – 2006/07

Hospital	Episodes		Rate	
	2005/06	2006/07	2005/06	2006/07
Belfast City Hospital	190	113	1.487	0.881
Forster Green Hospital	0	0	0	0
Mater Infirmorum	40	95	0.811	1.925
Musgrave Park Hospital	10	22	0.238	0.531
NICCO (formerly at Belvoir Park)	5	4	0.418	0.404
Royal Victoria Hospital	107	92	0.843	0.776
Belfast Health & Social Care Trust	352	326	0.968	0.923
Antrim Area Hospital	63	87	1.057	1.399
Braid Valley Hospital	0	1	0	0.063
Causeway Hospital	64	40	1.581	1.046
Dalriada Hospital	0	0	0	0
Mid Ulster Hospital	25	20	0.739	0.626
Moyle Hospital	0	0	0	0
Robinson Memorial Hospital	7	0	1.029	0
Whiteabbey Hospital	25	24	0.594	0.634
Northern Health & Social Care Trust	184	172	0.838	0.811
Ards Hospital	0	0	0	0
Bangor Hospital	0	0	0	0
Downe Hospital	16	19	0.911	1.057
Lagan Valley Hospital	42	19	1.266	0.582
Ulster Hospital	185	218	1.551	1.993
South Eastern Health & Social Care Trust	243	256	1.341	1.490
Craigavon Area Hospital	99	86	1.643	1.413
Daisy Hill Hospital	21	17	0.571	0.498
Lurgan Hospital	33	16	1.076	0.514
South Tyrone Hospital	15	5	1.001	0.384
Southern Health & Social Care Trust	168	124	1.178	0.891
Altnagelvin Area Hospital	83	94	1.188	1.325
Erne Hospital	4	20	0.133	0.647
