



CDSC (NI)

***S. aureus* bacteraemia surveillance**

Quarter ending March 2009

***S. aureus* bacteraemia surveillance**

Quarter: January – March 2009

Key Points

- **MRSA rates have increased by approximately 37% compared to October-December quarter.**
- **However, Northern Ireland rates of SA (MRSA and MSSA) this quarter remain within the control limits of the SPC charts (Figure 9a-c).**
- **MRSA reports during 2008/09 fell 8% compared to 2007/08.**

***S. aureus* (MRSA plus MSSA)**

- ❖ The Northern Ireland rate of *S. aureus* bacteraemia (MRSA plus MSSA) has **decreased** to 0.30 per 1,000 occupied bed days from 0.31 per 1,000 occupied bed days in the previous quarter (3%; Figure 1; Appendix 3).
- ❖ 133 reports were notified in January – March, a decrease of 3 (2%) compared to the October – December quarter 2008 (136 reports).

MRSA

- ❖ The number of MRSA bacteraemias has **increased** from 38 reports last quarter to 53 reports this quarter (39%) (Appendix 1; Table 1).
- ❖ The MRSA rate **increased** (37%) from 0.087 last quarter to 0.119 this quarter (Figure 1; Appendix 3).
- ❖ The overall percentage of all *S. aureus* patient episodes reported as MRSA **increased** by approximately 12%; 27.9% last quarter to 40.0% this quarter (Appendix 3).
- ❖ Four out of the five Trusts had an increase in MRSA rates during quarter 1, 2009 (Figure 3). However, when the MRSA rates reported for these Trusts in Quarter 1 are compared to Quarter 1 in previous years it is clear, using 95% confidence intervals, that there has been no statistical change in the figures (Figure 4).

MSSA

- ❖ The number of MSSA bacteraemias has **decreased** from 98 reports last quarter to 80 reports this quarter (18%) (Appendix 1; Table 2).
- ❖ The MSSA rate **decreased** (19%) from 0.223 last quarter to 0.180 this quarter (Figure 1; Appendix 3). However, there has been no statistically significant change in rates between October-December 2008 and January-March 2009 (Figure 1).
- ❖ This quarter, four out of five Trusts reported higher MSSA rates than MRSA (Figure 2). For the remaining Trust, MSSA rates were lower than MRSA rates.

- ❖ MSSA rates decreased in three out of five Trusts during quarter 1, 2009 (Figure 5). However, when figures are compared to data for quarter 1 in previous years, there is no statistically significant change in the rates (Figure 6).
- ❖ Figures 7 and 8 show the rate of MRSA and MSSA patient episodes during Quarter 1 in 2009 for the individual hospitals that make up each Trust (see also Appendix 1; Tables 1 and 2).

SPC charts

- ❖ Trends in rates since reporting began in 2001 are shown for each Trust in the form of Statistical Process Control (SPC) charts in Figure 9 and Appendix 2. 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 4.
- ❖ For Northern Ireland as a whole, SA rates (MRSA and MSSA) are fluctuating within normal parameters (Figure 9; Appendix 2).

Caveats

- ❖ The results shown are of isolates which have been identified by testing within a hospital. No distinction is made between the origin of the isolate i.e. from the hospital or the community.
- ❖ **For several of the Trusts, for which the patient source is known, a number of recent reports have been from patients in the Accident & Emergency department at the time of blood sampling. Although the actual source of infection may have been external to the Trust where the specimens were tested, these patients still count towards the Trust quarterly total.** Transferred patients and duplicates between Trusts (within a 14-day time period) are removed from the dataset as far as possible using the details reported as part of the usual laboratory reporting (CoSurv and EARSS where available). However, there is a potential for duplicates to be included.
- ❖ During this quarter bed day data was not available for Lurgan General Hospital, Mullinure, Daisy Hill, Royal Belfast Hospital for Sick Children and Royal Maternity, thus, an estimate using previous year’s quarter one data was used. All unvalidated data or estimated averages presented in this report will be corrected for the next report when validated information is available. Therefore, there may be a few changes between reports.
- ❖ Appendix 5 has been added to clarify some issues surrounding definitions of *S. aureus* patient episodes.

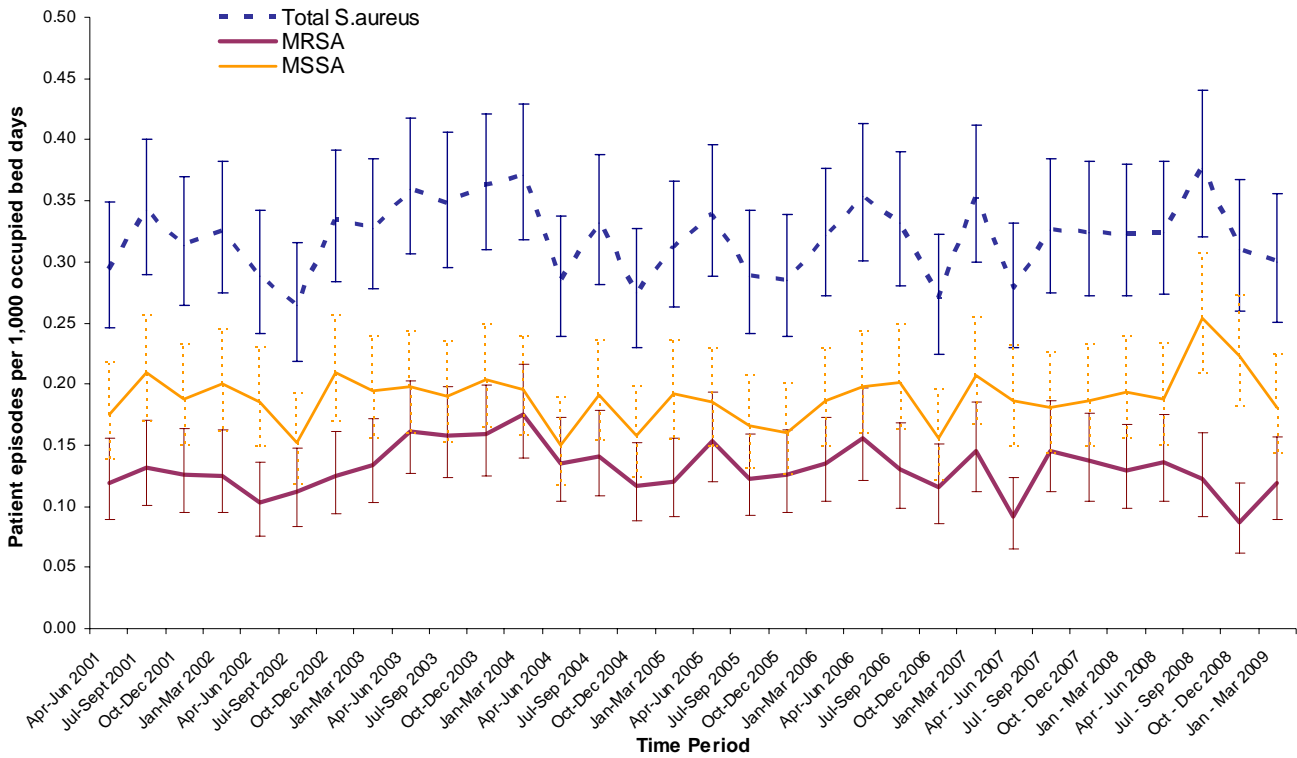


Figure 1: MSSA, MRSA and *S. aureus* patient episode rates in Northern Ireland by quarter, with 95% Confidence Intervals, April 2001 – March 2009 (see Appendix 3)

