REPORT ON METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS* BACTERAEMIA IN SCOTLAND, JULY 2003 TO JUNE 2004

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Key Points

- This report provides data on the rates of MRSA bacteraemias (blood infections) for the 15 NHS boards in Scotland in the twelve-month period July 2003 to June 2004. MRSA bacteraemias are monitored because, although they do not include all the MRSA in an institution, they are at present the best indicator we have for invasive infection.
- In the period July 2003 to June 2004, MRSA bacteraemia rates ranged from 0.0/1000 bed days to 0.25/1000 bed days with an average for Scotland of 0.15 per 1000 bed days. A reading of 0 means that the division reported that they had no cases in the period.
- Crude comparisons between bacteraemia rates in different acute divisions is inappropriate for several reasons, including the following:
  - Patients may not have acquired the MRSA in the division that diagnosed or reported the bacteraemia. The patient may have been colonized or infected in another institution, or even in the community.
  - Divisions differ in the numbers of patients at high risk of MRSA colonization 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 divisions 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 divisions in Scotland and as one of several indicators of the efficacy of infection control processes are being fed into NHS Scotland's Performance Assessment Framework system.
- Trusts ceased to exist on 1 April 2004 and in consequence all future quarterly reports will refer to acute divisions in NHS Boards, for the purposes of consistency this report will present the results for similar administrative units as previous reports.

1. Background

1.1 This report of MRSA bacteraemias (blood infections) in acute divisions in Scotland is required by Health Department Letter (2001)57 'A Framework for National Surveillance of Hospital Acquired Infection in Scotland'[1].

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

1.3 Although MRSA can be acquired in the community[2,3], the presence of the organism in hospital patients has been regarded as a useful indicator of hospital acquisition, and MRSA bacteraemias are at present the best indicator of invasive infection.

1.4 The rates of MRSA bacteraemia are based on identified MRSA from blood cultures reported to the Scottish Centre for Infection and Environmental Health (SCIEH) from all NHS diagnostic microbiology laboratories in Scotland.

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 the 15 NHS boards in Scotland reported to SCIEH by NHS diagnostic microbiology laboratories.

2.2 The graphs and tables are based on the number of cases of MRSA bacteraemia in the division in the period, divided by the number of "acute occupied bed days" (AOBDs) for the period. One patient in one bed for one night is one AOBD. The rate is the number of MRSA bacteraemias per 1000 bed days. This rate gives an indication of the number of cases relative to the size of the population at risk.

Table 1: MRSA bacteraemia rates by acute Trust with 95% confidence interval limits: July 2003 to June 2004

Trust Name	Trust Category	MRSA per 1000 bed days	MRSA per 1000 bed days	
			Lower CL	Upper CL
Argyll & Clyde	General Acute	0.0655	0.0431	0.0953
Ayrshire & Arran	General Acute	0.0955	0.0673	0.1317
Borders	General Acute	0.1323	0.0704	0.2262
Dumfries & Galloway	General Acute	0.1344	0.0753	0.2217
Fife	General Acute	0.1536	0.1082	0.2117
Forth Valley	General Acute	0.1014	0.0643	0.1521
Grampian	Teaching	0.0912	0.0662	0.1224
Highland	General Acute	0.1073	0.0664	0.1640
Lanarkshire	General Acute	0.1781	0.1414	0.2213
Lothian	Teaching	0.2527	0.2129	0.2924
North Glasgow	Teaching	0.2278	0.1941	0.2616
Orkney	Island	0.0000	0.0000	0.1938
Shetland	Island	0.0000	0.0000	0.1472
South Glasgow	Teaching	0.1268	0.0968	0.1632
Tayside	Teaching	0.2472	0.1980	0.3049
West Lothian	General Acute	0.0469	0.0214	0.0889
Western Isles	Island	0.0525	0.0109	0.1536
Yorkhill	Specialist	0.0000	0.0000	0.0449

Table 2: MRSA bacteraemia rates by acute Trust with 95% confidence interval limits: July 2002 to June 2003

