



CDSC (NI)

***S. aureus* bacteraemia surveillance**

Quarter ending December 2008

***S. aureus* bacteraemia surveillance**

Quarter: October – December 2008

Key Points

- **MRSA rates have decreased by approximately 30% compared to July-September quarter.**
- **This quarter Northern Ireland rates of MSSA have fallen below the warning limit, as MSSA rates decreased by approximately 14% from the July-September quarter (Figure 9c).**

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

- ❖ The Northern Ireland rate of *S. aureus* bacteraemia (MRSA plus MSSA) has **decreased** to 0.31 per 1,000 occupied bed days from 0.38 per 1,000 occupied bed days in the previous quarter (18%; Figure 1; Appendix 3).
- ❖ 136 reports were notified in October – December, a decrease of 24 (15%) compared to the July – September quarter (160 reports).

MRSA

- ❖ The number of MRSA bacteraemias has **decreased** from 52 reports last quarter to 38 reports this quarter (27%) (Appendix 1; Table 1). This is the lowest number of isolates notified since reporting began in April 2001.
- ❖ The MRSA rate **decreased** (30%) from 0.123 last quarter to 0.086 this quarter (Figure 1; Appendix 3).
- ❖ The overall percentage of all *S. aureus* patient episodes reported as MRSA **decreased** by approximately 5%; 32.5% last quarter to 27.9% this quarter (Appendix 3). This is the lowest proportion notified since reporting began in April 2001.
- ❖ Only one out of the five Trusts had an increase in MRSA rates during quarter 4, 2008 (Figure 3). However, when the MRSA rates reported for these Trusts in Quarter 4 are compared to Quarter 4 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 108 reports last quarter to 98 reports this quarter (9%) (Appendix 1; Table 2).
- ❖ The MSSA rate **decreased** (14%) from 0.256 last quarter to 0.221 this quarter (Figure 1; Appendix 3). However, there has been no statistically significant change in rates between July-September and October-December (Figure 1).
- ❖ This quarter, four out of five Trusts reported higher MSSA rates than MRSA (Figure 2). For the remaining Trust, MRSA and MSSA rates were equal.
- ❖ MSSA rates decreased in four out of five Trusts during quarter 4, 2008 (Figure 5). However, when figures are compared to data for quarter 4 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 4 in 2008 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). MRSA rates have crossed the lower warning limit, but as this is the first quarter this has occurred it may be the result of natural variation. MSSA rates for Northern Ireland, having breached the action limit during July-September, have come below the warning limit of the chart.

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 Belfast City Hospital, thus, an estimate using previous year’s quarter four 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.
- ❖ Maintenance work is still being carried out in Robinson Memorial Hospital which has significantly reduced their number of bed days. This may have slight implications for the overall Northern Trust rate.
- ❖ Appendix 5 has been added to clarify some issues surrounding definitions of *S. aureus* patient episodes.

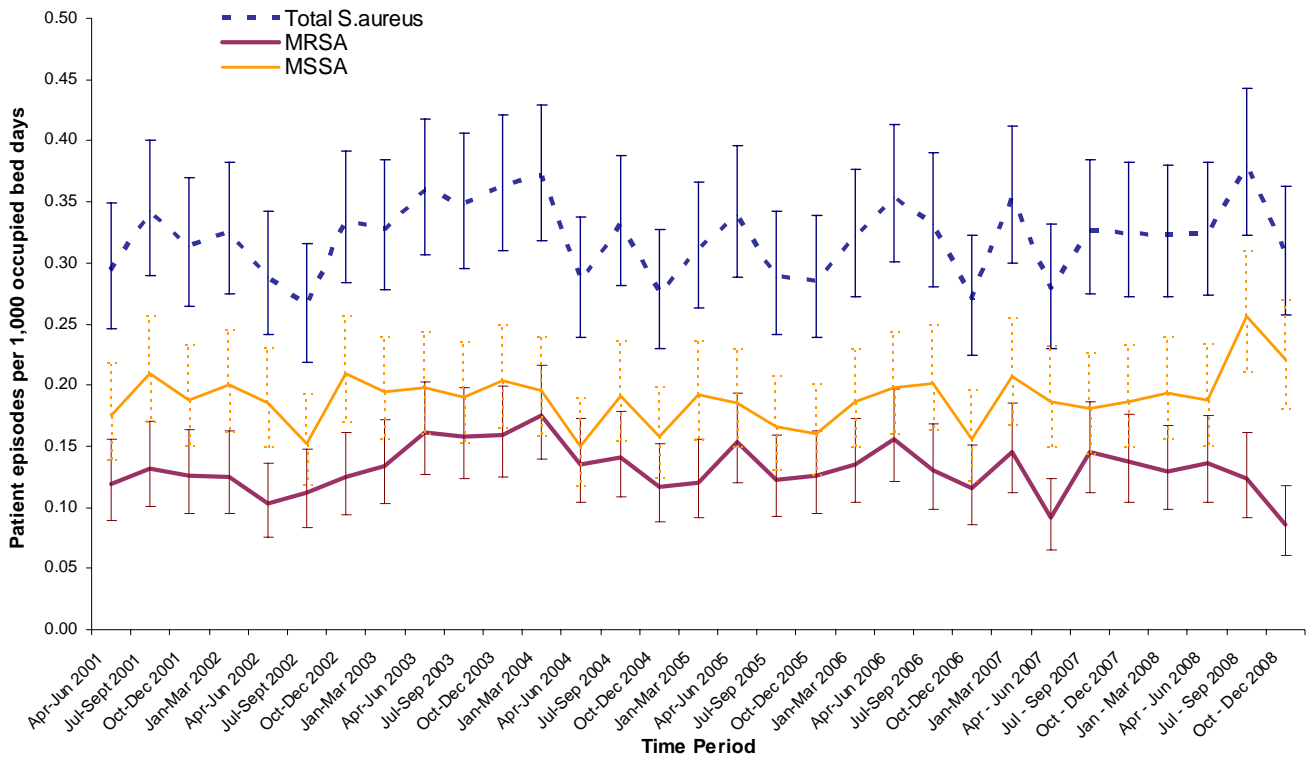


Figure 1: MSSA, MRSA and *S. aureus* patient episode rates in Northern Ireland by quarter, with 95% Confidence Intervals, April 2001 – December 2008 (see Appendix 3)