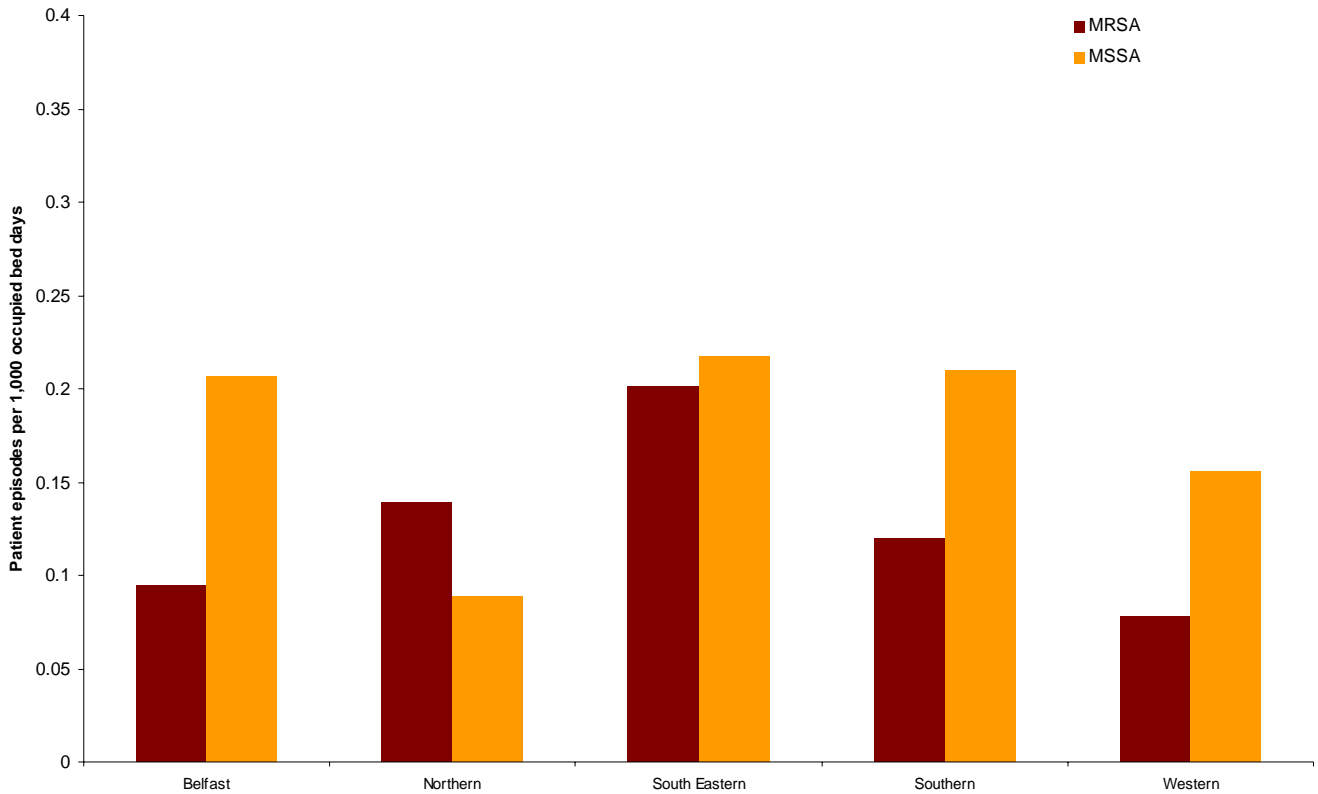


Figure 2: MRSA and MSSA patient episodes per 1,000 occupied bed days, by Trust, January – March 2009.

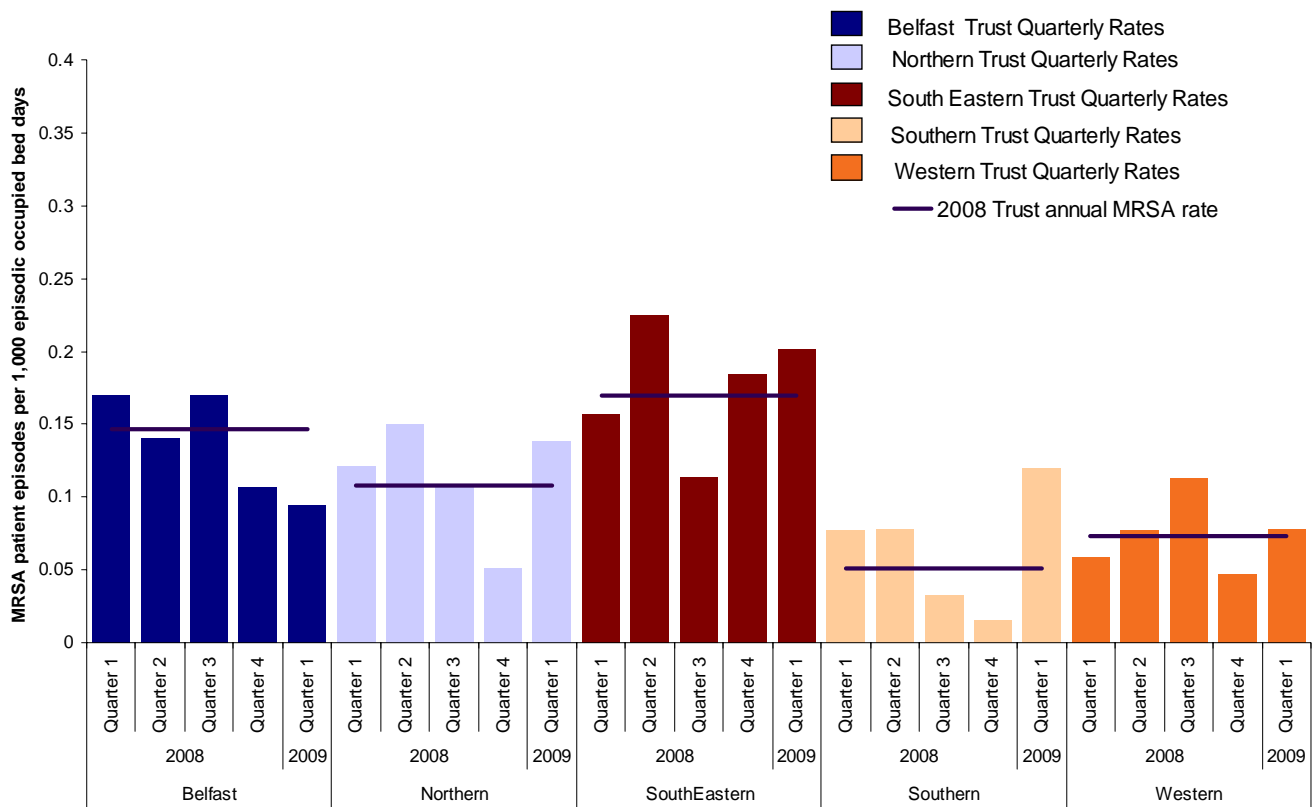


Figure 3: Quarterly rates of MRSA by Trust 1 January 2008 – 31 March 2009, with 2008 Trust Annual MRSA rates.

