







# CDR WEEKLY

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## News

Last updated: 16 April 2004  
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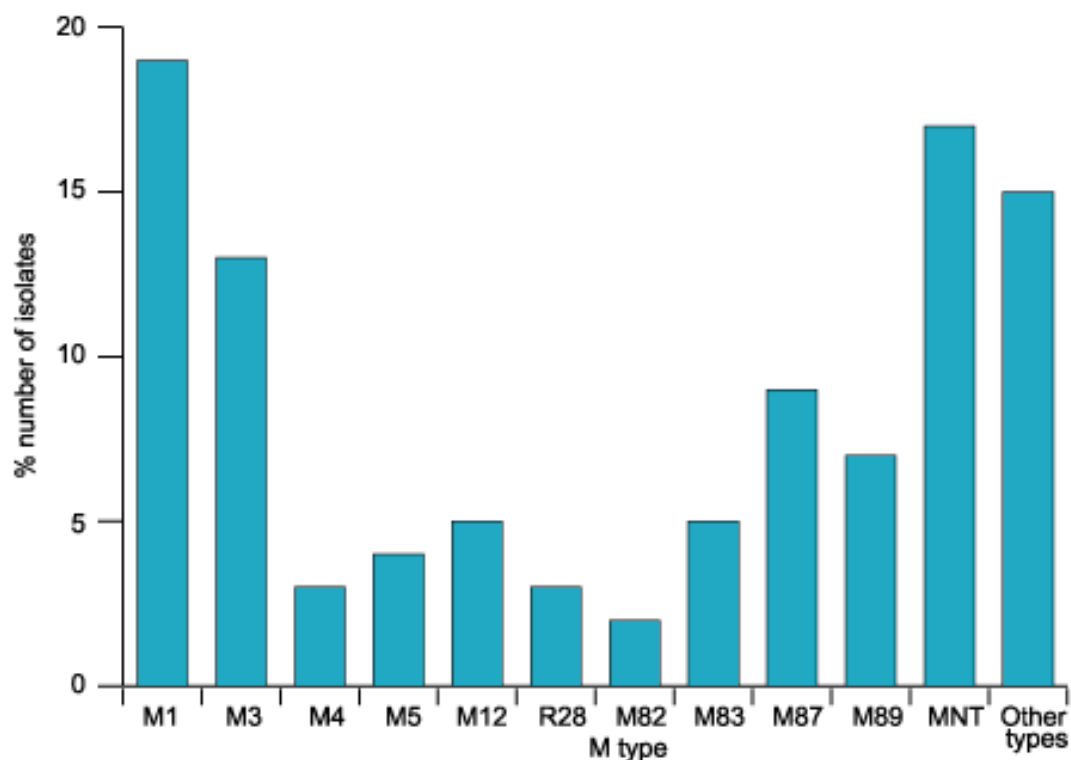
- [First year of the enhanced surveillance of invasive group A streptococcal infections](#)
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## First year of the enhanced surveillance of invasive group A streptococcal infections

Preliminary results from the first year of the enhanced surveillance of invasive group A streptococcal infections in the United Kingdom (UK) illustrate the success in increasing case ascertainment, with reports of group A streptococcal (GAS) bacteraemia having doubled between 2002 and 2003. Initial analysis of reports received thus far indicate a possible 2085 severe group A streptococcal infections in 2003 across England, Wales, Northern Ireland, and the Channel Islands (1). Fifty-five per cent of the cases were male. To date, questionnaires have been received and entered into the database for 60% of cases, and isolates submitted for 77% of cases. Analysis of information available through questionnaires and routine sources indicate that 90% of cases presented with bacteraemia, with or without a primary focus of infection. Among cases for which a specific diagnosis was available 10% presented with septic arthritis, 9% with pneumonia, 6% with toxic shock-like syndrome, 5% with necrotising fasciitis, 3% with puerperal sepsis, and just over 1% with meningitis. One in five of the cases were reported as having died within seven days of initial diagnosis, broadly in line with the previous enhanced surveillance period (1994 to 1997) where the overall mortality rate was 27% (2).

