

# REPORT

## ON METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS* BACTERAEMIA IN SCOTLAND,

### JULY 2002 TO JUNE 2003

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#### Key Points

- This report of methicillin-resistant *Staphylococcus aureus* (MRSA) in acute trusts in Scotland provides data on the rates of MRSA bacteraemias (blood infections) for 14 acute NHS trusts, one health care NHS trust and three island NHS boards in Scotland in the twelve-month period July 2002 to June 2003. The presence of MRSA in blood (bacteraemias) depends upon a number of factors, including the particular strain of MRSA and the patient's underlying condition. They are reported here as they are an important marker of the total amount of MRSA within an institution and, at present, are the best marker that we have for invasive infection.
- Between July 2002 and June 2003, recorded MRSA bacteraemia rates ranged from 0.0/1000 bed days to 0.29/1000 bed days with an average for Scotland of 0.16 per 1000 bed days. A reading of 0 means that the Trust reported they had no cases in the period.
- Comparisons between trusts of the bacteraemia rates should be made **with great caution** for several reasons, including the following:
  - Patients may not have acquired the MRSA in the Trust where the MRSA bacteraemias were diagnosed. Laboratory reports of MRSA bacteraemias include reports on patients who became colonized or infected in a different hospital from the one that diagnosed and reported the bacteraemias, as well as reports on patients who became colonized or infected in the community.
  - The data reflect the overall position in trusts which differ in the numbers of patients at high risk of MRSA carriage and infection. Certain groups of patients e.g. the elderly, renal patients, diabetics, some surgical patients and patients with previous hospital admissions are more prone to MRSA carriage and infection.
- These data provide trusts with the opportunity to examine their own performance in the context of the national data. The data provided in the quarterly reports are being used to monitor trends in MRSA in acute trusts in Scotland and as one of several indicators of the efficacy of infection control processes and are being fed into NHS Scotland's Performance Assessment Framework system.

#### 1. Background

- 1.1 This report of MRSA bacteraemias (blood infections) in acute hospital trusts in Scotland as required by Health Department Letter (2001)57 'A Framework for National Surveillance of Hospital Acquired Infection in Scotland'<sup>1</sup>.
- 1.2 Previous reports, which are published every three-months and are based on a rolling twelve-month period, can be accessed on the web at [http://www.show.scot.nhs.uk/scieh/#infectious/hai/MRSA\\_Scot.htm](http://www.show.scot.nhs.uk/scieh/#infectious/hai/MRSA_Scot.htm)

- 1.3 MRSA carriage and infection have been regarded as markers of potential or real hospital acquired infection. However, community acquired carriage is increasingly reported <sup>2,3</sup>.
- 1.4 The rates of MRSA bacteraemia are based on reports of identified MRSA from blood cultures to the Scottish Centre for Infection and Environmental Health (SCIEH) from all microbiology laboratories in Scotland. MRSA bacteraemias rates are currently the best available indicators of the amount of MRSA in trusts.
- 1.5 For ease of reference, a description of the methods of data collection, analysis and reporting are given in section 2.
- 1.6 It is important that the results are read in conjunction with the notes on interpreting the data provided in section 3.

## 2. Data sources, data analysis and reporting

- 2.1 The figures and tables show the rates of MRSA bacteraemias for 14 acute NHS trusts, one health care trust and three island boards in Scotland (hereafter referred to as 'trusts') reported to SCIEH by microbiology laboratories.
- 2.2 The rate presented in the graphs and tables is the number of 'episodes' (cases) of MRSA bacteraemia in the trust in the period, divided by the total number of occupied 'bed days' for the period. (One patient in one bed for one night is one occupied 'bed day'). The rate given is the number of MRSA bacteraemias per 1000 bed days. This provides an index of MRSA bacteraemia in the trust that relates the cases to the total number of days during which patients have been in hospital in the twelve-month period.
- 2.3 The data on 'patient bed days' are estimates obtained from the Information and Statistics Division of the NHS in Scotland. They are based on the 24 hourly midnight counts of occupied beds that are undertaken in every hospital. These counts exclude patients treated as day patients who, by definition, do not occupy a bed at midnight.
- 2.4 Confidence intervals for the rates (shown in Table 1) indicate the range within which one can be 95% confident that the true rate will fall.