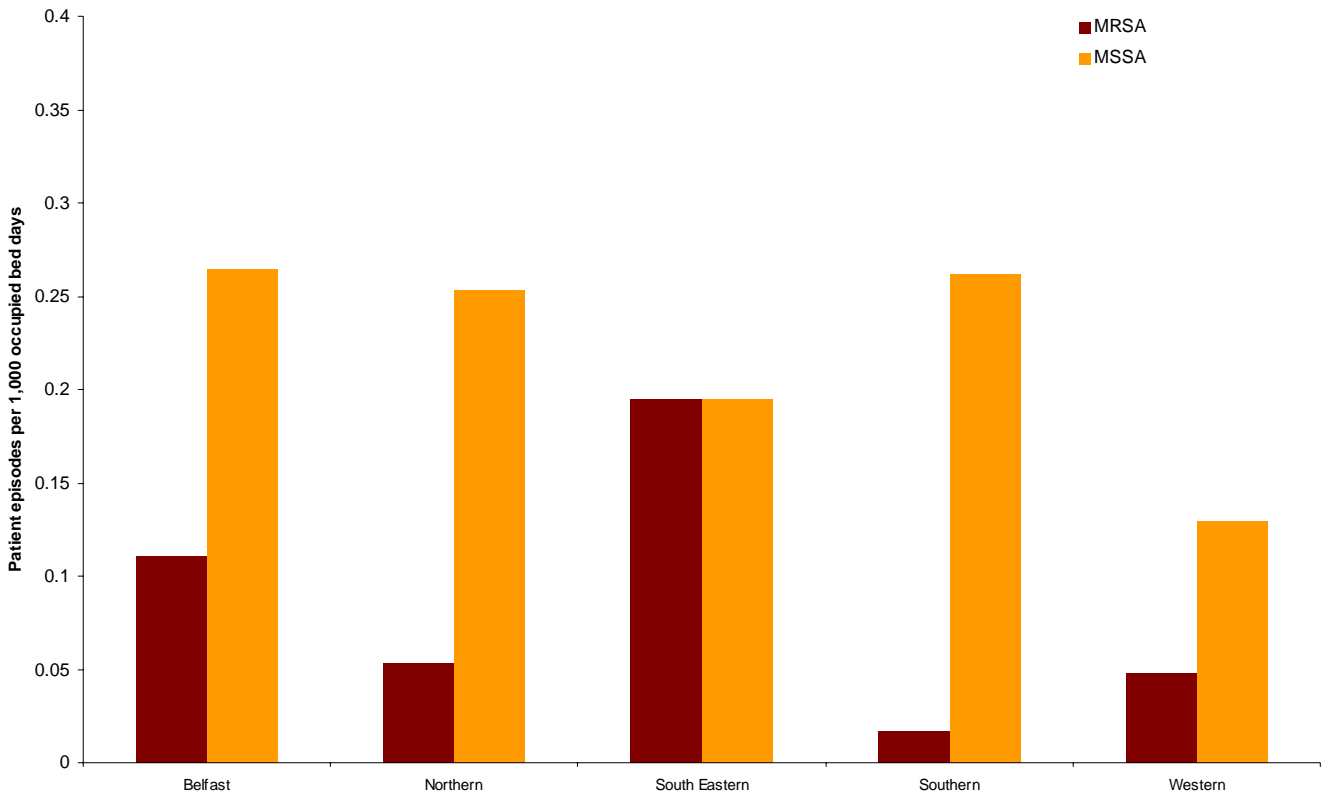


Figure 2: MRSA and MSSA patient episodes per 1,000 occupied bed days, by Trust, October – December 2008.

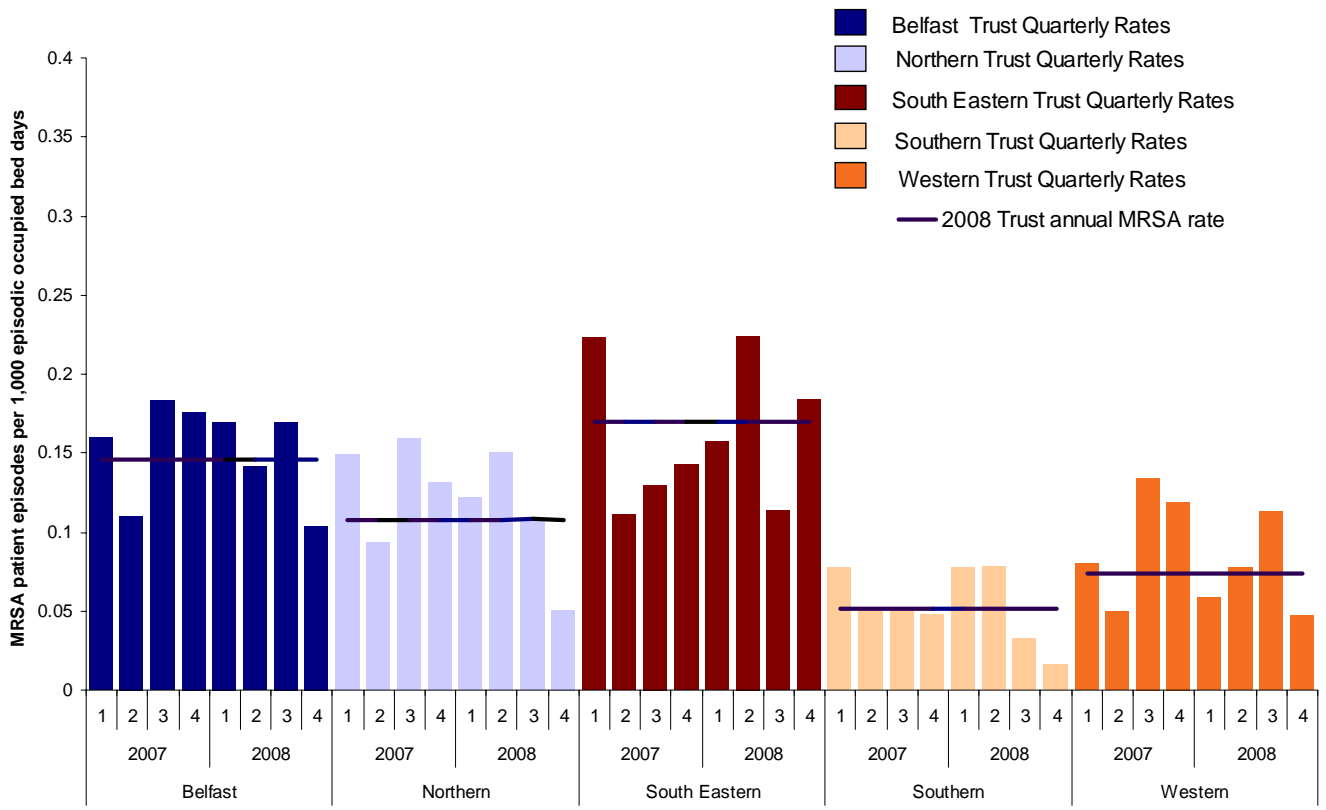


Figure 3: Quarterly rates of MRSA by Trust 1 January 2007 – 31 December 2008, with 2008 Trust Annual MRSA rates.

