

REPORT

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

APRIL 2001 TO MARCH 2002

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Key points

- This second 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 trust and three island boards in Scotland in the twelve-month period April 2001 to March 2002.
- Between April 2001 and March 2002, recorded MRSA bacteraemia rates ranged from 0.0/1000 bed days to 0.36/1000 bed days with an average for Scotland of 0.16 per 1000 bed days.
- Nine months (April - December 2001) are included in the periods covered in both the first and second reports. Comparisons between two *independent* twelve-month periods will be made in April 2003.
- Comparisons between trusts of the bacteraemia rates should be made **with great caution** for several reasons, including the following:
 - The application of standard definitions for use in data reporting is not fully in place in all trusts,
 - The data reflect the overall position in trusts that 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.
 - Laboratory reports of MRSA bacteraemia include reports on patients who became colonized or infected in different hospitals from the one that reported the bacteraemia, as well as reports on patients who became colonized or infected in the community.
- These data provide trusts with the opportunity to examine their own performance in the context of the national data. The data provided in the reports will be used, in the longer term, to monitor trends in MRSA in acute trusts in Scotland and as one of several indicators of the efficacy of infection control processes.

1. Background

- 1.1 This is the second national 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'¹. In this second report, data are presented on MRSA bacteraemias in Scottish acute NHS trusts in the twelve-month period April 2001 to March 2002.
- 1.2 The report for the twelve-month period January to December 2001 can be accessed on the web at http://www.show.scot.nhs.uk/scieh/#infectious/hai/FirstReportMRSA/MRSA_Scot_first.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^{2,3}.
- 1.4 MRSA bacteraemias are routinely reported to the Scottish Centre for Infection and Environmental Health (SCIEH) by all microbiology laboratories in Scotland. Rates of MRSA bacteraemia are the best available indicators of the amount of MRSA in trusts.
- 1.5 Many trusts and hospitals already monitor and report their own MRSA data locally, using these to audit their performance. The data presented in this report enable all trusts to view their rates within the context of the national rates. The data provide the trusts with an additional perspective on their own performance. As data accumulate, it will be possible to compare trends in the rates.
- 1.6 For ease of reference, a description of the methods of data collection, analysis and reporting (section 2) and notes on interpreting the data (section 3), which were published in the first report, are included in this second report.

2. Data sources, data analysis and reporting

- 2.1 The figures and table 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 in the twelve-month period, April 2001 to March 2002.

- 2.2 The rate presented in the graphs and table is the number of ‘episodes’ (cases) of MRSA bacteraemia in the trust in the twelve-month period, divided by the total number of patient ‘bed days’ for the period. (One patient in one bed for one night is one patient ‘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 at risk of infection in the twelve-month period. It does not, however, take account of the actual numbers of patient episodes or the varying types of patients who are treated in the different trusts and who differ in their vulnerability to MRSA bacteraemia. It also takes no account of the different specialties within hospitals in the trusts, some of which treat patients who are more prone to MRSA acquisition.
- 2.3 The numbers on which the rates are based include ‘community acquired’ MRSA bacteraemias as well as ‘hospital acquired’ bacteraemias.
- 2.4 The data on bed days have been 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.
- 2.5 Confidence intervals for the rates (shown in Figure 1) indicate the range within which one can be 95% confident that the true rate will fall.
- 2.6 The data are also presented in the form of a ‘control chart’⁴. 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 of 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.

3 Interpreting the data

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

- 3.1 Data definitions have not yet been in place for the whole of the period reported here. Work is continuing to improve the accuracy of the data that are reported to SCIEH.
- 3.2 Trusts differ in the vulnerability of their patients to MRSA colonization and infection. A single trust may include different kinds of hospitals, e.g. teaching or specialist hospitals and district general hospitals. This differing composition results in each trust having different numbers of patients in a variety of patient groups with differing vulnerability to MRSA bacteraemia. These differences contribute to differences in the MRSA bacteraemia rates. Trusts with more patients in vulnerable categories, e.g. the elderly, renal patients, diabetics, some types of surgical patients and intensive care unit patients, may have higher rates. Trusts which receive patients transferred from other hospitals e.g. tertiary referral centres, or which admit a large number of patients who have had a recent admission, may also have higher rates of MRSA infection.
- 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 So-called ‘acute trusts’ also include a varying number of ‘non-acute’ beds, occupied by patients who are at a lower risk of MRSA infection e.g. psychiatric patients.