Table 1: MRSA bacteraemia rates by acute Trust with 95% confidence interval limits: July 2002 to June 2003

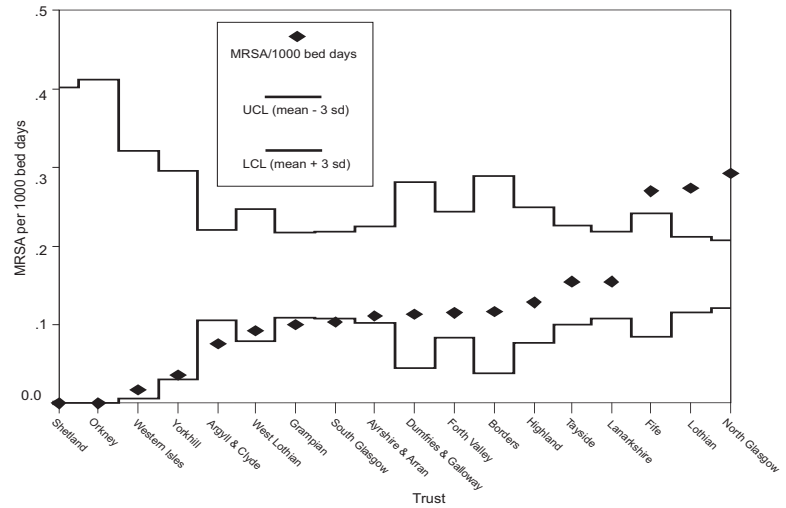
Trust Name	Trust Category	MRSA per 1000 bed days	MRSA per 1000 bed days	
			Lower CL	Upper CL
Argyll & Clyde	General Acute	0.0756	0.0520	0.1061
Ayrshire & Arran	General Acute	0.1105	0.0800	0.1489
Borders	General Acute	0.1165	0.0581	0.2084
Dumfries & Galloway	General Acute	0.1135	0.0587	0.1983
Fife	General Acute	0.2701	0.2080	0.3450
Forth Valley	General Acute	0.1153	0.0753	0.1689
Grampian	Teaching	0.1000	0.0742	0.1318
Highland	General Acute	0.1275	0.0825	0.1883
Lanarkshire	General Acute	0.1551	0.1214	0.1953
Lothian	Teaching	0.2747	0.2335	0.3158
North Glasgow	Teaching	0.2925	0.2546	0.3304
Orkney	Island	0.0000	0.0000	0.1551
Shetland	Island	0.0000	0.0000	0.1402
South Glasgow	Teaching	0.1041	0.0772	0.1372
Tayside	Teaching	0.1543	0.1165	0.2003
Western Isles	Island	0.0168	0.0005	0.0938
West Lothian	General Acute	0.0926	0.0557	0.1446
Yorkhill	Specialist	0.0363	0.0075	0.1063

Table 2: MRSA bacteraemia rates by acute Trust with 95% confidence interval limits: July 2001 to June 2002

Trust Name	Trust Category	MRSA per 1000 bed days	MRSA per 1000 bed days	
			Lower Limit	Upper Limit
Argyll & Clyde	General Acute	0.0810	0.0573	0.1112
Ayrshire & Arran	General Acute	0.1190	0.0874	0.1583
Borders	General Acute	0.1664	0.0932	0.2745
Dumfries & Galloway	General Acute	0.1496	0.0856	0.2429
Fife	General Acute	0.2132	0.1588	0.2804
Forth Valley	General Acute	0.1602	0.1128	0.2209
Grampian	Teaching	0.1082	0.0813	0.1412
Highland	General Acute	0.0909	0.0539	0.1437
Lanarkshire	General Acute	0.1809	0.1441	0.2243
Lothian	Teaching	0.3842	0.3358	0.4326
North Glasgow	Teaching	0.2001	0.1686	0.2316
Orkney	Island	0.0825	0.0099	0.2978
Shetland	Island	0.0000	0.0000	0.1333
South Glasgow	Teaching	0.0908	0.0657	0.1223
Tayside	Teaching	0.2305	0.1841	0.2850
Western Isles	Island	0.0000	0.0000	0.0583
West Lothian	General Acute	0.0579	0.0299	0.1012
Yorkhill	Specialist	0.0490	0.0134	0.1255