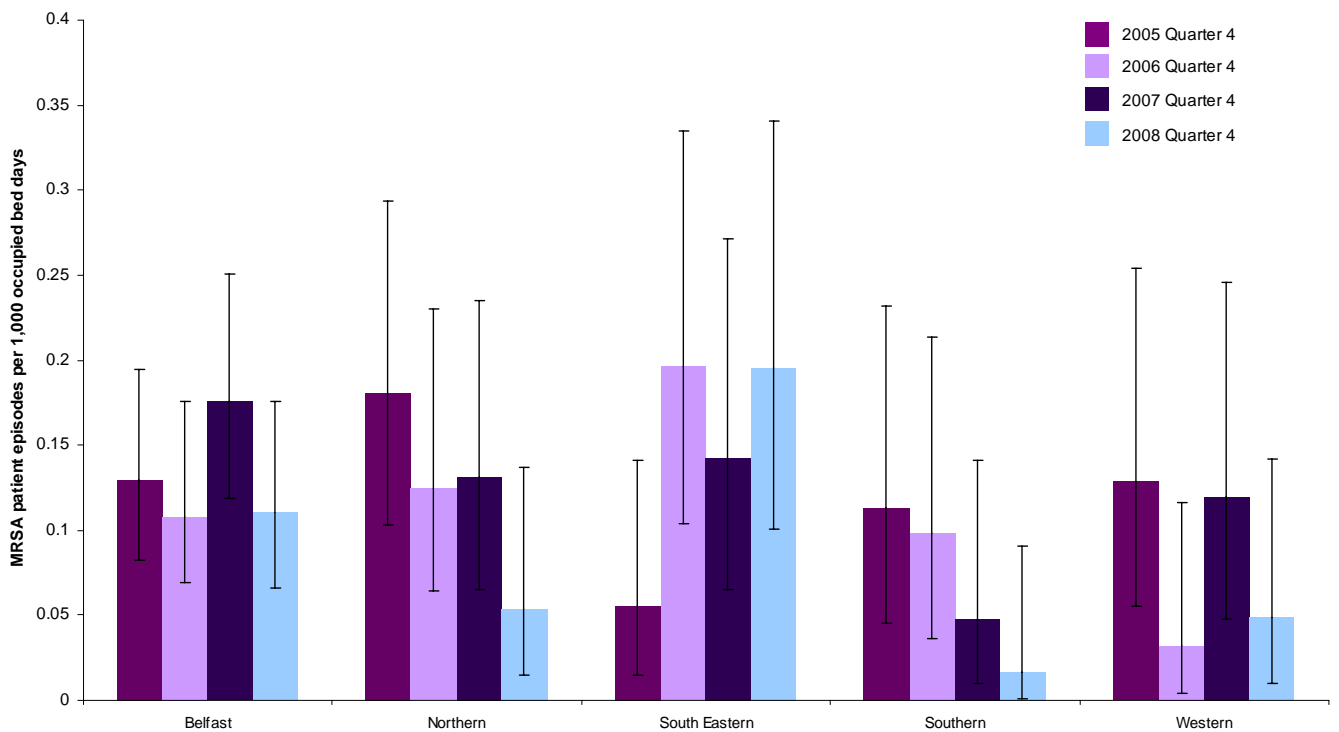


Figure 4: MRSA patient episodes by Trust in Quarter 4 from 2005 - 2008, with 95% confidence intervals.

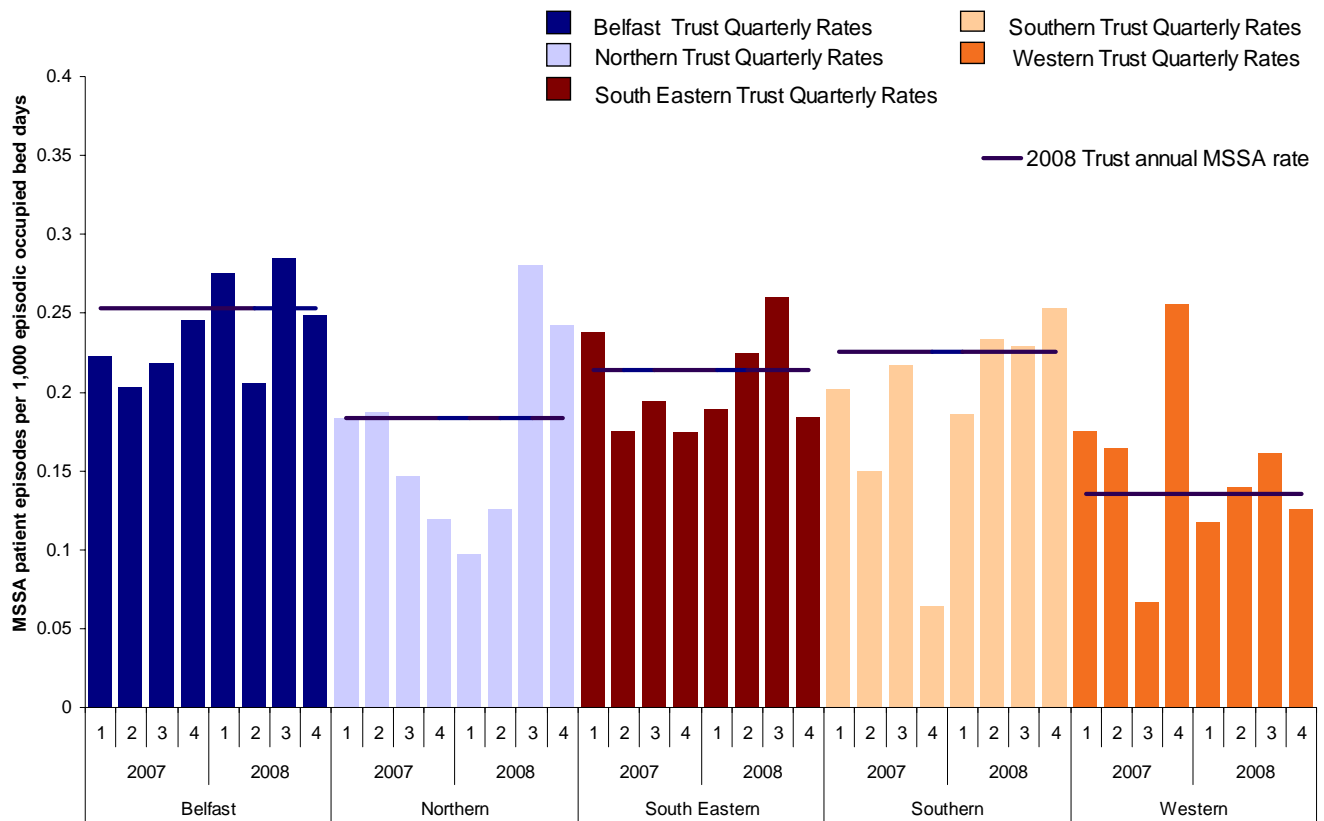


Figure 5: Quarterly rates of MSA by Trust 1 January 2007 – 31 December 2008, with 2008 Trust Annual MSA rates.