The Health Protection Agency Streptococcus and Diphtheria Reference Unit (SDRU) has so far typed GAS isolates from 1443 blood cultures of specimens taken between 1 January and 31 December 2003, with an overall typability rate of 83% using conventional serological methods. The four predominant serotypes were M1, M3, M87 and M89 (figure 1). The non-typable isolates are currently being further characterised by sequencing of the *emm* gene. The emergence of higher types during this surveillance period contrasts with the type distributions observed during the 1994-1997 enhanced surveillance, where M1, M3, R28, and M12 predominated (3).

**Figure 1 M type distribution of group A streptococcal blood culture isolates submitted to SDRU for typing, January to December 2003**



MNT= on-typable isolates, currently undergoing molecular characterisation. Other types consist of 25 different M types.

The enhanced surveillance of invasive group A streptococcal infections currently underway in the UK is a major component of the European Commission, Fifth Framework Programme (QLK2.CT-2002-01398) on 'Severe *Streptococcus pyogenes* disease in Europe', (Strep-EURO) (4). The main aims are to determine and compare the overall disease burden, type distributions and antimicrobial susceptibility patterns of isolates and clinical manifestations of severe group A streptococcal disease across 11 European countries. The UK enhanced surveillance is a joint collaboration between the HPA Respiratory and Systemic Infection Laboratory and the Healthcare Associated Infections and Antimicrobial Resistance Department and commenced on 1 January 2003 for a period of two years (5).

To maximise case ascertainment, data on isolate referrals to the national reference laboratory (SDRU) have been merged with routine laboratory reports made to the Communicable Disease Surveillance Centre (CDSC) through the creation of a 'satellite' database. Microbiologists reporting cases through routine reporting methods or submitting isolates to SDRU are sent a survey questionnaire asking for further information. Cases are defined by the isolation of group A *Streptococcus* from a site that is normally sterile (blood, cerebrospinal fluid, joint aspirates, abscesses, pericardial/peritoneal fluid, deep tissue at operation or necropsy, and bone).

Microbiologists are requested to complete any outstanding questionnaires and to continue to submit *all* sterile-site group A streptococcal isolates to SDRU.

Further details, including the enhanced surveillance questionnaire, can be found on the HPA strep-EURO web page at <<http://www.hpa.org.uk/hpa/inter/strep-EURO.htm>>.

## References

1. HPA. Pyogenic and non-pyogenic streptococcal bacteraemias, England, Wales, and Northern Ireland: 2003. *Commun Dis Rep Weekly* [serial online] 2004 [cited 16 April 2004]; **14**(16): Bacteraemia. Available at: <<http://www.hpa.org.uk/cdr/PDFfiles/2004/cdr1504.pdf>>.
2. Efstratiou A. Group A streptococci in the 1990s. *J Antimicrob Chemother* 2000; **45** Suppl: 3-12.
3. CDSC. Invasive group A streptococcal infections: first report of enhanced surveillance. *Commun Dis Rep Weekly* [serial online] 1995 2004 [cited 16 April 2004]; **5**(10). Available at <<http://www.hpa.org.uk/cdr/CDR95/cdr1095.pdf>> .
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## Illness in England, Wales, and Northern Ireland associated with foreign travel

The Health Protection Agency has published a baseline report on travel-associated illness, *Illness in England, Wales, and Northern Ireland associated with foreign travel*, following the first year of operation of its new Travel Health Surveillance Section, which was set up to monitor such illness as part of the National Travel Health Network and Centre (NaTHNaC), an English Department of Health initiative to promote clinical standards in travel medicine.

The report, includes data up to 2002 and has been produced in order to assess current travel health surveillance in England, Wales, and Northern Ireland, as surveillance information should contribute to the evidence base for the guidance issued by NaTHNaC. It brings together the surveillance data currently available on imported infections from many Health Protection Agency departments both within and outside CDSC, highlights the limitations associated with data currently available and makes recommendations for the improvement of surveillance of travel-associated illness.

With the increase in foreign travel by UK residents to destinations both in Europe and the Tropics and the emergence and re-emergence of infectious diseases such as SARS, influenza, and west Nile fever, which can spread rapidly worldwide, it is essential to have good surveillance systems for travel-associated illnesses. This in turn relies upon clinicians providing accurate travel histories on pathology request and notification forms for the patients they see with travel-associated illness.

