

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

OCTOBER 2001 TO SEPTEMBER 2002

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- 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 trust and three island boards in Scotland in the twelve-month period October 2001 to September 2002.
- Between October 2001 and September 2002, recorded MRSA bacteraemia rates ranged from 0.0 per 1000 bed days to 0.41 per 1000 bed days with an average for Scotland of 0.16 /1000 bed days.
- 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 trusts where MRSA bacteraemia was diagnosed. Laboratory reports of MRSA bacteraemia include reports on patients who became colonized or infected in a different hospital from the one that diagnosed and reported the bacteraemia, as well as reports on patients who became colonized or infected in the community.
 - 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.
- 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 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 report of MRSA bacteraemias (blood infections) in acute hospital trusts in Scotland is required by Health Department Letter (2001)57 'A Framework for National Surveillance of Hospital Acquired Infection in Scotland'¹. In this report, data are presented on MRSA bacteraemias in Scottish acute NHS trusts in the twelve-month period October 2001 to September 2002.
- 1.2 The three previous reports can be accessed on the web at 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^{2,3}.
- 1.4 The rates of MRSA bacteraemia diagnosed in trusts in the period October 2001 to September 2002 are reported here. They are based on reports of diagnoses of MRSA bacteraemias to the Scottish Centre for Infection and Environmental Health (SCIEH) by microbiology laboratories in Scotland. Rates of MRSA bacteraemia are currently 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.
- 1.6 For ease of reference, a description of the methods of data collection, analysis and reporting is provided in section 2.
- 1.7 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 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, October 2001 to September 2002.
- 2.2 Because of the relatively small numbers of MRSA reported from each trust, twelve-month reporting periods are being used. The twelve-month reporting period that is the subject of this report overlaps by nine months with that reported in October 2002.

- 2.3 The rate presented in the graphs and table is the number of ‘episodes’ (cases) of MRSA bacteraemia in the trust for the twelve-month period October 2001 to September 2002, 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 cases of MRSA bacteraemia diagnosed per 1000 bed days. This provides an index of MRSA bacteraemia in the trust that relates the diagnosed cases to the total number of days during which patients have been in hospital in the twelve-month period. Patients differ in their vulnerability to MRSA bacteraemia. The measure used does not take account of the actual numbers of patients or the varying types of patients who are treated in the different trusts for different lengths of time. 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.
- 2.4 The numbers on which the rates are based include MRSA bacteraemias caused by MRSA acquired in the community as well as MRSA acquired in hospital.
- 2.5 The data on ‘patient 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.
- 2.6 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.
- 2.7 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, when a trust’s rate falls within the limits, and ‘special cause’ variation, where something unusual is occurring in a trust which results in a rate which falls 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.

3 Interpreting the data

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

- 3.1 Trusts’ 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. 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 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.

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

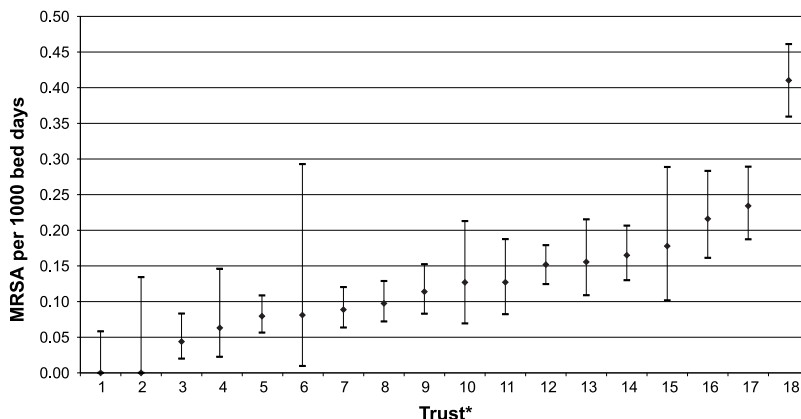
| Trust | Trust Category | MRSA per 1000 bed days | MRSA per 1000 bed days | |
|--|----------------|------------------------|------------------------|-------------|
| | | | Lower Limit | Upper Limit |
| 1 Western Isles Health Board | Island | 0.0000 | 0.0000 | 0.0583 |
| 2 Shetland Health Board | Island | 0.0000 | 0.0000 | 0.1343 |
| 3 West Lothian Healthcare NHS Trust | General Acute | 0.0439 | 0.0201 | 0.0833 |
| 4 The Yorkhill NHS Trust | Specialist | 0.0623 | 0.0202 | 0.1455 |
| 5 South Glasgow University Hospitals NHS Trust | Teaching | 0.0795 | 0.0565 | 0.1087 |
| 6 Orkney Health Board | Island | 0.0811 | 0.0097 | 0.2928 |
| 7 Argyll & Clyde Acute Hospitals NHS Trust | General Acute | 0.0887 | 0.0637 | 0.1204 |
| 8 Grampian University Hospitals NHS Trust | Teaching | 0.0975 | 0.0721 | 0.1289 |
| 9 Ayrshire & Arran Acute Hospitals NHS Trust | General Acute | 0.1139 | 0.0831 | 0.1524 |
| 10 Dumfries & Galloway Acute & Maternity Hospitals NHS Trust | General Acute | 0.1269 | 0.0693 | 0.2129 |
| 11 Highland Acute Hospitals NHS Trust | General Acute | 0.1271 | 0.0823 | 0.1876 |
| 12 North Glasgow University Hospitals NHS Trust | Teaching | 0.1519 | 0.1246 | 0.1791 |
| 13 Forth Valley Acute Hospitals NHS Trust | General Acute | 0.1556 | 0.1089 | 0.2154 |
| 14 Lanarkshire Acute Hospitals NHS Trust | General Acute | 0.1650 | 0.1300 | 0.2066 |
| 15 Borders General Hospital NHS Trust | General Acute | 0.1779 | 0.1017 | 0.2888 |
| 16 Fife Acute Hospitals NHS Trust | General Acute | 0.2161 | 0.1614 | 0.2834 |
| 17 Tayside University Hospitals NHS Trust | Teaching | 0.2342 | 0.1873 | 0.2893 |
| 18 Lothian University Hospitals NHS Trust | Teaching | 0.4103 | 0.3595 | 0.4612 |

