



***S. aureus* bacteraemia surveillance**

Quarter ending September 2009

***S. aureus* bacteraemia surveillance**

Quarter: July – September 2009

Key Points

- **SA rates have decreased by approximately 7% this quarter compared to April – June 2009.**
- **MRSA rates have decreased by approximately 25% compared to April-June 2009.**
- **MRSA reports during the financial year 2008/09 fell 8% compared to 2007/08 (Appendix 6).**
- **MSSA rates have increased by approximately 2% compared to April-June 2009.**
- **MSSA reports during 2008/09 rose by 12% compared to 2007/08 (Appendix 6).**
- **Northern Ireland rates of SA (MRSA and MSSA) this quarter remain within the control limits of the SPC charts (Figure 9a).**

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

- ❖ The Northern Ireland rate of *S. aureus* bacteraemia (MRSA plus MSSA) has **decreased** from 0.30/1,000 occupied bed days to 0.28/1000 occupied bed days during this quarter of 2009 (Figure 1; Appendix 3).
- ❖ 113 *S. aureus* reports were notified in July – September 2009, a decrease of 13 reports (10%) compared to the previous quarter of 2009 (126 reports).

MRSA

- ❖ The number of MRSA bacteraemias has **decreased** from 39 reports last quarter to 28 reports this quarter (28%) (Appendix 1; Table 1).
- ❖ The MRSA rate **decreased** (25%) from 0.092 last quarter to 0.069 this quarter (Figure 1; Appendix 3).
- ❖ The overall percentage of all *S. aureus* patient episodes reported as MRSA this quarter **decreased** by approximately 6% (31.0% last quarter to 24.8% this quarter) (Appendix 3).
- ❖ Four out of the five Trusts had a decrease in MRSA rates during quarter 3, 2009 (Figure 3).
- ❖ When the MRSA bacteraemia rates reported for Trusts in Quarter 3 are compared to Quarter 3 in previous years, using 95% confidence intervals, there has been no statistically significant change in the figures (Figure 4). However, there is a downward trend in the overall rate of MRSA bacteraemias (Figure 1).

MSSA

- ❖ The number of MSSA bacteraemias has **decreased** from 87 reports last quarter to 85 reports this quarter (2%) (Appendix 1; Table 2).
- ❖ The MSSA rate **increased** (2%) from 0.205 last quarter to 0.209 this quarter (Figure 1; Appendix 3). However, there has been no statistically significant change in rates between this quarter and the previous quarter in 2009 (Figure 1).
- ❖ This quarter, all five Trusts reported higher MSSA rates than MRSA (Figure 2).

- ❖ MSSA rates increased in three out of five Trusts during quarter 3, 2009 (Figure 5). However, when figures are compared to data for quarter 3 in previous years, there is no statistically significant change in MSSA rates (Figure 6).
- ❖ Figures 7 and 8 show the rate of MRSA and MSSA patient episodes during Quarter 2 in 2009 for individual hospitals in each Trust (see also Appendix 1; Tables 1 and 2).

SPC charts

- ❖ Trends in SA (MRSA and MSSA) rates since mandatory 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 expected parameters (Figure 9a).
- ❖ In Northern Ireland this quarter, the rate of MRSA patient episodes crossed the lower action limit of the chart (Figure 9b). This indicates a significant reduction in the number of MRSA patient episodes not explained by natural variation. This is the first time since mandatory reporting commenced in NI in 2001 that the lower action limit of the SPC chart for MRSA has been crossed.

Caveats

- ❖ The results outlined in this surveillance report are for SA isolates which have been identified within a hospital setting. No distinction is made between the origin of the isolate i.e. from the hospital or the community.
- ❖ **A number of recent reports (for which patient source was known) have been from patients located 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 are included in the relevant Trust’s quarterly total.** Transferred patients and duplicate samples (within a 14-day time period) are removed from the dataset as far as possible, using information reported through usual NI laboratory reporting systems (CoSurv and EARSS where available). However, it should be noted that the potential for inclusion of duplicates remains.
- ❖ During this quarter, bed day data was not available for the Southern Trust, 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 quarterly HCAI report when validated information is made available.
- ❖ Appendix 5 has been added to this report to clarify ongoing queries relating to definitions of *S. aureus* patient episodes included in mandatory HCAI surveillance in NI.
- ❖ **The data in this report reflects SA episodes as validated by the diagnostic laboratories. This data will be compared to the NI HCAI web based system and as such it may change. Any updates will be reflected in the next report.**

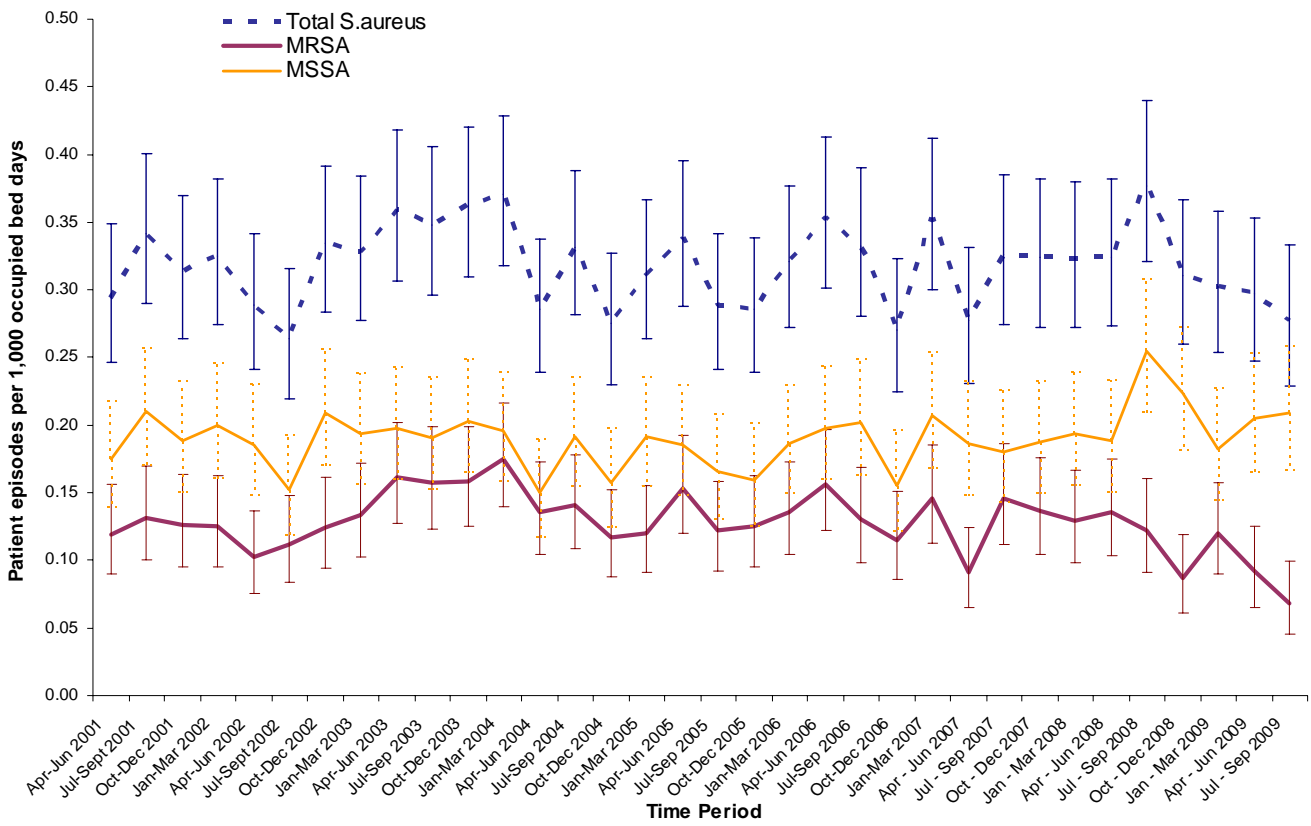


Figure 1: MSSA, MRSA and *S. aureus* patient episode rates in Northern Ireland by quarter, with 95% Confidence Intervals, April 2001 – September 2009 (see Appendix 3).