Tyrone County Hospital	8	18	0.307	0.739
Waterside Hospital (Ward 5)	1	0	0.199	0
Western Health & Social Care Trust	96	132	0.732	1.006
NI TOTAL	1043	1010	1.004	1.003

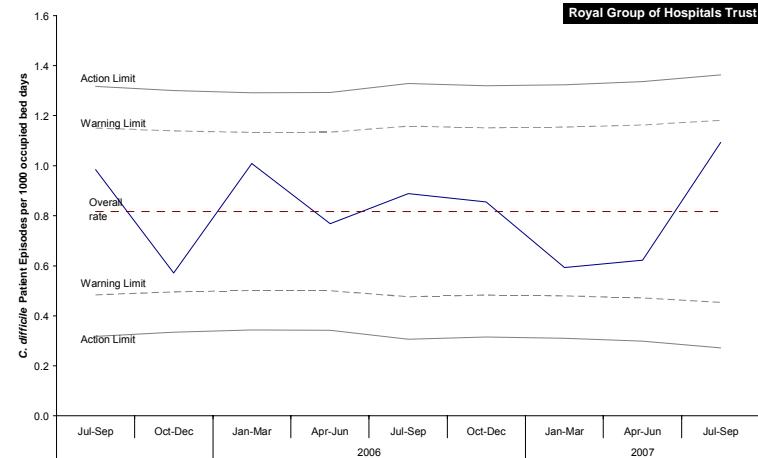
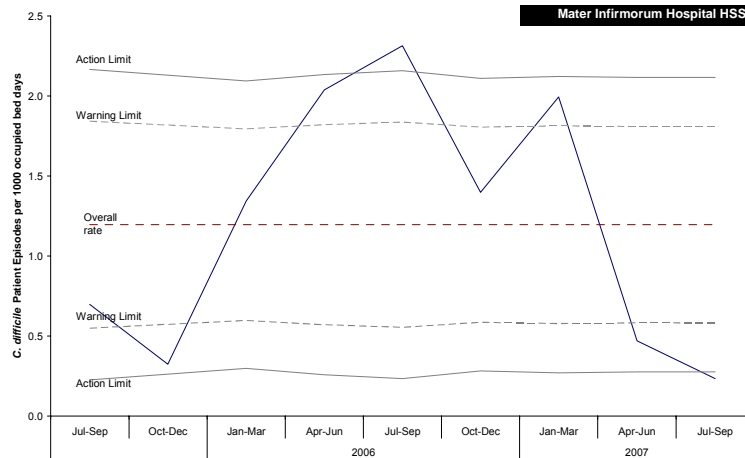
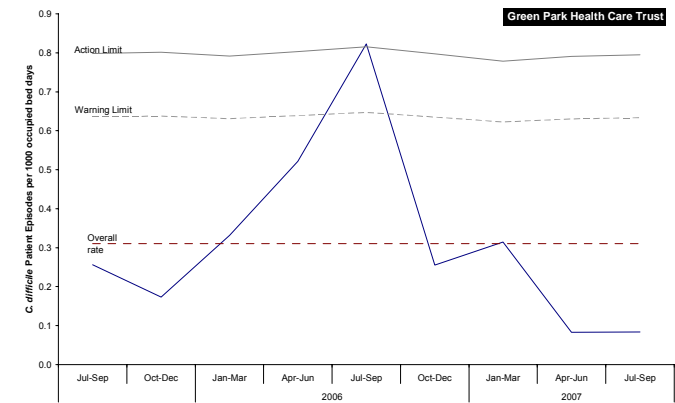
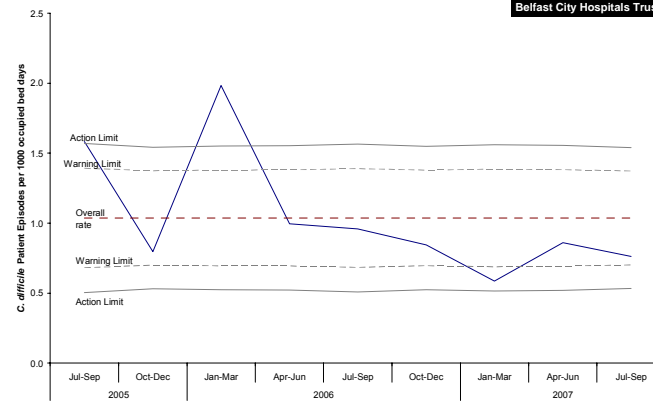
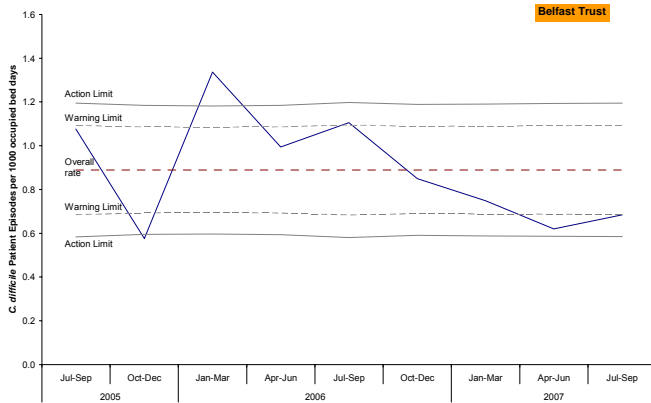
Appendix A

Table 2: Number of *Clostridium difficile* patient episodes, patients 65 years and over, and rates by Hospital, January - March, April - June, July - September 2007

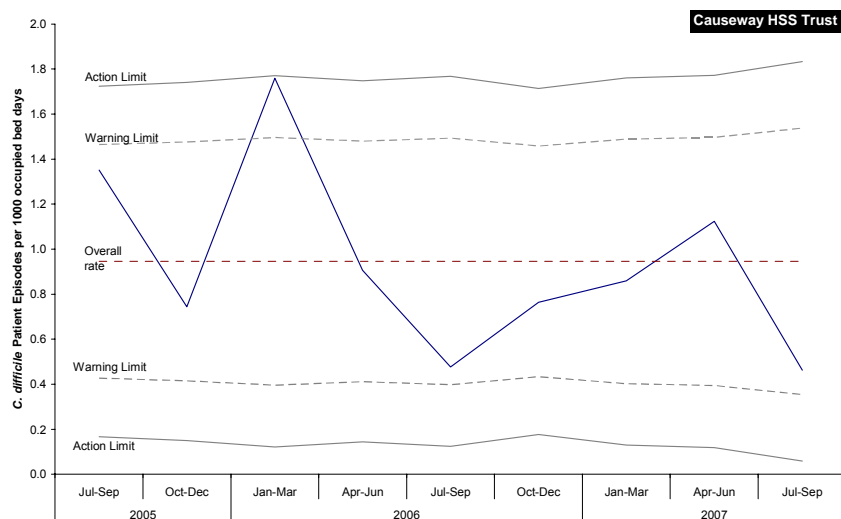
