



CDSC (NI)

***S. aureus* bacteraemia surveillance**

Quarter ending June 2008

***S. aureus* bacteraemia surveillance**

Quarter: April – June 2008

Key Points

There was no statistically significant change in *S. aureus*, MRSA or MSSA rates compared to the previous quarter (Figure 1).

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

- ❖ The Northern Ireland rate of *S. aureus* (MRSA plus MSSA) has **remained** constant at 0.32 per 1,000 occupied bed days (Figure 1; Appendix 3). This is similar to the previous three quarters.

MRSA

- ❖ The number of MRSA bacteraemias has **increased** from 58 to 60 reports (3.4%) (Appendix 1 Table 1).
- ❖ The MRSA rate **increased** (5.4%) from 0.129 last quarter to 0.136 (Figure 1; Appendix 3).
- ❖ The overall percentage of all *S. aureus* patient episodes reported as MRSA **increased** by 1.9% from the previous quarter to 42% (Appendix 3).
- ❖ Three out of five Trusts have witnessed an increase in MRSA rates during quarter 2, 2008 (Figure 3). However, when the MRSA rates reported for these Trusts in Quarter 2 are compared to Quarter 2 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 87 to 83 reports (4.6%) (Appendix 1 Table 2).
- ❖ The MSSA rate **decreased** (2.6%) from 0.193 last quarter to 0.188 this quarter (Figure 1; Appendix 3).
- ❖ Within each Trust MRSA and MSSA rates are not significantly different (Figure 2), however, three out of the five Trusts have higher MSSA rates than MRSA.
- ❖ MSSA rates increased in four out of five Trusts during quarter 2, 2008 (Figure 5). However, when figures are compared to data for quarter 2 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 2 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 new 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, and for each Trust, MRSA and MSSA rates 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.
- ❖ 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.

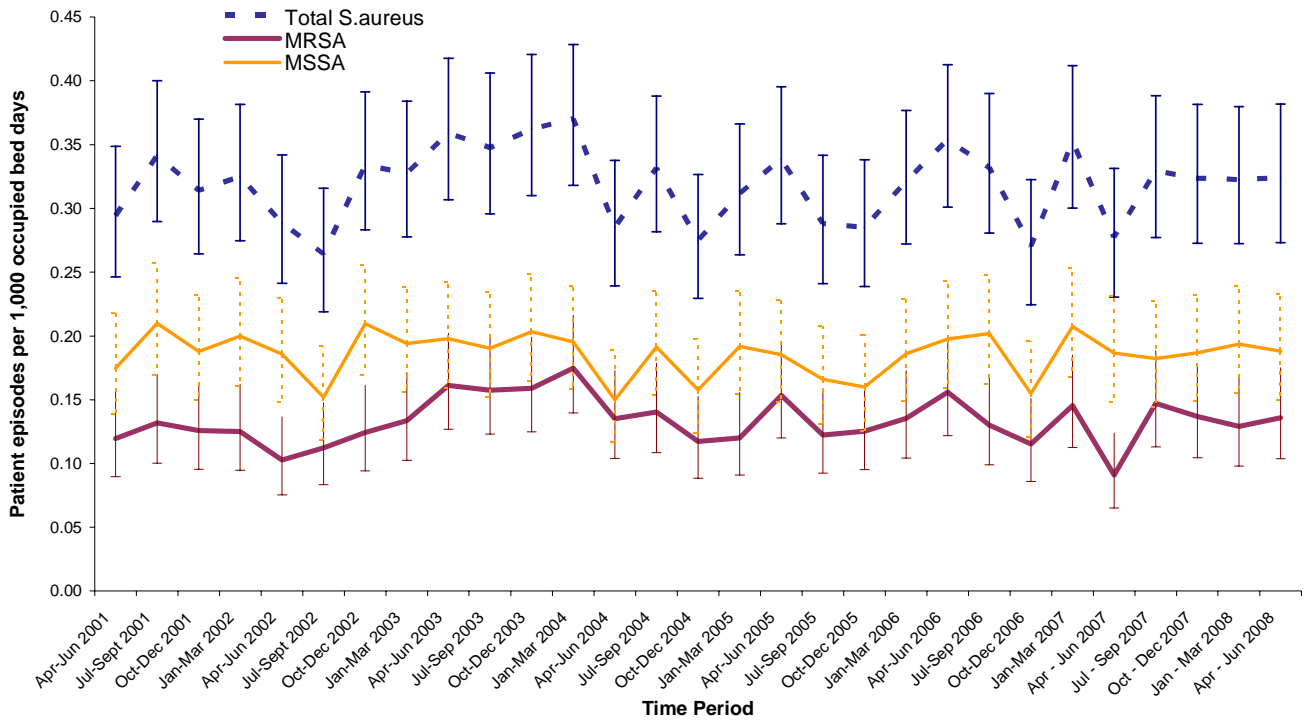


Figure 1: MSSA, MRSA and *S. aureus* patient episode rates in Northern Ireland by quarter, with 95% Confidence Intervals, April 2001 – June 2008 (see Appendix 3)