2.5 The data are also presented in the form of a ‘control chart’<sup>4</sup>. On the chart the rates for individual trusts are plotted. The chart also includes upper and lower limits (in this case defined by +/- three standard deviations of the Scottish rate). This approach is based on an assumption that rates in trusts will be largely similar, and allows the distinction between ‘common cause’ or natural variation in trust rates, when a trust’s rate falls within the limits, and ‘special cause’ variation, where something unusual is occurring in a trust which results in rates which fall outside these limits. The latter result should lead to a search for the explanation for the unusual situation, unique to that trust, which results in a rate that lies outside the limits. This could be the result of either a true high or low rate of MRSA bacteraemia or due to reporting biases, e.g. incomplete reporting or over-reporting.

Figure 1: Episodes of MRSA bacteraemia per 1000 total occupied bed days July 2002 to June 2003. In Scottish Acute Trusts.



### 3. Interpreting the data

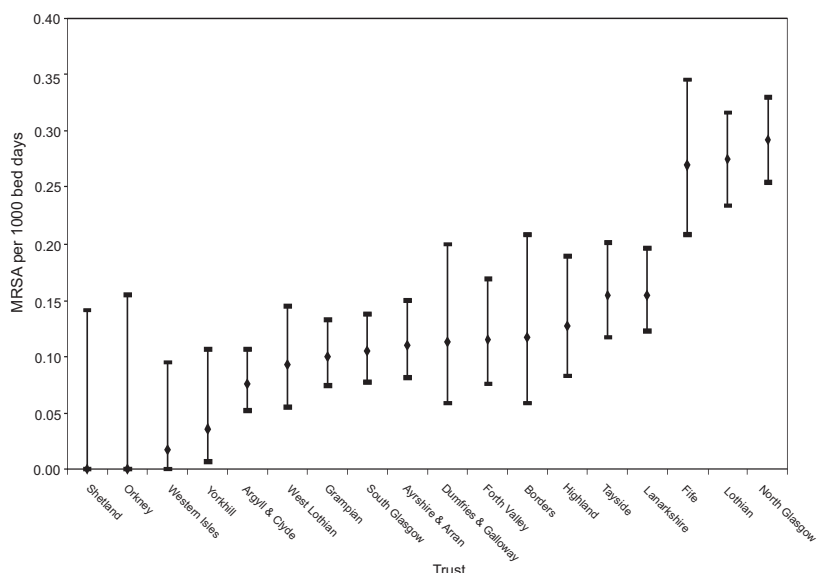
Direct comparisons between trusts of the reported MRSA rates should be made *with great caution* for several reasons:

- 3.1 Patients differ in their vulnerability to MRSA colonization and infection. A single trust may include different kinds of hospitals, e.g. teaching or specialist hospitals and district general hospitals, different specialties with varying numbers of patients and therefore differing numbers of vulnerable patients. These differences contribute to differences in the MRSA bacteraemia rates. Trusts with more patients in vulnerable categories, e.g. the elderly, renal patients and some types of surgical patients may have higher rates. Trusts that receive patients from other hospitals or large numbers of patients with recent hospital admission, may also have higher rates of MRSA infection.
- 3.2 MRSA bacteraemias in renal dialysis patients are included in the number of cases diagnosed in trusts where such patients are treated. The bed days occupied by them are not included in the ‘total occupied bed days’ as these patients are treated as day patients. As a result, calculated rates may be artificially high.
- 3.3 The MRSA which the patient carries and which eventually causes a patient’s bacteraemia may not have been acquired in the trust to which it has been attributed. A patient may carry MRSA for some time without developing infection with the organism. He/she may not have been an inpatient during some part of the period of carriage and/or may have been in different hospitals during that period.
- 3.4 MRSA bacteraemia data have been obtained from the laboratories in acute trusts that may also provide services to a primary care trust. It is not possible to exclude MRSA bacteraemias from these trusts (which are likely to be very small in number).