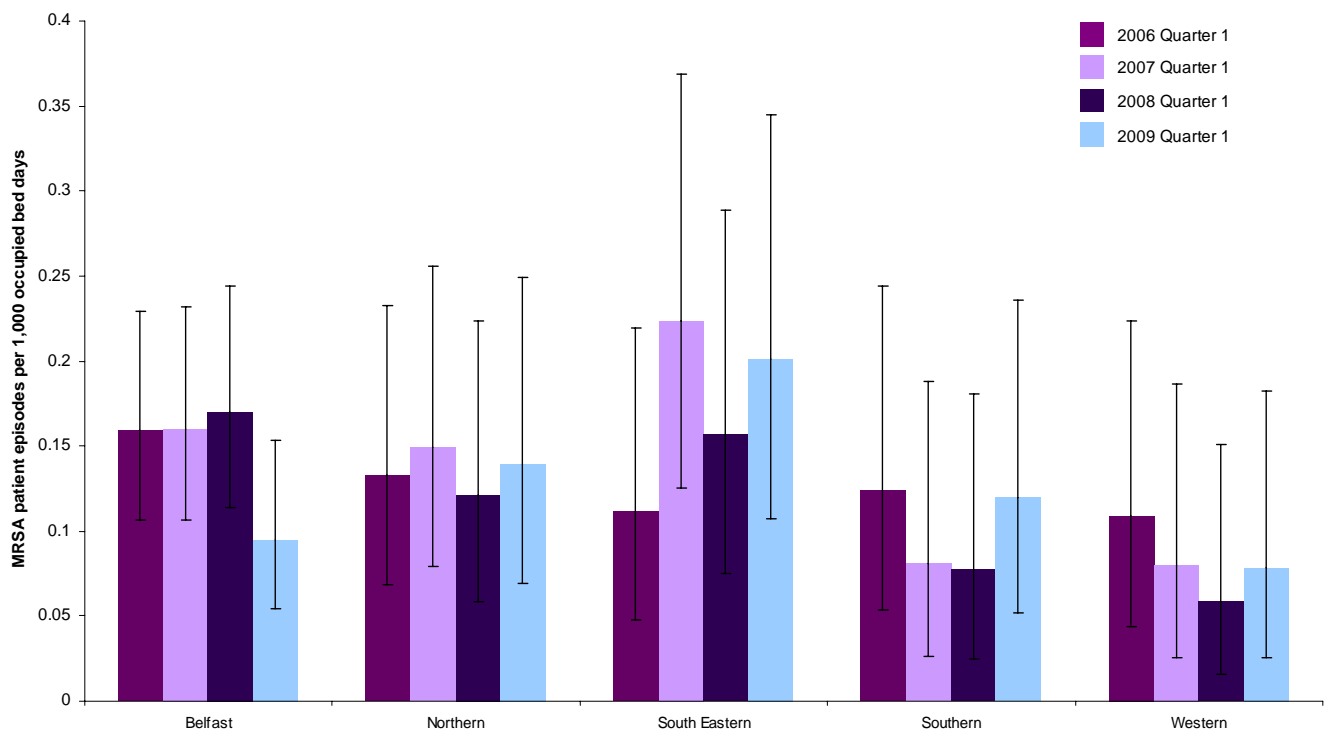


Figure 4: MRSA patient episodes by Trust in Quarter 1 from 2006 - 2009, with 95% confidence intervals.

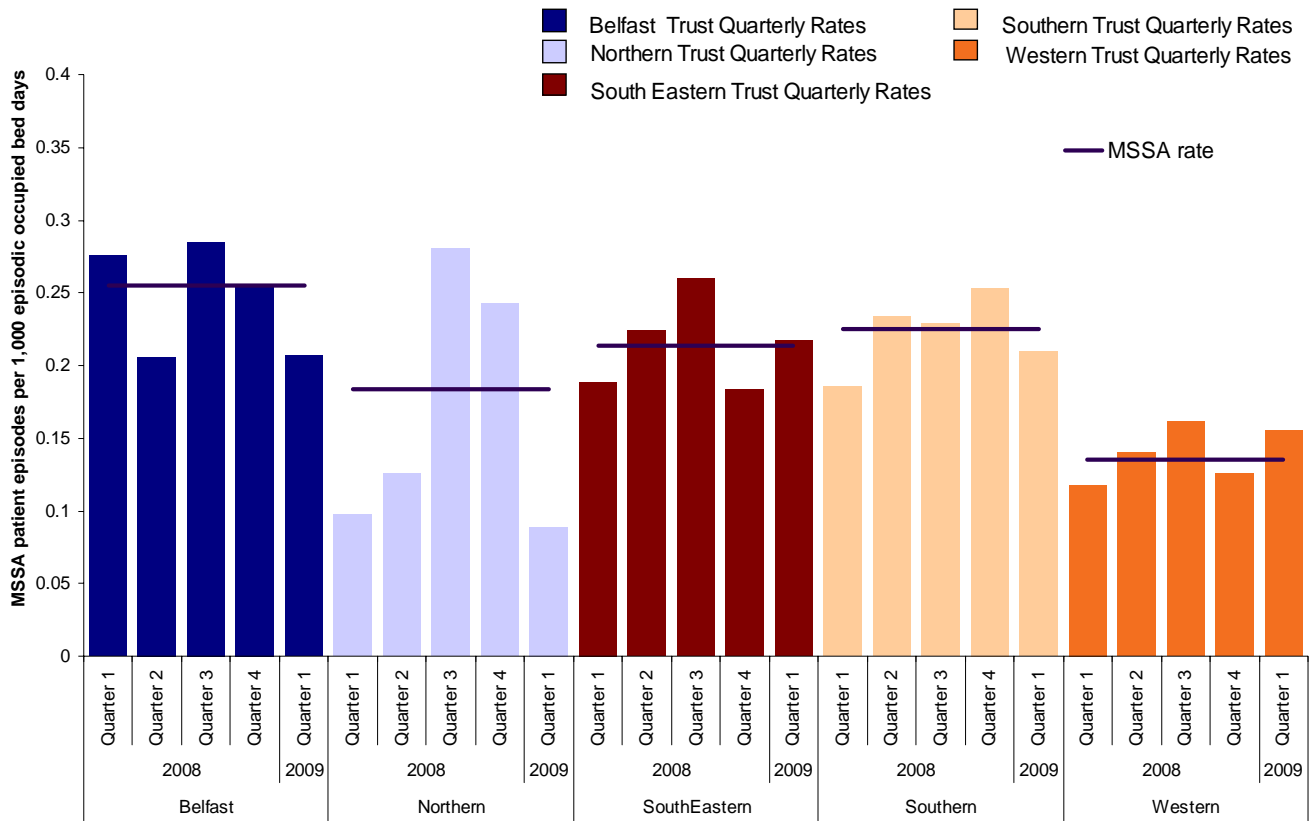


Figure 5: Quarterly rates of MSA by Trust 1 January 2008 – 31 March 2009, with 2008 Trust Annual MSA rates.