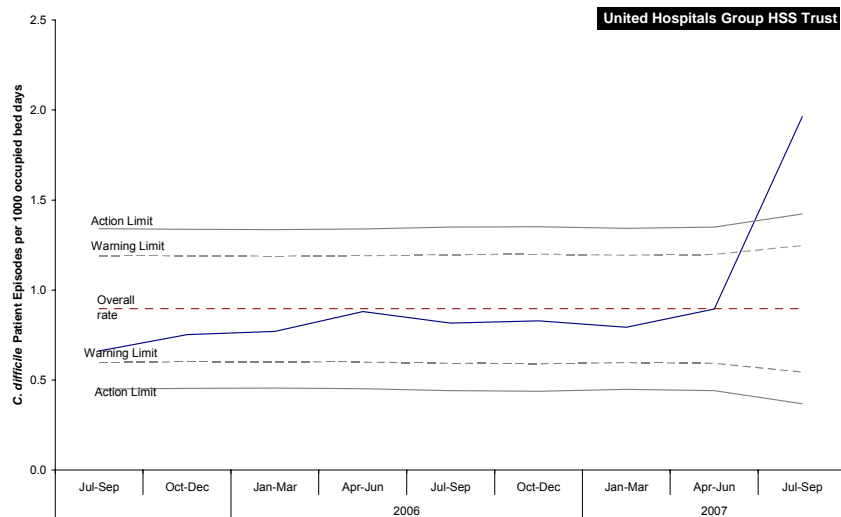
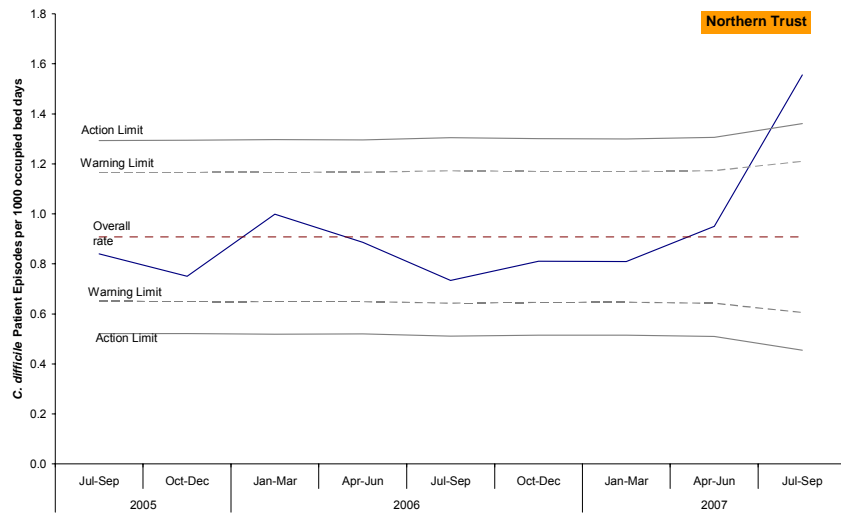
Hospital	Jan-Mar 2007		Apr-Jun 2007		Jul-Sep 2007	
	Episodes	Rate	Episodes	Rate	Episodes	Rate
Belfast City Hospital	19	0.61	25	0.78	23	0.68
Forster Green Hospital	0	0	0	0	0	0
Mater Infirmorum	25	1.99	6	0.47	3	0.24
Musgrave Park Hospital	4	0.35	1	0.09	1	0.09
NICCO (formerly at Belvoir Park)	1	0.35	5	1.95	5	1.63
Royal Victoria Hospital	17	0.59	17	0.62	27	1.09
Belfast Health & Social Care Trust	66	0.75	54	0.62	59	0.69
Antrim Area Hospital	26	1.54	26	1.67	39	2.84
Braid Valley Hospital	0	0	0	0	0	0