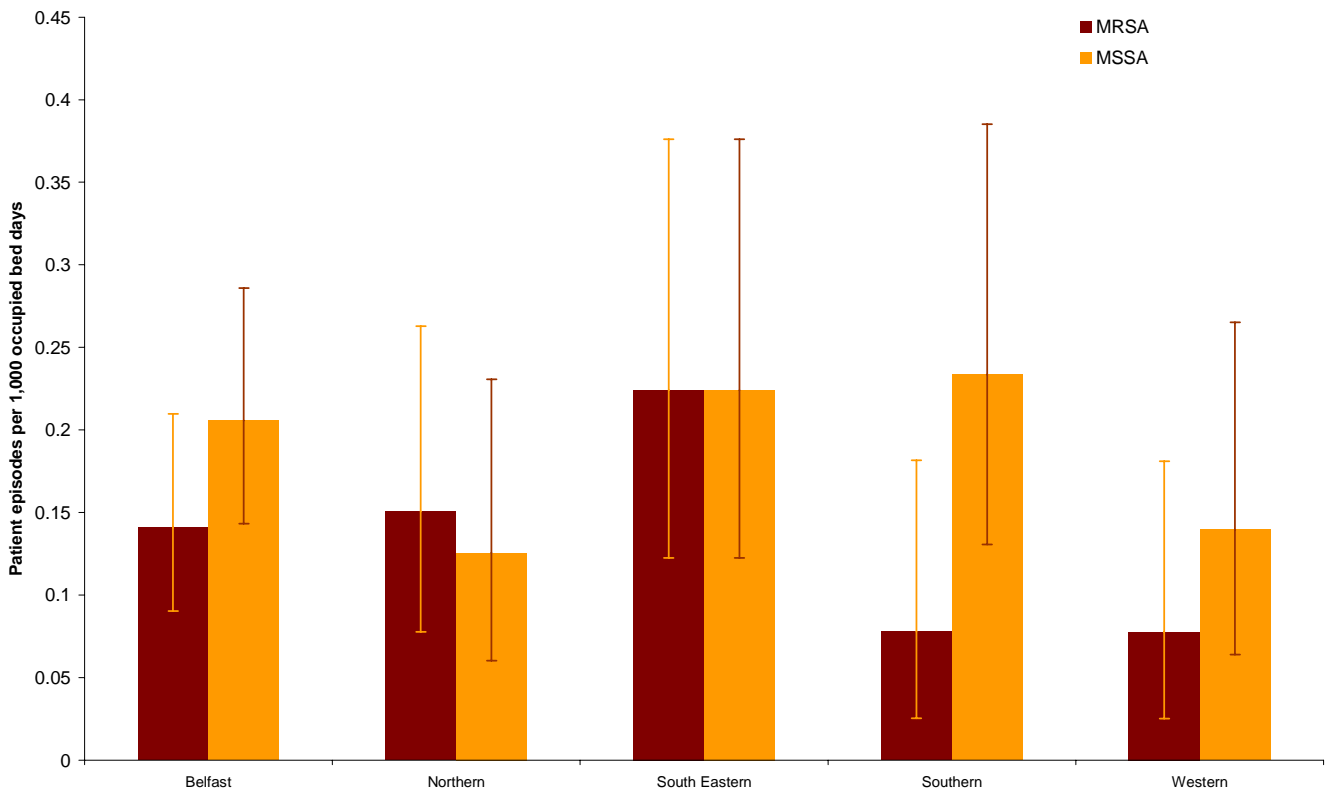


Figure 2: MRSA and MSSA patient episodes per 1,000 occupied bed days, with 95% Confidence Intervals, by Trust, April – June 2008.

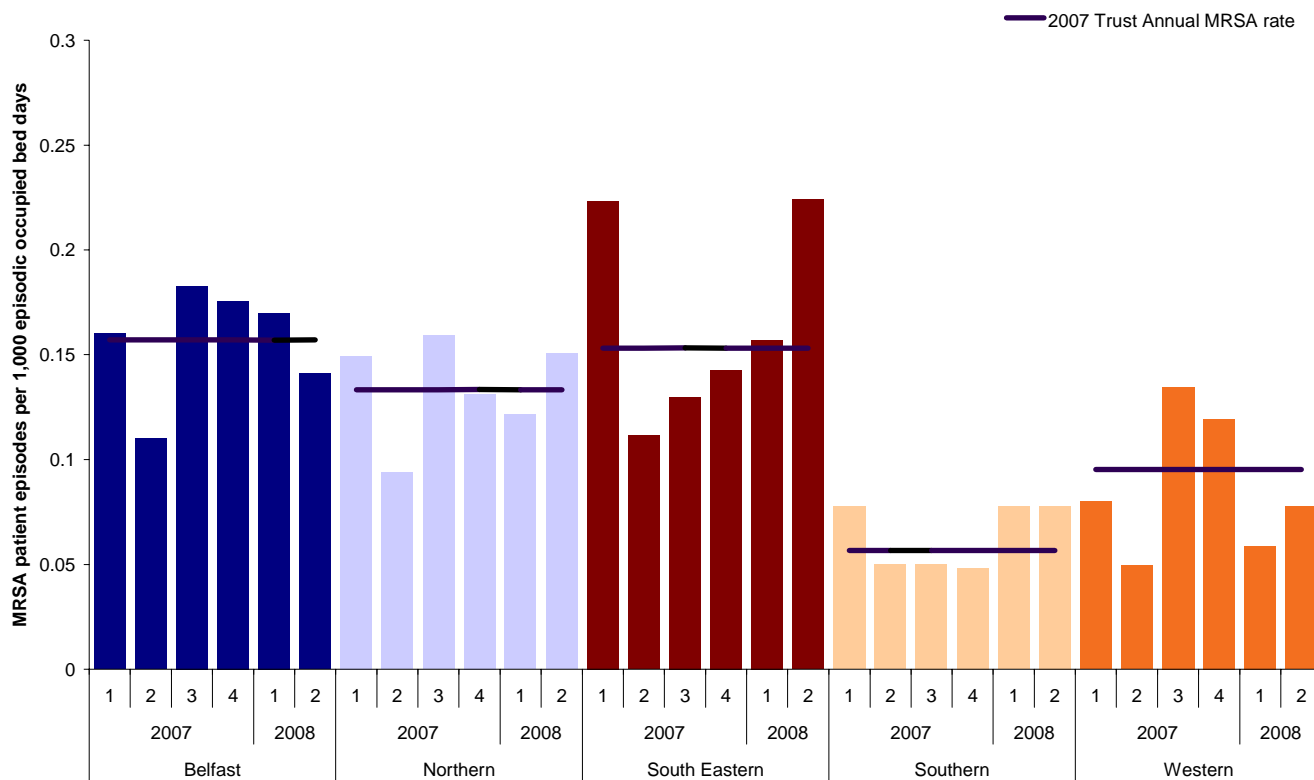


Figure 3: Quarterly rates of MRSA by Trust 1 January 2007 – 30 June 2008, with 2007 Trust Annual MRSA rates.