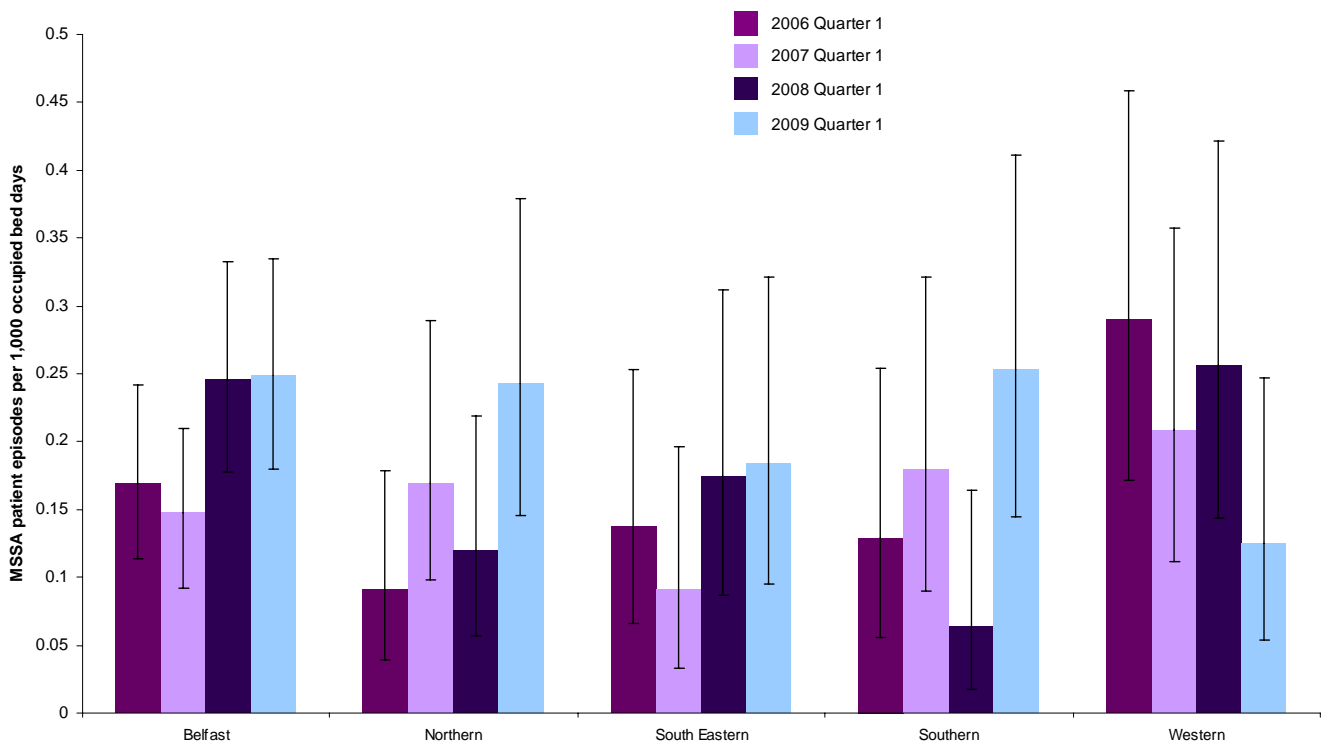


Figure 6: MSA patient episodes by Trust in Quarter 1 from 2006 - 2009, with 95% confidence intervals.