Causeway Hospital	11	1.23	11	1.19	5	0.58
Dalriada Hospital	0	0	2	1.37	0	0
Mid Ulster Hospital	4	0.52	4	0.51	3	0.58
Moyle Hospital	0	0	0	0	0	0
Robinson Memorial Hospital	0	0	1	0.58	0	0
Whiteabbey Hospital	2	0.21	5	0.55	15	2.60
Northern Health & Social Care Trust	43	0.81	49	0.95	62	1.56
Ards Hospital	0	0	0	0	0	0
Bangor Hospital	0	0	0	0	0	0
Downe Hospital	7	1.45	8	1.99	2	0.43
Lagan Valley Hospital	5	0.68	2	0.32	3	0.44
Ulster Hospital	58	2.07	38	1.52	36	1.51
South Eastern Health & Social Care Trust	70	1.62	48	1.26	41	1.08
Craigavon Area Hospital	26	1.67	18	1.31	16	1.20
Daisy Hill Hospital	2	0.24	2	0.25	2	0.27
Lurgan Hospital	3	0.39	6	0.86	6	0.87
Mullinure	2	0.89	0	0	0	0
South Tyrone Hospital	0	0	0	0	1	0.35
Southern Health & Social Care Trust	33	0.90	26	0.78	25	0.78
Altnagelvin Area Hospital	35	1.90	18	1.07	22	1.28
Erne Hospital	4	0.50	2	0.30	0	0
Tyrone County Hospital	13	2.23	10	1.51	2	0.46
Waterside Hospital (Ward 5)	0	0	0	0	0	0
Western Health & Social Care Trust	52	1.54	30	0.97	24	0.83
NI TOTAL	264	1.04	207	0.858	211	0.94

Appendix B

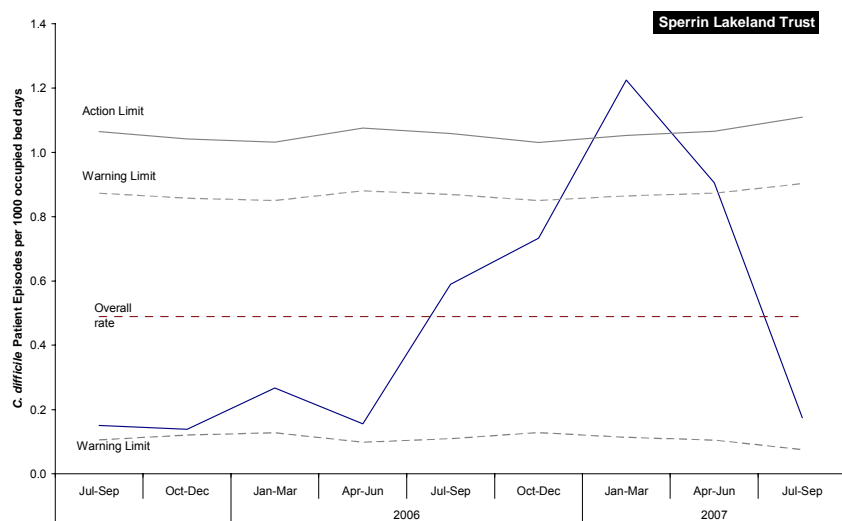
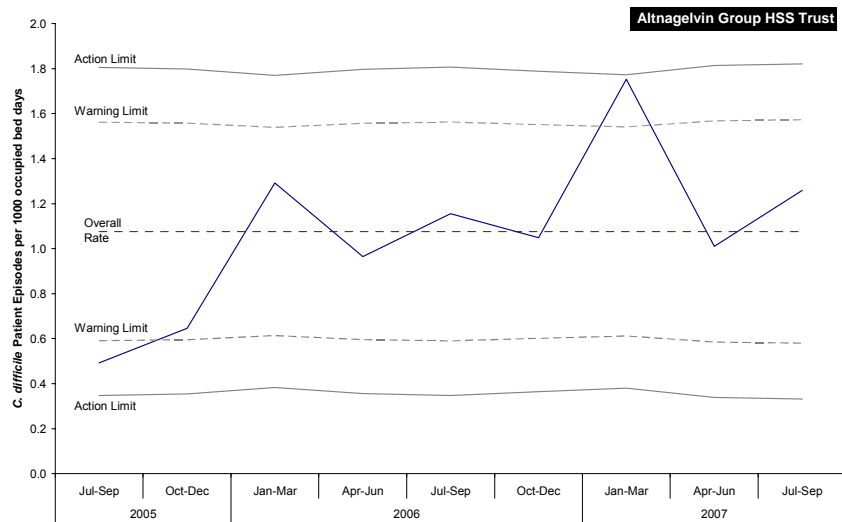
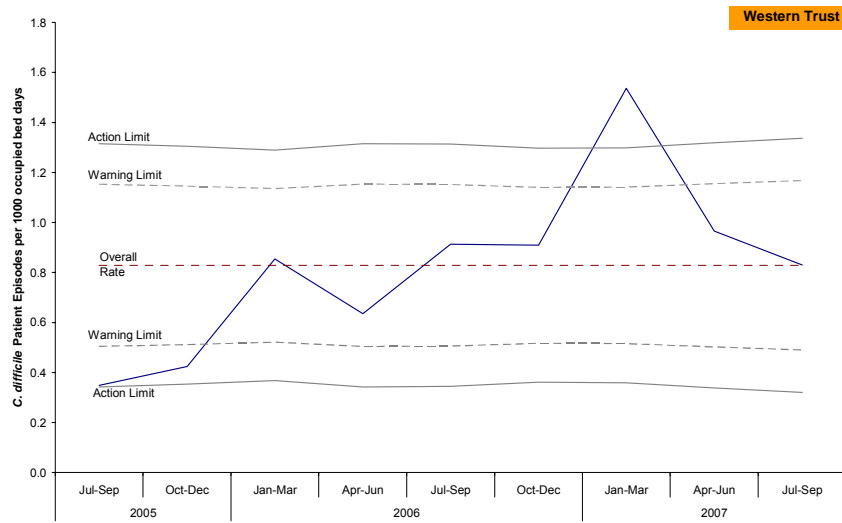
