



**CDSC (NI)**

## ***S. aureus* bacteraemia surveillance**

**Quarter ending December 2007**

# ***S. aureus* bacteraemia surveillance**

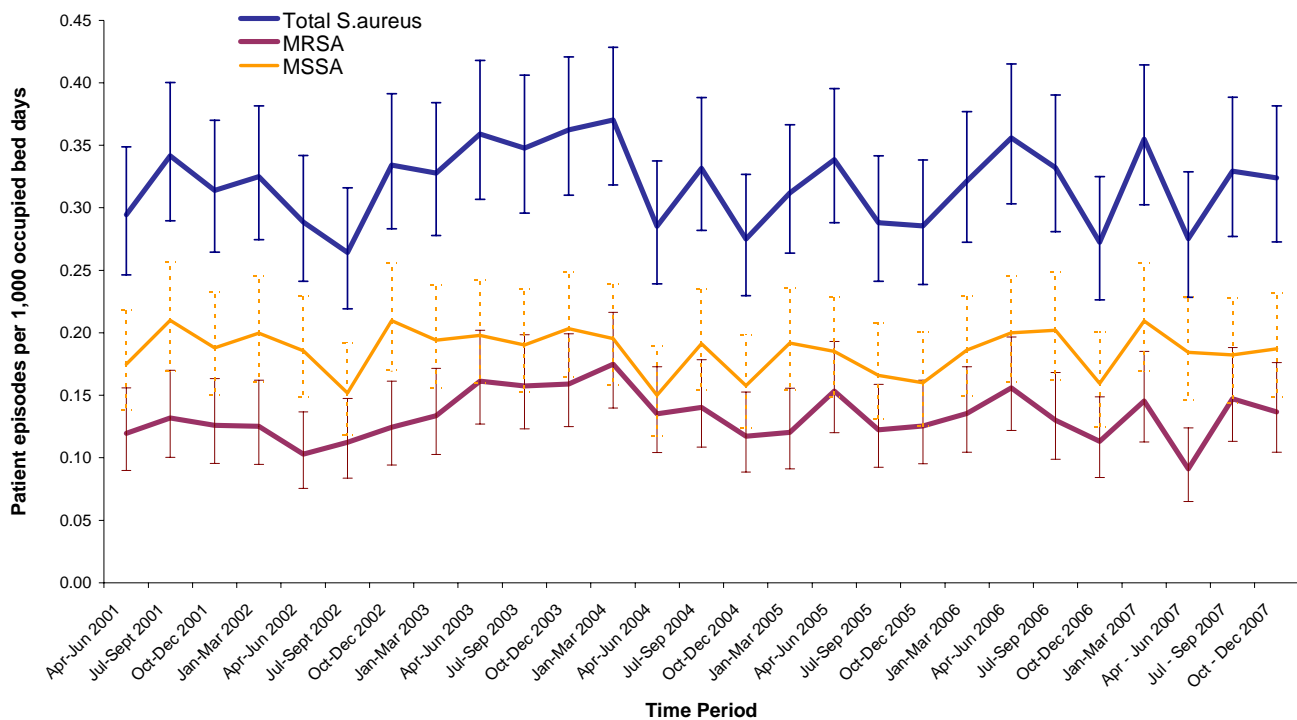
**Quarter: October – December 2007**

## **Summary**

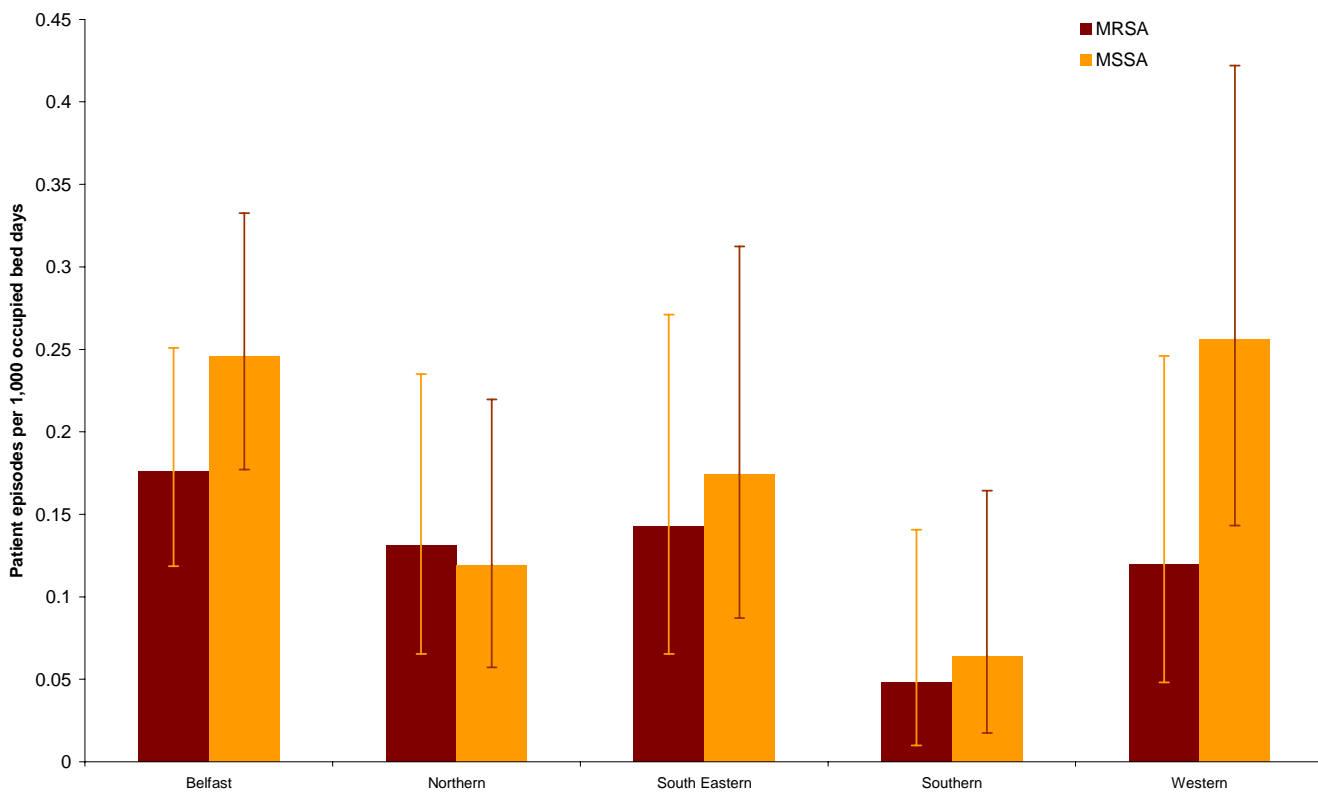
**There was no statistically significant change in *S. aureus*, MRSA or MSSA rates compared to the previous quarter (Figure 1).**

- ❖ The Northern Ireland rate of *S. aureus* (MRSA plus MSSA) has **remained** constant at 0.33 per 1,000 occupied bed days (Figure 1; Appendix 3).
- ❖ The MRSA rate **decreased** by 0.01 points from the previous quarter to 0.14 (Figure 1; Appendix 3).
- ❖ The MSSA rate **increased** (2.7%) from 0.182 last quarter to 0.187 this quarter (Figure 1; Appendix 3).
- ❖ The overall percentage of all *S. aureus* patient episodes reported as MRSA **decreased** by 5.4% from the previous quarter (Appendix 3).
- ❖ Within each Trust MRSA and MSSA rates are not significantly different (Figure 2), however, there is a trend for all Trusts, excluding the Northern, to have higher MSSA rates than MRSA.
- ❖ All Trusts, excluding the South Eastern, have witnessed a reduction in MRSA rates during quarter 4 (Figure 3). However, when the MRSA rates reported for these Trusts in Quarter 4 are compared to Quarter 4 in previous years, it was clear, using 95% confidence intervals, that there has been no statistical change in the figures (Figure 4).
- ❖ Figure 5 shows the rate of MRSA patient episodes during Quarter 4 in 2007 for the individual hospitals that make up each Trust (see also Appendix 1 Table 1).
- ❖ 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 6 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 rates are fluctuating within normal parameters (Figure 6; Appendix 2).
- ❖ The results shown are of infections which have been identified by testing within a hospital. No distinction is made between where the infection was acquired, that is, 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.
- ❖ **Rate calculations are provisional for this quarter and may be subject to change.**
- ❖ 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.