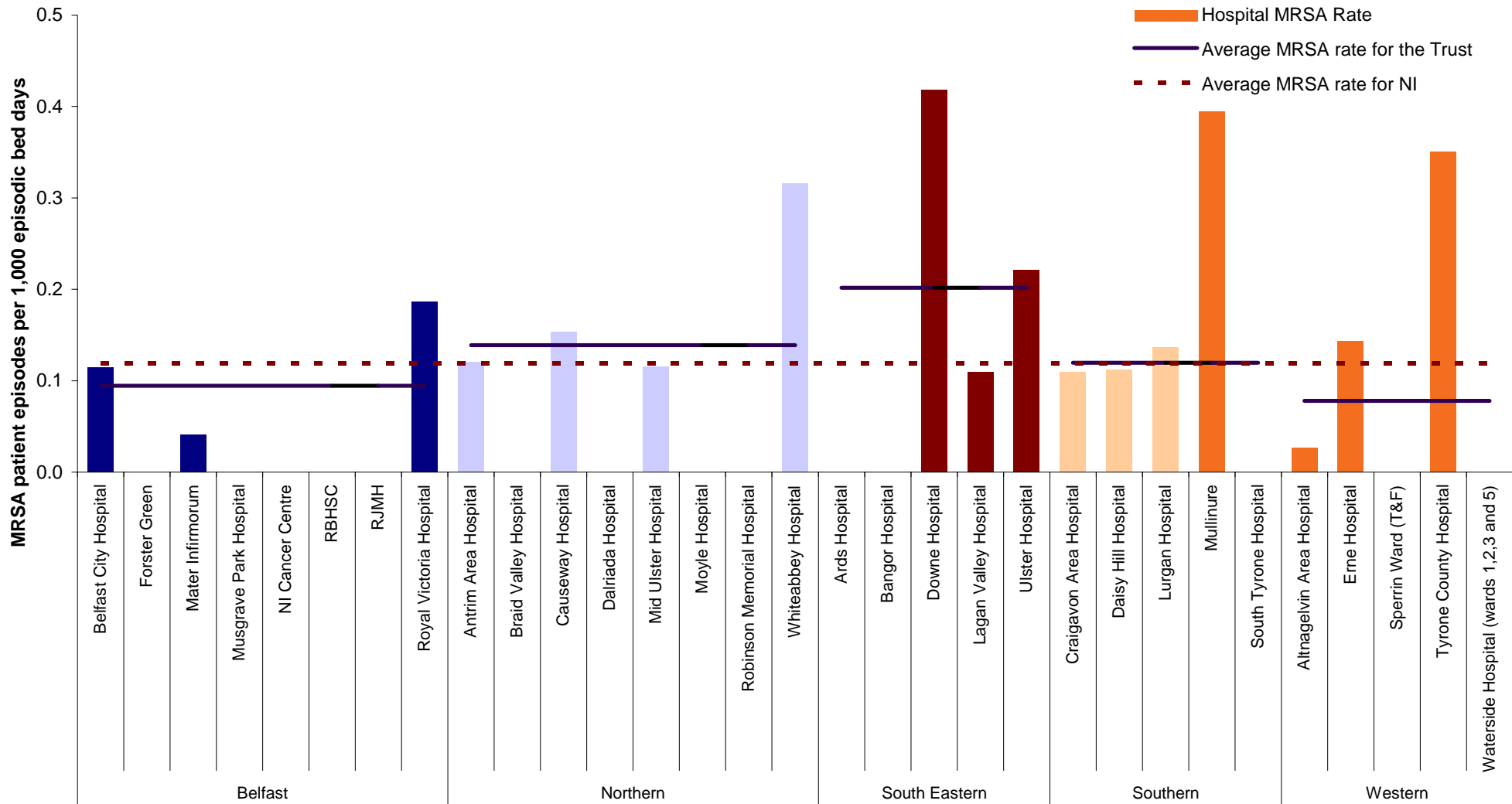


Figure 7: Rates of MRSA by individual Hospitals, 2009 Quarter 1 (gaps represent zero episodes), compared to 2009 Quarter 1 Northern Ireland and Trust average rates.

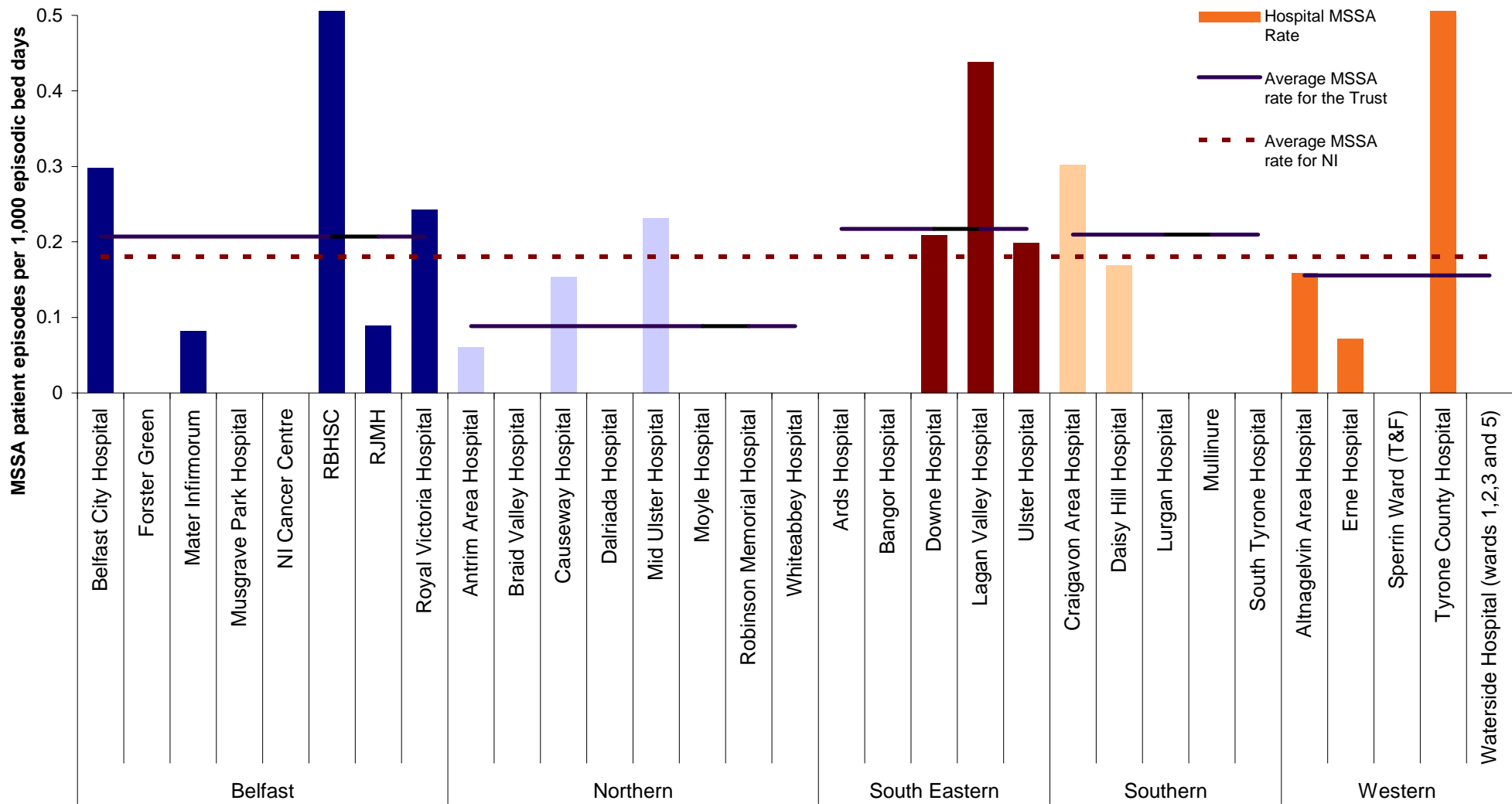


Figure 8: Rates of MSSA by individual Hospitals, 2009 Quarter 1 (gaps represent zero episodes) compared to Quarter 1, 2009, Northern Ireland and Trust average rates.

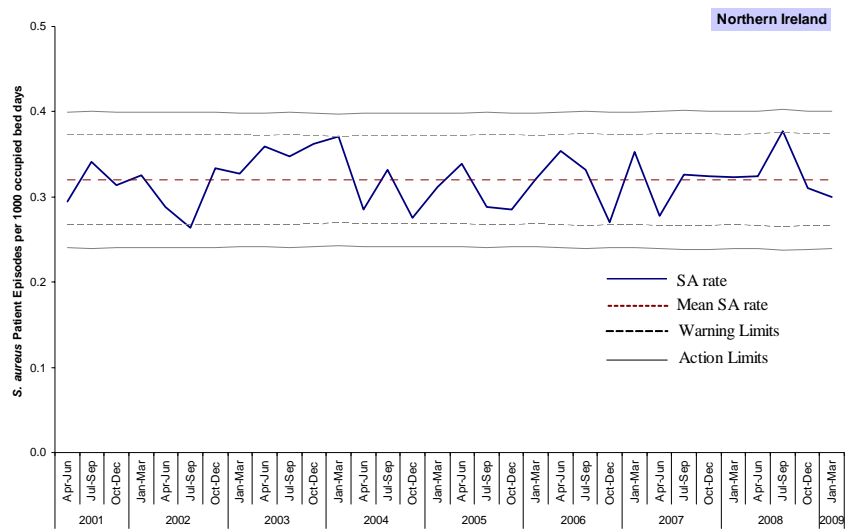


Figure 9a: Statistical Process Control chart for quarterly **S.aureus** rates in Northern Ireland