Appendix B: Trends in *C difficile* rates by trust (both new and old) and quarter (2005-2007)



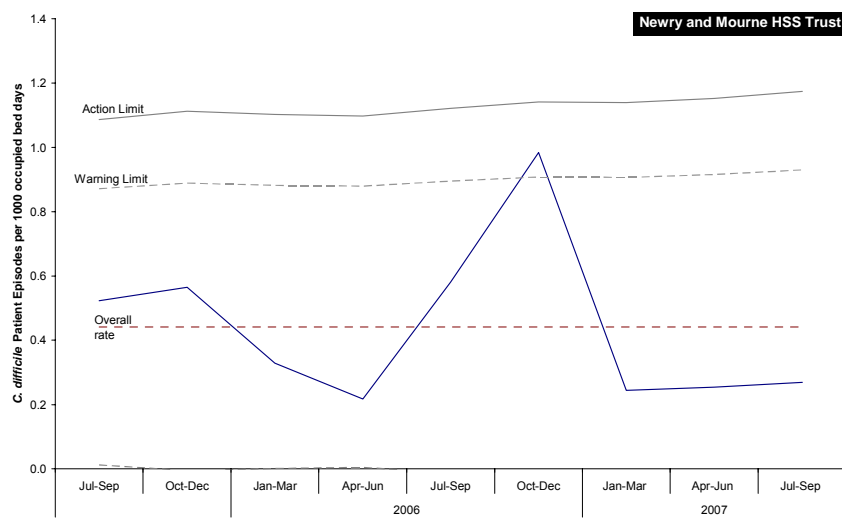
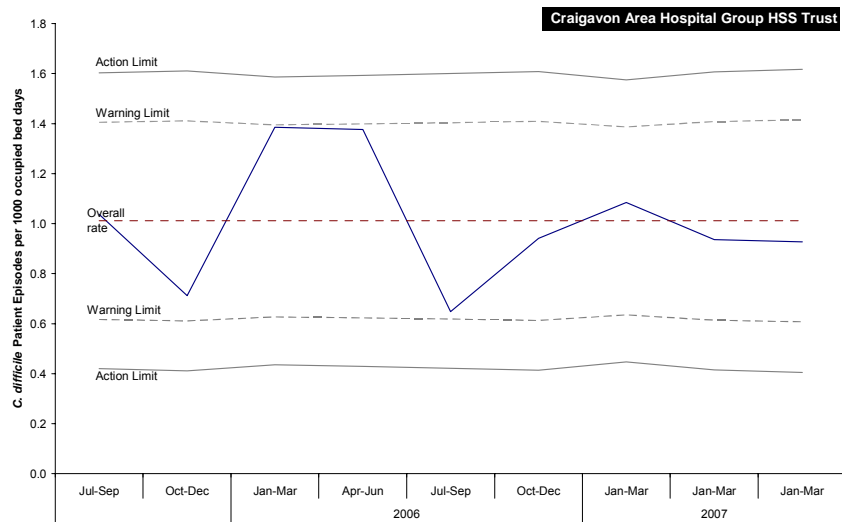
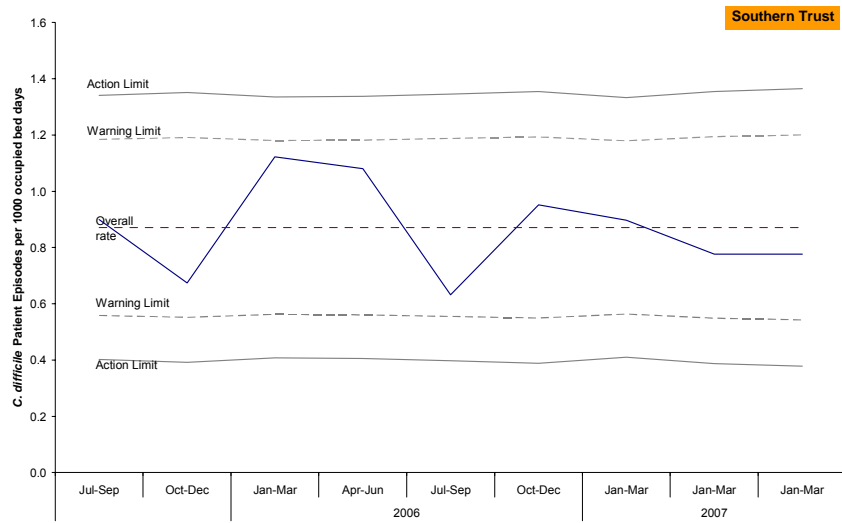
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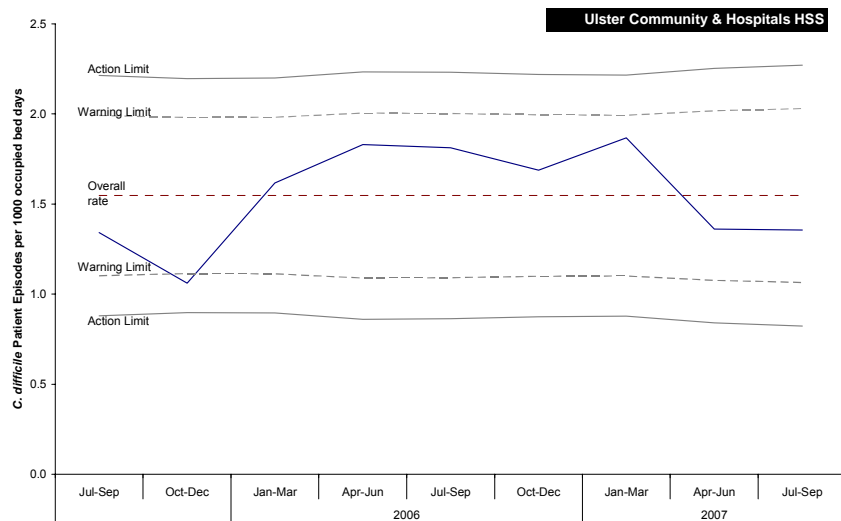
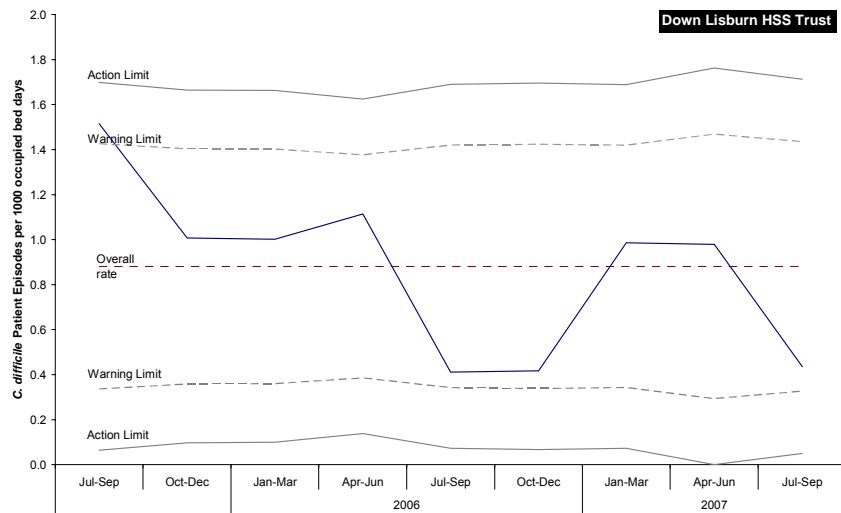
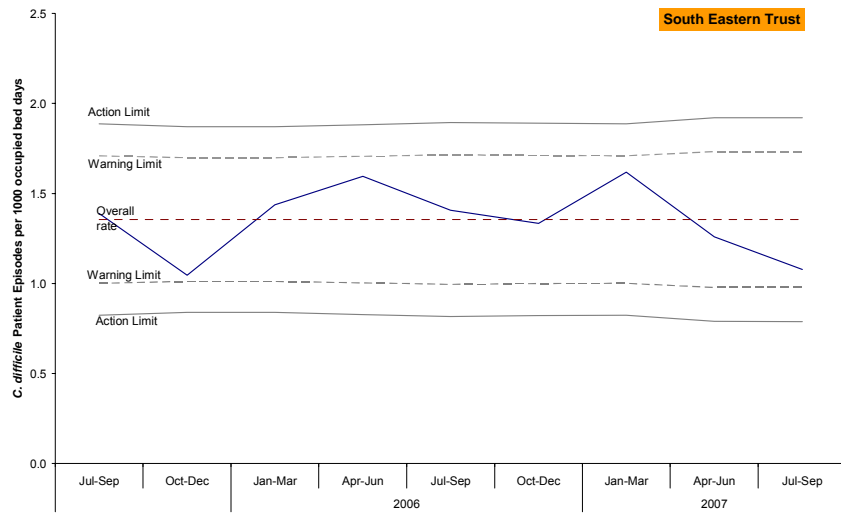
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Appendix C

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, Ni is the number of Occupied Bed-days per quarter and Ei 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