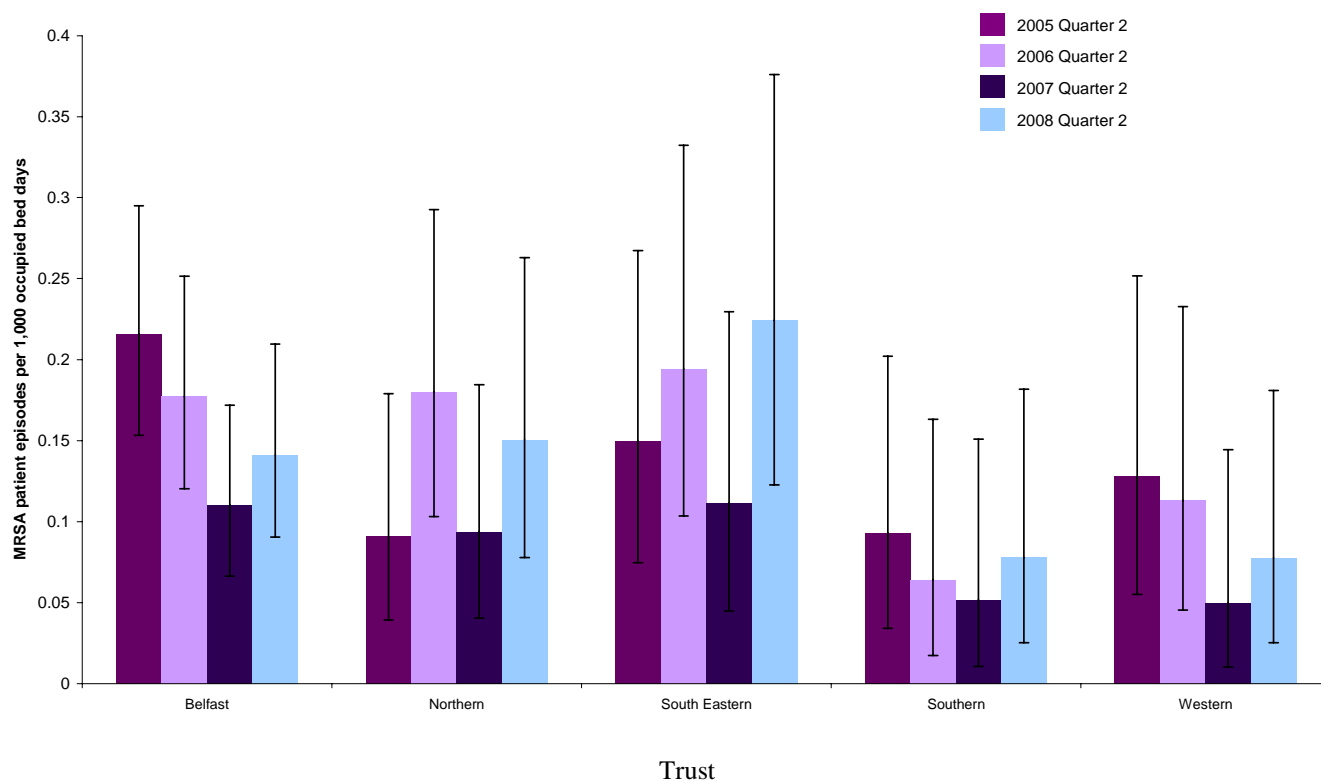


Figure 4: MRSA patient episodes by Trust in Quarter 2 from 2005 - 2008, with 95% confidence intervals.

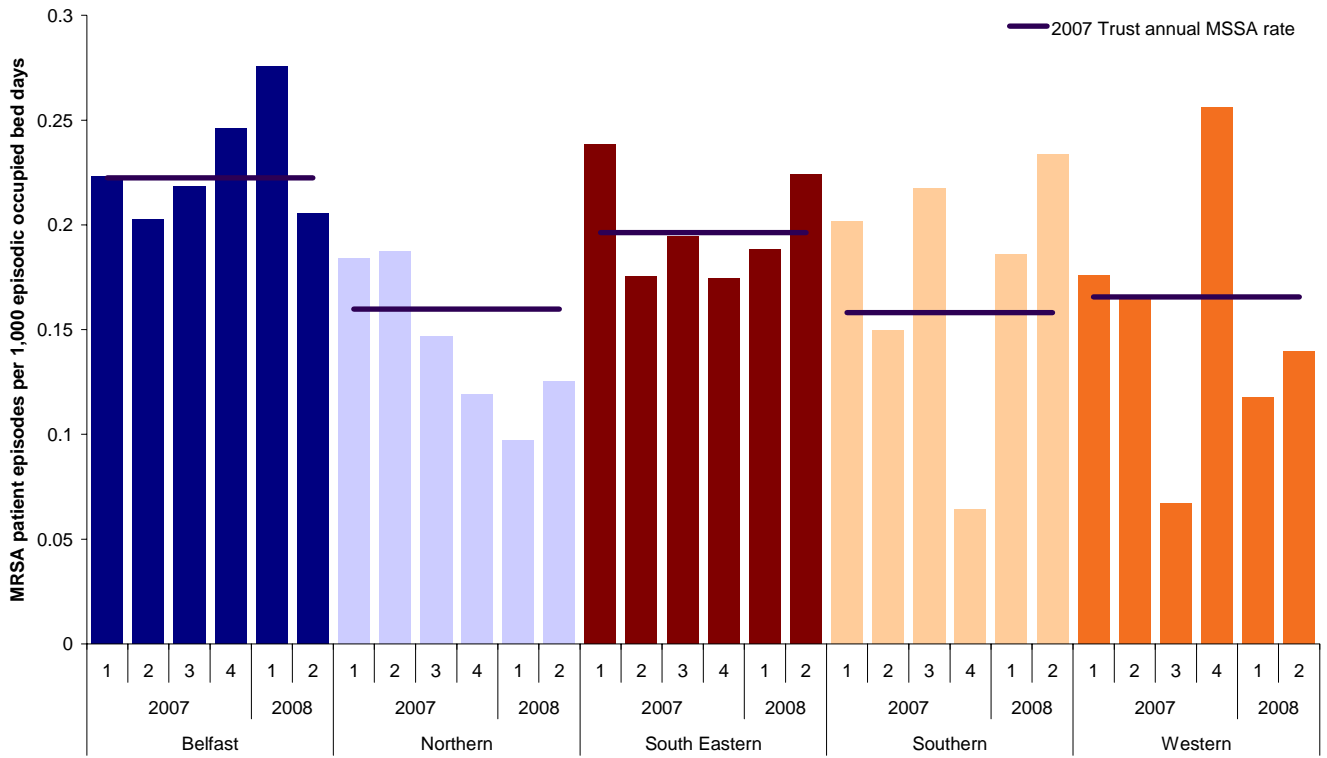


Figure 5: Quarterly rates of MSA by Trust 1 January 2007 – 30 June 2008, with 2007 Trust Annual MSA rates.