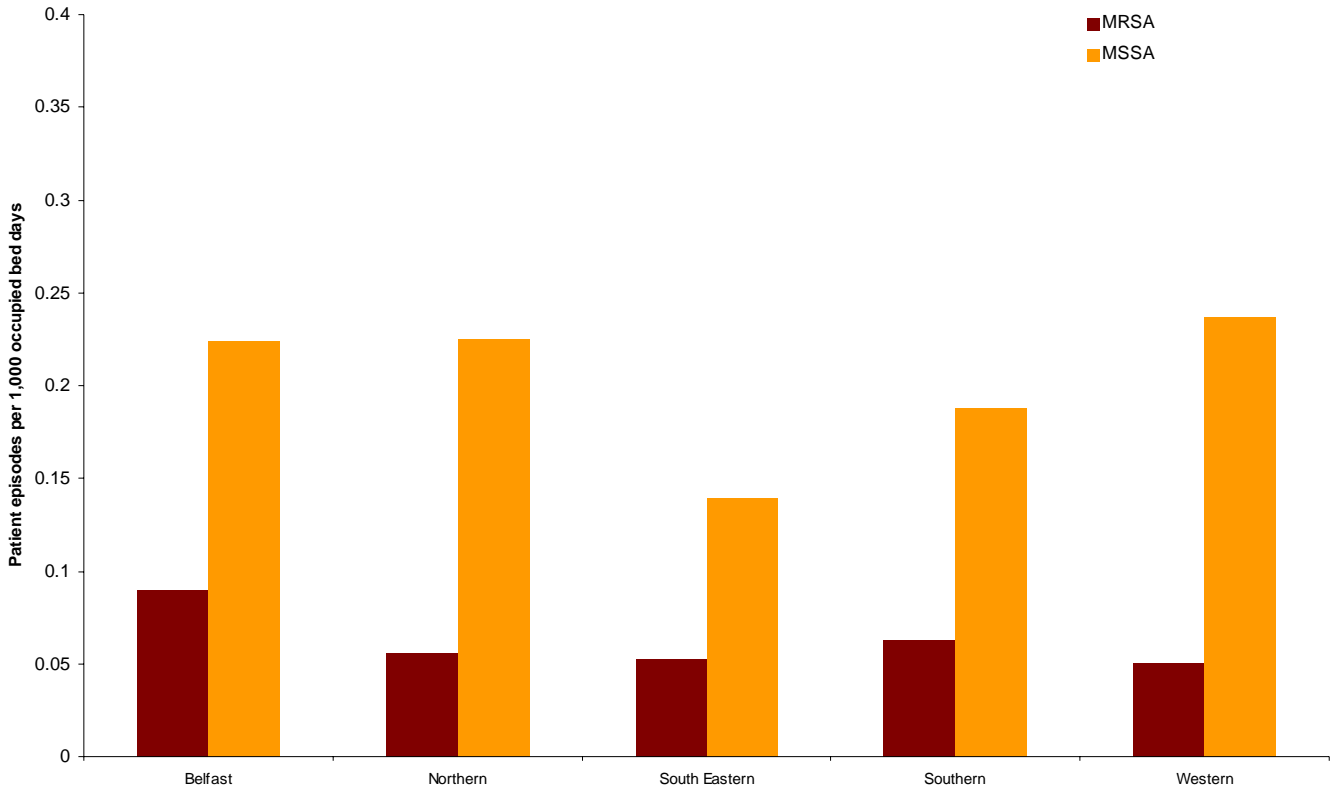


Figure 2: MRSA and MSSA patient episodes per 1,000 occupied bed days, by Trust, July – September 2009.