Table: MRSA Bacteraemia rates by acute Trust with 95% confidence interval limits: April 2001 to March 2002

Trust Name	Trust Category	MRSA per 1000 bed days	MRSA per 1000 bed days	
			Lower Limit	Upper Limit
1 Shetland Health Board	Island	0.0000	0.0000	0.2534
2 The Yorkhill NHS Trust	Specialist	0.0121	0.0004	0.0675
3 Western Isles Health Board	Island	0.0308	0.0037	0.1112
4 West Lothian Healthcare NHS Trust	General Acute	0.0468	0.0225	0.0861
5 Highland Acute Hospitals NHS Trust	General Acute	0.0749	0.0420	0.1236
6 Argyll & Clyde Acute Hospitals NHS Trust	General Acute	0.0762	0.0531	0.1060
7 Orkney Health Board	Island	0.0853	0.0102	0.3079
8 Grampian University Hospitals NHS Trust	Teaching	0.0982	0.0727	0.1298
9 South Glasgow University Hospitals NHS Trust	Teaching	0.1016	0.0741	0.1359
10 Ayrshire & Arran Acute Hospitals NHS Trust	General Acute	0.1130	0.0824	0.1512
11 Dumfries & Galloway Acute & Maternity Hospitals NHS Trust	General Acute	0.1315	0.0718	0.2206
12 North Glasgow University Hospitals NHS Trust	Teaching	0.1360	0.1105	0.1656
13 Forth Valley Acute Hospitals NHS Trust	General Acute	0.1398	0.0956	0.1973
14 Borders General Hospital NHS Trust	General Acute	0.1875	0.1092	0.3003
15 Lanarkshire Acute Hospitals NHS Trust	General Acute	0.1981	0.1580	0.2452
16 Tayside University Hospitals NHS Trust	Teaching	0.2177	0.1729	0.2706
17 Fife Acute Hospitals NHS Trust	General Acute	0.2762	0.2136	0.3514
18 Lothian University Hospitals NHS Trust	Teaching	0.3615	0.3151	0.4080

3.5 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 these cases (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, April 2001 to March 2002, ranged from 0.0/1000 patient bed days to 0.36/1000 patient bed days (Figure 1 and Table).

4.2 In total, 830 episodes of MRSA bacteraemia were reported in Scotland for the twelve-month period, April 2001 to March 2002, giving an overall rate for Scotland of 0.16/1000 bed days. 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 the risk to an individual may be higher or lower as patients differ in their vulnerability to MRSA infection.

4.3 The rate reported for Lothian University Hospitals Trust (LUHT) is higher than that reported for January to December 2001. This is due to a careful audit of reporting to SCIEH, as a result of which, substantial under reporting has been found. The results do not represent a real increase in the rates of MRSA blood infections since the previous report, but a continued high rate of MRSA bacteraemia.

4.4 Figure 2 shows that the majority of Scottish Trusts report rates which fall within the defined limits. Two trusts, including LUHT, have rates that are above the upper limit of three standard deviations based on the all Scotland rate.

4.5 Four 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.

5. Comments

5.1 The range of MRSA bacteraemia rates for the period April 2001 to March 2002 was 0.0 to 0.36 per 1000 bed days. This is a wider range than that reported for 2001 (0.0 to 0.25/1000 bed days) due to an improvement in reporting by a trust with a rate at the high end of the range. The report from England for the period April 2001 to March 2002, using the same measure, gives a range for specialist trusts (including teaching hospitals) of 0.08 to 0.66 per 1000 bed days and, for general acute trusts, of 0.02 to 0.39 per 1000 bed days⁵. The overall rate for trusts in Scotland was 0.16 per 1000 bed days. The overall rate for England for the same period was 0.17 per 1000 bed days.

5.2 Nine months (April to December 2001) are included in the periods covered in both the first and second reports. Comparisons will be made between two *independent* twelve-month periods (2001 and 2002) in April 2003.

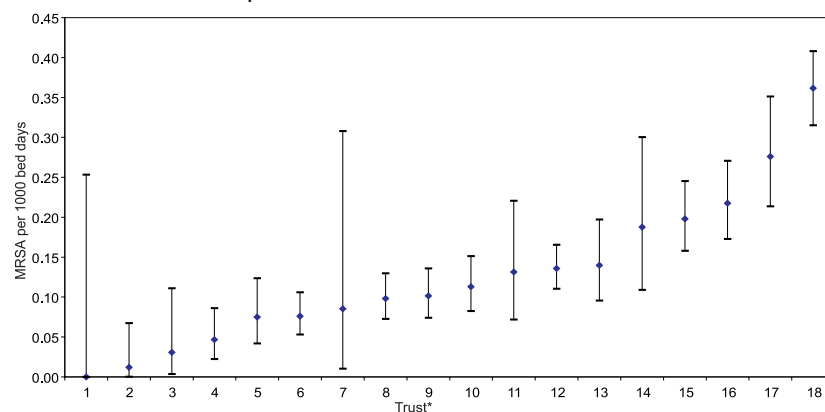
5.3 This is the second national report on MRSA bacteraemias in Scottish Trusts. The report is based on data that are routinely reported to SCIEH and laboratories are asked to check that the data reported by SCIEH are accurate. SCIEH is continuing to work with trusts to improve the quality of the data reported.