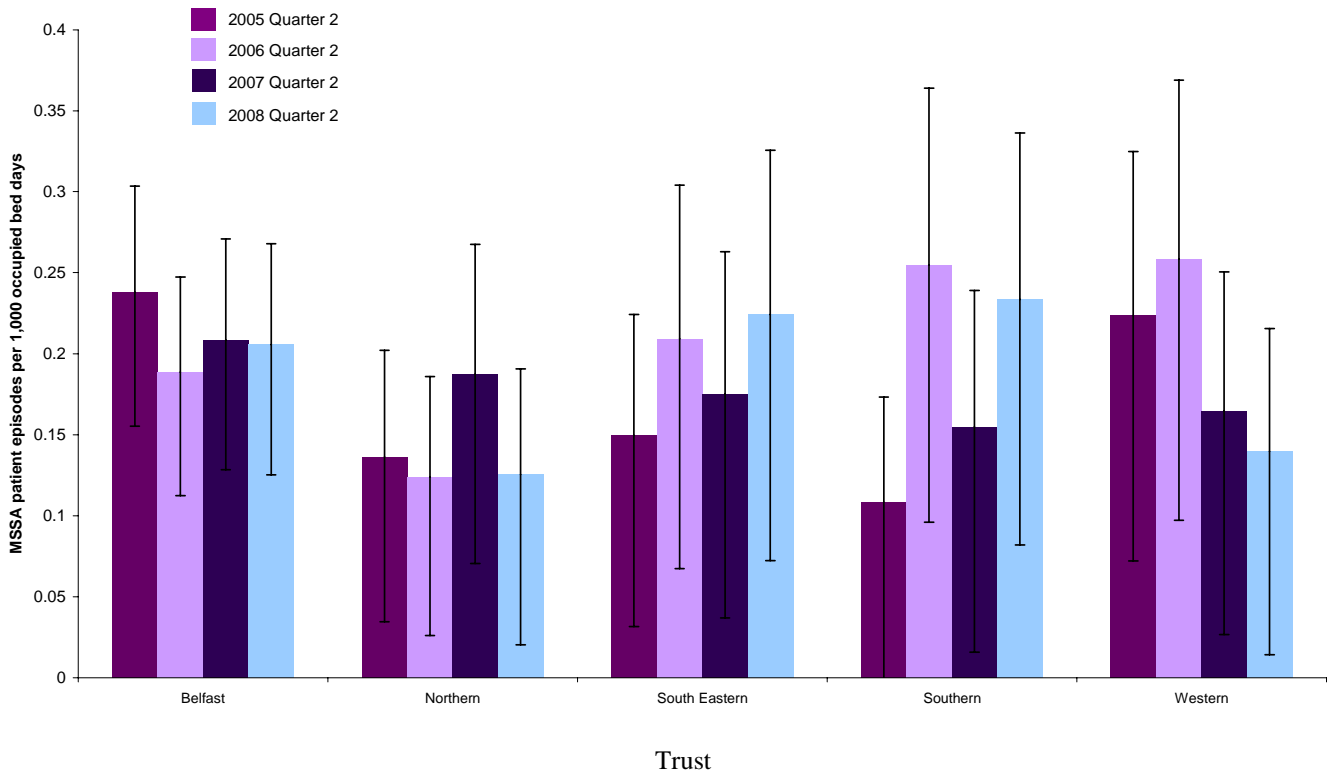


Figure 6: MSA patient episodes by Trust in Quarter 2 from 2005 - 2008, with 95% confidence intervals.