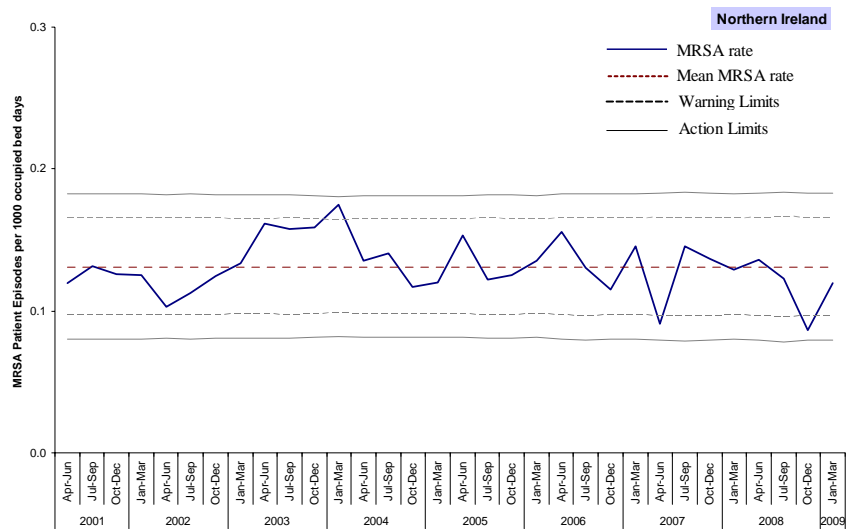


Figure 9b: Statistical Process Control chart for quarterly **MRSA** rates in Northern Ireland

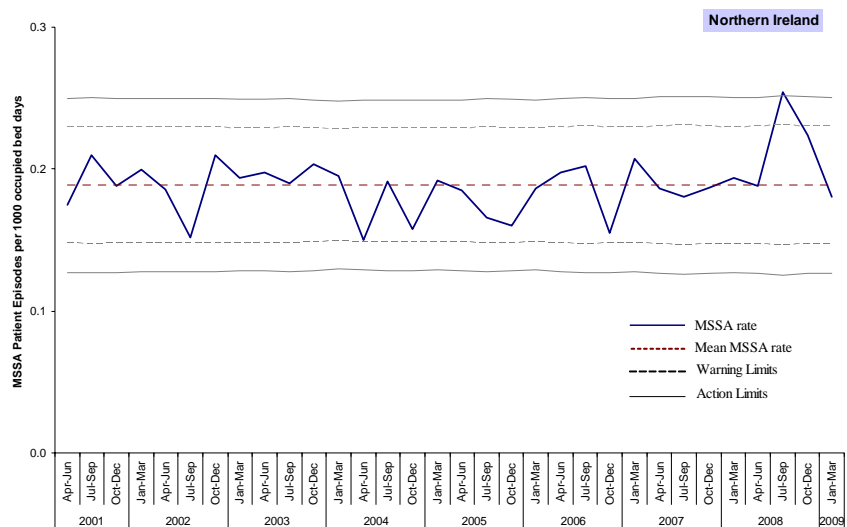


Figure 9c: Statistical Process Control chart for quarterly **MSSA** rates in Northern Ireland

Appendix 1

Table 1: Quarterly number of MRSA patient episodes and rates by Hospital, January – March 2009. Figures in parentheses represent data from October – December 2008.

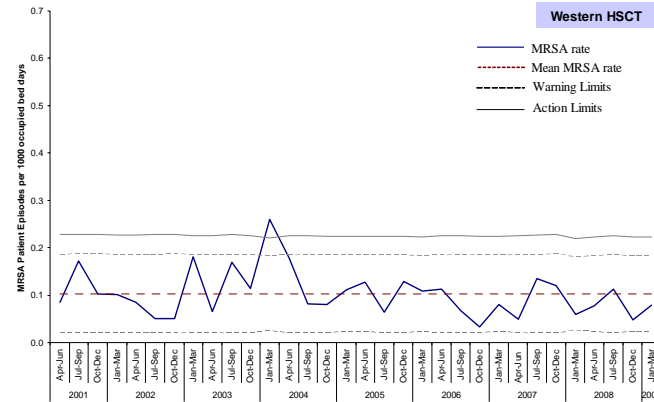
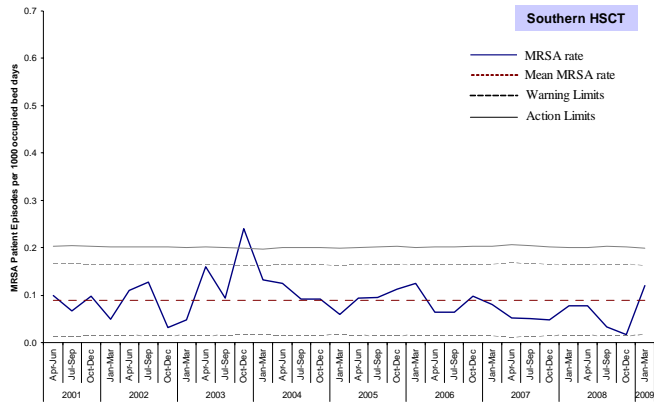
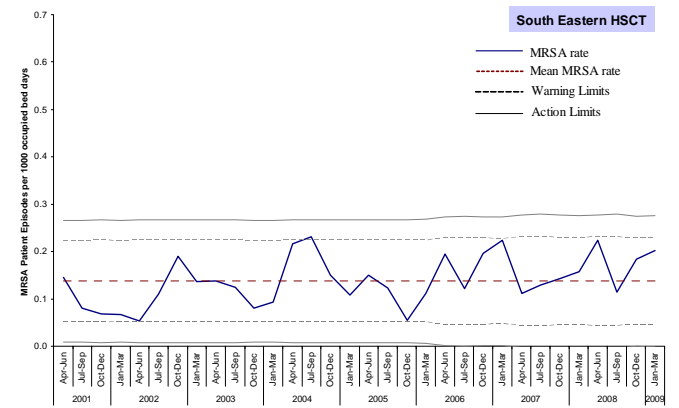
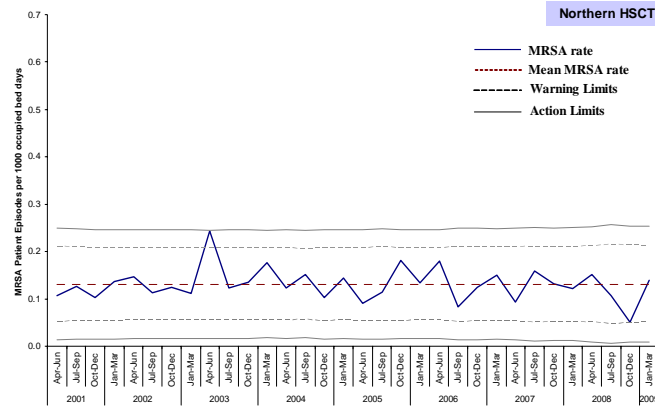
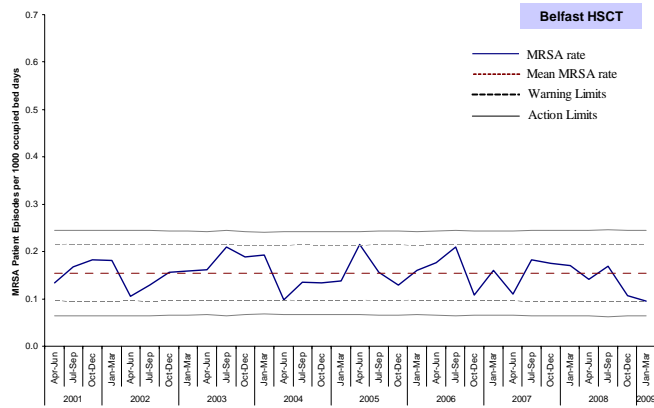
Hospital	Jan - Mar 2009	
	Episodes	Rate
Belfast City Hospital	5	0.115
Forster Green Hospital	0	0.000
Mater Infirmorum	1	0.041
Musgrave Park Hospital	0	0.000
NICCO (formerly at Belvoir Park)	0	0.000
RBHSC	0	0.000
RJMH	0	0.000
Royal Victoria Hospital	10	0.187
Belfast Health & Social Care Trust	16 (18)	0.095
Antrim Area Hospital	4	0.121
Braid Valley Hospital	0	0.000
Causeway Hospital	3	0.153
Dalriada Hospital	0	0.000
Mid Ulster Hospital	1	0.116
Moyle Hospital	0	0.000
Robinson Memorial Hospital	0	0.000
Whiteabbey Hospital	3	0.316
Northern Health & Social Care Trust	11 (4)	0.139
Ards Hospital	0	0.000
Bangor Hospital	0	0.000
Downe Hospital	2	0.418
Lagan Valley Hospital	1	0.110
Ulster Hospital	10	0.221
South Eastern Health & Social Care Trust	13 (12)	0.202
Craigavon Area Hospital	4	0.110
Daisy Hill Hospital	2	0.113
Lurgan Hospital	1	0.137
Mullinure	1	0.394
South Tyrone Hospital	0	0.000
Southern Health & Social Care Trust*	8 (1)	0.120
Altnagelvin Area Hospital	1	0.027
Erne Hospital	2	0.144
Sperrin Ward (T&F)	0	0.000
Tyrone County Hospital	2	0.350
Waterside Hospital (Wards 1-3, 5)	0	0.000
Western Health & Social Care Trust	5 (3)	0.078
NI TOTAL	53 (38)	0.119