*Illness in England, Wales, and Northern Ireland associated with foreign travel*, can be found on the HPA website at <[http://www.hpa.org.uk/infections/topics\\_az/travel/publications.htm](http://www.hpa.org.uk/infections/topics_az/travel/publications.htm)>.

The report can be downloaded in full, or by the chapter, with accompanying PowerPoint slides. Printed copies will be distributed to consultants in communicable disease control, regional epidemiologists, and reporting laboratories.



## Summary guidance (algorithm) for the identification of possible cases of SARS and avian influenza

The Health Protection Agency has published an algorithm on the HPA website to assist in the recognition of possible SARS and avian influenza in patients presenting with unexplained respiratory illness. The algorithm summarises the clinical and epidemiological assessment, infection control measures, and appropriate sampling and reporting mechanisms clinicians should undertake when considering a diagnosis of SARS or avian influenza.

As this constitutes interim guidance, comments are welcomed from clinicians who gain experiencing in using the algorithm, to assist its future development. Contact details are included in the text, which can be found at: <[http://www.hpa.org.uk/infections/topics\\_az/avianinfluenza/guidelines.htm](http://www.hpa.org.uk/infections/topics_az/avianinfluenza/guidelines.htm)>.

Additional guidance for SARS and avian influenza can be found on the website at:

<[http://www.hpa.org.uk/infections/topics\\_az/avianinfluenza/menu.htm](http://www.hpa.org.uk/infections/topics_az/avianinfluenza/menu.htm)> and <[http://www.hpa.org.uk/infections/topics\\_az/SARS/menu.htm](http://www.hpa.org.uk/infections/topics_az/SARS/menu.htm)>.

Recently published documents include the HPA contingency plan for SARS, and guidance for hospitals on the clinical management of SARS that was drafted by the British Thoracic Society in consultation with the HPA.

Please note that information and guidance are maintained in accordance with the current levels of SARS and human cases of avian influenza reported worldwide. These levels are constantly monitored by the HPA.



## Fall in antibiotic prescribing for children



Recently published data show that antibiotic prescribing in England for children by general practitioners decreased by 47% over the decade 1993 to 2002 (from 12.4 million to 6.5 million items per annum) (1). This represented a much greater fall in prescribing in children than for the whole population. On average, around 1330 and 710 items were dispensed per 1000 children aged under 14 years in 1993 and 2002 respectively. The cause of this sharp fall is unclear. Use of the three most used antibiotics for children — amoxicillin, erythromycin, and phenoxymethylpenicillin — reduced by 42%, 62%, and 47% respectively. Ampicillin and co-trimoxazole use both reduced by over 95% whereas use of flucloxacillin markedly increased by 114%. These encouraging data were made public at the annual scientific meeting of the Royal College of Paediatrics and Child Health by authors from the Prescription Pricing Authority and St George's Hospital London, reporting a study undertaken for the National Specialist Advisory Committee for Antimicrobial Resistance.

### References

1. Kendall HE, Holdsworth S, Sharland M. GP antibiotic prescribing for children in England has halved in the past decade. *Arch Dis Childhood* (Abstract) Conference Proceedings 8th RCPCH Spring Meeting 29 March-1 April 2004, University of York. Available at <[http://adc.bmjournals.com/content/vol89/suppl\\_1/](http://adc.bmjournals.com/content/vol89/suppl_1/)>.

**Bacteraemia**

Last updated: **16 April 2004**  
 Next update due: **20 May 2004**

-  [Staphylococcus aureus bacteraemia: England, Wales, and Northern Ireland: January to December 2003](#)
-  [Pyogenic and non-pyogenic streptococcal bacteraemias, England, Wales, and Northern Ireland: 2003](#)

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**Staphylococcus aureus bacteraemia: England, Wales, and Northern Ireland: October to December 2003** 
**Key points:**