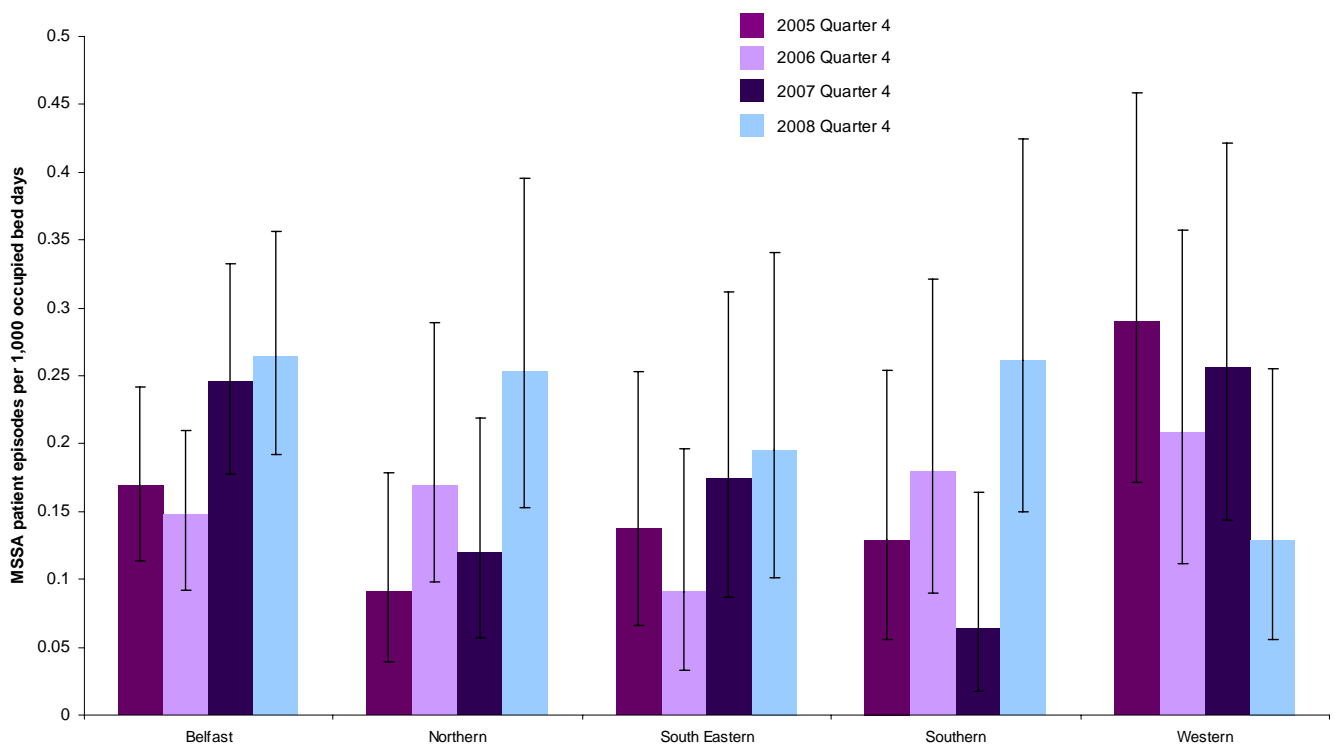


Figure 6: MSA patient episodes by Trust in Quarter 4 from 2005 - 2008, with 95% confidence intervals.

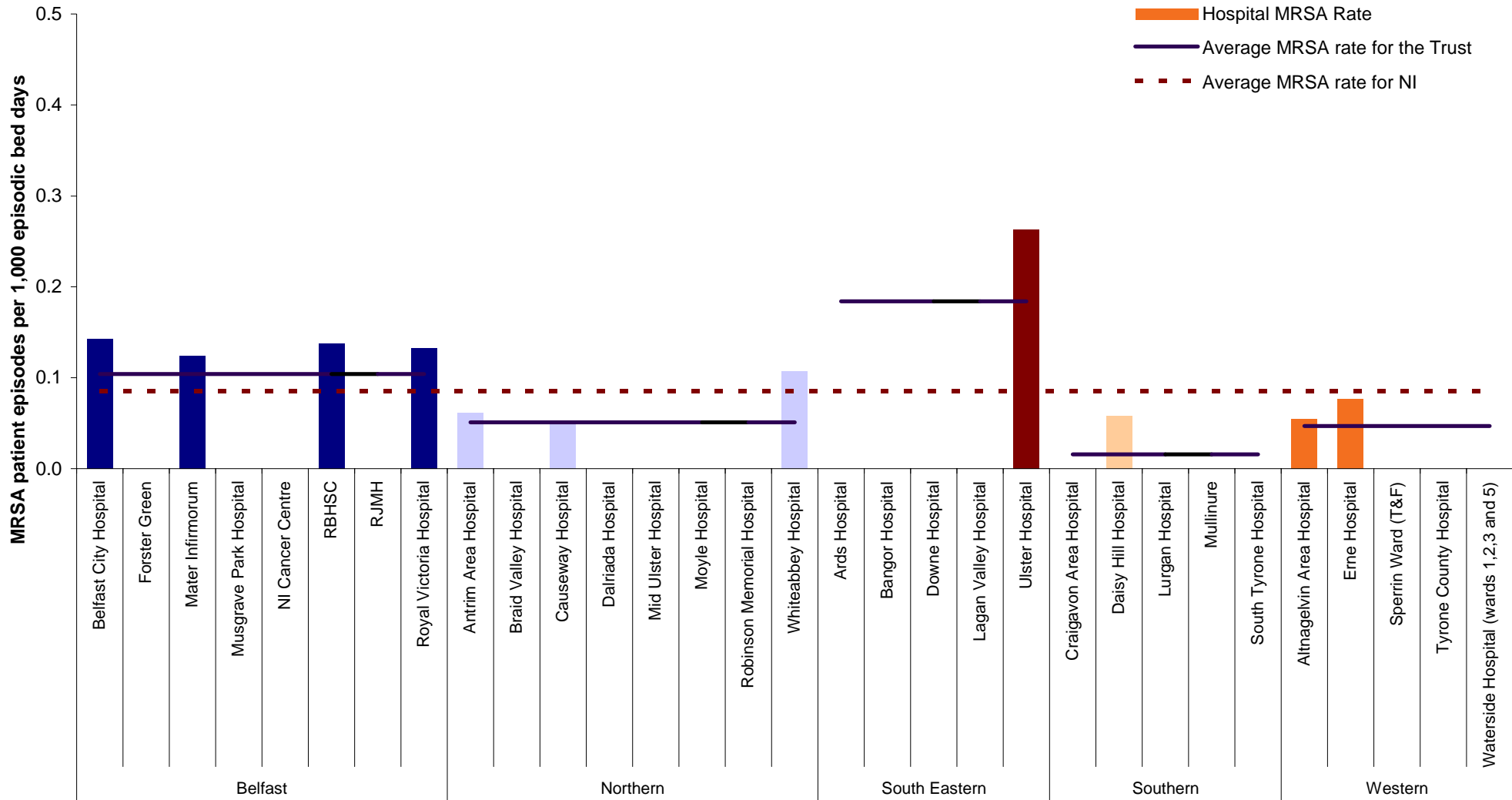


Figure 7: Rates of MRSA by individual Hospitals, 2008 Quarter 4 (gaps represent zero episodes), compared to 2008 Quarter 4 Northern Ireland and Trust average rates.

