

Staphylococcus aureus bacteraemia: England, Wales, and Northern Ireland: July to September 2003

Key points:

- Laboratories in England reported 3899 *Staphylococcus aureus* bacteraemia isolates between July and September 2003 through the voluntary reporting scheme*. A further 1000 *S. aureus* reports (4899) were made via the mandatory reporting scheme†. The trends in mandatory and voluntary reporting of *S. aureus* are considered in the discussion.
- Over the same period there were 203 and 121 voluntary reports of *S. aureus* bacteraemia isolates from laboratories in Wales and Northern Ireland respectively.
- Ninety-two per cent of voluntary reports contained information on susceptibility to methicillin. Methicillin resistance in Wales and Northern Ireland (voluntary reporting) was noted in 47% and 41% of *S. aureus* bacteraemia reports respectively. In England, 39% of *S. aureus* bacteraemias were due to methicillin resistant *Staphylococcus aureus* (MRSA) under both the voluntary and mandatory schemes.
- No reports of vancomycin or linezolid resistance in *S. aureus* bacteraemias were received during this period, and there were just two reports of teicoplanin resistance.
- These data do not distinguish between hospital-acquired and community-acquired infections, in which healthcare setting they may have been acquired, or whether they were acquired in the UK.

* Voluntary reporting: undertaken by most laboratories in England, Wales, and Northern Ireland for many years. Laboratories report individual clinically significant infections on a regular basis, usually weekly.

† Mandatory reporting: established in England in April 2001. Acute NHS Trusts send quarterly aggregate reports of total numbers of *S. aureus* bacteraemias, including MRSA.

Introduction

This report covers *Staphylococcus aureus* bacteraemia reports made during the third quarter of 2003 (July to September) under the voluntary (routine communicable disease reporting by laboratories) and mandatory bacteraemia reporting schemes. These bacteria were isolated from blood cultures with or without cerebrospinal fluid, by laboratories across England, Wales, and Northern Ireland. Wales and Northern Ireland do not participate in this mandatory *S. aureus* surveillance scheme. Rates were calculated using 2002 mid-year resident population estimate denominators for each region. Regional analyses were performed using the English regional boundaries introduced in April 2002.

Staphylococcus aureus

In the three month period July to September 2003, 3899 reports of *S. aureus* bacteraemia were received through the voluntary reporting scheme in England, Wales, and Northern Ireland (3575, 203, 121 respectively) (table 1 and figure 1). Under the mandatory surveillance scheme, there were 4899 *S. aureus* bacteraemia reports from England. Wales and Northern Ireland do not participate in the mandatory methicillin resistant *Staphylococcus aureus* (MRSA) surveillance scheme.

Among the English regions, the West Midlands had

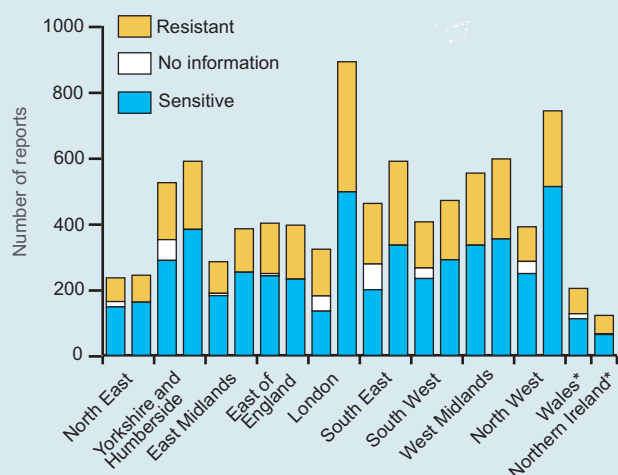
the highest number of reports under the voluntary scheme (553) and London had the highest number of reports under the mandatory scheme (891). The lowest number of reports under both schemes were received from the North East (235 for the voluntary and 243 for the mandatory scheme). London had the greatest discrepancy in MRSA reports made under the voluntary and mandatory schemes, with 253 more reports under the mandatory scheme, and East of England region had the smallest, with 11 more MRSA reports made under the mandatory scheme.