- In 2003, 15,081 *Staphylococcus aureus* bacteraemia reports (12% increase on 2002) were received from England (13,770), Wales (742), and Northern Ireland (569) under the voluntary laboratory reporting scheme\*.
- In 2003, 19,244 reports were received from England under the mandatory reporting scheme†. This represents a 6% increase on 2002.
- There were 28% more *S. aureus* isolates reported under the mandatory scheme than the voluntary scheme in England.
- Methicillin resistance as a proportion of *S. aureus* bacteraemias with susceptibility information was 41%, 47%, and 44% for England, Wales, and Northern Ireland respectively (voluntary reporting). Under the English mandatory scheme methicillin resistant *Staphylococcus aureus* (MRSA) accounted for 39% of the total susceptibility reports.
- Regional differences in the proportion of *S. aureus* bacteraemia reported as methicillin resistant between the voluntary and mandatory reporting schemes in England ranged from <1% to 6%.
- Numbers of reports of both MRSA and methicillin sensitive *S. aureus* (MSSA) bacteraemia increased again in 2003 over the previous year.
- There has been a continuing improvement in the reporting of methicillin susceptibility under the voluntary scheme, this information having been provided in 93% of reports in 2003.
- No confirmed vancomycin intermediate resistant *S. aureus* bacteraemia isolates (GISA) were reported in 2003.

\*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. Data include information on the patients age and the antimicrobial susceptibilities of the reported pathogen.

†Mandatory reporting: established in England in April 2001. Acute NHS Trusts send quarterly aggregate reports of total numbers of *S. aureus* bacteraemias, including MRSA. No information on individual cases.

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**Pyogenic and non-pyogenic streptococcal bacteraemias, England, Wales, and Northern Ireland: 2003** 
**Key points:**

- This report contains data from 2003, derived from routine laboratory reports of streptococcal bacteraemia\* together with enhanced surveillance of group A streptococci derived from a combination of routine laboratory reporting and isolate referrals to the Health Protection Agency's Streptococcus and Diphtheria Reference Unit (SDRU)†.
- Reports of streptococcal bacteraemias from laboratories in England, Wales, and Northern Ireland in 2003 all increased from 2002: group A 1870, group B 1182, group C 257, group G 698, and non-pyogenics 3791. These continuing yearly increases are probably explained by improved ascertainment and the 2003 programme of enhanced surveillance for group A streptococci.
- Rates of both pyogenic and non-pyogenic streptococcal bacteraemia reports in males exceeded those for females across almost all age groups.

- An increasing proportion of reports were accompanied by susceptibility data in 2003 when compared to the previous two years, but reporting rates for antibiotic susceptibility results are still low for a number of streptococcal groups.
- Overall, there is not much change in resistance patterns for all mentioned streptococcal species groups compared to the previous year.
- As in 2001 and 2002, no penicillin resistance in pyogenic streptococci was confirmed in 2003.
- Erythromycin resistance in group C streptococci has increased from approximately 7% to 8% in 2001 and 2002, to 13% in 2003.
- Resistance to erythromycin has remained fairly constant in groups A, B, and G streptococci.
- High rates of tetracycline resistance were observed in group B streptococci (approximately 75%) as seen in other studies. This high rate remains, so far, unexplained, as pregnant/nursing women and children are not prescribed tetracycline.

\*With the exception of *Streptococcus pneumoniae* which is reported separately.

†Enhanced surveillance of group A streptococci commenced January 2003.

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# Staphylococcus aureus bacteraemia: England, Wales, and Northern Ireland: January to December 2003

## Key points:

- In 2003, 15,081 *Staphylococcus aureus* bacteraemia reports (12% increase on 2002) were received from England (13,770), Wales (742), and Northern Ireland (569) under the voluntary laboratory reporting scheme\*.
- In 2003, 19,244 reports were received from England under the mandatory reporting scheme†. This represents a 6% increase on 2002.
- There were 28% more *S. aureus* isolates reported under the mandatory scheme than the voluntary scheme in England.
- Methicillin resistance as a proportion of *S. aureus* bacteraemias with susceptibility information was 41%, 47%, and 44% for England, Wales, and Northern Ireland respectively (voluntary reporting). Under the English mandatory scheme methicillin resistant *Staphylococcus aureus* (MRSA) accounted for 39% of the total susceptibility reports.
- Regional differences in the proportion of *S. aureus* bacteraemia reported as methicillin resistant between the voluntary and mandatory reporting schemes in England ranged from <1% to 6%.
- Numbers of reports of both MRSA and methicillin sensitive *S. aureus* (MSSA) bacteraemia increased again in 2003 over the previous year.
- There has been a continuing improvement in the reporting of methicillin susceptibility under the voluntary scheme, this information having been provided in 93% of reports in 2003.
- No confirmed vancomycin intermediate resistant *S. aureus* bacteraemia isolates (GISA) were reported in 2003.

