

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

JANUARY TO DECEMBER 2001

Published by Scottish Centre for Infection and Environmental Health
Amended January 2003

3 April 2002

Key Points

- This first quarterly report of methicillin-resistant *Staphylococcus aureus* (MRSA) in trusts providing acute care services in Scotland, as required by Health Department Letter (2001)57, provides data on the rates of MRSA bacteraemia in 18 Scottish 'acute hospital trusts' in 2001.
- Recorded MRSA bacteraemia rates in 2001 ranged from 0.0/1000 bed days to 0.34/1000 bed days.
- Comparisons between trusts of the bacteraemia rates should be made **with great caution** for several reasons, including the following:
 - These are initial data and 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 become colonized or infected in the community.
- These initial 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.
- This is the first stage in reporting of MRSA. Development of national reporting to improve data quality and to provide more precise indicators of the impact of MRSA on acute hospital trusts is continuing.

1. Background

1.1 In June 2001, Health Department Letter (2001)57 'A Framework for National Surveillance of Hospital Acquired Infection in Scotland'¹ required trusts to participate in a programme of national surveillance of hospital acquired infection. The first step in this programme is national

reporting of rates of methicillin-resistant *Staphylococcus aureus* (MRSA) bacteraemias to be reported from April 2002. This is the first of the quarterly national reports of MRSA infections in trusts providing acute care services in Scotland.

1.2 MRSA carriage and infection have been regarded as markers of potential or real hospital acquired infection, although community acquired carriage is increasingly reported^{2,3}. MRSA bacteraemias are the best available indicator of true MRSA infection and are therefore a useful measure of the amount of MRSA in hospitals. In this report data are presented on MRSA bacteraemias in Scottish acute NHS trusts in the period January to December 2001.

1.3 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 enables 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.

1.4 These data represent only the first stage in national reporting of MRSA in acute trusts. The data quality will improve over time. *These initial data are a relatively crude measure of MRSA in the trusts and any comparison between trusts has to be made with caution.* Developments planned over the next three years are aimed at providing more in depth analyses and reporting of MRSA in trusts, allowing more reliable conclusions to be drawn.

1.5 MRSA is not the only organism that can cause hospital acquired infections. Developments in national surveillance will address the monitoring of other important organisms which may give rise to hospital acquired infection.

1.6 Surveillance of hospital acquired infections following surgical procedures (surgical site infections) will be reported from April 2003.

2. Data sources, data analysis and reporting

2.1 The figures and tables show the rates of MRSA bacteraemia for each of the 14 acute NHS trusts, one health care trust and three health boards in Scotland in the 12 month period,

January to December 2001 hereafter referred to as ‘trusts’.

2.2 The rate presented in the graphs and table is the number of MRSA bacteraemias identified from patients (‘episodes’ of bacteraemia) in the trust in the 12 month period, divided by a measure of hospital ‘activity’, in this case the total number of occupied ‘patient bed days’ for the period. It is therefore the rate of MRSA bacteraemia per 1000 bed days. When expressed in this way it provides an index of MRSA bacteraemia in the trust that relates the numbers of bacteraemias reported to the total number of days during which patients have been at risk of infection in the period under observation. It does not, however, take account of the actual numbers of patient episodes and of 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 data on the numbers of MRSA bacteraemias have been obtained from the laboratories’ routine reports to the Scottish Centre for Infection and Environmental Health (SCIEH) of the numbers of clinical ‘episodes’ of MRSA, an episode of bacteraemia being defined as having a duration less than two weeks. Routine data reporting was used as the basis for this report in order not to duplicate reporting to SCIEH already being done by laboratories, yet at the same time aiming to have a relatively robust report ready for publication in April 2002. Every effort has been made to ensure that only one ‘episode’ of bacteraemia is included in the numerator i.e. that only one report from the same patient within one illness has been counted, and that other data definitions are consistent between laboratories. At this early stage of MRSA bacteraemia reporting it is difficult to achieve complete consistency of reporting definitions retrospectively, but laboratories are now working towards this objective prospectively. It is also important to note that the numbers include ‘community acquired’

MRSA bacteraemias as well as ‘hospital acquired’ bacteraemias.

2.4 The data on ‘patient bed days’ have been obtained from the Information and Statistics Division (ISD) 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 The data are also presented in the form of a ‘control chart’^{4,5}. 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 individual trusts’ rates fall 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 which lies outside the limits. This could be due to 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 These are initial data based on routine reporting in the 12 months of 2001 when the process of laboratory reporting based on standard definitions in all trusts was not fully in place. The data will improve over time as the application of standard definitions in routine reporting continues to improve and as data accumulate.