Appendix 1

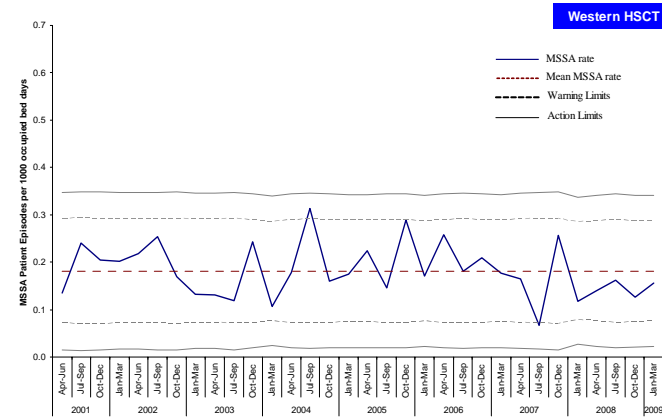
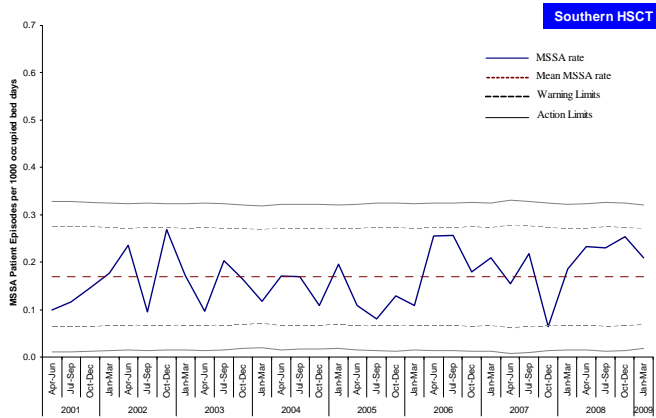
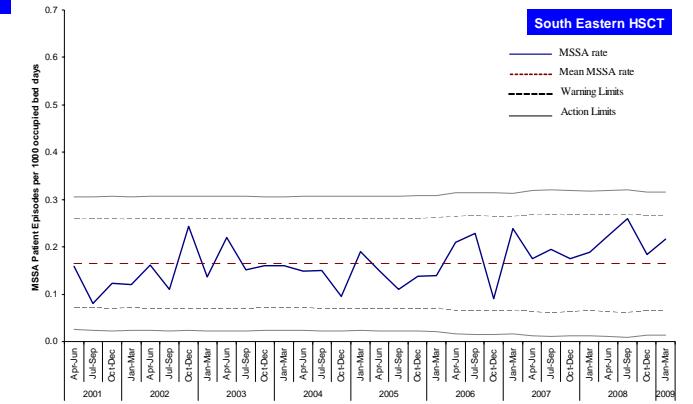
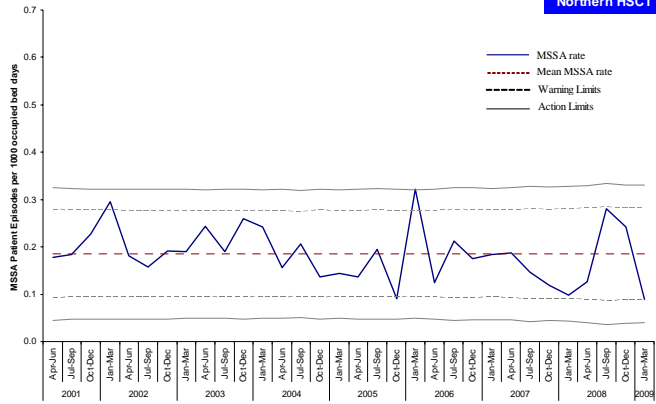
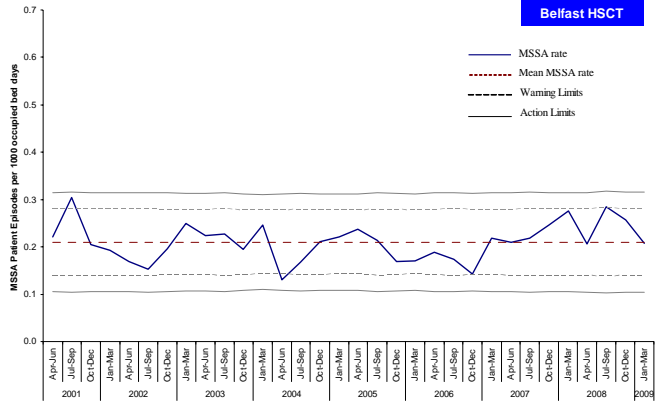
Table 2: Quarterly number of MSSA patient episodes and rates by Hospital, January – March 2009. Figures in parentheses represent data from October – December 2008.