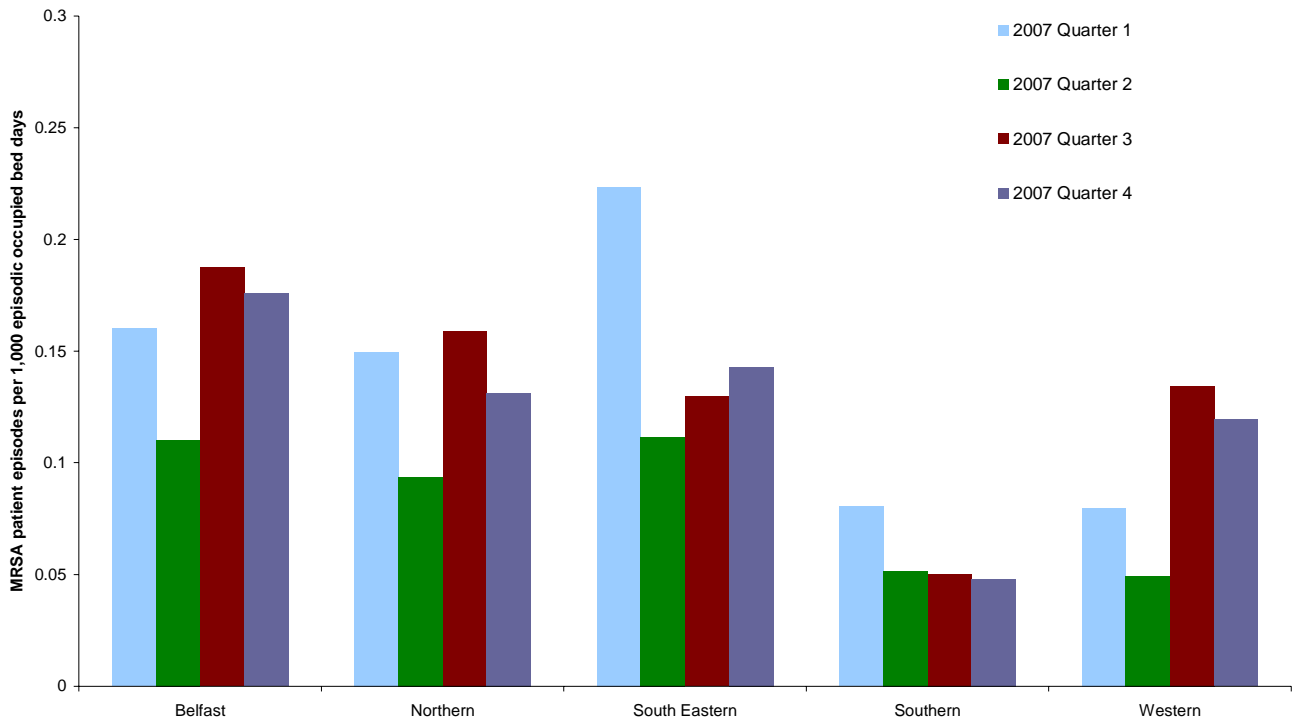
The baseline financial year 2006/07 MRSA/MSSA numbers and rates are reported in Appendix 1 Table 2 for reference. The Target 10% reductions for the financial year 2008/09, based on the 06/07 figures, are also supplied. For definitions, please refer to appendix 4.



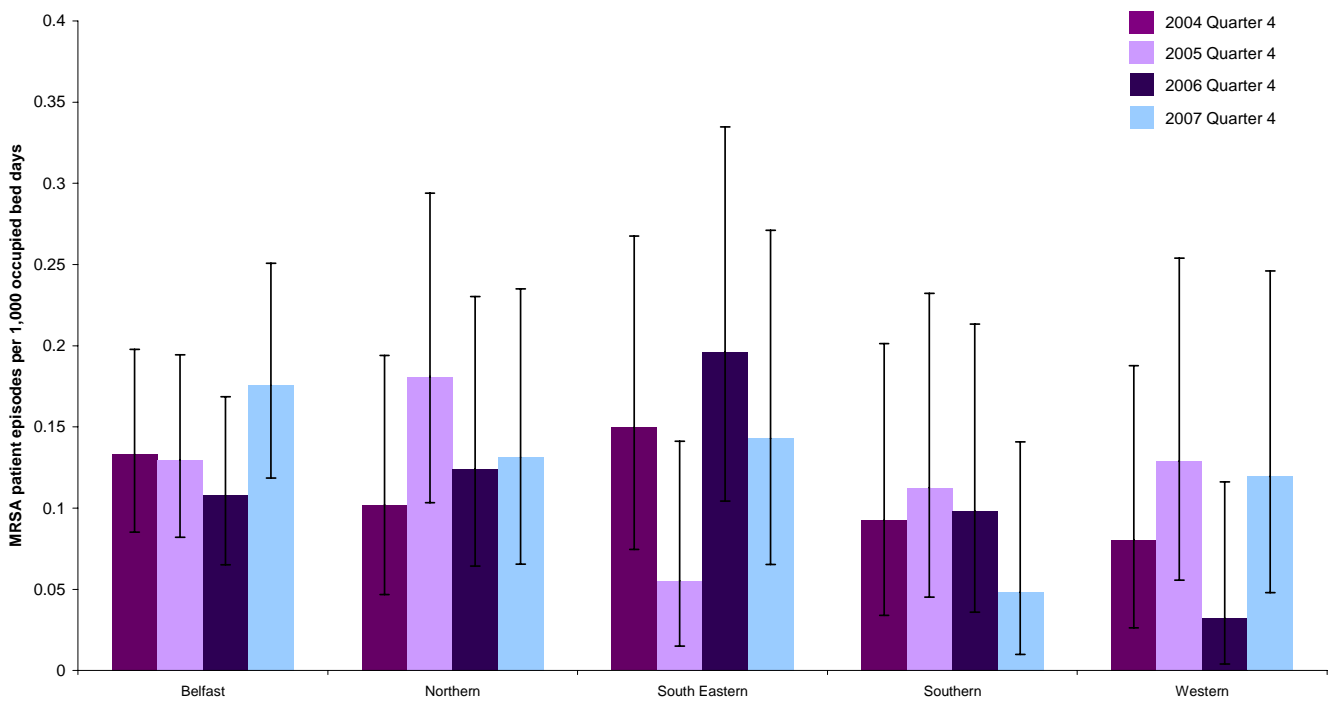
**Figure 1:** MSSA, MRSA and *S. aureus* patient episode rates in Northern Ireland by quarter, with 95% Confidence Intervals, April 2001 – December 2007 (see Appendix 3)