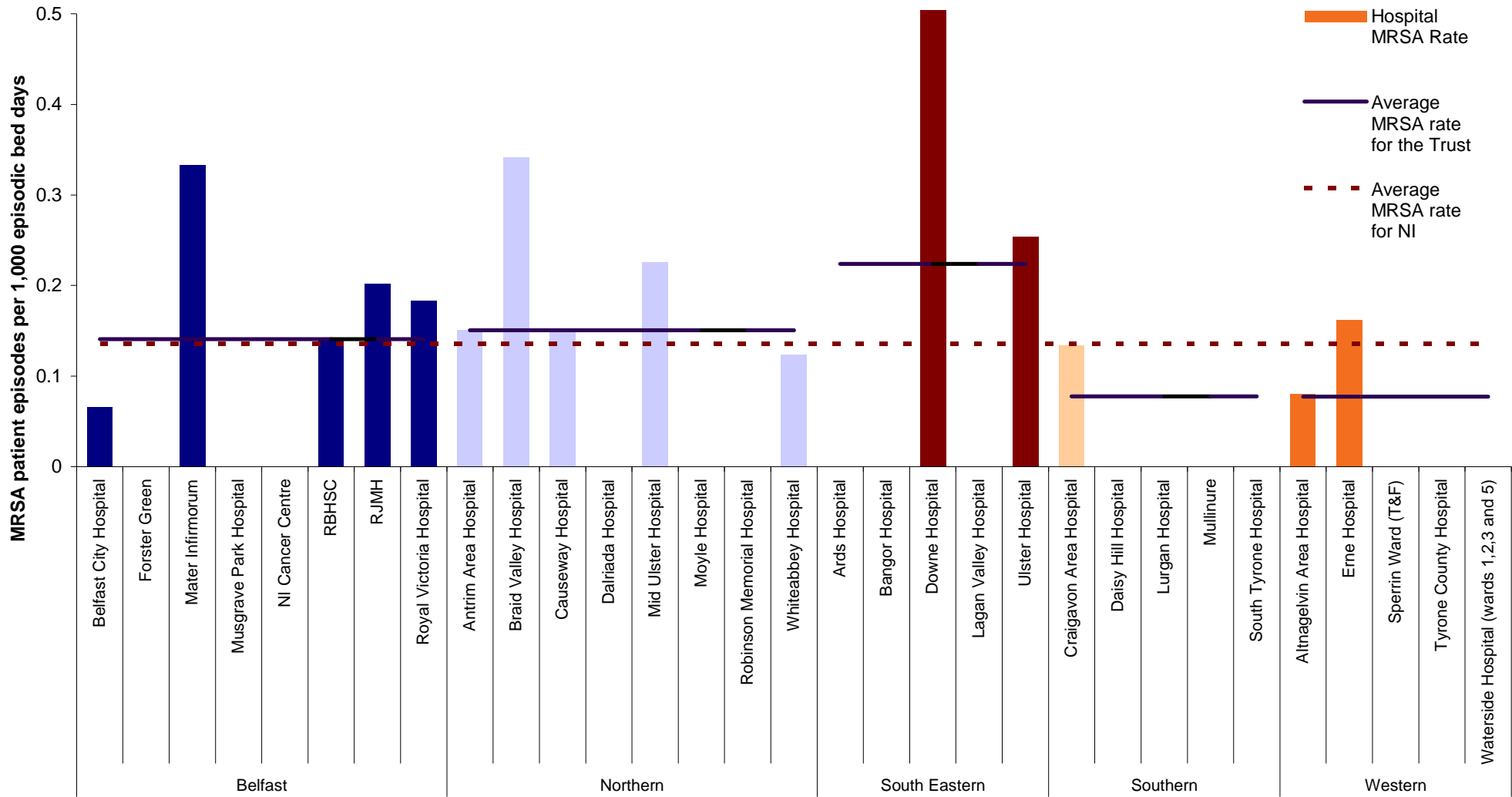


Figure 7: Rates of MRSA by individual Hospitals and Trust, 2008 Quarter 2 (gaps represent zero episodes), compared to 2008 Quarter 2 Northern Ireland and Trust average rates.

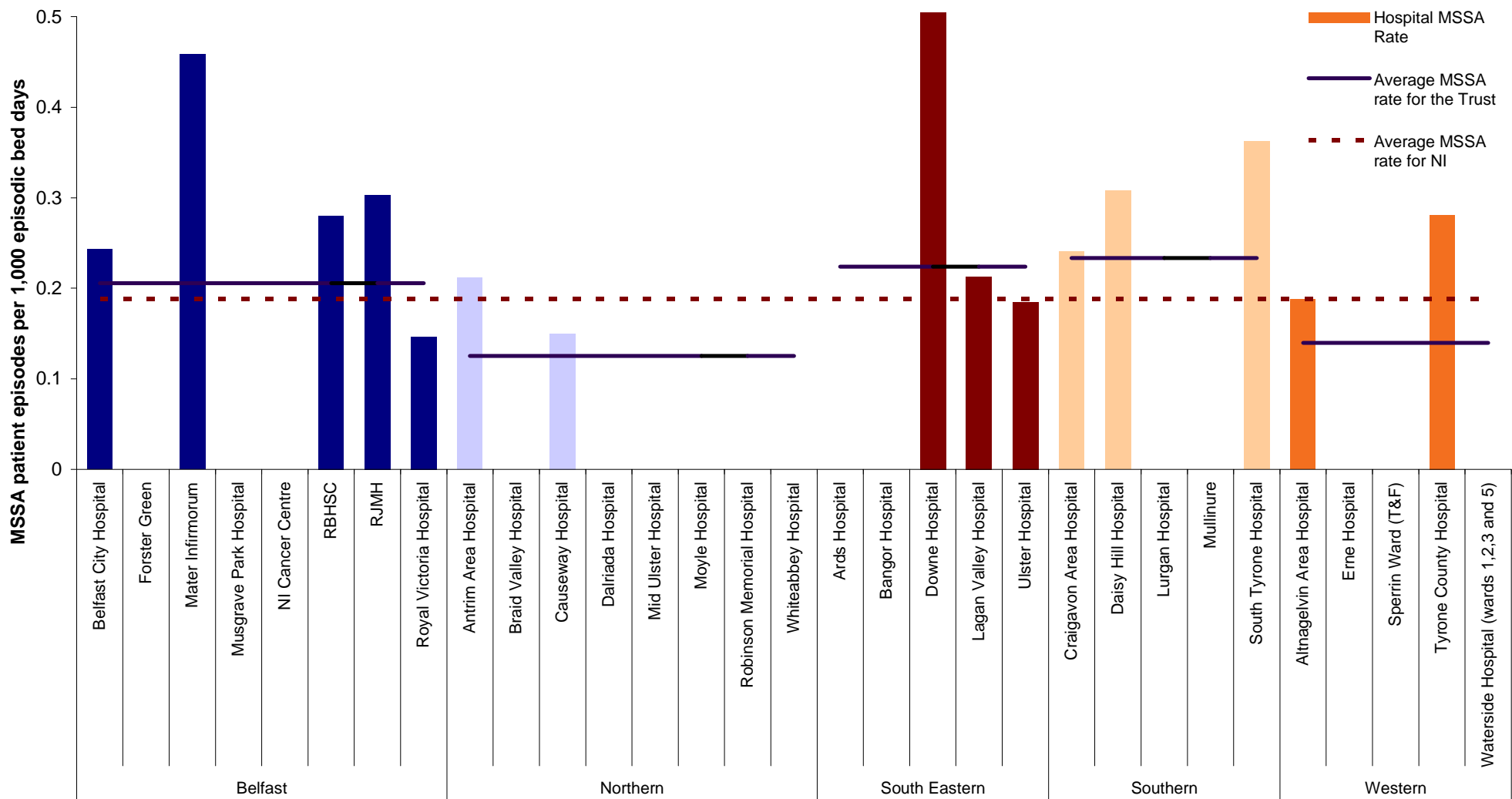


Figure 8: Rates of MSA by individual Hospitals and Trust, 2008 Quarter 2 (gaps represent zero episodes) compared to Quarter 2, 2008, Northern Ireland and Trust average rates.