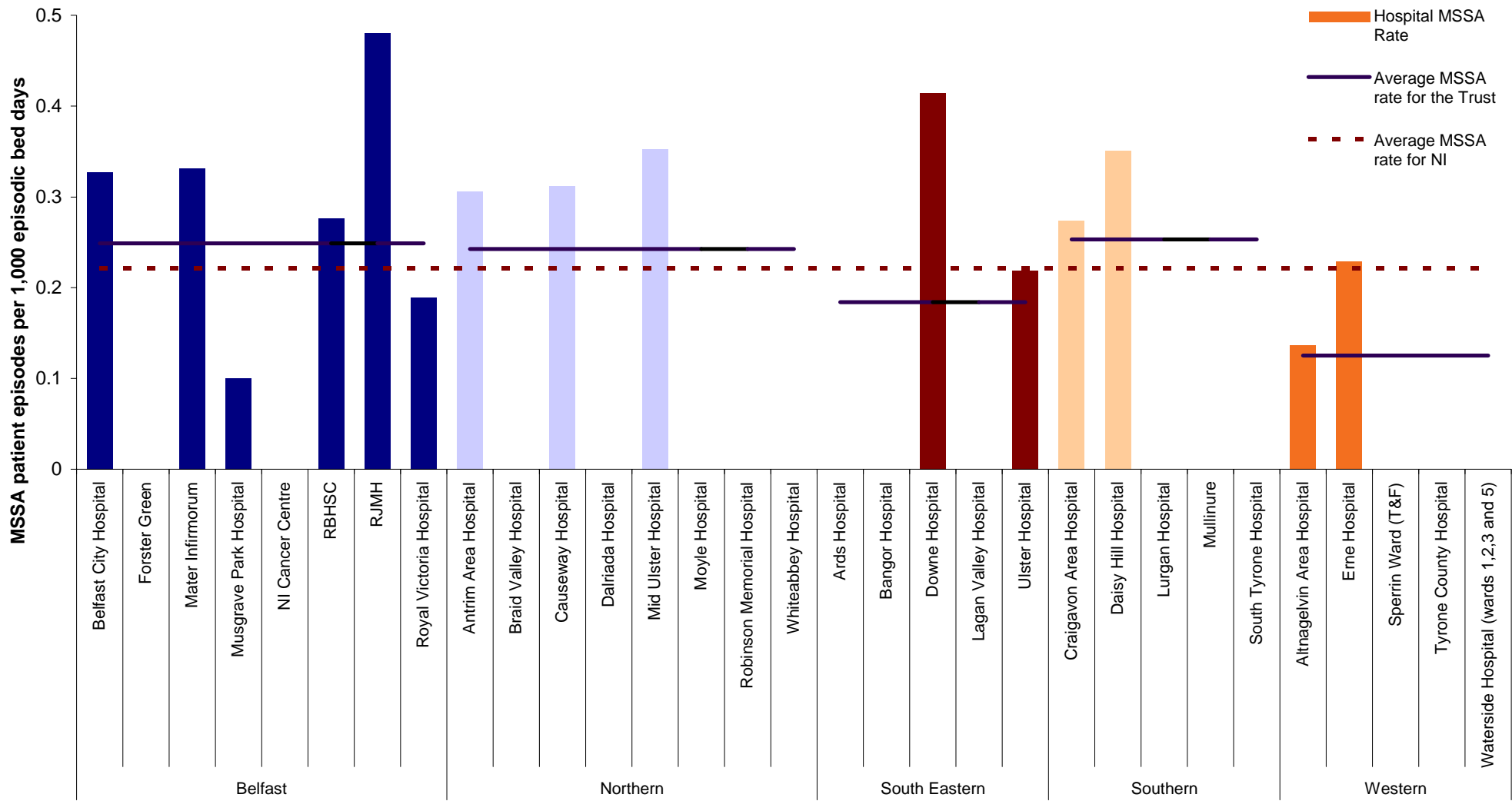


Figure 8: Rates of MSA by individual Hospitals, 2008 Quarter 4 (gaps represent zero episodes) compared to Quarter 4, 2008, Northern Ireland and Trust average rates.

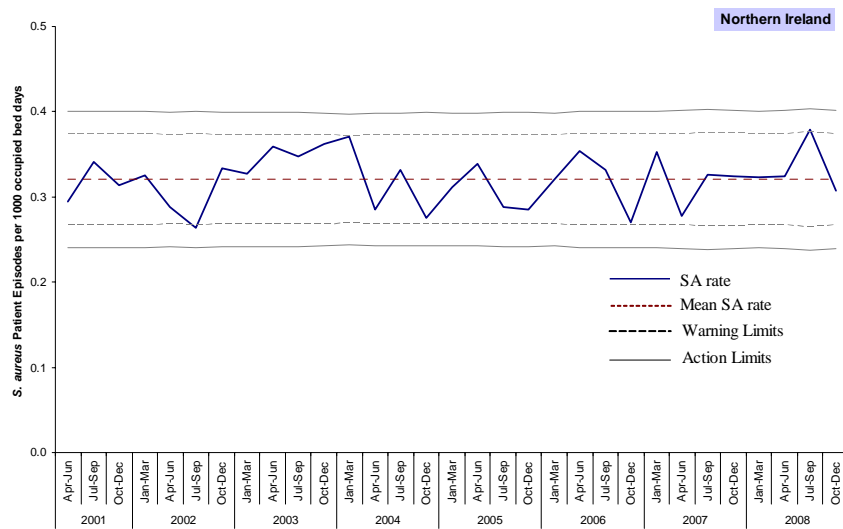


Figure 9a: Statistical Process Control chart for quarterly total **S.aureus** rates in Northern Ireland

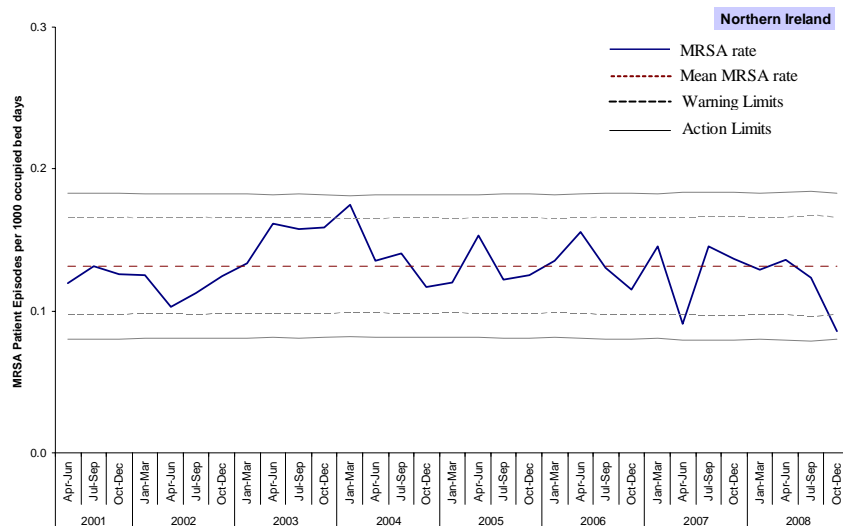


Figure 9b: Statistical Process Control chart for quarterly **MRSA** rates in Northern Ireland