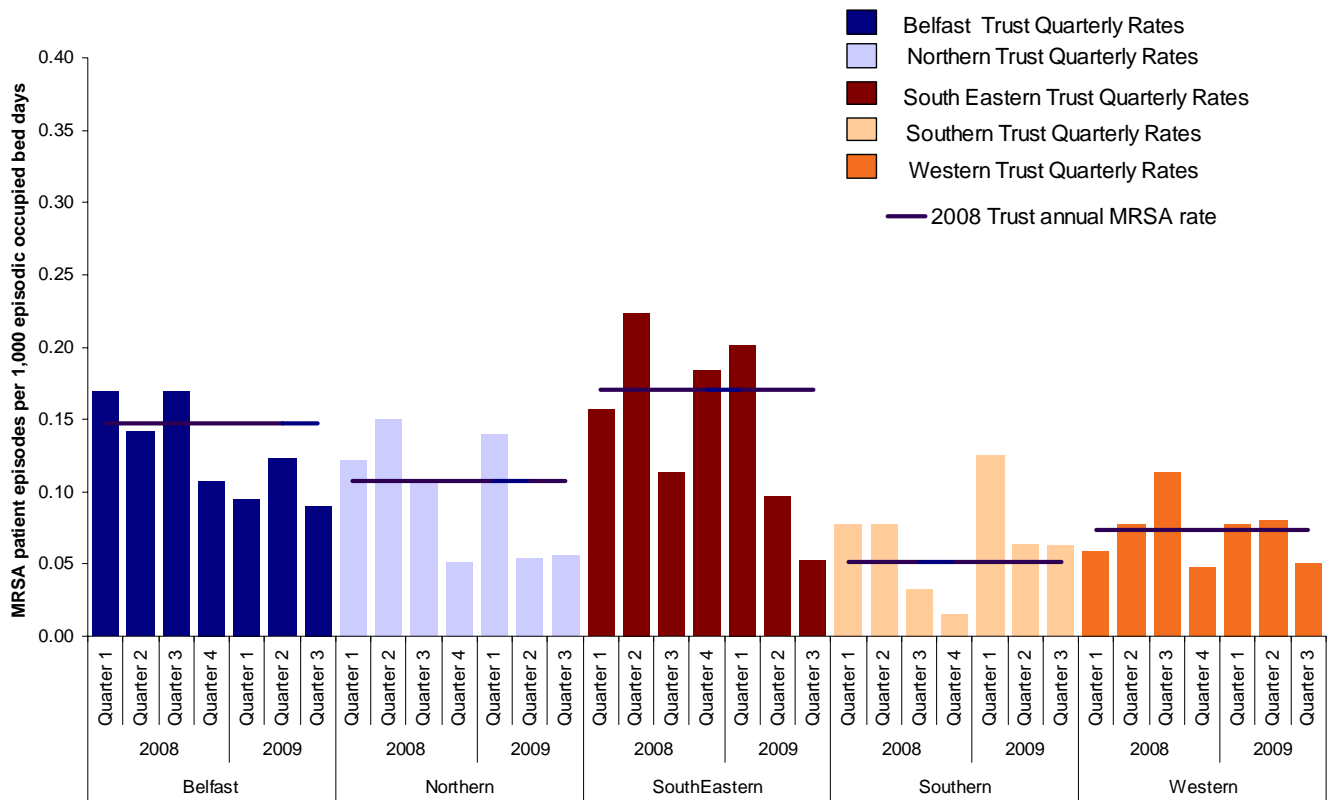


Figure 3: Quarterly rates of MRSA by Trust 1 January 2008 – 30 September 2009, with 2008 Trust Annual MRSA rates.

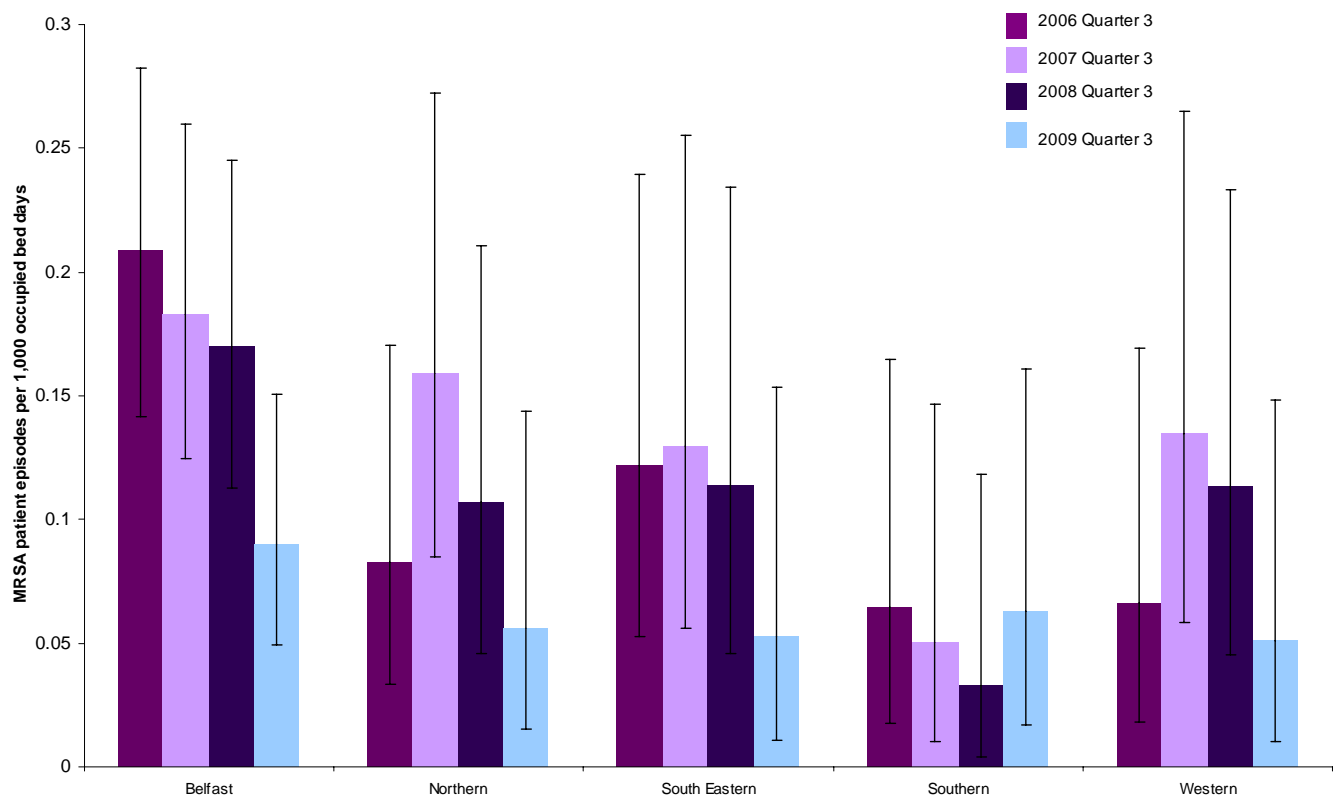


Figure 4: MRSA patient episodes by Trust in Quarter 3 from 2006 - 2009, with 95% confidence intervals.