\*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. Data include information on the patients age and the antimicrobial susceptibilities of the reported pathogen.

†Mandatory reporting: established in England in April 2001. Acute NHS Trusts send quarterly aggregate reports of total numbers of *S. aureus* bacteraemias, including MRSA. No information on individual cases.

## Introduction

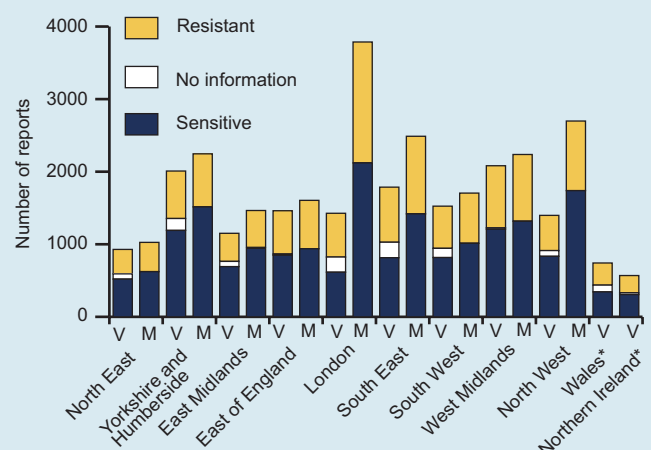
This report covers *Staphylococcus aureus* bacteraemias diagnosed between January and December 2003 under the voluntary laboratory reporting schemes in England, Wales, and Northern Ireland. These reports comprise bacteria isolated from blood cultures with or without cerebrospinal fluid. The data from the mandatory reporting scheme in England (established April 2001) are also included here. Northern Ireland (1) and Wales have their own mandatory methicillin resistant *Staphylococcus aureus* (MRSA) bacteraemia reporting schemes, which are not covered in this report.

Rates were calculated using 2002 resident population denominators. Regional analyses were performed using the English regional boundaries introduced in April 2002.

## Reporting of *Staphylococcus aureus* bacteraemias

A total of 15,081 *S. aureus* bacteraemias were reported in England (13,770), Wales (742), and Northern Ireland (569) through the voluntary reporting scheme in 2003. This compares to 19,244 reports under the mandatory scheme in England, a 28% deficit (table 1 and figure 1). Among the English regions, the West Midlands region had the highest number of reports (2082) under the

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



\*Wales & Northern Ireland do not take part in the English mandatory surveillance scheme; V = Voluntary, M = Mandatory.

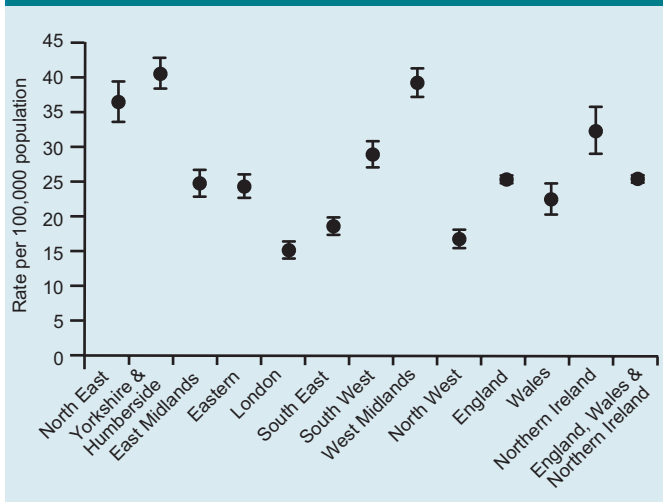
voluntary scheme, and London (3787) the highest number under the mandatory scheme. Fewest reports were received from the North East region under both schemes (929 for the voluntary and 1026 for the mandatory scheme). All regions reported higher



numbers of *S. aureus* bacteraemias under the mandatory than the voluntary scheme. The greatest discrepancy in reporting between the schemes was noted for London (62%) and the North West (48%), where 2360 and 1300 more reports, respectively, were reported under the mandatory scheme. The smallest discrepancy was in the West Midlands (7%).