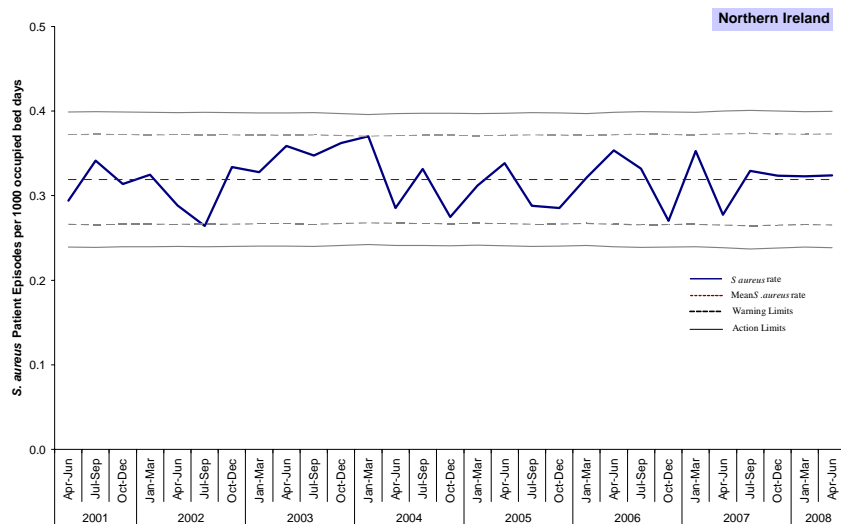


Figure 9a: Statistical Process control chart for quarterly **S.aureus** rates in Northern Ireland

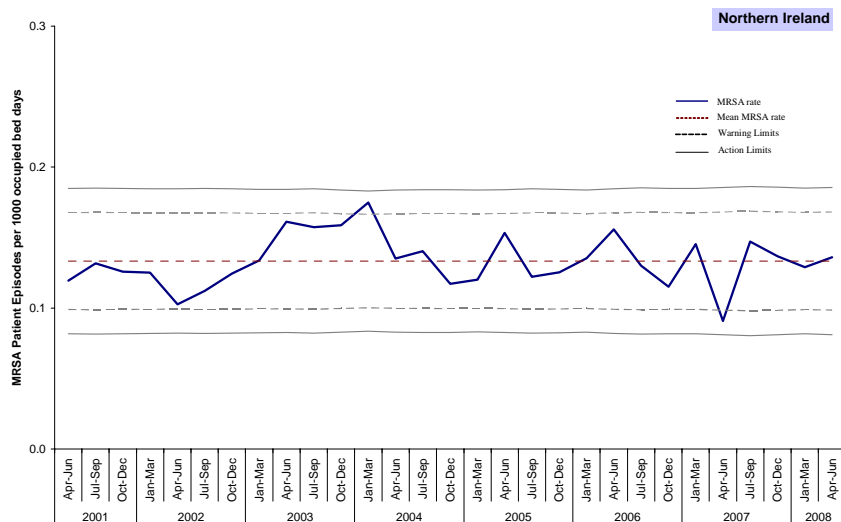


Figure 9b: Statistical Process control chart for quarterly **MRSA** rates in Northern Ireland

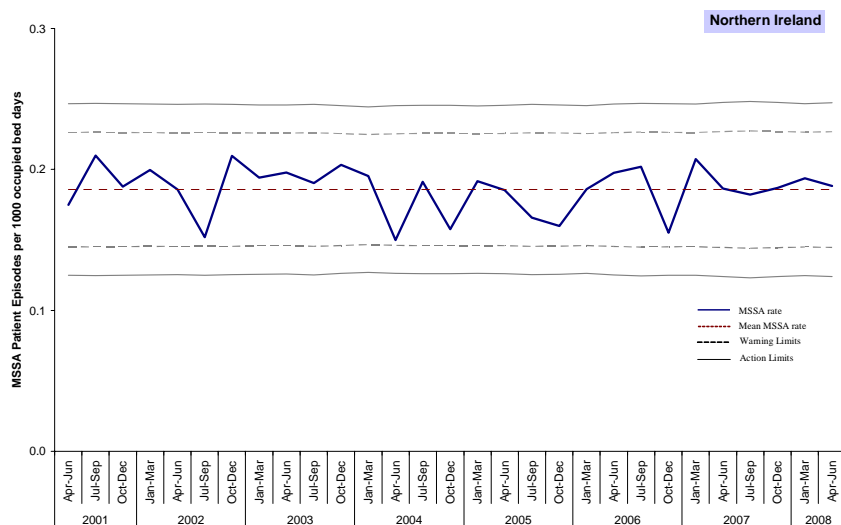


Figure 9c: Statistical Process control chart for quarterly **MSSA** rates in Northern Ireland