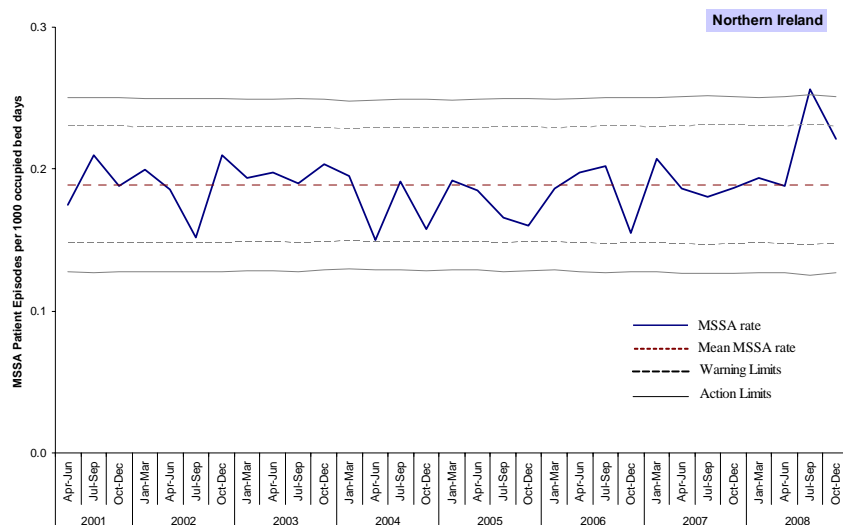


Figure 9c: Statistical Process Control chart for quarterly **MSSA** rates in Northern Ireland

Appendix 1

Table 1: Quarterly number of MRSA patient episodes and rates by Hospital, January – December 2008

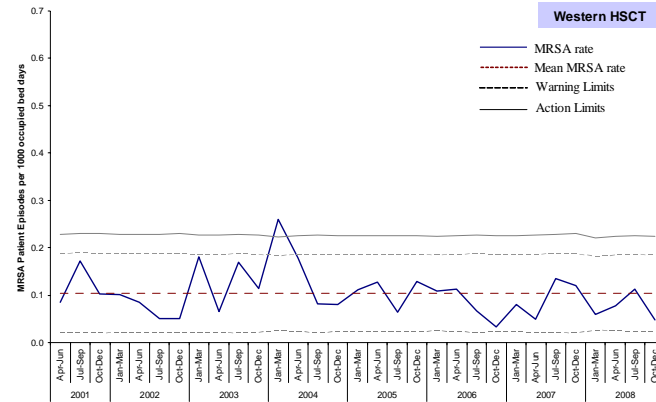
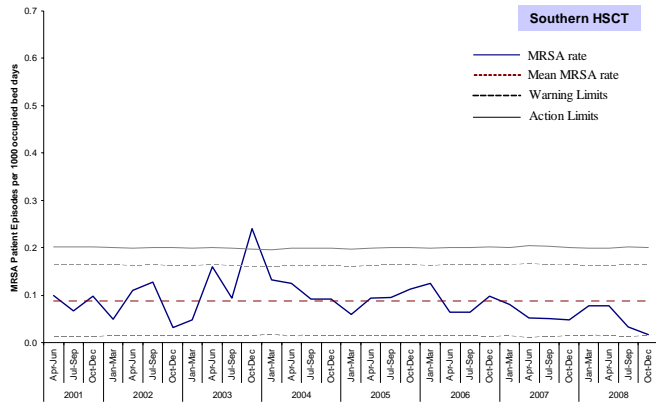
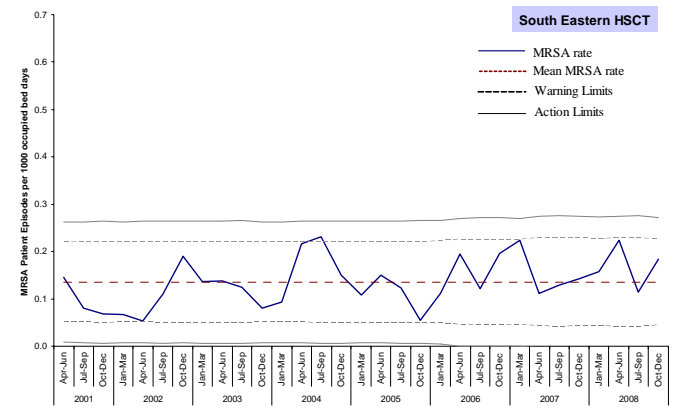
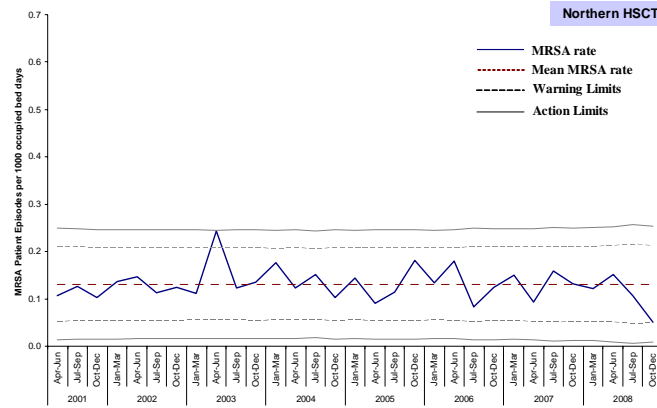
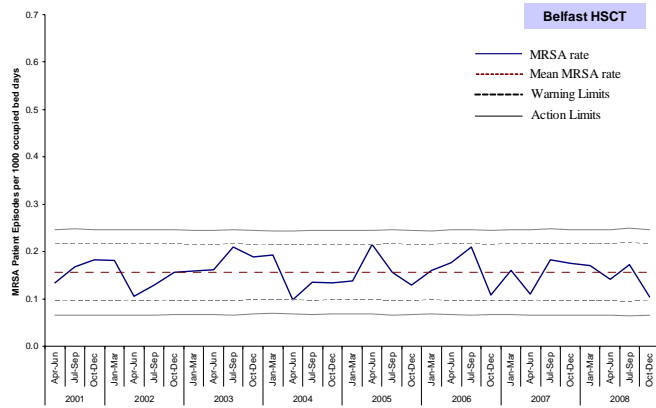
| Hospital | Jan - Mar 2008 | | Apr - Jun 2008 | | Jul - Sep 2008 | | Oct - Dec 2008 | |
|---|----------------|--------------|----------------|--------------|----------------|--------------|----------------|--------------|
| | Episodes | Rate | Episodes | Rate | Episodes | Rate | Episodes | Rate |
| Belfast City Hospital | 5 | 0.109 | 3 | 0.066 | 13 | 0.303 | 7 | 0.143 |
| Forster Green Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Mater Infirmorum | 8 | 0.332 | 8 | 0.333 | 8 | 0.344 | 3 | 0.124 |
| Musgrave Park Hospital | 1 | 0.052 | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| NICCO (formerly at Belvoir Park) | 1 | 0.152 | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| RBHSC | 1 | 0.137 | 1 | 0.140 | 0 | 0.000 | 1 | 0.138 |
| RJMH | 0 | 0.000 | 2 | 0.202 | 0 | 0.000 | 0 | 0.000 |
| Royal Victoria Hospital | 13 | 0.239 | 10 | 0.183 | 7 | 0.136 | 7 | 0.132 |
| Belfast Health & Social Care Trust | 29 | 0.170 | 24 | 0.141 | 28 | 0.173 | 18 | 0.104 |
| Antrim Area Hospital | 6 | 0.180 | 5 | 0.151 | 3 | 0.096 | 2 | 0.061 |
| Braid Valley Hospital | 0 | 0.000 | 1 | 0.341 | 0 | 0.000 | 0 | 0.000 |
| Causeway Hospital | 2 | 0.100 | 3 | 0.150 | 3 | 0.154 | 1 | 0.052 |
| Dalriada Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Mid Ulster Hospital | 0 | 0.000 | 2 | 0.226 | 1 | 0.128 | 0 | 0.000 |
| Moyle Hospital | 1 | 0.328 | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Robinson Memorial Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Whiteabbey Hospital | 1 | 0.106 | 1 | 0.123 | 1 | 0.127 | 1 | 0.107 |
| Northern Health & Social Care Trust | 10 | 0.122 | 12 | 0.151 | 8 | 0.107 | 4 | 0.051 |
| Ards Hospital | 0 | 0.000 | 0 | 0.000 | 1 | 0.253 | 0 | 0.000 |
| Bangor Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Downe Hospital | 1 | 0.203 | 3 | 0.682 | 0 | 0.000 | 0 | 0.000 |
| Lagan Valley Hospital | 1 | 0.099 | 0 | 0.000 | 1 | 0.114 | 0 | 0.000 |
| Ulster Hospital | 8 | 0.185 | 11 | 0.254 | 5 | 0.115 | 12 | 0.263 |
| South Eastern Health & Social Care Trust | 10 | 0.157 | 14 | 0.224 | 7 | 0.114 | 12 | 0.184 |
| Craigavon Area Hospital | 5 | 0.138 | 5 | 0.134 | 1 | 0.028 | 0 | 0.000 |
| Daisy Hill Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 | 1 | 0.058 |
| Lurgan Hospital | 0 | 0.000 | 0 | 0.000 | 1 | 0.170 | 0 | 0.000 |
| Mullinure | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| South Tyrone Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Southern Health & Social Care Trust | 5 | 0.077 | 5 | 0.078 | 2 | 0.033 | 1 | 0.016 |
| Altnagelvin Area Hospital | 4 | 0.101 | 3 | 0.081 | 3 | 0.085 | 2 | 0.055 |
| Erne Hospital | 0 | 0.000 | 2 | 0.162 | 3 | 0.249 | 1 | 0.076 |
| Sperrin Ward (T&F) | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Tyrone County Hospital | 0 | 0.000 | 0 | 0.000 | 1 | 0.147 | 0 | 0.000 |
| Waterside Hospital (Wards 1-3, 5) | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Western Health & Social Care Trust | 4 | 0.059 | 5 | 0.078 | 7 | 0.113 | 3 | 0.047 |
| NI TOTAL | 58 | 0.129 | 60 | 0.136 | 52 | 0.123 | 38 | 0.086 |