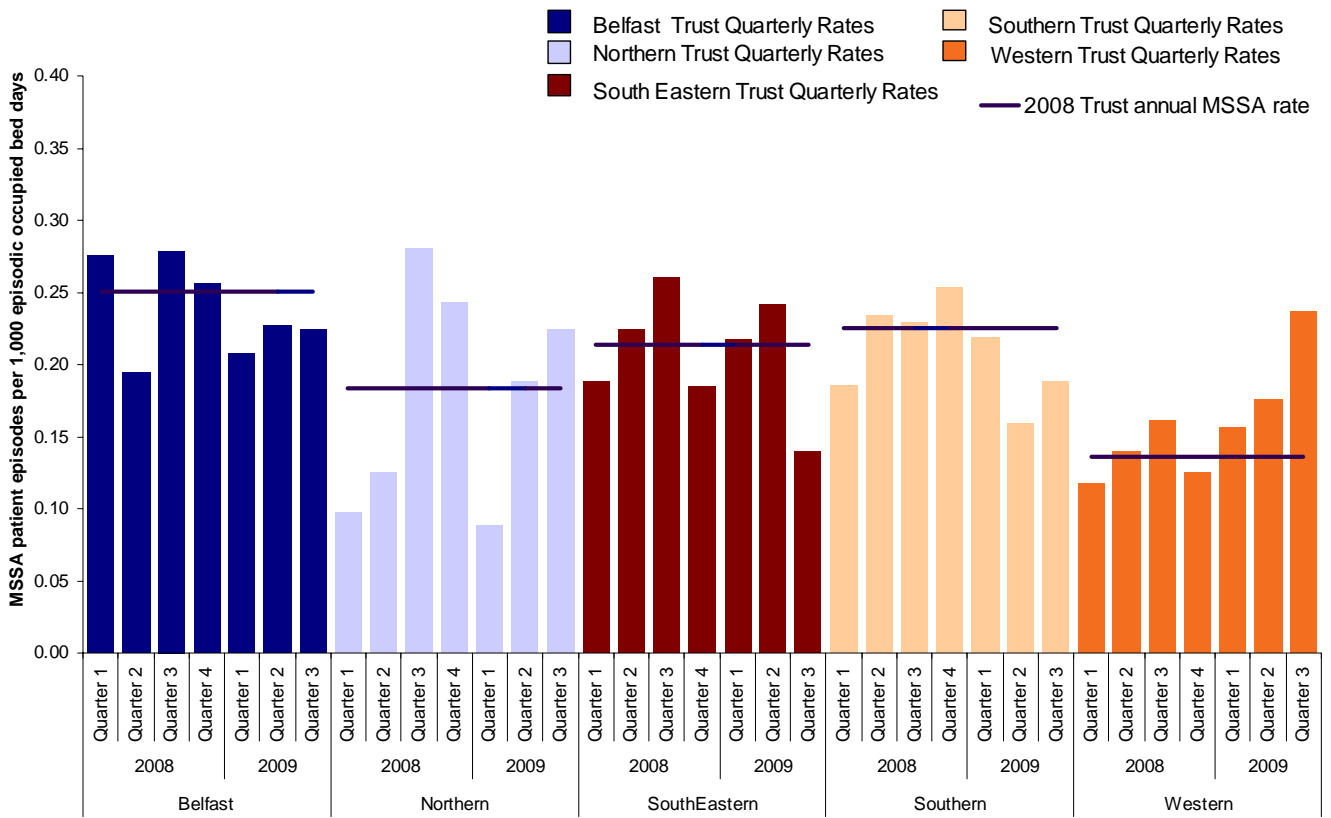


Figure 5: Quarterly rates of MSA by Trust 1 January 2008 – 30 September 2009, with 2008 Trust Annual MSA rates.

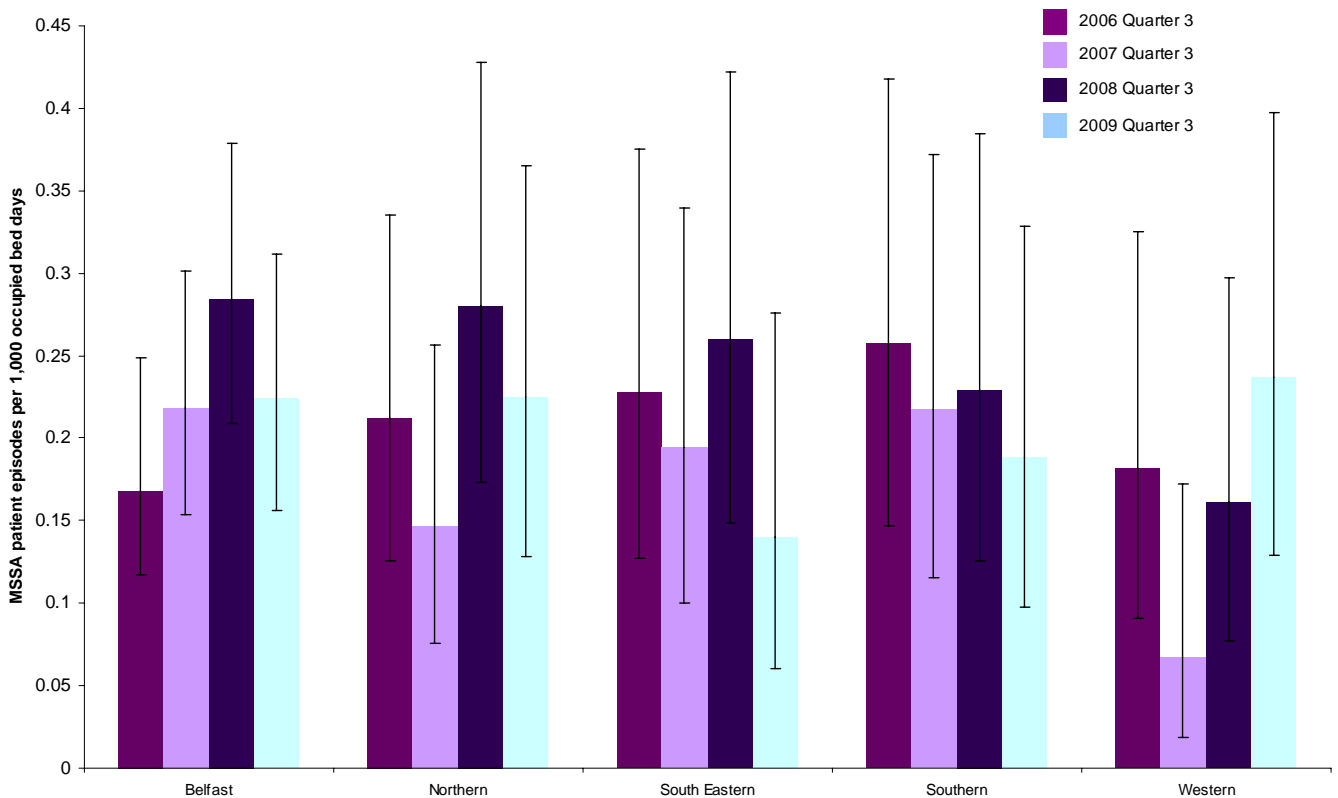


Figure 6: MSA patient episodes by Trust in Quarter 3 from 2006 - 2009, with 95% confidence intervals.