The overall reporting rate of *S. aureus* bacteraemia for England, Wales, and Northern Ireland was 7.2 per 100,000 for the three month period, based on voluntary reporting (figure 2). England had the highest rate (7.2 per 100,000 population) followed by Northern Ireland (7.1/100,000) and Wales (7.0/100,000). Reporting rates within England ranged from 4.4/100,000 in London to 10.5/100,000 in Yorkshire and Humberside.

Antimicrobial susceptibility

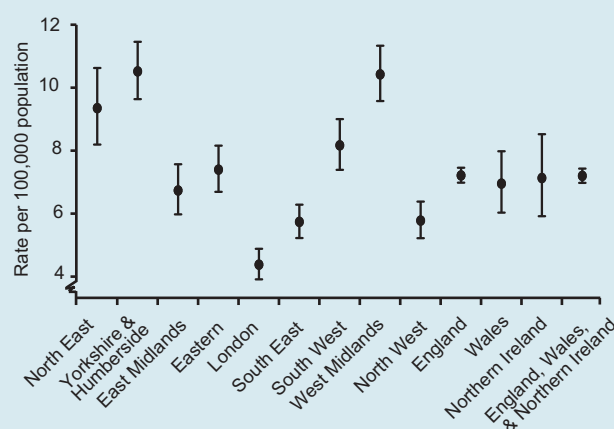
All reports made under the mandatory surveillance scheme include methicillin susceptibility data, whereas 92% of voluntary reports included this information (table 1 and figure 3). There was little variation in the proportion of *S. aureus* bacteraemia isolates resistant to methicillin between the two schemes in the South West (0%), West Midlands (1%), North West (1%), East Midlands (1%), and North East regions (1%). In London,

Figure 1 *Staphylococcus aureus* bacteraemia reports and methicillin susceptibility data, England, Wales, and Northern Ireland: July to September 2003*



*rates calculated using 2002 mid-year resident population estimates

Figure 2 *Staphylococcus aureus* bacteraemia voluntary reporting rates* per 100,000 population (95% confidence intervals): England, Wales, and Northern Ireland, July to September 2003



*rates calculated using 2002 mid-year resident population estimates

Table 1 *Staphylococcus aureus* bacteraemia reports and methicillin susceptibility data*, England, Wales, and Northern Ireland: July to September 2003

Region	Reporting scheme	Resistant	(%†)	Sensitive	No information	(%)	Total
North East	Voluntary	72	33	147	16	7	235
	Mandatory	82	34	161	-	-	243
Yorkshire & Humberside	Voluntary	173	38	288	63	12	524
	Mandatory	207	35	382	-	-	589
East Midlands	Voluntary	96	35	181	7	2	284
	Mandatory	132	34	252	-	-	384
East of England	Voluntary	153	39	241	7	2	401
	Mandatory	164	42	231	-	-	395
London	Voluntary	142	51	134	46	14	322
	Mandatory	395	44	496	-	-	891
South East	Voluntary	184	48	199	78	17	461
	Mandatory	255	43	334	-	-	589
South West	Voluntary	140	38	233	32	8	405
	Mandatory	180	38	290	-	-	470
West Midlands	Voluntary	219	40	334	-	-	553
	Mandatory	243	41	353	-	-	596
North West	Voluntary	105	30	248	37	9	390
	Mandatory	230	31	512	-	-	742
England	Voluntary	1284	39	2005	286	8	3575
	Mandatory	1888	39	3011	-	-	4899
Wales‡	Voluntary	77	41	111	15	7	203
Northern Ireland‡	Voluntary	56	47	63	2	2	121
England, Wales, & Northern Ireland	Voluntary	1417	39	2179	303	8	3899

* provisional data; †R as a percentage of R+S; ‡ Wales and Northern Ireland have separate mandatory surveillance schemes

however, voluntary reporting a 7% higher rate of methicillin resistance than mandatory reporting.