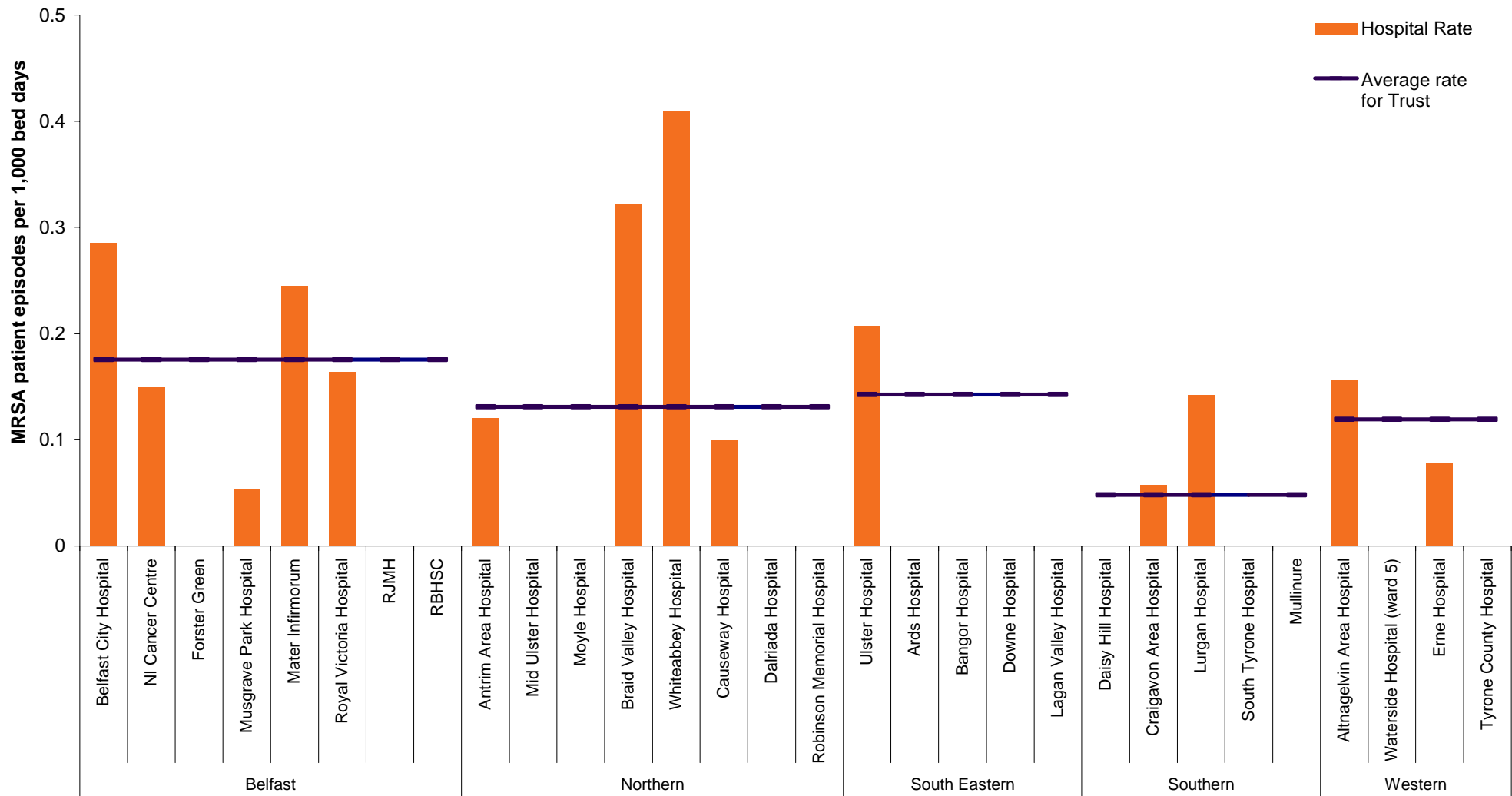
**Figure 2:** MRSA and MSSA patient episodes per 1,000 occupied bed days, with 95% Confidence Intervals, by Trust October - December 2007