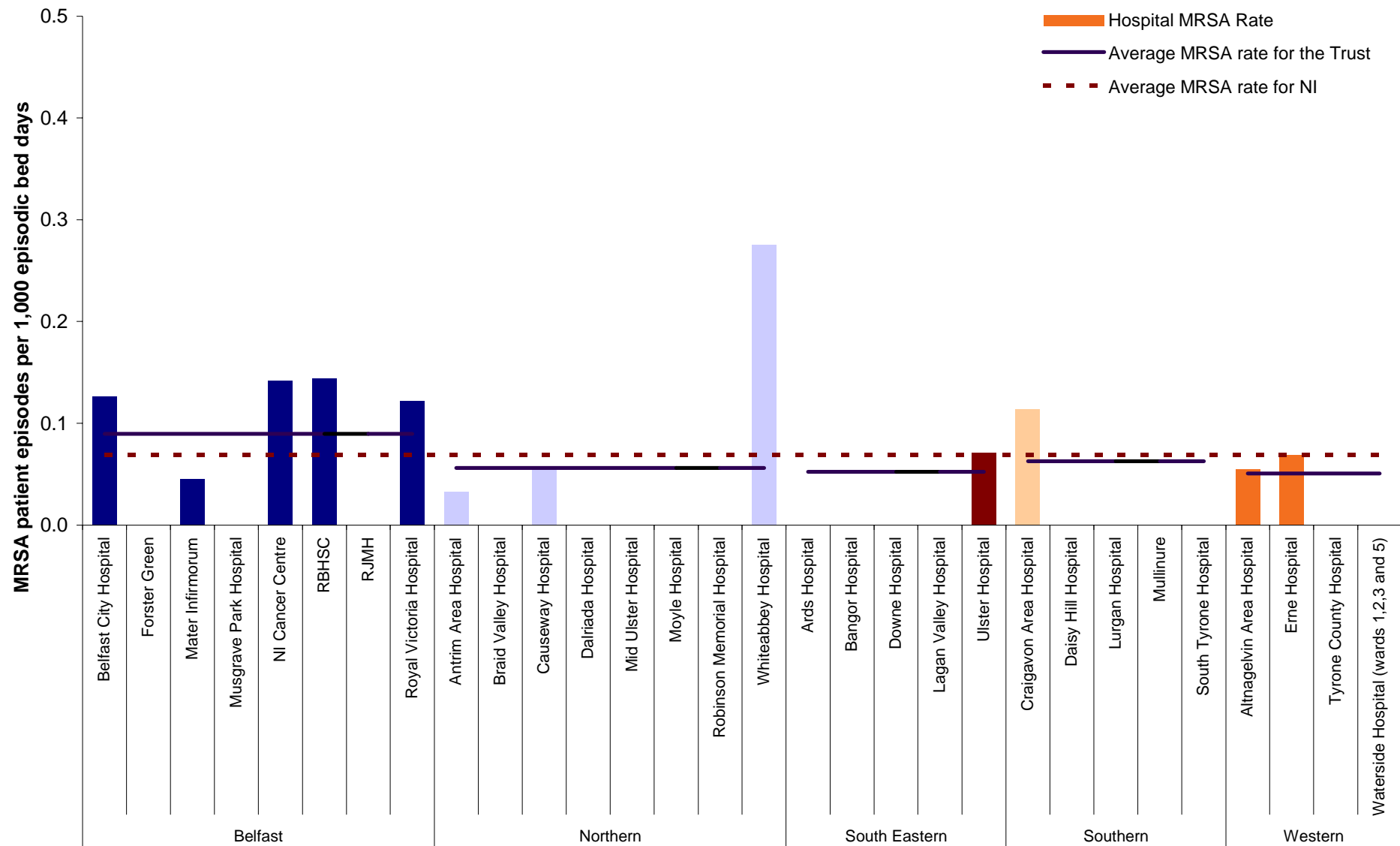


Figure 7: Rates of MRSA by individual Hospitals, 2009 Quarter 3 (gaps represent zero episodes), compared to 2009 Quarter 3 Northern Ireland and Trust average rates.

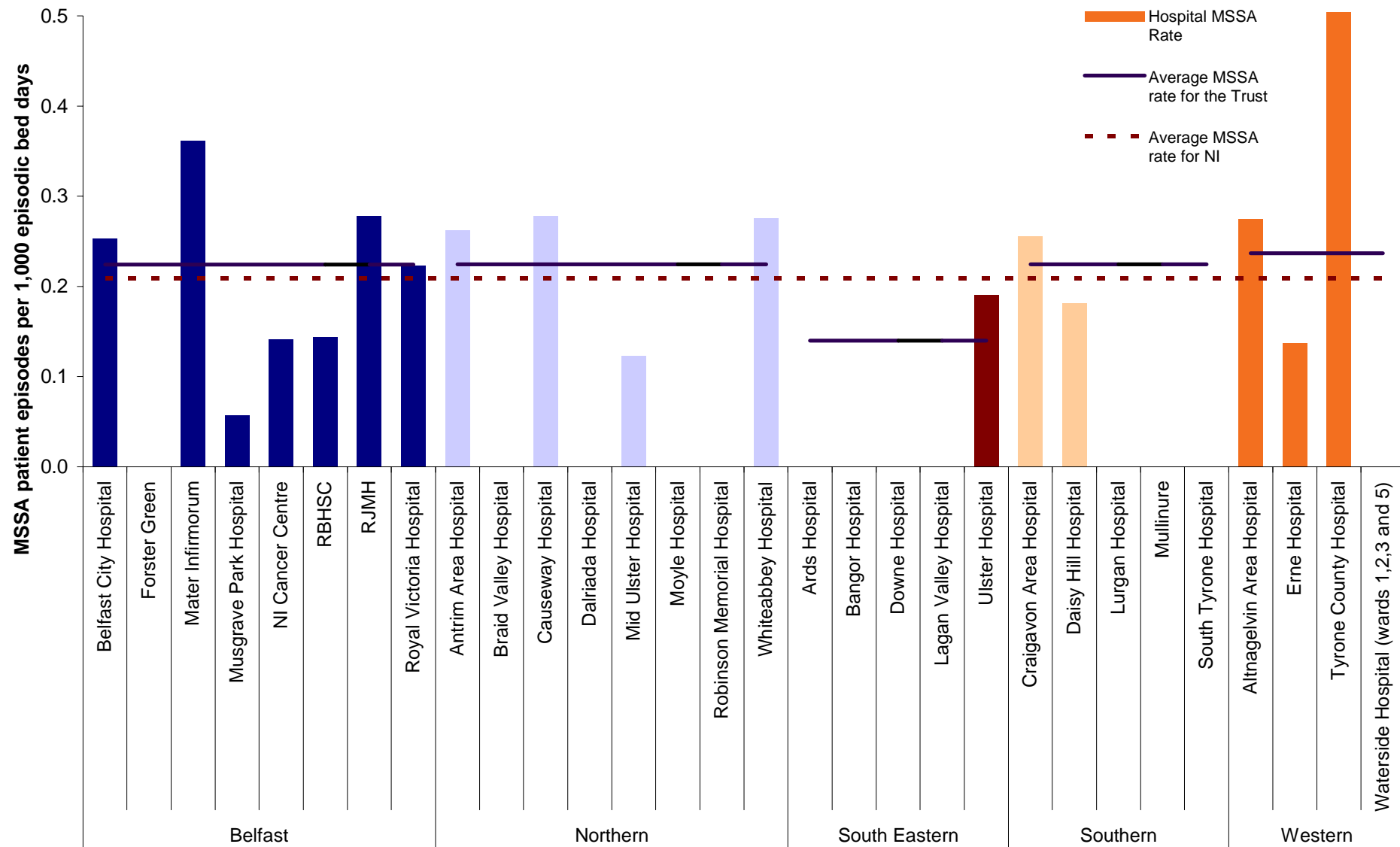


Figure 8: Rates of MSA by individual Hospitals, 2009 Quarter 3 (gaps represent zero episodes) compared to Quarter 3, 2009, Northern Ireland and Trust average rates.

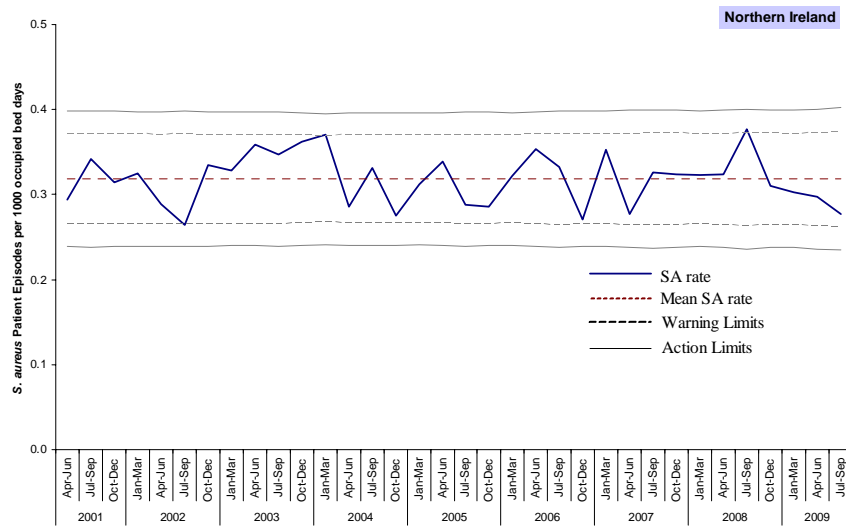


Figure 9a: Statistical Process Control chart for quarterly total *S.aureus* rates in Northern Ireland