Table: MRSA Bacteraemia rates by acute Trust with 95% confidence interval limits: January to December 2001

Trust	Trust Category	MRSA per 1000 bed days	MRSA per 1000 bed days	
			Lower Limit	Upper Limit
1 The Yorkhill NHS Trust	Specialist	0.0000	0.0000	0.0438
2 Shetland Health Board	Island	0.0000	0.0000	0.1298
3 Western Isles Health Board	Island	0.0309	0.0037	0.1115
4 Orkney Health Board	Island	0.0428	0.0013	0.2384
5 Argyll & Clyde Acute Hospitals NHS Trust	General Acute	0.0565	0.0372	0.0822
6 West Lothian Healthcare NHS Trust	General Acute	0.0703	0.0393	0.1159
7 Highland Acute Hospitals NHS Trust	General Acute	0.0750	0.0420	0.1237
8 South Glasgow University Hospitals NHS Trust	Teaching	0.0886	0.0644	0.1189
9 Grampian University Hospitals NHS Trust	Teaching	0.1060	0.0794	0.1387
10 Dumfries & Galloway Acute & Maternity Hospitals NHS Trust	General Acute	0.1127	0.0582	0.1968
11 Ayrshire & Arran Acute Hospitals NHS Trust	General Acute	0.1147	0.0840	0.1530
12 Forth Valley Acute Hospitals NHS Trust	General Acute	0.1267	0.0848	0.1819
13 North Glasgow University Hospitals NHS Trust	Teaching	0.1339	0.1080	0.1598
14 Borders General Hospital NHS Trust	General Acute	0.1876	0.1092	0.3003
15 Lanarkshire Acute Hospitals NHS Trust	General Acute	0.1880	0.1500	0.2328
16 Tayside University Hospitals NHS Trust	Teaching	0.2217	0.1766	0.2748
17 Fife Acute Hospitals NHS Trust	General Acute	0.2503	0.1910	0.3221
18 Lothian University Hospitals NHS Trust	Teaching	0.3358	0.2907	0.3809

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 will 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.

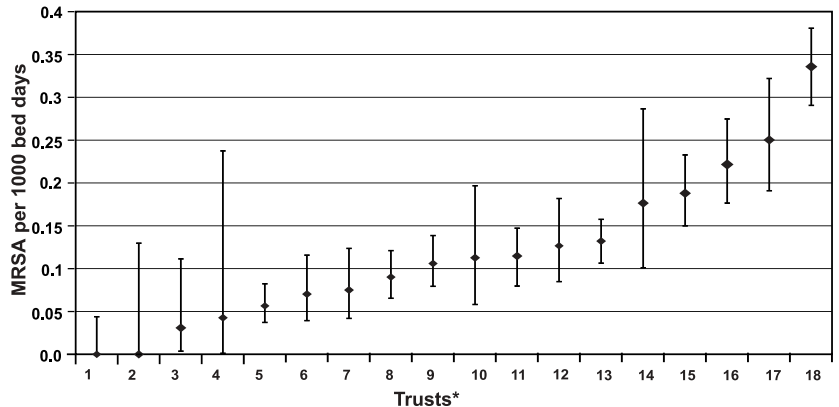
3.5 Data have been obtained from the laboratories in acute trusts that may also provide services to a primary care trust. The reported number of episodes of bacteraemia may therefore include (in the numerator used in the rate calculation) a (probably) small number of MRSA bacteraemias from patients in these non-acute trusts. This will falsely increase the reported MRSA bacteraemia rate. At this stage it has not been possible to remove these infections from the numerator.

3.6 These initial data reflect an overall, and therefore relatively crude MRSA bacteraemia rate but provide an opportunity for trusts to compare themselves with others in Scotland. They can proceed to collect additional data that may throw further light on why these differences exist and examine whether there are measures that can be taken to reduce their own rates. The data also provide a baseline rate that can be used to monitor future trends.