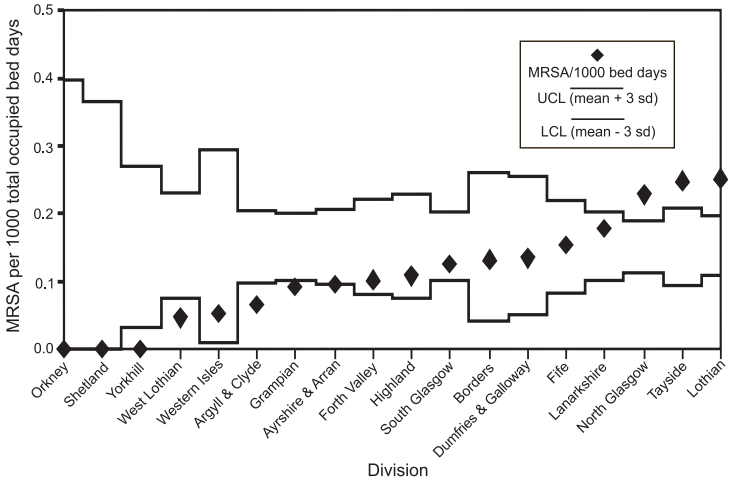
Trust Name	Trust Category	MRSA per 1000 bed days	MRSA per 1000 bed days	
			Lower Limit	Upper Limit
Argyll & Clyde	General Acute	0.0808	0.0679	0.1284
Ayrshire & Arran	General Acute	0.1105	0.0800	0.1489
Borders	General Acute	0.1165	0.0581	0.2084
Dumfries & Galloway	General Acute	0.1135	0.0857	0.1983
Fife	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	0.2039	0.1601	0.2774
West Lothian	General Acute	0.0926	0.0557	0.1446
Western Isles	Island	0.0168	0.0005	0.0938
Yorkhill	Specialist	0.0363	0.0075	0.1063

2.3 The data on AOBDs are obtained from the Information and Statistics Division of the NHS in Scotland. They are based on the daily counts of occupied beds that are undertaken in every hospital at midnight. These counts obviously exclude day patients who, by definition, do not occupy a bed at midnight.

2.4 Confidence intervals for the rates (shown in Table 1, Table 2 and Figure 2) indicate the range within which one can be 95% confident that the true rate will fall.

2.5 The data are also presented in the form of a 'control chart'[4]. On this chart, not only are the rates for individual divisions plotted, but also upper and lower control limits (in this case defined by +/- three standard deviations from the Scottish rate). This approach allows us to identify divisions that differ from the average by more than is likely to be due to a natural variation in rates, and in which special circumstances are likely to operate. Such a result should lead to a search for the explanation for the unusual situation. The explanation could be a true high or low rate (for example, due to an unusually high number of vulnerable patents) or due to reporting biases (for example, under or over-reporting).

Figure 1: Episodes of MRSA bacteraemia per 1000 total occupied bed days with control limits, July 2003 to June 2004. In Scottish Acute Divisions.



3. Interpreting the data

3.1 Direct comparisons between divisions of the reported MRSA rates are inappropriate because divisions differ in many important ways.

3.2 Patients differ in their vulnerability to MRSA colonization and infection. A single divisions may include different kinds of hospitals (for example, teaching or specialist hospitals and district general hospitals) and different specialties with varying numbers of patients of differing vulnerability. These differences contribute to differences in the MRSA bacteraemia rates. Divisions with more patients in vulnerable categories (for example, the elderly, renal patients and some types of surgical patients) are prone to higher rates.

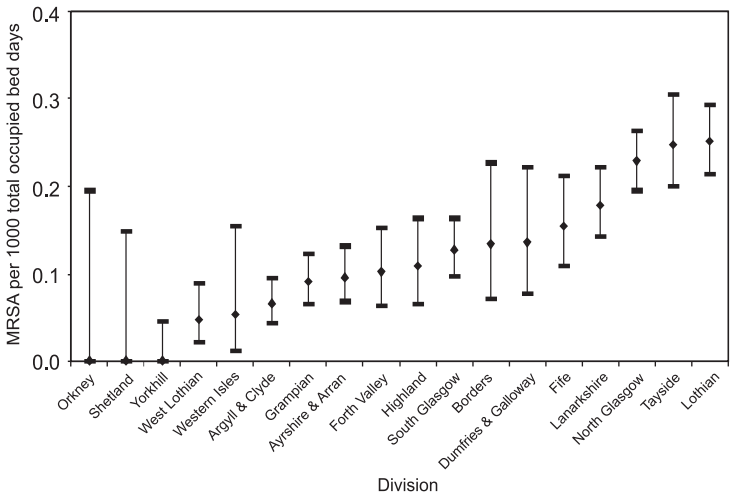
3.3 Another example is renal dialysis patients. Cases of MRSA bacteraemia in these patients are included in the number of cases diagnosed in divisions where they are treated. As they may not occupy beds in the trust where they are dialysed, rates for these trusts may be artificially high.