Appendix 1

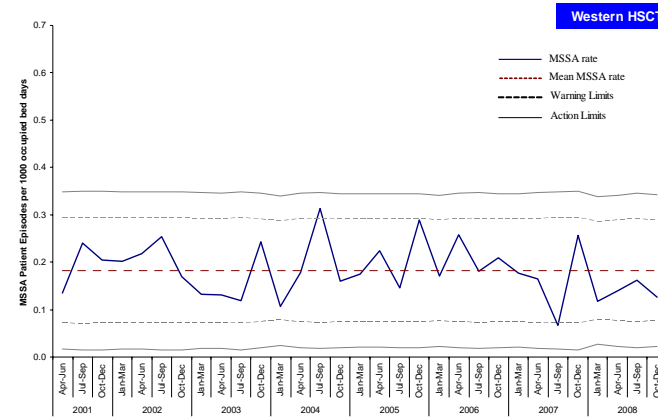
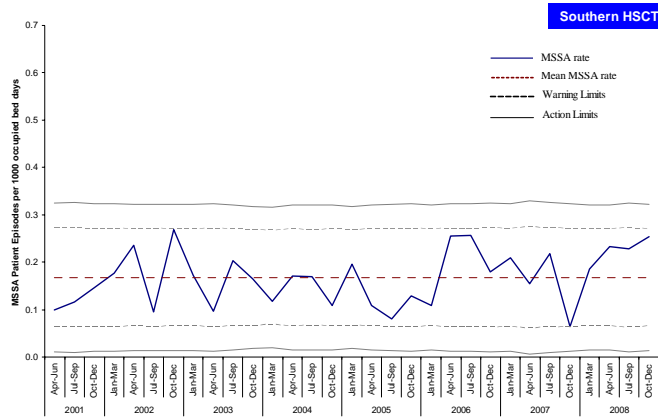
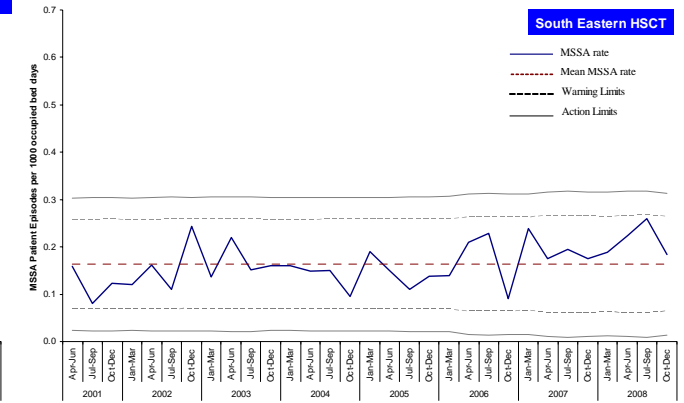
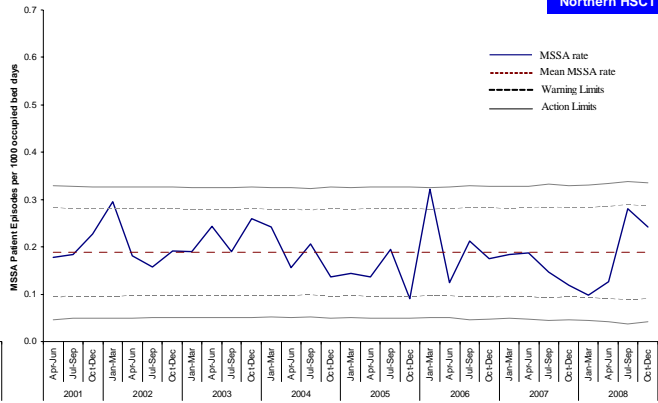
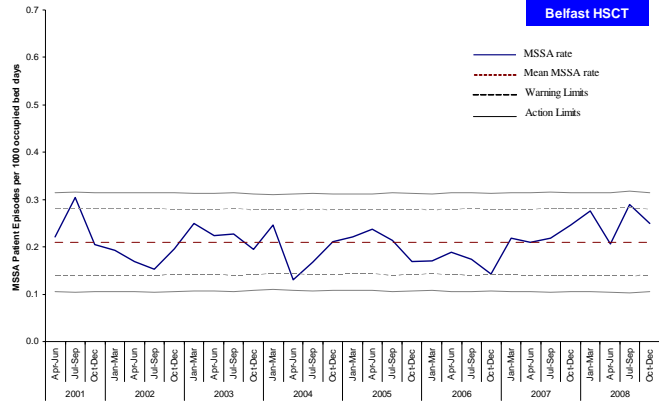
Table 2: Quarterly number of MSSA patient episodes and rates by Hospital, January – December 2008