The proportion of *S. aureus* reports without methicillin susceptibility information was highest in reports from the South East (17%), London (14%), and Yorkshire and Humberside regions (12%). Only the West Midlands had complete information on methicillin susceptibility for the July to September 2003 quarter under the voluntary scheme.

Thirty-nine per cent of reports of isolates with methicillin susceptibility information made under the voluntary laboratory reporting scheme for England were resistant to methicillin. This compares to 41% of reports from Wales (77/188) and 47% of reports from Northern Ireland (56/119) (table 1). Of the 4899 reports made via the mandatory scheme in England, 1888 (39%) isolates were reported as resistant to methicillin.

London had the highest percentage of methicillin resistant *S. aureus* (MRSA) isolates (51% voluntary and 44% mandatory) in England (table 1). The North West (30% voluntary and 31% mandatory) and North East regions (33% voluntary and 34% mandatory) had the lowest proportion of methicillin resistant isolates.

Of the reports that included susceptibility data for other antimicrobials, 51% of isolates were reported as resistant to ciprofloxacin, and 37% as resistant to erythromycin. Less than 10% resistance was reported for the remaining antibiotics listed in table 2. No reports of vancomycin or linezolid resistance in *S. aureus* bacteraemias were received during this period and there were just two reports of teicoplanin resistance.

Table 2 *Staphylococcus aureus* bacteraemia reports (voluntary reporting*) and susceptibility data: England, Wales, and Northern Ireland: July to September 2003

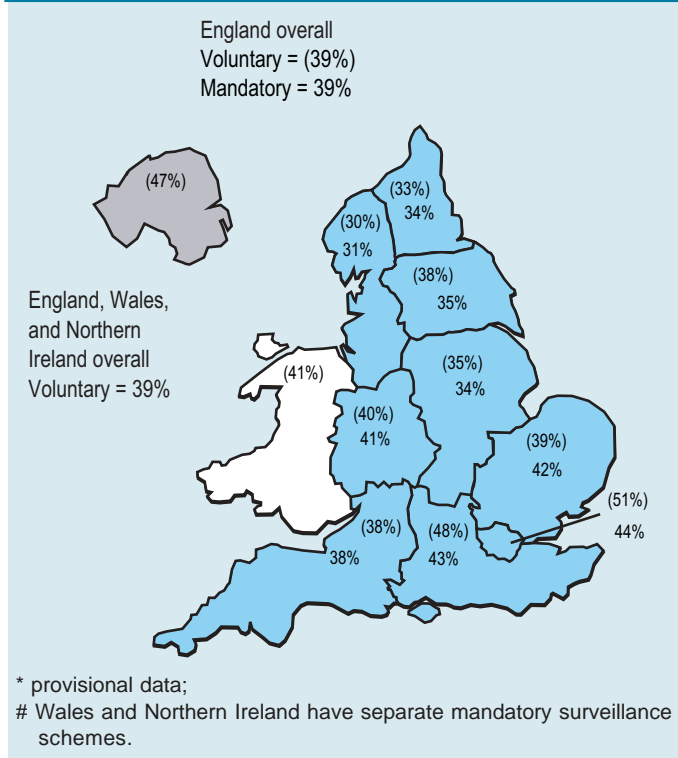
	Resistant	(%)†	Sensitive	No information	(%)‡
Ciprofloxacin	657	51	620	2622	67
Erythromycin	1095	37	1852	952	24
Fusidic acid	237	9	2309	1353	35
Gentamicin	159	6	2582	1158	30
Mupirocin	85	6	1345	2469	63
Rifampicin	85	6	1345	2469	63
Vancomycin	–	–	1582	2317	59
Teicoplanin	2	0.2	1226	2671	69
Linezolid	–	–	160	3739	96

* This information is not available under the mandatory surveillance scheme

† as a percentage of reports with susceptibility information

‡ reports with no susceptibility information as a percentage of total voluntary *S. aureus* reports