3.4 The MRSA which the patient carries and which eventually causes their bacteraemia may not have been acquired in the division that reports it. A patient may carry MRSA for some time without developing infection. They could, therefore, have acquired the MRSA in another hospital, or even in the community. Divisions that receive patients from other hospitals or large numbers of patients with recent hospital admission will therefore also tend to have higher rates of infection.

3.5 MRSA bacteraemia data have been obtained from the laboratories in acute divisions that may also provide services to a primary care trust. It is not possible to exclude from the data MRSA bacteraemias acquired in the community. These are likely to be very small in number.

3.6 Although SCIEH goes to considerable effort to ensure the quality of the data, routine validation of individual bacteraemias can only be performed at a local level and SCIEH must rely on laboratories to ensure that all bacteraemias are reported

Figure 2 - Episodes of MRSA bacteraemia per 1000 total occupied bed days with 95% confidence intervals. July 2003 to June 2004. In Scottish Acute Divisions



4. Results

4.1 In the period July 2003 to June 2004, there were 787 episodes of MRSA bacteraemia, compared to 885 between July 2002 and June 2003. The

rate per 1000 AOBDs fell to 0.15 (95% CI 0.14-0.16) in the period July 2003 to June 2004 from 0.17 (95% CI 0.16-0.18) between July 2002 and June 2003. This decline was not statistically significant.

4.2 Between July 2003 and June 2004, rates across Scotland ranged from 0 to 0.25/1000 bed days, whereas between April 2002 and March 2003 the rates ranged from 0 to 0.29/1000 bed days (Figure 1 and Table 1 and 2).

4.3 In the period July 2003 to June 2004, all but three divisions, Lothian, Tayside and North Glasgow, reported rates within or below the defined limits of three standard deviations of the Scottish average.

4.4 For July 2003 to June 2004, four mainland trusts, Yorkhill, West Lothian, Argyll & Clyde and Grampian, recorded rates below the lower limit. Low rates were reported from all 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).

Comments

5.1 Overall rates of MRSA bacteraemias in Scotland have not significantly changed in the period reported. The rate between July 2003 and June 2004 of 0.15 per 1000 patient bed days is not significantly different from the rate of 0.17 reported from June 2002 to July 2003. This suggests that, on average, a patient who stays in hospital for 10 days has approximately a one in 650 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.

5.2 Although high rates do not necessarily imply a deficiency on the part of a trust, and may be due to the vulnerability or mobility of its patients, or other factors outside its control, it is important that trusts whose rates fall at the upper end of the national average range examine critically the measures they are taking to control MRSA. However no trust, even those with low rates, should be complacent. The trend within a trust, whether up or down, is as important a measure as its position relative to other trusts. 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.

5.3 SCIEH is currently conducting a validation study into the consistency of reporting MRSA bacteraemias and the results of this study will be used to review the data collection and reporting of this condition. In addition the format of MRSA reporting is being reviewed by the HAI National Surveillance Steering group and shall be modified for the next quarterly report, published in January 2005. The emphasis in future reports will be on comparing MRSA bacteraemia rates across time within a division rather than making comparisons between different institutions with distinct case mixes.

5.4 In order to ensure that all possible MRSA bacteraemias are captured, a mapping process between the current SCIEH MRSA reporting system and the European Antimicrobial Resistance Surveillance System (EARSS) will be carried out. As a result of this process future rates are expected to be higher than those reported previously and in order to provide a comparison with previously published reports the rate produced from the SCIEH reporting system will also be produced.

Acknowledgements

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