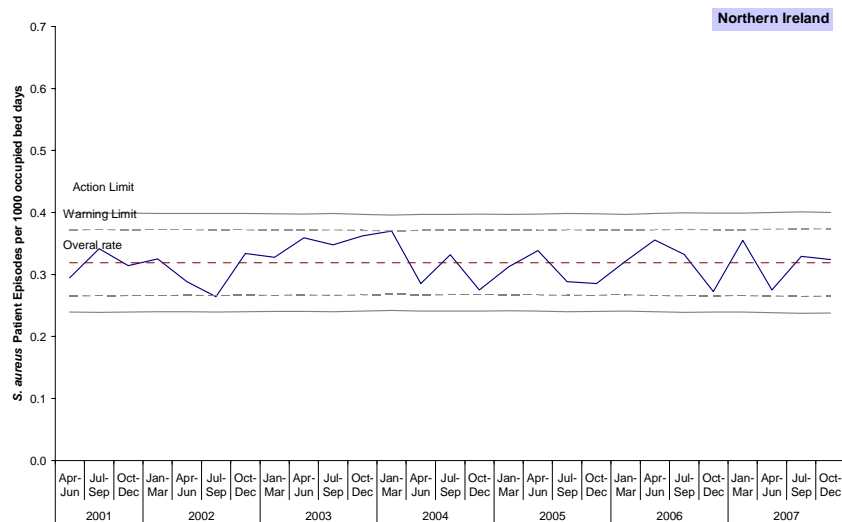
**Figure 3:** Quarterly rates of MRSA by Trust 1 January 2007 – 31 December 2007



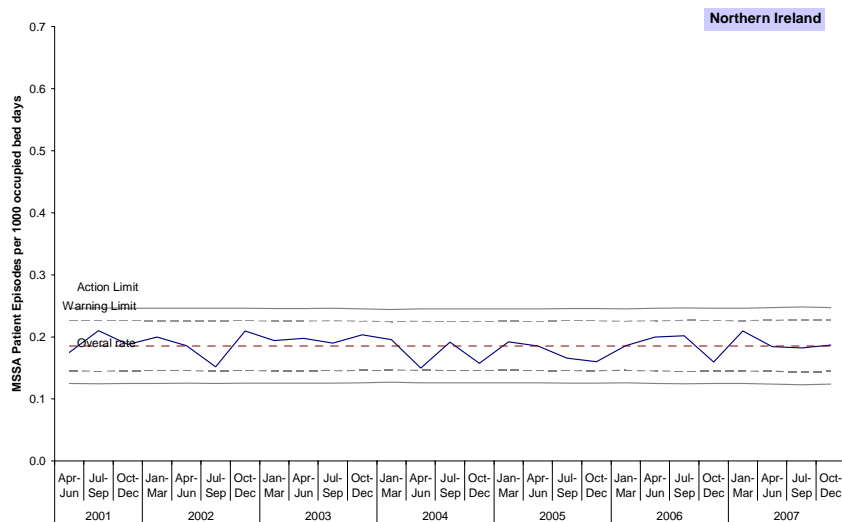
**Figure 4:** MRSA patient episodes by Trust in Quarter 4 from 2004 - 2007, with 95% confidence intervals



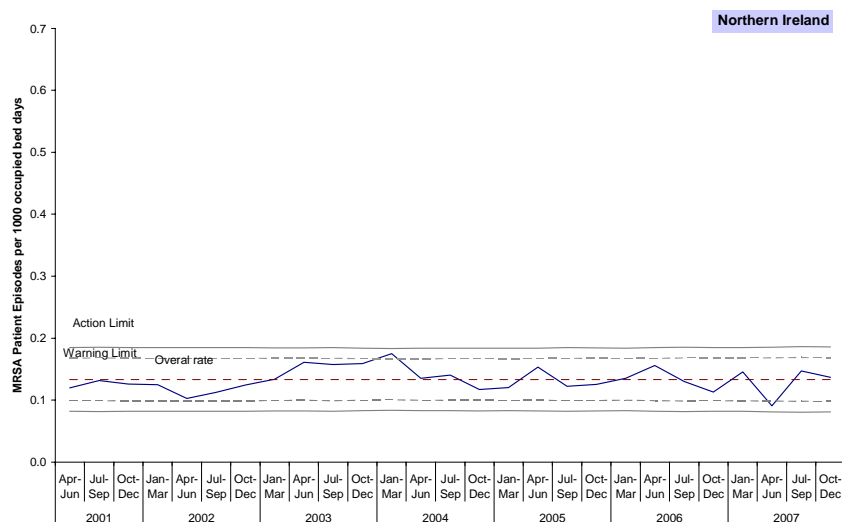
**Figure 5:** Rates of MRSA by individual Hospitals and Trust, 2007 Quarter 4 (gaps represent zero episodes)