5.4 The high rate reported here for LUHT does not represent a real increase but is the result of improved reporting. The trust is continuing to review their arrangements for control of MRSA. The rate reported from LUHT, a major teaching hospital trust which includes a number of specialist units and takes a large number of referrals from other hospitals, is comparable to those of similar trusts (specialist trusts) in England (range 0.08 to 0.66/1000 bed days).

5.5 Figure 2 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.

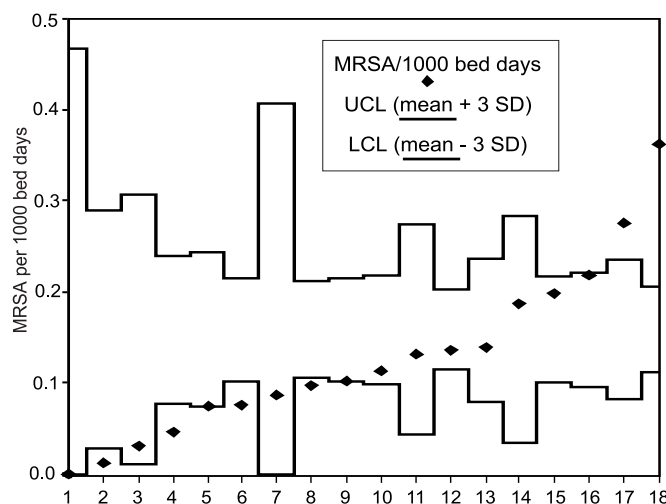
5.6 MRSA was first recognized in the 1960s in British hospitals and has now spread in Europe as well as in other countries^{6,7}. However, the trends in incidence in different countries have varied, with periods of increasing incidence, epidemics and even decreases

Figure 1: Episodes of MRSA per 1000 total occupied bed days with 95% confidence intervals. April 2001 to March 2002. In Scottish Acute NHS Trusts



*See Table on page 2 for trusts to which numbers refer.

Figure 2: Episodes of MRSA bacteraemia per 1000 total occupied bed days



*See Table on page 2 for trusts to which numbers refer.

in incidence in some countries^{7,8}. The geographical variability in the impact of MRSA is a characteristic of the organism that is not at all well understood. Reasons for this may lie in differences in the organization of the health services and in the running of hospitals in the different countries as well as in the variation of individual strains that have become prevalent in different countries.

- 5.7 Control of MRSA in hospitals is a complex matter and requires close attention to several different areas of patient care and the involvement and commitment of managers and staff at all levels within the organisation. Factors which affect the amount of MRSA infection in a hospital include: the numbers of colonized patients admitted, the case mix/MRSA vulnerability profile of patients admitted, the prevalence of carriage and infection in the hospital, hospital MRSA screening policies, the effectiveness of infection control, control of antibiotic prescribing, availability of isolation facilities, the availability and use of handwashing facilities, patient throughput in relation to staffing levels, multiple patient movements between wards, and levels of hygiene⁹⁻¹⁵.
- 5.8 Control of the spread of colonization, an important risk factor for MRSA infection, is extremely difficult in those institutions where the organism has become endemic. Where MRSA is endemic, UK national guidance¹⁰ advises that attention is focused on areas and patients who have the highest susceptibility to MRSA. All trusts have MRSA control policies in place. Monitoring and feedback of rates of MRSA infection to units at high risk is undertaken in many Scottish hospitals.
- 5.9 Infection control standards are being monitored by the Clinical Standards Board for Scotland and their Interim Report 'Improving Clinical Care in Scotland. Healthcare Associated Infection; infection control standards' has now been published¹⁶. A letter stressing the need for infection control to be given the priority it requires was recently sent to trust chief executives by the chief executive of the NHS, Scotland¹⁷.
- 5.10 This is the second of a series of reports on the amount of MRSA bacteraemia in Scottish hospitals and work continues to improve their quality. As mentioned earlier, these initial data are relatively crude, reporting overall rates in hospitals that vary in their case mix. More work has to be done to ensure consistent adherence to the reporting definitions and to refine the reporting so that in the longer term more robust and discerning measures of the impact of MRSA in hospitals can be reported in Scotland.

Acknowledgements

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