4. Results

4.1 Overall rates of MRSA bacteraemia reported in Scotland in 2001 ranged from 0.0/1000 patient bed days to 0.34/1000 patient bed days (Figure

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



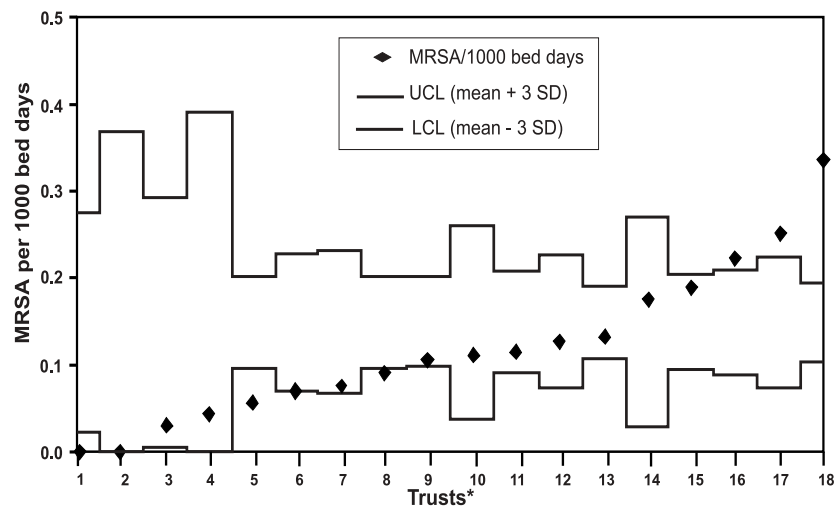
*See Table on page 2 for names of trusts to which numbers refer.

1 and Table). There was little evidence in Scotland of marked differences between university hospitals and other hospitals in the rates of MRSA.

4.2.A very low rate was reported by Yorkhill Hospital in Glasgow, a specialist hospital for children. Low rates were also reported from the island boards but the small numbers of beds in the hospitals within these boards results in a large confidence interval being placed around the rates.

4.3 Figure 2 shows that the majority of Scottish trusts report rates which fall within the defined limits. Three trusts have rates that are slightly above the upper limit of three standard deviations based on the all Scotland rate. Two of these trusts are university hospital trusts. University trusts tend to include more vulnerable patients and patients who have had previous admissions. The reasons for rates which lie above the upper limit will be investigated. Three trusts recorded rates of MRSA during 2001 that were below the lower limit. Again the possible explanations for rates that lie below the lower limit will be explored.

Figure 2: Episodes of MRSA bacteraemia per 1000 total occupied bed days Jan to Dec 2001. In Scottish acute NHS Trusts.



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

5. Comments

5.1 These data provide a measure of the amount of MRSA in hospitals in Scotland during 2001. The range of MRSA bacteraemia rates reported here was 0.0 to 0.34 per 1000 bed days. Data reported from England for the period April to September 2001, using the same measure, report a range for specialist trusts of 0.05 to 0.69 per 1000 bed days and for general acute trusts of 0.01 to 0.41 per 1000 bed days⁶.

5.2 Figure 2 shows that most trusts recorded rates within the limits of +/- three standard deviations of the Scottish rate. All trusts and their constituent hospitals will examine their own local data in the light of the national figures. More detailed examination of the impact of MRSA in hospitals, e.g. with reference to the age, sex and speciality distribution of patients is planned so that some of the differences in rates that are shown in these data can be examined in more detail. Trusts will also 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 Since MRSA was first recognized in the 1960s in British hospitals, it has appeared and spread in most countries worldwide. However, the trends in incidence in different countries has varied, with periods of increasing incidence, epidemics and even decreases in incidence in some countries^{7,8}. Data collected through the European Antimicrobial Resistance Surveillance System (EARSS)⁹ from laboratories in 18 European countries suggest that even within Europe the incidence of MRSA bacteraemia varies widely. The geographical variability in the impact of MRSA is a characteristic of the organism that is not at all well understood. The explanation may lie in variation in antibiotic policies, hygiene arrangements and differences in the strains that have become prevalent in different countries.

5.4 Control of the spread of MRSA depends on the availability of well resourced and fully implemented infection control measures which are supported at the highest levels within the institution, as well as an adherence to appropriate antibiotic prescribing policies^{10,11}. Nonetheless, 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 guidance¹² 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.

5.5 This is the first of a series of quarterly reports of the amount of MRSA bacteraemia in Scottish hospitals. 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 more robust and discerning measures of the impact of MRSA in hospitals can be achieved in Scotland.

Acknowledgements

The Scottish Centre for Infection and Environmental Health is grateful to all the microbiologists in the Scottish laboratories who provided the data for this report and helped in its preparation and to Colin Houston of ISD who provided hospital activity data.

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