The voluntary *S. aureus* bacteraemia reporting rate for England, Wales, and Northern Ireland overall was 27.8 per 100,000 population in 2003. This comprised rates of 27.8, 25.2, and 33.5/100,000 for England, Wales, and Northern Ireland respectively (figures 2 and 3). Within England, reporting rates ranged from 19.4/100,000 in London to 40.3/100,000 in the Yorkshire and Humberside region. Using the mandatory scheme data, the *S. aureus* bacteraemia reporting rate for England was 38.8/100,000 (figure 3). Under the mandatory scheme within England, reporting rates ranged from 29.6/100,000 in the East of England region to 51.5/100,000 in London.

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



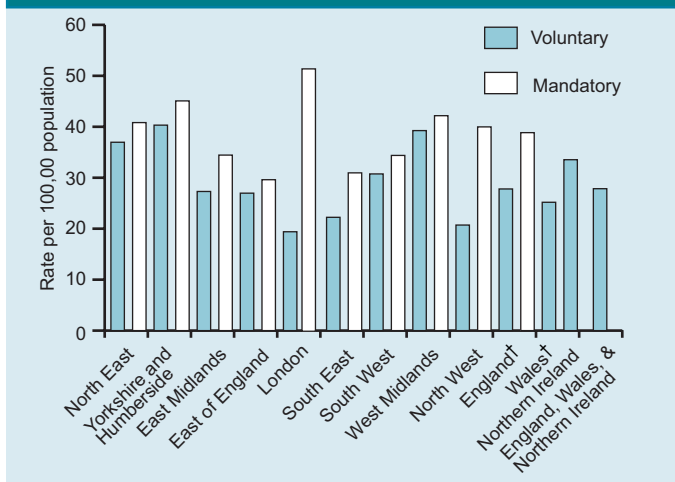
\*rates calculated using 2002 mid-year resident population estimates.

**Table 1** *Staphylococcus aureus* bacteraemia reports and methicillin susceptibility data\*, England, Wales, and Northern Ireland: January to December 2003

Region	Reporting scheme	Resistant	Sensitive	No information	(%†)	Total	(% Difference‡)
North East	Voluntary	337	520	72	8	929	9
	Mandatory	403	623	–	–	1026	
Yorkshire & Humberside	Voluntary	654	1191	164	8	2009	11
	Mandatory	731	1515	–	–	2246	
East Midlands	Voluntary	387	692	72	6	1151	21
	Mandatory	507	945	–	–	1452	
East of England	Voluntary	596	850	16	1	1462	9
	Mandatory	667	938	–	–	1605	
London	Voluntary	603	615	209	15	1427	62
	Mandatory	1666	2121	–	–	3787	
South East	Voluntary	759	815	213	12	1787	28
	Mandatory	1069	1419	–	–	2488	
South West	Voluntary	581	817	127	8	1525	11
	Mandatory	692	1013	–	–	1705	
West Midlands	Voluntary	854	1208	20	1	2082	7
	Mandatory	920	1317	–	–	2237	
North West	Voluntary	485	834	79	6	1398	48
	Mandatory	959	1739	–	–	2698	
England	Voluntary	5256	7542	972	7	13,770	28
	Mandatory	7614	11,630	–	–	19,242	
Wales§	Voluntary	305	344	93	13	742	
Northern Ireland§	Voluntary	238	307	24	4	569	
England, Wales, & Northern Ireland	Voluntary	5799	8193	1089	7	15,081	

\*provisional data; †No information as a percentage of total reports; ‡Percentage difference between voluntary and mandatory reporting schemes; § Wales and Northern Ireland do not take part in the English mandatory surveillance scheme.

**Figure 3** *Staphylococcus aureus* bacteraemia reporting rates\* per 100,000 population (95% confidence intervals): England, Wales, and Northern Ireland: January to December 2003



\*rates calculated using 2002 mid-year resident population estimates.  
 †Wales and Northern Ireland do not take part in the English mandatory surveillance scheme.