### 4. Results

- 4.1 Rates of MRSA bacteraemia reported in Scotland in the twelve-month period, July 2002 to June 2003, ranged from 0.0/1000 patient bed days to 0.29/1000 patient bed days (Figure 1 and Table 1). In the period July 2001 to June 2002 the rates ranged from 0.0/1000 patient bed days to 0.38/1000 patient bed days (Table 2).
- 4.2 In total, 865 episodes of MRSA bacteraemia were reported in Scotland for the twelve-month period, July 2002 to June 2003, giving an overall rate for Scotland of 0.16/1000 bed days (95% CI 0.15 to 0.17/1000 bed days). This compares with 902 episodes of MRSA bacteraemia and a rate of 0.17/1000 bed days (95% CI 0.16 to 0.18/1000 bed days) for July 2001 to June 2002.

Figure 2 - Episodes of MRSA per 1000 total occupied bed days with 95% confidence intervals. July 2002 to June 2003. In Scottish Acute NHS Trusts



- 4.3 Table 2 presents the MRSA bacteraemias rates reported by trusts during the period July 2001 to June 2002, for comparison with the data presented in Table 1.
- 4.4 Figure 1 shows that the majority of Scottish Trusts report rates fall within the defined limits of three standard deviations of the Scottish average. Three trusts have rates that are above the upper limit-North Glasgow, Fife and Lothian
- 4.5 Three trusts recorded rates of MRSA that were below the lower limit. Low rates are reported from the island boards but the small numbers of beds in the hospitals in these boards result in a large confidence interval being placed around the rates (Figure 2).

## 5. Comments

- 5.1 Overall rates of MRSA bacteraemias in Scotland have not significantly changed in the period reported. The rate between July 2002 and June 2003 of 0.16 per 1000 patient bed days is not significantly different from the rate of 0.17 per 1000 bed days recorded between July 2001 and June 2002. This suggests that, *on average*, a patient who stays in hospital for 10 days has approximately a one in 600 chance of getting an MRSA bacteraemia. However, it is important to note that the risk to an individual may be higher or lower as patients differ in their vulnerability to MRSA infection. The total number of bacteraemias reported in the current reporting period was 865 compared with a total of 902 for the twelve-month period July 2001 to June 2002.
- 5.2 The overall rate of MRSA bacteraemias in Scotland (0.16 per 1000 bed days; range 0 to 0.29/1000) is very similar to the rate reported in England for the period April 2002 to March 2003 of 0.17 per 1000 bed days. The range reported for general trusts (including the categories of General Acute, Teaching and Island Trusts) in England was 0.04 to 0.30/1000 and that for specialist trusts was 0.06 to 0.49/1000<sup>5</sup>.
- 5.3 Current United Kingdom Guidelines for the control of methicillin-resistant *Staphylococcus aureus* infection in hospitals<sup>6</sup> are being revised and within Scotland the Scottish Infection Standards and Strategy (SISS) Group have formed a sub-group to produce some good practice guidelines for MRSA control.
- 5.4 Figure 1 shows that most trusts recorded rates within the limits of +/- three standard deviations of the Scottish rate. It is particularly important that trusts whose rates fall at the upper end of the range examine critically the measures they are taking to control MRSA. However no trust should be complacent about their rates and all trusts should continue to monitor closely the trends in MRSA in their hospitals in order to target interventions to contain and control the spread of the infection.
- 5.5 After the previous quarterly report highlighted a change in the rate for the North Glasgow Trust the Trust conducted a careful review of their reporting arrangement. This resulted in the identification of missed reports and the rates for this site are therefore higher than shown in previous reports. The results do not necessarily denote a real increase in the incidence of MRSA blood infections, but certainly represent an improvement in reporting.
- 5.6 As is common with all surveillance systems, statistics are routinely revised in the light of further reports received by SCIEH which may have been delayed as a result of difficulties in information collection and communication processes. For these reasons retrospective updating of reported statistics often occurs.

## Acknowledgements

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