3.2 A patient may be admitted already colonized with MRSA and then develop an MRSA bacteraemia in hospital. He/she may have acquired the MRSA in a previous hospital admission to the same or to another hospital, or in the community. The numbers of bacteraemias diagnosed therefore may include MRSA acquired elsewhere. For this reason it is not correct to use the numerical data provided to quantitatively estimate differences in the risk of MRSA acquisition of patients admitted to different hospitals.

3.3 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.

3.4 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).

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



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

4. Results

4.1 Rates of MRSA bacteraemia reported in Scotland in the twelve-month period, October 2001 to September 2002, ranged from 0.0/1000 patient bed days to 0.41/1000 patient bed days (Figure 1 and Table).

4.2 In total, 864 episodes of MRSA bacteraemia were reported in Scotland for the twelve-month period, October 2001 to September 2002, giving an overall rate for Scotland of 0.16/1000 bed days (95% CI 0.15/1000 bed days to 0.17/1000 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, 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.

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

4.4 Five trusts recorded rates of MRSA that were below the lower limit.

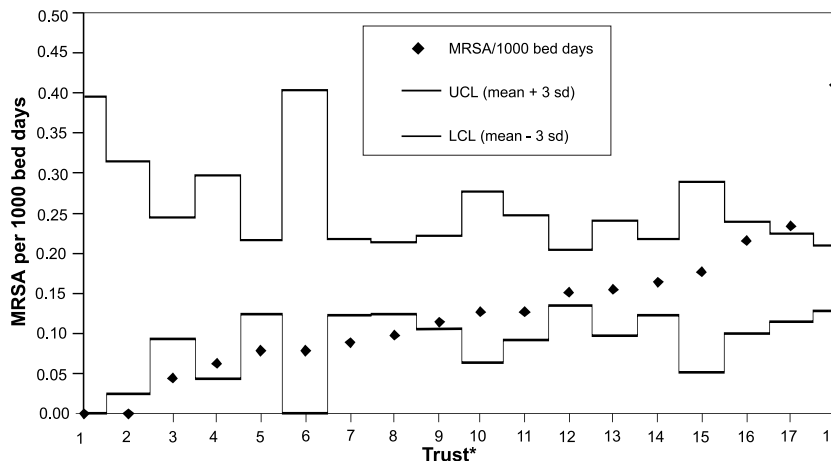
4.5 The rates of MRSA bacteraemia in Scotland in the three six-month periods April to September 2001, October 2001 to March 2002 and April to September 2002 were 0.15/1000 bed days, 0.15/1000 bed days and 0.17/1000 bed days respectively.

5. Comments

5.1 In the period from October 2001 to September 2002, 864 reports of MRSA bacteraemia were received and the rate recorded in individual trusts ranged from 0.0/1000 bed days to 0.41/1000 bed days. This compares with a total of 830 episodes reported in the period between July 2001 and June 2002 and a range in individual trusts of 0.0/1000 bed days to 0.38/1000 bed days.

5.2 Overall the position of trusts within the range has not changed markedly since the first report. Two trusts recorded rates above the upper limit and both of these are teaching hospitals in which there are likely to be larger proportions of patients at high risk of MRSA infection than in district

Figure 2: Episodes of MRSA bacteraemia per 1000 total occupied bed days. October 2001 to September 2002. In Scottish Acute NHS Trusts



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

general hospitals. The five trusts recording rates below the lower limit also include a teaching hospital that, in all reports to date, has recorded rates that were below the middle of the range. Approaches to and compliance with infection control and the appropriate use of antibiotics are very important factors in controlling MRSA in hospitals, but there are other contributory factors that are not well understood^{5,6,7}.

- 5.3 The rates of MRSA bacteraemia in the most recent three six-month periods (see section 4.5 above) have not changed markedly. The next publication in this series will cover the twelve months of 2002. It will be possible at that time to examine whether there has been a significant change in the numbers of MRSA bacteraemias diagnosed in trusts in Scotland in the two years 2001 and 2002.
- 5.4 Trusts need to monitor their rates closely and target their efforts to control the impact of MRSA and other resistant organisms. The use of process control charts to feedback data to units has been shown in one hospital in Scotland to be effective in leading to a reduction in the numbers of infections reported⁸. An important area of infection control but one that is difficult to implement effectively is handwashing. Recent publications^{9,10}, that include the Centers for Disease Control's 'Guideline for Hand Hygiene in Health-Care Settings' point out that reasons for non-compliance must be addressed and that 'the interdependence of individual factors, environmental constraints and institutional climate must be taken into account in the strategic planning and development of hand-hygiene campaigns'.
- 5.5 Action to control HAI in Scotland now has a very high and urgent priority at the Scottish Executive Health Department. Health Department Letter (2002)82¹¹, published on 22 November 2002 requires trusts to consider and report their plans for implementing the recommendations of the HAI Convention held in Edinburgh in July 2002 and those of the Watt Group Report into the outbreak of Salmonella infection at the Victoria Infirmary. A number of priority areas within the Ministerial Action Plan drawn up as a result of the HAI Convention are identified. A Task Force, chaired by the Chief Medical Officer, is to be set up to ensure that priority areas for action identified in the two documents are taken forward.

Acknowledgements

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