**Figure 6a:** Statistical Process control chart for quarterly **S.aureus** rates in Northern Ireland



**Figure 6b:** Statistical Process control chart for quarterly **MSSA** rates in Northern Ireland



**Figure 6c:** Statistical Process control chart for quarterly **MRSA** rates in Northern Ireland

## Appendix 1

**Table 1:** Quarterly number of MRSA patient episodes and rates by Hospital, January – December 2007

Hospital	Jan-Mar 2007		Apr-Jun 2007		Jul-Sep 2007		Oct-Dec 2007	
	Episodes	Rate	Episodes	Rate	Episodes	Rate	Episodes	Rate
Belfast City Hospital	7	0.147	6	0.128	7	0.156	13	0.285
NICCO (formerly at Belvoir Park)	0	0.000	1	0.148	1	0.146	1	0.150
Forster Green Hospital	0	0.000	0	0.000	0	0.000	0	0.000
Musgrave Park Hospital	1	0.051	0	0.000	0	0.000	1	0.054
Mater Infirmorum	5	0.199	2	0.085	8	0.323	6	0.245
Royal Victoria Hospital	13	0.239	9	0.165	14	0.263	9	0.164
RJMH	0	0.306	0	0.000	0	0.000	0	0.000
RBHSC	2	0.284	1	0.152	1	0.156	0	0.000
<b>Belfast Health &amp; Social Care Trust</b>	<b>28</b>	<b>0.160</b>	<b>19</b>	<b>0.110</b>	<b>31</b>	<b>0.187</b>	<b>30</b>	<b>0.176</b>
Antrim Area Hospital	6	0.174	4	0.122	6	0.190	4	0.120
Mid Ulster Hospital	2	0.203	0	0.000	0	0.000	0	0.000
Moyle Hospital	0	0.000	0	0.000	0	0.000	0	0.000
Braid Valley Hospital	1	0.226	0	0.000	0	0.000	1	0.322
Whiteabbey Hospital	3	0.274	2	0.189	4	0.436	4	0.409
Causeway Hospital	1	0.052	2	0.102	3	0.154	2	0.099
Dalriada 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
<b>Northern Health &amp; Social Care Trust</b>	<b>13</b>	<b>0.929</b>	<b>8</b>	<b>0.094</b>	<b>13</b>	<b>0.159</b>	<b>11</b>	<b>0.131</b>
Ulster Hospital	14	0.306	4	0.096	5	0.121	9	0.208
Ards Hospital	0	0.000	0	0.000	0	0.000	0	0.000
Bangor Hospital	0	0.000	0	0.000	0	0.000	0	0.000
Downe Hospital	1	0.179	1	0.211	1	0.211	0	0.000
Lagan Valley Hospital	0	0.000	2	0.202	2	0.202	0	0.000
<b>South Eastern Health &amp; Social Care Trust</b>	<b>15</b>	<b>0.223</b>	<b>7</b>	<b>0.113</b>	<b>8</b>	<b>0.130</b>	<b>9</b>	<b>0.143</b>
Daisy Hill Hospital	2	0.119	1	0.064	1	0.064	0	0.000
Craigavon Area Hospital	2	0.057	2	0.060	1	0.030	2	0.058
Lurgan Hospital	1	0.139	0	0.000	1	0.152	1	0.143
South Tyrone Hospital	0	0.000	0	0.000	0	0.000	0	0.000
Mullinure*	0	0.000	0	0.000	0	0.000	0	0.000
<b>Southern Health &amp; Social Care Trust**</b>	<b>5</b>	<b>0.081</b>	<b>3</b>	<b>0.050</b>	<b>3</b>	<b>0.050</b>	<b>3</b>	<b>0.048</b>
Altnagelvin Area Hospital	2	0.052	1	0.026	2	0.052	6	0.156
Waterside Hospital (ward 5)	0	0.000	0	0.000	0	0.000	0	0.000
Erne Hospital	3	0.211	0	0.000	3	0.223	1	0.078
Tyrone County Hospital	0	0.000	2	0.254	3	0.396	0	0.000
<b>Western Health &amp; Social Care Trust</b>	<b>5</b>	<b>0.080</b>	<b>3</b>	<b>0.049</b>	<b>8</b>	<b>0.134</b>	<b>7</b>	<b>0.119</b>
<b>NI TOTAL</b>	<b>66</b>	<b>0.146</b>	<b>40</b>	<b>0.091</b>	<b>63</b>	<b>0.147</b>	<b>60</b>	<b>0.137</b>