Appendix 1

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

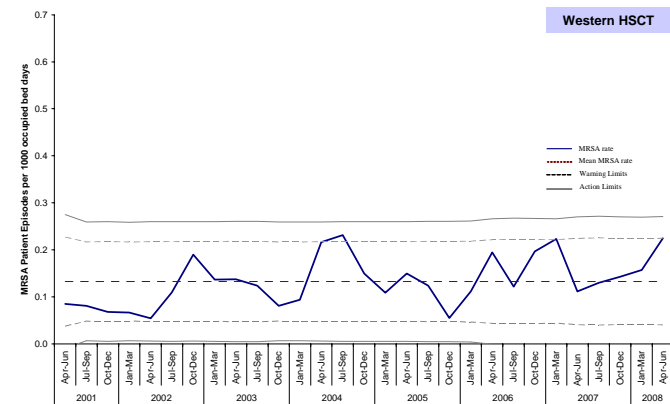
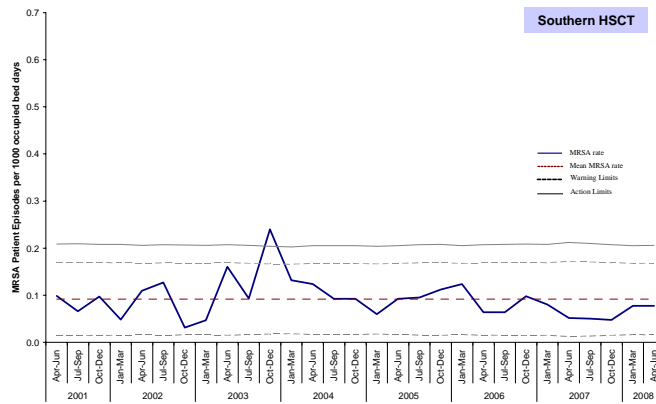
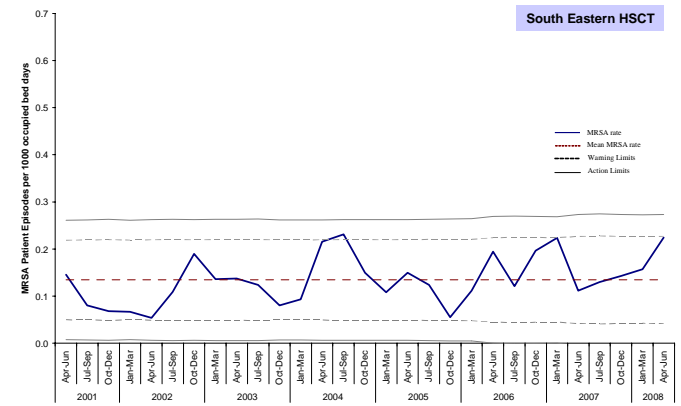
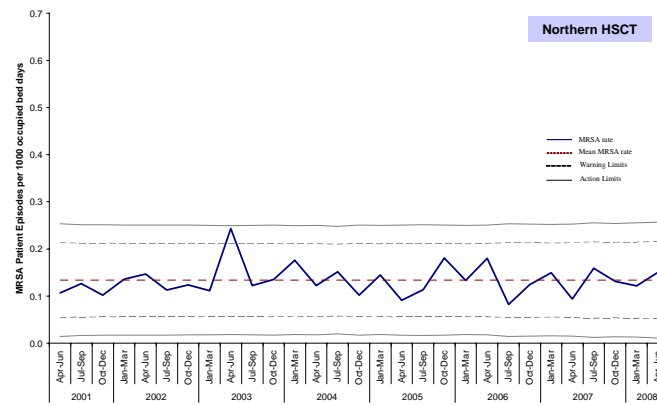
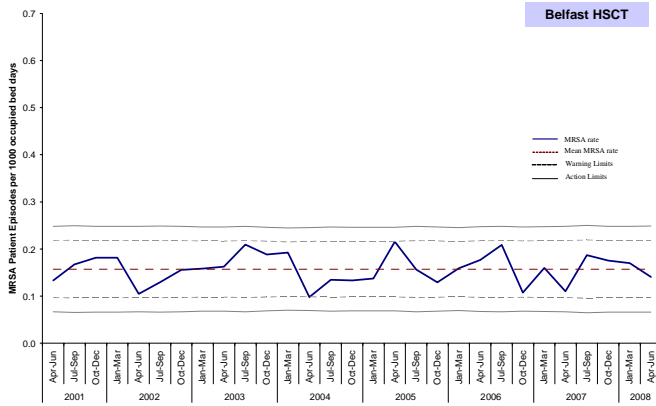
Hospital	Jan - Mar 2008		Apr - Jun 2008	
	Episodes	Rate	Episodes	Rate
Belfast City Hospital	5	0.109	3	0.066
Forster Green Hospital	0	0.000	0	0.000
Mater Infirmorum	8	0.332	8	0.333
Musgrave Park Hospital	1	0.052	0	0.000
NICCO (formerly at Belvoir Park)	1	0.152	0	0.000
RBHSC	1	0.137	1	0.140
RJMH	0	0.000	2	0.202
Royal Victoria Hospital	13	0.239	10	0.183
Belfast Health & Social Care Trust	29	0.170	24	0.141
Antrim Area Hospital	6	0.180	5	0.151
Braid Valley Hospital	0	0.000	1	0.341
Causeway Hospital	2	0.100	3	0.150
Dalriada Hospital	0	0.000	0	0.000
Mid Ulster Hospital	0	0.000	2	0.226
Moyle Hospital	1	0.328	0	0.000
Robinson Memorial Hospital	0	0.000	0	0.000
Whiteabbey Hospital	1	0.106	1	0.123
Northern Health & Social Care Trust	10	0.122	12	0.151
Ards Hospital	0	0.000	0	0.000
Bangor Hospital	0	0.000	0	0.000
Downe Hospital	1	0.203	3	0.682
Lagan Valley Hospital	1	0.099	0	0.000
Ulster Hospital	8	0.185	11	0.254
South Eastern Health & Social Care Trust	10	0.157	14	0.224
Craigavon Area Hospital	5	0.138	5	0.134
Daisy Hill Hospital	0	0.000	0	0.000
Lurgan Hospital	0	0.000	0	0.000
Mullinure	0	0.000	0	0.000
South Tyrone Hospital	0	0.000	0	0.000
Southern Health & Social Care Trust	5	0.077	5	0.078
Altnagelvin Area Hospital	4	0.101	3	0.081
Erne Hospital	0	0.000	2	0.162
Sperrin Ward (T&F)	0	0.000	0	0.000
Tyrone County Hospital	0	0.000	0	0.000
Waterside Hospital (Wards 1-3, 5)	0	0.000	0	0.000
Western Health & Social Care Trust	4	0.059	5	0.078
NI TOTAL	58	0.129	60	0.136