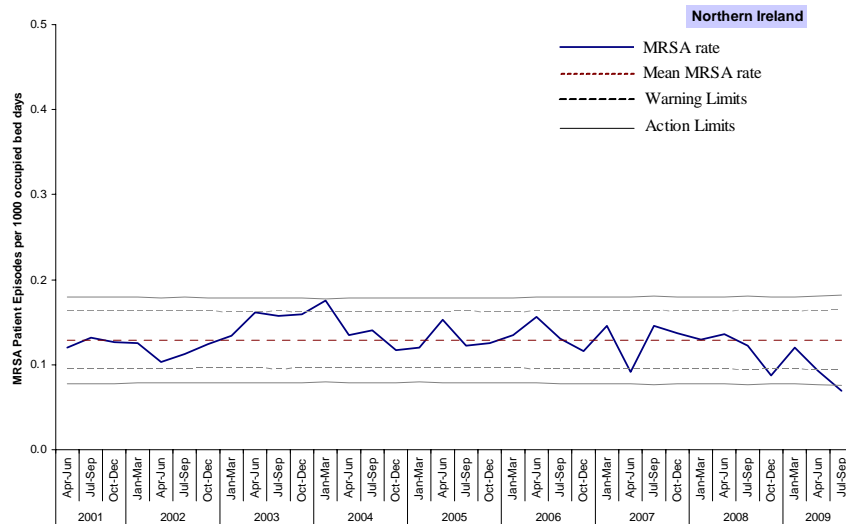


Figure 9b: Statistical Process Control chart for quarterly MRSA rates in Northern Ireland

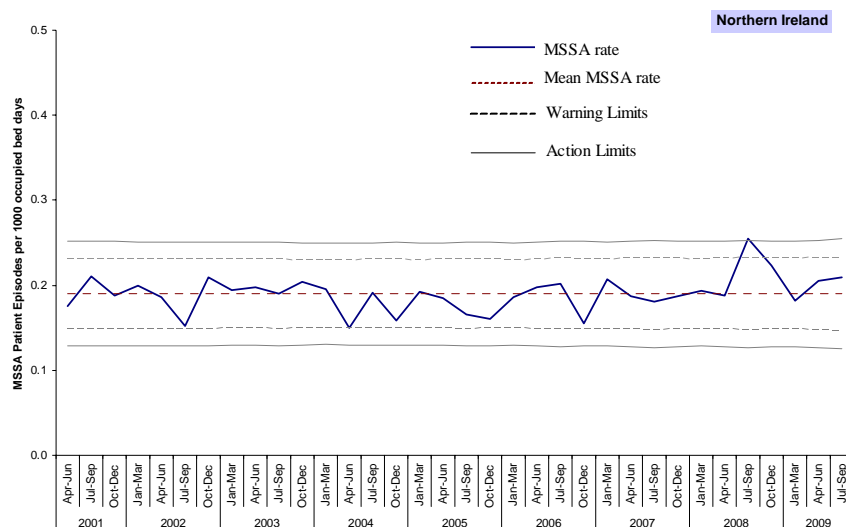


Figure 9c: Statistical Process Control chart for quarterly MSSA rates in Northern Ireland