\*Mullinure has been added to the Southern Trust data this quarter

\*\* A look back exercise is being carried out due to the inclusion of Mullinure, thus the figures are provisional

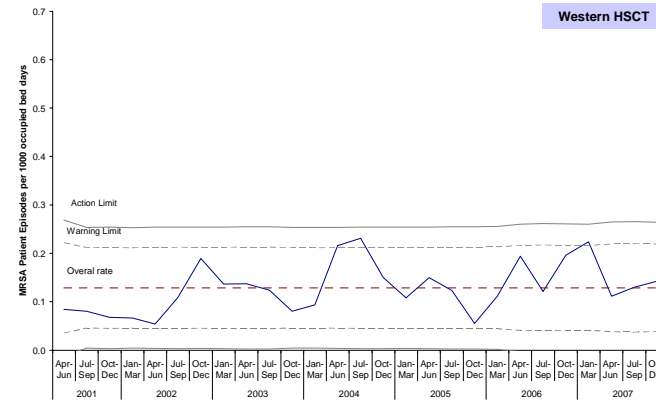
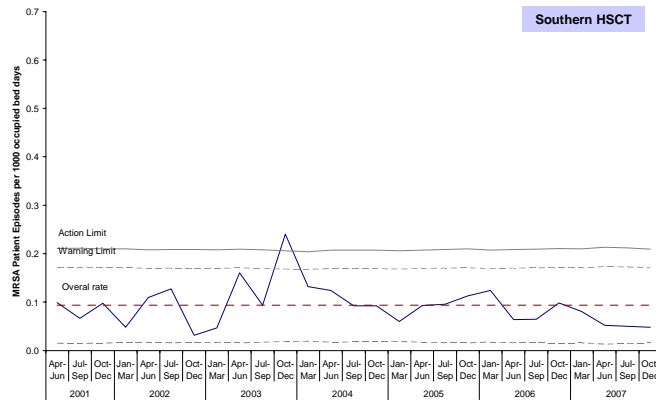
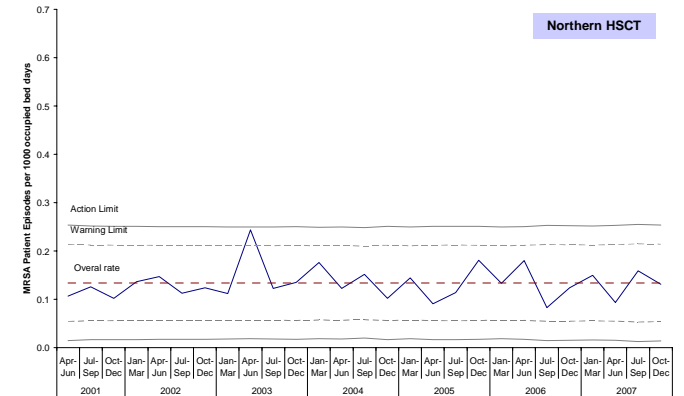
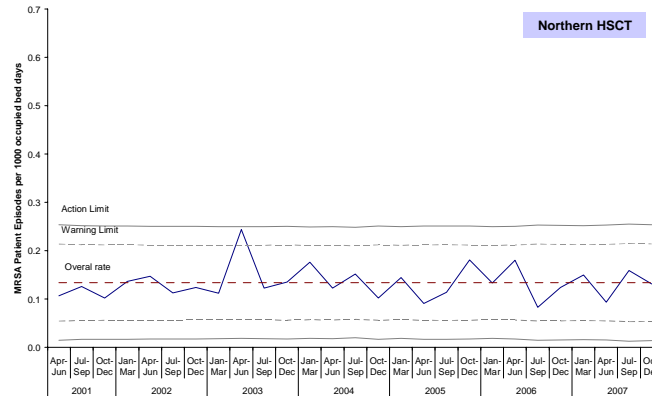
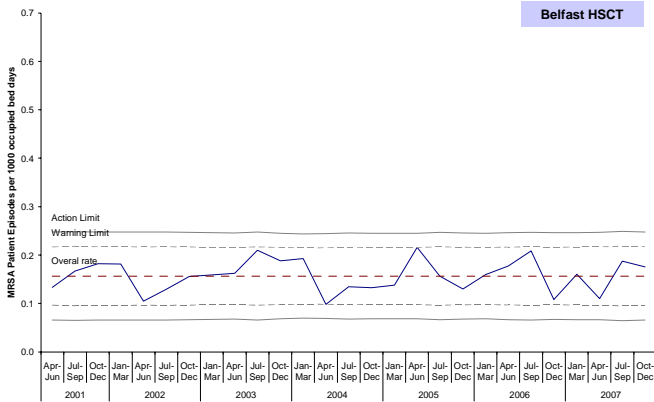
## Appendix 1

**Table 2:** Baseline financial year 2006/07 MRSA and MSSA patient episodes and rates by Hospital, with associated targets based on a 10% reduction for the financial year 2008/09.