Appendix 1

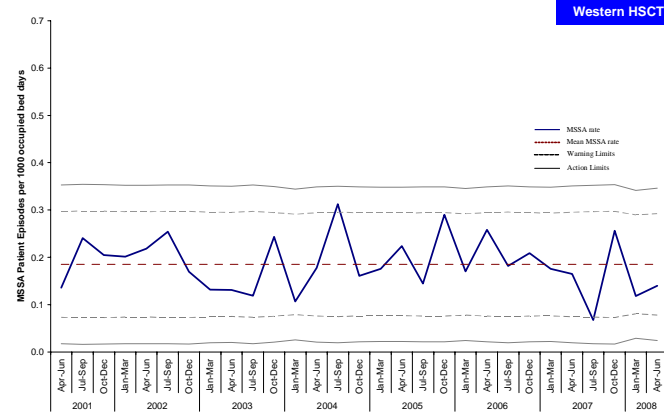
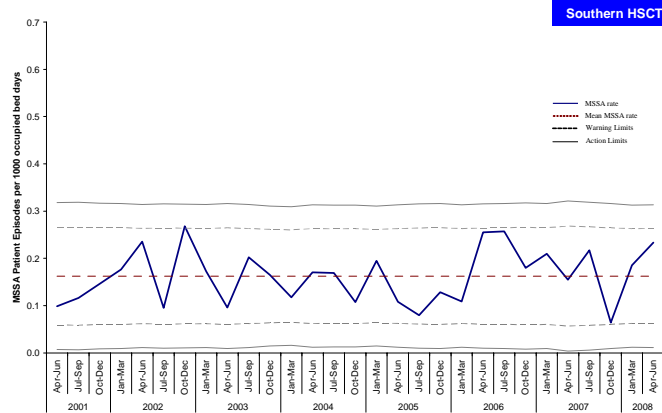
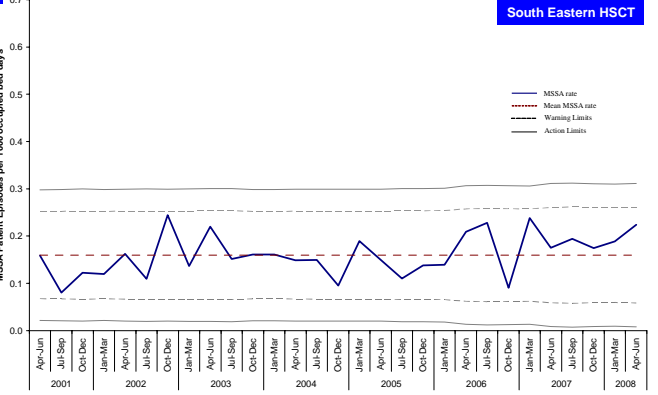
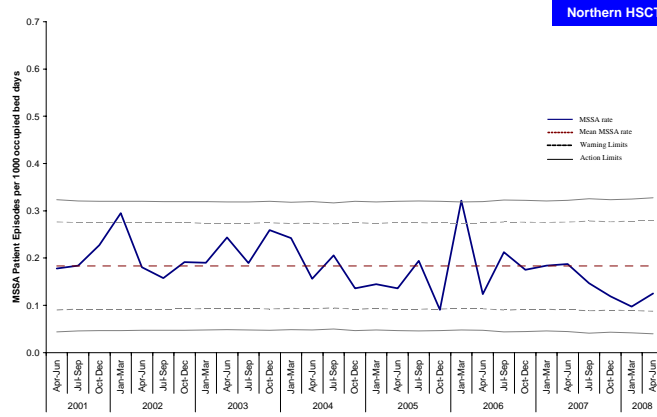
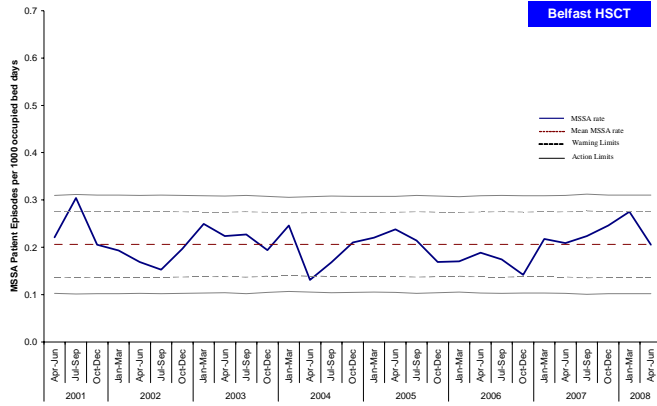
Table 2: Quarterly number of MSSA patient episodes and rates by Hospital, January – June 2008

Hospital	Jan - Mar 2008		Apr - Jun 2008	
	Episodes	Rate	Episodes	Rate
Belfast City Hospital	20	0.436	11	0.243
Forster Green Hospital	0	0.000	0	0.000
Mater Infirmorum	7	0.290	11	0.458
Musgrave Park Hospital	1	0.052	0	0.000
NICCO (formerly at Belvoir Park)	3	0.456	0	0.000
RBHSC	4	0.548	2	0.280
RJMH	4	0.394	3	0.303
Royal Victoria Hospital	8	0.147	8	0.146
Belfast Health & Social Care Trust	47	0.275	35	0.206
Antrim Area Hospital	5	0.150	7	0.211
Braid Valley Hospital	0	0.000	0	0.000
Causeway Hospital	3	0.149	3	0.150
Dalriada Hospital	0	0.000	0	0.000
Mid Ulster Hospital	0	0.000	0	0.000
Moyle Hospital	0	0.000	0	0.000
Robinson Memorial Hospital	0	0.000	0	0.000
Whiteabbey Hospital	0	0.000	0	0.000
Northern Health & Social Care Trust	8	0.097	10	0.125
Ards Hospital	0	0.000	0	0.000
Bangor Hospital	0	0.000	0	0.000
Downe Hospital	0	0.000	4	0.909
Lagan Valley Hospital	2	0.199	2	0.213
Ulster Hospital	10	0.231	8	0.185
South Eastern Health & Social Care Trust	12	0.188	14	0.224
Craigavon Area Hospital	11	0.304	9	0.241
Daisy Hill Hospital	1	0.058	5	0.308
Lurgan Hospital	0	0.000	0	0.000
Mullinure	0	0.000	0	0.000
South Tyrone Hospital	0	0.000	1	0.362
Southern Health & Social Care Trust	12	0.186	15	0.234
Altnagelvin Area Hospital	4	0.101	7	0.188
Erne Hospital	0	0.000	0	0.000
Sperrin Ward (T&F)	0	0.000	0	0.000
Tyrone County Hospital	4	0.518	2	0.281
Waterside Hospital (Wards 1-3, 5)	0	0.000	0	0.000
Western Health & Social Care Trust	8	0.118	9	0.140
NI TOTAL	87	0.194	83	0.188

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 – June 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

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.