Appendix 1

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

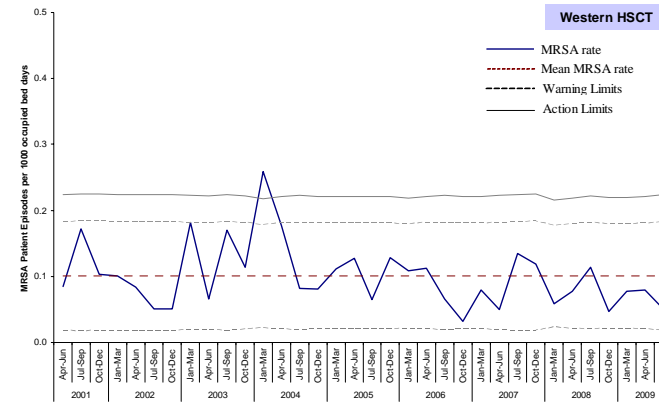
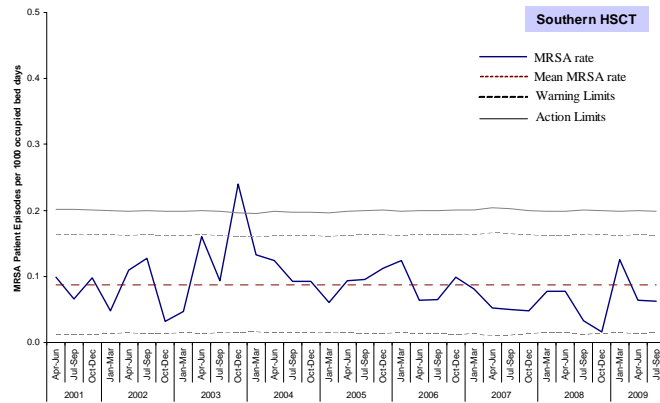
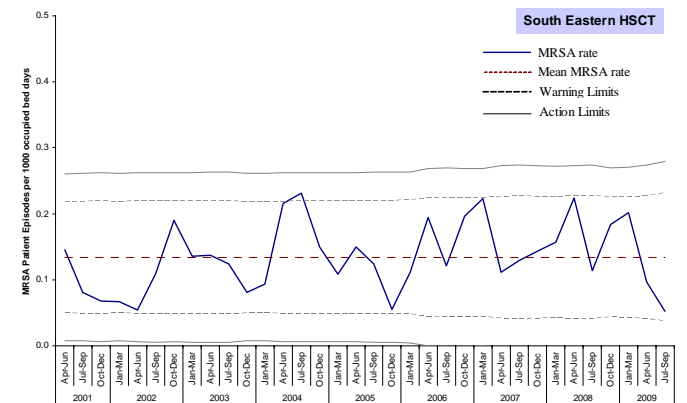
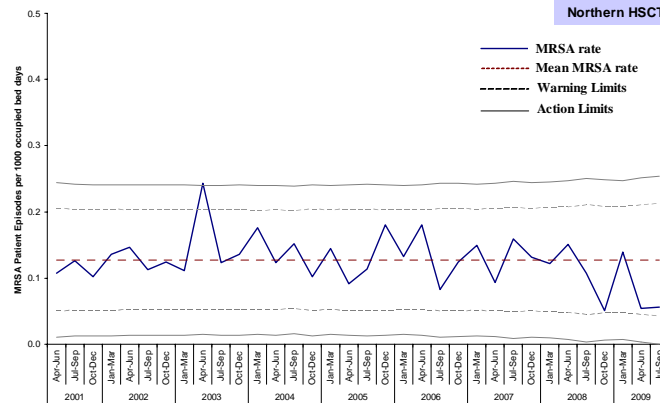
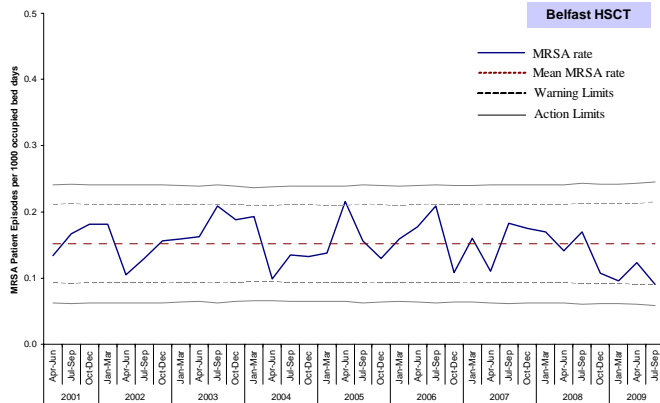
| Hospital | Jan - Mar 2009 | | Apr - Jun 2009 | | Jul - Sep 2009 | |
|---|----------------|--------------|----------------|--------------|----------------|--------------|
| | Episodes | Rate | Episodes | Rate | Episodes | Rate |
| Belfast City Hospital | 5 | 0.115 | 9 | 0.216 | 5 | 0.127 |
| Forster Green Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Mater Infirmorum | 1 | 0.041 | 5 | 0.219 | 1 | 0.045 |
| Musgrave Park Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| NICCO (formerly at Belvoir Park) | 0 | 0.000 | 1 | 0.146 | 1 | 0.142 |
| RBHSC | 0 | 0.000 | 0 | 0.000 | 1 | 0.144 |
| RJMH | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Royal Victoria Hospital | 10 | 0.187 | 5 | 0.095 | 6 | 0.122 |
| Belfast Health & Social Care Trust | 16 (18) | 0.095 | 20 | 0.123 | 14 | 0.090 |
| Antrim Area Hospital | 4 | 0.121 | 2 | 0.064 | 1 | 0.033 |
| Braid Valley Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Causeway Hospital | 3 | 0.153 | 1 | 0.053 | 1 | 0.056 |
| Dalriada Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Mid Ulster Hospital | 1 | 0.116 | 0 | 0.000 | 0 | 0.000 |
| Moyle Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Robinson Memorial Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Whiteabbey Hospital | 3 | 0.316 | 1 | 0.123 | 2 | 0.275 |
| Northern Health & Social Care Trust | 11 (4) | 0.139 | 4 | 0.054 | 4 | 0.056 |
| Ards Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Bangor Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Downe Hospital | 2 | 0.418 | 0 | 0.000 | 0 | 0.000 |
| Lagan Valley Hospital | 1 | 0.110 | 2 | 0.218 | 0 | 0.000 |
| Ulster Hospital | 10 | 0.221 | 4 | 0.090 | 3 | 0.072 |
| South Eastern Health & Social Care Trust | 13 (12) | 0.202 | 6 | 0.097 | 3 | 0.052 |
| Craigavon Area Hospital | 4 | 0.110 | 2 | 0.057 | 4 | 0.114 |
| Daisy Hill Hospital | 2 | 0.117 | 1 | 0.062 | 0 | 0.000 |
| Lurgan Hospital | 1 | 0.172 | 1 | 0.146 | 0 | 0.000 |
| Mullinure | 1 | 0.531 | 0 | 0.000 | 0 | 0.000 |
| South Tyrone Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Southern Health & Social Care Trust | 8 (1) | 0.125 | 4 | 0.064 | 4 | 0.063 |
| Altnagelvin Area Hospital | 1 | 0.027 | 3 | 0.079 | 2 | 0.055 |
| Erne Hospital | 2 | 0.144 | 2 | 0.144 | 1 | 0.069 |
| Tyrone County Hospital | 2 | 0.350 | 0 | 0.000 | 0 | 0.000 |
| Waterside Hospital (Wards 1-3, 5) | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Western Health & Social Care Trust | 5 (3) | 0.078 | 5 | 0.080 | 3 | 0.051 |
| NI TOTAL | 53 (38) | 0.120 | 39 | 0.092 | 28 | 0.069 |

Appendix 1

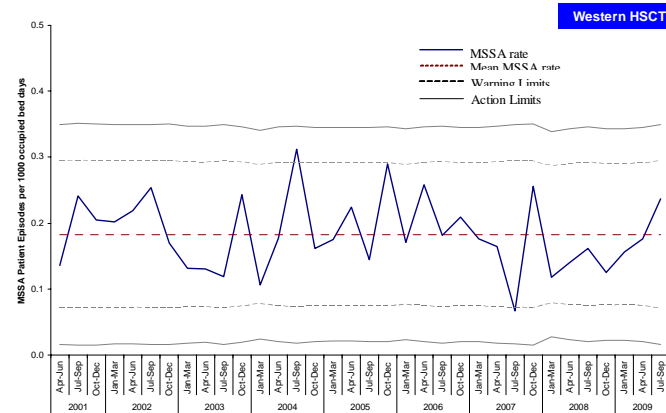
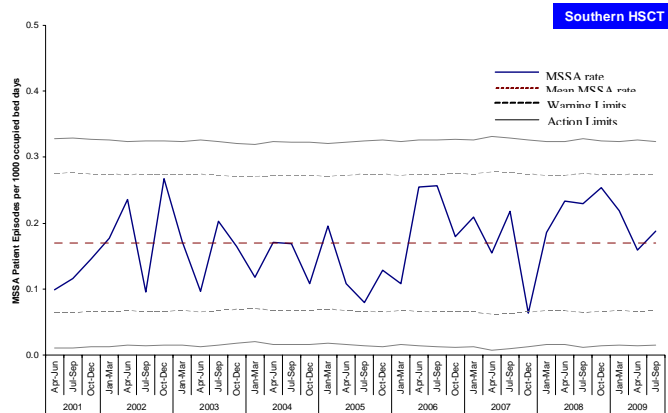
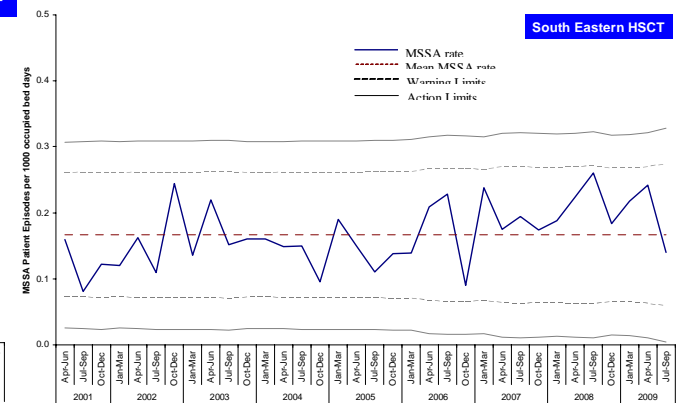
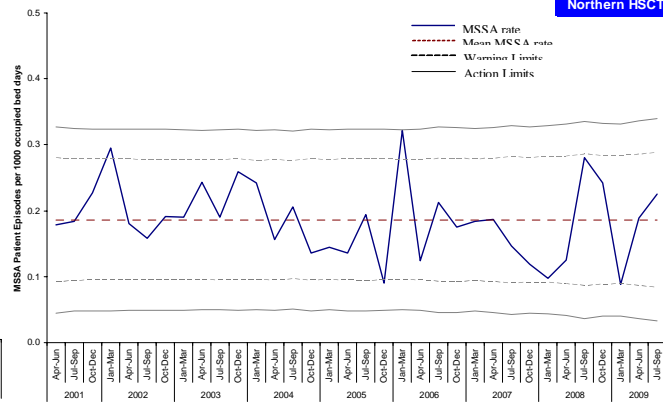
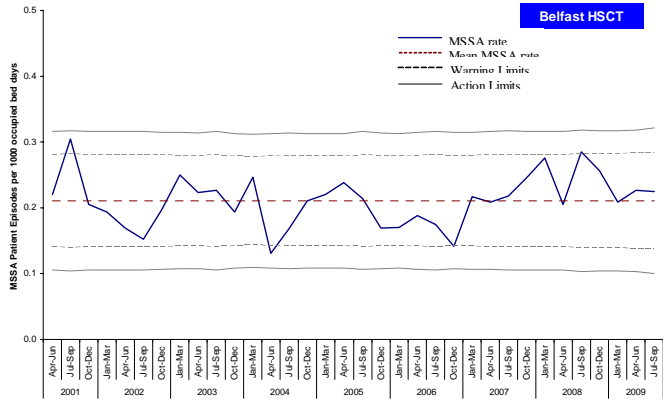
Table 2: Quarterly number of MSSA patient episodes and rates by Hospital, January – September 2009. Figures in parentheses represent data from October – December 2008.