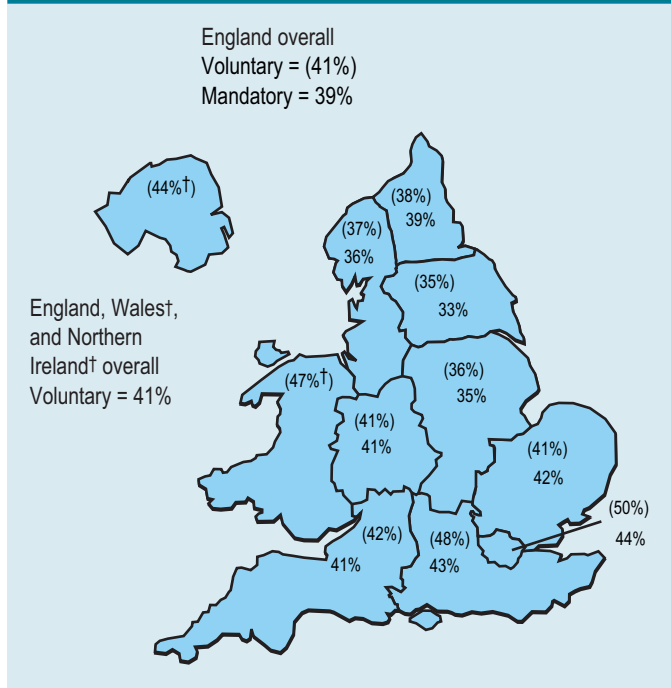
### Antimicrobial susceptibility

Methicillin susceptibility data for *S. aureus* bacteraemia reports received under the voluntary and mandatory schemes in 2003 are shown in table 1 and figures 1 and 4. By definition, information on methicillin susceptibility is complete under the mandatory scheme. This information, however, is not always given under the voluntary laboratory reporting scheme. In England, Wales, and Northern Ireland, 93% of voluntary reports of *S. aureus* bacteraemias (13,992/15,081) included this information in 2003, an improvement of 1% on 2002 (2). Within England, there has been an increase in the total number of *S. aureus* reports: 10,338 in 2000 (4), 11,852 (13% increase) in 2001 (3), 12,284 (4% increase) in 2002 (2), and 13,770 (11% increase) in 2003. During this period, there has been an increase in the proportion of reports with susceptibility information to methicillin, 84% (2000), 90% (2001) 92% (2002), and 93% (2003). In Wales and Northern Ireland, 87% and 96% respectively of *S. aureus* bacteraemia voluntary reports included methicillin susceptibility information.

Under the voluntary scheme, the London region had the highest proportion of reports without methicillin susceptibility information (15%, 209 reports), followed by the South East (12%, 213 reports). Yorkshire and Humberside (164 reports), the South West (127 reports), and the North East (72 reports) all had 8% of reports lacking methicillin susceptibility information. Nearly all reports from the East of England and West Midlands regions (1% missing) included methicillin susceptibility information.

In England, methicillin resistance was reported in 41% (5256/12,798) of *S. aureus* bacteraemias with susceptibility information under the voluntary

**Figure 4** Methicillin resistance in *Staphylococcus aureus* bacteraemia reports\*: England, Wales, Northern Ireland: January to December 2003. MRSA as a percentage of isolates whose susceptibilities were reported



\*Provisional data.  
 †Wales and Northern Ireland do not take part in the English mandatory surveillance scheme.

scheme, and in 39% (7614/19,244) of *S. aureus* bacteraemia isolates under the mandatory scheme. This compares to 42% and 39% respectively from these schemes for January to December 2002 (2). In Wales and Northern Ireland, methicillin resistance was reported in 47% (same as 2002 data)(2) and 44% (an increase of 6% on 2002 data) of *S. aureus* bacteraemia reports respectively. Within England, an increase in the number of both MRSA and MSSA was also seen during this period.

The highest proportion of *S. aureus* methicillin resistant bacteraemia reports in England were in London (50% voluntary and 44% mandatory) and the South East (48% voluntary and 43% mandatory) (table 1 and figures 1 and 4). Conversely, the lowest proportion of MRSA bacteraemia was seen in Yorkshire and Humberside (35% voluntary and 33% mandatory) (table 1 and figures 1 and 4). All regions with the exception of East of England reported slightly higher proportions of MRSA under the voluntary scheme than under the mandatory scheme. Within English regions, the difference in the proportions of *S. aureus* bacteraemias reported as methicillin resistant under the voluntary and mandatory schemes ranged from <1% to 2% for most regions. Exceptions to this were London (6%) and South East (5%).