| Hospital | Jan - Mar 2008 | | Apr - Jun 2008 | | Jul - Sep 2008 | | Oct - Dec 2008 | |
|---|----------------|--------------|----------------|--------------|----------------|--------------|----------------|--------------|
| | Episodes | Rate | Episodes | Rate | Episodes | Rate | Episodes | Rate |
| Belfast City Hospital | 20 | 0.436 | 11 | 0.243 | 14 | 0.326 | 16 | 0.327 |
| Forster Green Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Mater Infirmorum | 7 | 0.290 | 11 | 0.458 | 7 | 0.301 | 8 | 0.332 |
| Musgrave Park Hospital | 1 | 0.052 | 0 | 0.000 | 1 | 0.059 | 2 | 0.101 |
| NICCO (formerly at Belvoir Park) | 3 | 0.456 | 0 | 0.000 | 2 | 0.287 | 0 | 0.000 |
| RBHSC | 4 | 0.548 | 2 | 0.280 | 9 | 1.380 | 2 | 0.276 |
| RJMH | 4 | 0.394 | 3 | 0.303 | 2 | 0.195 | 5 | 0.480 |
| Royal Victoria Hospital | 8 | 0.147 | 8 | 0.146 | 12 | 0.233 | 10 | 0.189 |
| Belfast Health & Social Care Trust | 47 | 0.275 | 35 | 0.206 | 47 | 0.290 | 43 | 0.249 |
| Antrim Area Hospital | 5 | 0.150 | 7 | 0.211 | 9 | 0.289 | 10 | 0.306 |
| Braid Valley Hospital | 0 | 0.000 | 0 | 0.000 | 1 | 0.367 | 0 | 0.000 |
| Causeway Hospital | 3 | 0.149 | 3 | 0.150 | 6 | 0.308 | 6 | 0.311 |
| Dalriada Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Mid Ulster Hospital | 0 | 0.000 | 0 | 0.000 | 3 | 0.384 | 3 | 0.353 |
| Moyle Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Robinson Memorial Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Whiteabbey Hospital | 0 | 0.000 | 0 | 0.000 | 2 | 0.253 | 0 | 0.000 |
| Northern Health & Social Care Trust | 8 | 0.097 | 10 | 0.125 | 21 | 0.280 | 19 | 0.242 |
| Ards Hospital | 0 | 0.000 | 0 | 0.000 | 1 | 0.253 | 0 | 0.000 |
| Bangor Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Downe Hospital | 0 | 0.000 | 4 | 0.909 | 1 | 0.253 | 2 | 0.415 |
| Lagan Valley Hospital | 2 | 0.199 | 2 | 0.213 | 3 | 0.341 | 0 | 0.000 |
| Ulster Hospital | 10 | 0.231 | 8 | 0.185 | 11 | 0.254 | 10 | 0.219 |
| South Eastern Health & Social Care Trust | 12 | 0.188 | 14 | 0.224 | 16 | 0.260 | 12 | 0.184 |
| Craigavon Area Hospital | 11 | 0.304 | 9 | 0.241 | 7 | 0.198 | 10 | 0.274 |
| Daisy Hill Hospital | 1 | 0.058 | 5 | 0.308 | 6 | 0.382 | 6 | 0.351 |
| Lurgan Hospital | 0 | 0.000 | 0 | 0.000 | 1 | 0.170 | 0 | 0.000 |
| Mullinure | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| South Tyrone Hospital | 0 | 0.000 | 1 | 0.362 | 0 | 0.000 | 0 | 0.000 |
| Southern Health & Social Care Trust* | 12 | 0.186 | 15 | 0.234 | 14 | 0.229 | 16 | 0.253 |
| Altnagelvin Area Hospital | 4 | 0.101 | 7 | 0.188 | 8 | 0.227 | 5 | 0.137 |
| Erne Hospital | 0 | 0.000 | 0 | 0.000 | 2 | 0.166 | 3 | 0.229 |
| Sperrin Ward (T&F) | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Tyrone County Hospital | 4 | 0.518 | 2 | 0.281 | 0 | 0.000 | 0 | 0.000 |
| Waterside Hospital (Wards 1-3, 5) | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Western Health & Social Care Trust | 8 | 0.118 | 9 | 0.140 | 10 | 0.162 | 8 | 0.125 |
| NI TOTAL | 87 | 0.194 | 83 | 0.188 | 108 | 0.256 | 98 | 0.221 |

Appendix 2: Trends in MRSA rates by Trust and quarter (2001-2008)



Appendix 2: Trends in MSSA rates by Trust and quarter (2001-2008)



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 | 0.193 | 0.129 | 0.322 | 40.1 |
| Apr-Jun 2008 | 0.188 | 0.136 | 0.324 | 42.0 |
| Jul-Sep 2008 | 0.256 | 0.123 | 0.379 | 32.5 |
| Oct-Dec 2008 | 0.221 | 0.086 | 0.307 | 27.9 |

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. If the new admission is within 14 days of the original positive specimen date, for *S. aureus*, then the duplicate rule applies regardless of the change in hospital and the isolate should not be reported.