| Hospital | Jan - Mar 2009 | | Apr - Jun 2009 | | Jul - Sep 2009 | |
|---|----------------|--------------|----------------|--------------|----------------|--------------|
| | Episodes | Rate | Episodes | Rate | Episodes | Rate |
| Belfast City Hospital | 13 | 0.298 | 9 | 0.216 | 10 | 0.253 |
| Forster Green Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Mater Infirmorum | 2 | 0.082 | 3 | 0.132 | 8 | 0.362 |
| Musgrave Park Hospital | 0 | 0.000 | 0 | 0.000 | 1 | 0.057 |
| NICCO (formerly at Belvoir Park) | 0 | 0.000 | 5 | 0.730 | 1 | 0.142 |
| RBHSC | 6 | 0.783 | 7 | 1.019 | 1 | 0.144 |
| RJMH | 1 | 0.099 | 0 | 0.000 | 3 | 0.278 |
| Royal Victoria Hospital | 13 | 0.243 | 13 | 0.248 | 11 | 0.223 |
| Belfast Health & Social Care Trust | 35 (43) | 0.208 | 37 | 0.227 | 35 | 0.224 |
| Antrim Area Hospital | 2 | 0.060 | 6 | 0.193 | 8 | 0.262 |
| Braid Valley Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Causeway Hospital | 3 | 0.153 | 2 | 0.105 | 5 | 0.278 |
| Dalriada Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Mid Ulster Hospital | 2 | 0.232 | 4 | 0.493 | 1 | 0.123 |
| Moyle Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Robinson Memorial Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Whiteabbey Hospital | 0 | 0.000 | 2 | 0.245 | 2 | 0.275 |
| Northern Health & Social Care Trust | 7 (19) | 0.088 | 14 | 0.188 | 16 | 0.225 |
| Ards Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Bangor Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Downe Hospital | 1 | 0.209 | 1 | 0.267 | 0 | 0.000 |
| Lagan Valley Hospital | 4 | 0.439 | 0 | 0.000 | 0 | 0.000 |
| Ulster Hospital | 9 | 0.199 | 14 | 0.315 | 8 | 0.191 |
| South Eastern Health & Social Care Trust | 14 (12) | 0.217 | 15 | 0.242 | 8 | 0.140 |
| Craigavon Area Hospital | 11 | 0.302 | 4 | 0.115 | 9 | 0.256 |
| Daisy Hill Hospital | 3 | 0.175 | 4 | 0.249 | 3 | 0.181 |
| Lurgan Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Mullinure | 0 | 0.000 | 2 | 0.814 | 0 | 0.000 |
| South Tyrone Hospital | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Southern Health & Social Care Trust | 14 (16) | 0.219 | 10 | 0.160 | 12 | 0.188 |
| Altnagelvin Area Hospital | 6 | 0.159 | 8 | 0.211 | 10 | 0.275 |
| Erne Hospital | 1 | 0.072 | 3 | 0.216 | 2 | 0.138 |
| Tyrone County Hospital | 3 | 0.525 | 0 | 0.000 | 2 | 0.686 |
| Waterside Hospital (Wards 1-3, 5) | 0 | 0.000 | 0 | 0.000 | 0 | 0.000 |
| Western Health & Social Care Trust | 10 (8) | 0.156 | 11 | 0.176 | 14 | 0.237 |
| NI TOTAL | 80 (98) | 0.182 | 87 | 0.205 | 85 | 0.209 |

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 – September 2009

| 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 | 0.182 | 0.120 | 0.302 | 39.9 |
| Apr-Jun 2009 | 0.205 | 0.092 | 0.297 | 31.0 |
| Jul-Sep 2009 | 0.209 | 0.069 | 0.277 | 24.8 |

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, 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 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 symptoms of *C. diff* or *S. aureus* within 2 days and a specimen is taken and tested at this point, this HCAI 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 patient transfer/admission and may therefore have been acquired prior to admission to the second healthcare facility.

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

A patient may be an in-patient 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 may 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 second isolate should not be reported.

Appendix 6

Table 1: MRSA patient episodes, by Trust and for Northern Ireland, for each financial year.

| Trust | Financial Year | | | |
|------------------|----------------|---------|---------|---------|
| | 2005/06 | 2006/07 | 2007/08 | 2008/09 |
| Belfast | 118 | 115 | 109 | 86 |
| Northern | 46 | 47 | 42 | 35 |
| South Eastern | 32 | 49 | 34 | 46 |
| Southern | 27 | 19 | 14 | 16 |
| Western | 27 | 18 | 22 | 20 |
| Northern Ireland | 250 | 248 | 221 | 203 |

Table 2: MSSA patient episodes, by Trust and for Northern Ireland, for each financial year.

| Trust | Financial Year | | | |
|------------------|----------------|---------|---------|---------|
| | 2005/06 | 2006/07 | 2007/08 | 2008/09 |
| Belfast | 141 | 129 | 161 | 157 |
| Northern | 66 | 60 | 46 | 57 |
| South Eastern | 39 | 51 | 46 | 56 |
| Southern | 27 | 56 | 38 | 59 |
| Western | 52 | 51 | 37 | 37 |
| Northern Ireland | 325 | 347 | 328 | 366 |