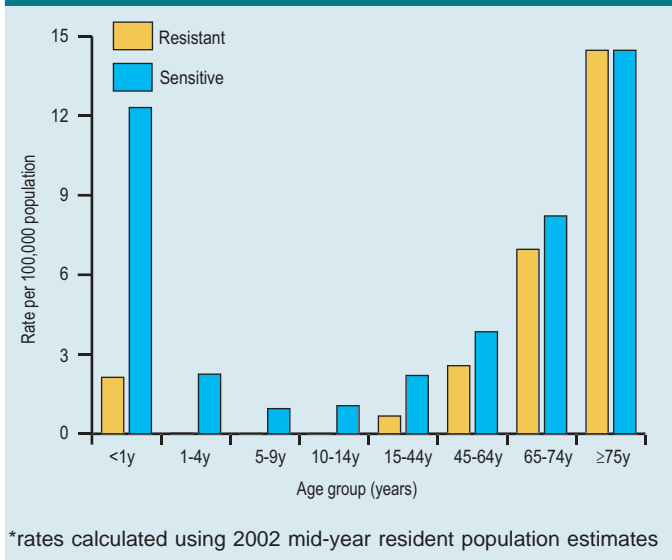
Figure 3 Methicillin resistance in *Staphylococcus aureus* bacteraemia reports*, England, Wales, and Northern Ireland: July to September 2003. MRSA as a percentage of isolates whose susceptibilities were reported



Age distribution

The age-specific rate of MRSA (figure 4) was highest in the 75 years and over age group (14.47 per 100,000 population), followed by the 65 to 74 years and 45 to 64 age groups. This is the same distribution as that reported for the second quarter of 2003. This information is only obtainable from the voluntary reporting scheme and is not included in the mandatory dataset. The proportion of methicillin sensitive *S. aureus* (MSSA) was higher than MRSA for all age groups except the over 75 years age group, where it was equal.

Figure 4 Age-specific *Staphylococcus aureus* bacteraemia rates* and methicillin susceptibility per 100,000 population: England, Wales, and Northern Ireland: July to September 2003 (voluntary reporting)



Discussion

S. aureus bacteraemia reports made from July to September 2003, from both the voluntary and mandatory reporting schemes, are presented here to allow comparison with earlier reports. Caution should be exercised when interpreting data from a short time period such as three months. The data obtained under both schemes (voluntary and mandatory) have been analysed here as the voluntary scheme includes additional information such as age and gender. No distinction is made between community- and hospital-acquired bacteraemias in this analysis, nor is there data to identify the location that the infection was acquired.

Where voluntary and mandatory reporting from England are compared, there is a deficit of 1324 reports. There were, however, no differences in the overall proportion (39%) of *S. aureus* bacteraemias due to MRSA in England under the two schemes. It is noteworthy that the number of reports made under the voluntary scheme has risen by over 30%, while during the same period the number of mandatory reports has risen by less than 10% (1). This would suggest an improvement in the reporting of bacteraemias under the voluntary scheme.

In England, Wales, and Northern Ireland, 92%, 93% and 98% respectively of voluntary *S. aureus* reports included data on methicillin susceptibility. Ninety-two per cent of voluntary reports contained methicillin susceptibility information, which compares to 91% for the same period of 2002 (1) and 93% for the preceding quarter of 2003 (2). All mandatory reports included methicillin susceptibility data.

The proportion of *S. aureus* reports identified as methicillin resistant was very similar when compared to data from the previous report (2), where methicillin resistance of 39% and 40% from the mandatory and voluntary schemes respectively was reported. These results compare well with other surveys such as those produced by the British Society for Antimicrobial Chemotherapy (BSAC) (3) and the European Antimicrobial Resistance Surveillance System (EARSS) (4) and this strengthens the observation made in the previous quarter's report on MRSA (2) that the proportion of *S. aureus* due to MRSA appears to have stabilised at approximately 40%.

There is a wide range in the regional reporting rate for the voluntary reporting scheme (from 4.9 to 10.5 per 100,000 population). This may be due to a number of factors, including regional differences in rates of MRSA and methodological differences in reporting. For example, the rate in the West Midlands is one of the higher rates 10.4 per 100,000 population, which may be due to the fact that this region has complete electronic reporting of both voluntary and mandatory *S. aureus* bacteraemias.