Hospital	06/07 baseline		Target		06/07 baseline		Target	
	MRSA		MRSA		MSSA		MSSA	
	Episodes	Rate	Episodes	Rate	Episodes	Rate	Episodes	Rate
Belfast City Hospital	30	0.157	27	0.14	39	0.20	35	0.18
NICCO (formerly at Belvoir Park)	0	0	0	0.00	5	0.20	5	0.18
Forster Green Hospital	0	0	0	0.00	0	0.00	0	0.00
Musgrave Park Hospital	5	0.067	5	0.06	7	0.09	6	0.08
Mater Infirmorum	28	0.288	25	0.26	26	0.27	23	0.24
Royal Victoria Hospital	49	0.218	44	0.20	30	0.13	27	0.12
RJMH	0	0	0	0.00	5	0.11	5	0.10
RBHSC	3	0.107	3	0.10	18	0.64	16	0.58
<b>Belfast Health &amp; Social Care Trust</b>	<b>114</b>	<b>0.163</b>	<b>103</b>	<b>0.15</b>	<b>126</b>	<b>0.18</b>	<b>113</b>	<b>0.16</b>
Antrim Area Hospital	27	0.217	24	0.20	43	0.35	39	0.31
Mid Ulster Hospital	3	0.069	3	0.06	6	0.14	5	0.12
Moyle Hospital	0	0	0	0.00	0	0.00	0	0.00
Braid Valley Hospital	2	0.1	2	0.09	0	0.00	0	0.00
Whiteabbey Hospital	7	0.15	6	0.14	2	0.04	2	0.04
Causeway Hospital	8	0.101	7	0.09	9	0.11	8	0.10
Dalriada Hospital	0	0	0	0.00	0	0.00	0	0.00
Robinson Memorial Hospital	0	0	0	0.00	0	0.00	0	0.00
<b>Northern Health &amp; Social Care Trust</b>	<b>47</b>	<b>0.136</b>	<b>42</b>	<b>0.12</b>	<b>60</b>	<b>0.17</b>	<b>54</b>	<b>0.16</b>
Ulster Hospital	45	0.25	41	0.23	33	0.18	30	0.16
Ards Hospital	0	0	0	0.00	0	0.00	0	0.00
Bangor Hospital	0	0	0	0.00	0	0.00	0	0.00
Downe Hospital	3	0.136	3	0.12	8	0.36	7	0.33
Lagan Valley Hospital	1	0.024	1	0.02	10	0.24	9	0.21
<b>South Eastern Health &amp; Social Care Trust</b>	<b>49</b>	<b>0.184</b>	<b>44</b>	<b>0.17</b>	<b>51</b>	<b>0.19</b>	<b>46</b>	<b>0.17</b>
Daisy Hill Hospital	5	0.075	5	0.07	19	0.29	17	0.26
Craigavon Area Hospital	11	0.078	10	0.07	37	0.26	33	0.23
Lurgan Hospital	3	0.105	3	0.09	0	0.00	0	0.00
South Tyrone Hospital	0	0	0	0.00	0	0.00	0	0.00
Mullinure	0	0	0	0.00	0	0.00	0	0.00
<b>Southern Health &amp; Social Care Trust*</b>	<b>19</b>	<b>0.076</b>	<b>17</b>	<b>0.07</b>	<b>56</b>	<b>0.23</b>	<b>50</b>	<b>0.20</b>
Altnagelvin Area Hospital	10	0.065	9	0.06	28	0.18	25	0.16
Waterside Hospital (ward 5)	0	0	0	0.00	0	0.00	0	0.00
Erne Hospital	6	0.108	5	0.10	11	0.20	10	0.18
Tyrone County Hospital	2	0.06	2	0.05	12	0.36	11	0.32
<b>Western Health &amp; Social Care Trust</b>	<b>18</b>	<b>0.073</b>	<b>16</b>	<b>0.07</b>	<b>51</b>	<b>0.21</b>	<b>46</b>	<b>0.19</b>
<b>NI TOTAL</b>	<b>247</b>	<b>0.137</b>	<b>222</b>	<b>0.12</b>	<b>344</b>	<b>0.19</b>	<b>310</b>	<b>0.17</b>

\*Southern Health & Social Care Trust now includes Mullinure. A look back exercise is being carried out to confirm numbers since April 06, thus the **figures are provisional**.

## Appendix 2: Trends in MRSA rates by Trust and quarter (2001-2007)



### 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 2007

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

## 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.