Hospital	Jan - Mar 2009	
	Episodes	Rate
Belfast City Hospital	13	0.298
Forster Green Hospital	0	0.000
Mater Infirmorum	2	0.082
Musgrave Park Hospital	0	0.000
NICCO (formerly at Belvoir Park)	0	0.000
RBHSC	6	0.809
RJMH	1	0.089
Royal Victoria Hospital	13	0.243
Belfast Health & Social Care Trust	35 (43)	0.207
Antrim Area Hospital	2	0.060
Braid Valley Hospital	0	0.000
Causeway Hospital	3	0.153
Dalriada Hospital	0	0.000
Mid Ulster Hospital	2	0.232
Moyle Hospital	0	0.000
Robinson Memorial Hospital	0	0.000
Whiteabbey Hospital	0	0.000
Northern Health & Social Care Trust	7 (19)	0.088
Ards Hospital	0	0.000
Bangor Hospital	0	0.000
Downe Hospital	1	0.209
Lagan Valley Hospital	4	0.439
Ulster Hospital	9	0.199
South Eastern Health & Social Care Trust	14 (12)	0.217
Craigavon Area Hospital	11	0.302
Daisy Hill Hospital	3	0.169
Lurgan Hospital	0	0.000
Mullinure	0	0.000
South Tyrone Hospital	0	0.000
Southern Health & Social Care Trust*	14 (16)	0.210
Altnagelvin Area Hospital	6	0.159
Erne Hospital	1	0.072
Sperrin Ward (T&F)	0	0.000
Tyrone County Hospital	3	0.525
Waterside Hospital (Wards 1-3, 5)	0	0.000
Western Health & Social Care Trust	10 (8)	0.156
NI TOTAL	80 (98)	0.180

Appendix 2: Trends in MRSA rates by Trust and quarter (2001-2009)



Appendix 2: Trends in MSSA rates by Trust and quarter (2001-2009)



Appendix 3

Table 1: MSSA, MRSA and total *S. aureus* patient episode rates and the percentage of *S. aureus* which were reported as MRSA in Northern Ireland, April 2001 – December 2008

Quarter	MSSA rate	MRSA rate	All <i>S. aureus</i> rate	% MRSA
Apr-Jun 2001	0.175	0.120	0.294	40.6
Jul-Sept 2001	0.210	0.132	0.342	38.6
Oct-Dec 2001	0.188	0.126	0.314	40.1
Jan-Mar 2002	0.200	0.125	0.325	38.5
Apr-Jun 2002	0.186	0.103	0.288	35.6
Jul-Sept 2002	0.152	0.112	0.264	42.5
Oct-Dec 2002	0.210	0.124	0.334	37.3
Jan-Mar 2003	0.194	0.134	0.328	40.8
Apr-Jun 2003	0.198	0.161	0.359	44.9
Jul-Sep 2003	0.190	0.157	0.348	45.3
Oct-Dec 2003	0.203	0.159	0.362	43.9
Jan-Mar 2004	0.195	0.175	0.370	47.2
Apr-Jun 2004	0.150	0.135	0.285	47.4
Jul-Sep 2004	0.191	0.140	0.332	42.3
Oct-Dec 2004	0.158	0.117	0.275	42.6
Jan-Mar 2005	0.192	0.120	0.312	38.5
Apr-Jun 2005	0.185	0.155	0.341	45.3
Jul-Sep 2005	0.166	0.122	0.290	42.4
Oct-Dec 2005	0.160	0.125	0.285	43.9
Jan-Mar 2006	0.186	0.135	0.321	42.1
Apr-Jun 2006	0.198	0.156	0.354	44.1
Jul-Sep 2006	0.200	0.132	0.332	39.8
Oct-Dec 2006	0.156	0.112	0.269	41.6
Jan-Mar 2007	0.207	0.146	0.353	41.4
Apr-Jun 2007	0.187	0.091	0.277	32.9
Jul-Sep 2007	0.182	0.147	0.329	44.7
Oct-Dec 2007	0.187	0.137	0.324	42.3
Jan-Mar 2008	0.194	0.129	0.323	40.0
Apr-Jun 2008	0.188	0.136	0.324	42.0
Jul-Sep 2008	0.254	0.122	0.378	32.5
Oct-Dec 2008	0.223	0.087	0.310	27.9
Jan-Mar 2009	0.180	0.119	0.300	39.9

Appendix 4

Notes and Definitions

Statistical Process Control charts:

The Statistical Process Control (SPC) chart is now commonly used for the reporting of MRSA rates throughout the UK. SPC charts assume that rates within a Trust will be largely similar over time. They present the occurrence of *S. aureus* bacteraemias 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 April 2001. 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 to 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

Trust Activity is defined as the number of occupied beds (from KH03A return) and is used to calculate a rate per 1,000 occupied bed days. KH03A data is obtained from DHSSPSNI on a quarterly basis.

The number of patient episodes is defined as the total number of patients from whom blood culture set(s) collected during the quarter grew *S aureus*. If repeat specimens were collected from a single patient, and the patient was considered to have had two episodes of bacteraemia, then they should be counted as two patients. As an arbitrary measure, if positive blood culture sets are collected more than 14 days apart, they should be considered as reflecting different episodes.

Appendix 5

Clarification of Existing HCAI definitions

Patient Transfers

A patient may be an inpatient in a healthcare facility and at some point may be transferred to another hospital/Trust, symptom free. Upon admission to the second facility, if the patient develops the symptoms of *C. diff* or *S. aureus* within 2 days and a specimen is taken and tested at this point, the episode is attributed to the current stay i.e. the receiving hospital. Whilst the infection may have been acquired during their first hospital admission, it is the hospital where the patient is **at the time the specimen is taken** that must report the episode. For this reason, CDSC ensures that there are caveats to state that this does not infer the patient acquired their infection in that hospital. Trusts should be aware of such circumstances so that they are in a position to clarify any episodes that developed within 2 days of transfer/admission and are therefore likely to have been acquired prior to admission to that hospital.

Patient in one hospital and after discharge are later admitted to another

A patient may be an inpatient in a healthcare facility and test positive for a healthcare associated infection. Once discharged, the patient may develop new symptoms and be readmitted to the same hospital or to a different hospital and be retested for *S. aureus*. If the new admission is within 14 days of the original positive specimen date then the duplicate rule applies regardless of the change in hospital and the isolate should not be reported.