It is interesting to note that the rate has increased from an overall rate of 6.2 per 100,000 population from England, Wales, and Northern Ireland to 7.2/100,000. This increase in the rate may be due, in part, to the use of 2002 mid-year population estimates in this latest quarterly analysis.

The rate of mandatory *S. aureus* reports is 9.9 per

100,000 population for England. This rate is considerably higher than the rate of voluntary reports, suggesting under-reporting of *S. aureus* bacteraemias under the voluntary scheme.

Although 92% of voluntary *S. aureus* reports included data on methicillin susceptibility, only 36% of these reports included ciprofloxacin susceptibility data and 81% included susceptibility data for erythromycin. Thirty-nine per cent of MRSA reports were accompanied by reports of resistance to ciprofloxacin and 65% of MRSA reports included erythromycin resistance. Thirty-one per cent of MRSA isolates were reported with concomitant resistance to ciprofloxacin and erythromycin and only 1% of MSSA reports were reported with this resistance pattern. The higher percentage ciprofloxacin and erythromycin resistance in MRSA isolates compared to MSSA isolates, is consistent with the MRSA isolates belonging to EMRSA-15 and EMRSA-16 strains, which account for the majority of MRSA isolates in England (Livermore DM, Personal communication, 16 December 2003) and which differ in their antimicrobial susceptibilities and treatment options (2,5).

Susceptibility data for other antimicrobials was weak as there was a lack of information on more than 50% of the isolates. These data are similar to those for the previous quarter although the incomplete information makes comparisons with previous data and analyses difficult. There were no reports of vancomycin- or linezolid-resistant bacteraemias and only two reports of teicoplanin resistant bacteraemias.

Laboratories are asked to send any isolates suspected to have full or intermediate glycopeptide resistance or resistance to newer anti-staphylococcal agents, such as linezolid, to the Health Protection Agency (HPA) Antibiotic Resistance Monitoring Reference Laboratory (ARMRL). Suspect isolates will also be typed at the HPA Laboratory of Healthcare Associated Infection (LHCAI) to explore the evolution and spread of new strains.

Acknowledgements

These reports would not be possible without the weekly contributions from microbiology colleagues in laboratories across England, Wales, and Northern Ireland without whom there would be no surveillance data. This is your data, so please tell us what you would like done with it. We are always pleased to hear your views. Please send your comments to Georgia Duckworth, email: georgia.duckworth@hpa.org.uk. The support from colleagues within the HPA's Specialist and Reference Microbiology Division, in particular, is also valued in the preparation of the reports.

References

1. PHLS. *Staphylococcus aureus* bacteraemia: England, Wales, and Northern Ireland, July to September 2002. *Commun Dis Rep CDR Wkly* [serial online] 2002 [cited 16 December 2003]; **12**(38): Bacteraemia. Available at <<http://www.hpa.org.uk/cdr/PDFfiles/2002/cdr3802.pdf>>.
2. Health Protection Agency. *Staphylococcus aureus* bacteraemia: England, Wales, and Northern Ireland,

- April to June 2003. *Commun Dis Rep CDR Wkly* [serial online] 2003 [cited 16 December]; **13**(38): Bacteraemia. Available at <<http://www.hpa.org.uk/cdr/PDFfiles/2003/cdr3803.pdf>>
3. Reynolds RA, Livermore DM, *Resistance among the pathogens of bacteremia in the UK assessed by sentinel surveillance and routine data*. 42nd Interscience Conference on Antimicrobial Agents and Chemotherapy (ICAAC), 2002: p 90.
 4. European Antimicrobial Resistance Surveillance System. *EARSS Annual Report 2002*. Bilthoven, The Netherlands: EARSS, July 2003. Available at <<http://www.earss.rivm.nl>>.
 5. Johnson AP, Aucken HM, Cavendish S, Ganner M, Wale MCJ, Warner M, *et al*. Dominance of EMRSA-15 and -16 among MRSA causing nosocomial bacteraemia in the UK: analysis of isolates from the European Antimicrobial Resistance Surveillance System (EARSS). *J Antimicrob Chemother* 2001; **48**: 141-56.