Of the reports that included susceptibility data for other antimicrobials, 54% of isolates were reported as resistant to ciprofloxacin (53% were reported resistant in 2002), and 39% were reported as resistant to erythromycin (41% in 2002). Less than 10% resistance

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

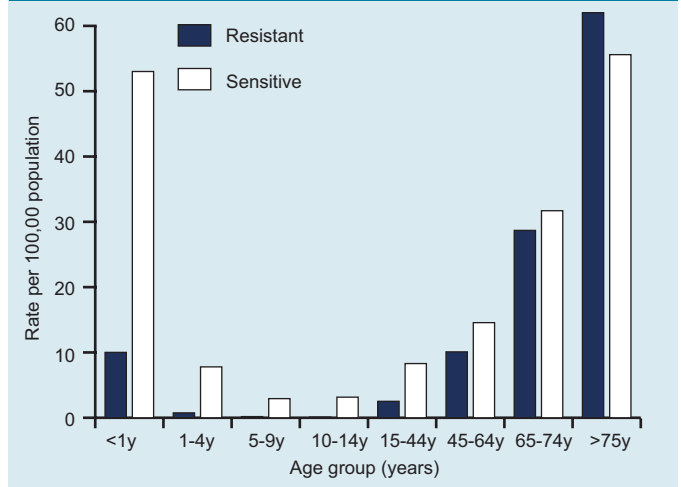
	Resistant	(%)†	Sensitive	No information	(%)‡
Ciprofloxacin	2590	54	2241	10,250	68
Erythromycin	4338	39	6863	3880	26
Fusidic acid	925	9	9053	5103	34
Gentamicin	553	5	9892	4636	31
Mupirocin	308	6	5142	9631	64
Rifampicin	196	3	6483	8402	56
Vancomycin	–	–	9413	5668	38
Teicoplanin	7	0.1	4772	10,302	68
Linezolid	–	–	656	14,425	96

\*This information is not available under the mandatory surveillance scheme.

†R as a percentage of R+S.

‡No information as a percentage of total reports.

**Figure 5** Age-specific *Staphylococcus aureus* bacteraemia voluntary reporting rates\* and methicillin susceptibility per 100,000 population, England, Wales, and Northern Ireland: January to December 2003



\*rates calculated using 2002 mid-year resident population estimates.

was reported for the remaining antibiotics listed in table 2.

Although seven reports were initially made of vancomycin intermediate resistance in *S. aureus* bacteraemias in 2003 (glycopeptide-intermediate *S. aureus* [GISA]), five were confirmed to be sensitive and the others were unconfirmed. There were seven reports of teicoplanin resistance and no reports of linezolid resistance during 2003.

### Age distribution

This information is only obtainable from the voluntary reporting scheme as it is not currently included in the mandatory dataset. For MSSA the highest age-specific rate was noted in those aged 75 years and over (55.6 per 100,000 population), followed by those aged under 1 year (53.0/100,000) (figure 5). The MSSA rates were higher than MRSA for all the age groups except the 75 years and over age group. The highest age-specific rate for MRSA was noted in those aged 75 years and over (62.0/100,000), followed by the 65 to 74 years age group (28.7/100,000).

### Discussion

In 2003 the numbers of *S. aureus* bacteraemia reports increased under the voluntary reporting scheme in England compared to 2001(3) and 2002(2), with both MRSA and MSSA increasing during this period (2,3). Just under a third more reports of *S. aureus* bacteraemia were received under the mandatory scheme in England. Regional differences between the two schemes ranged from 7% to 62% in 2003. These differences will need to be addressed in light of the anticipated change in the method for reporting the mandatory *S. aureus* bacteraemia data from the quarterly aggregate

reporting of total numbers of bacteraemias to regular reporting of individual bacteraemias. The voluntary scheme is also useful in allowing comparison with previous years and brings in additional information in terms of affected age groups and other antimicrobial susceptibilities, but has the drawback that information on methicillin susceptibility is not always complete. Last year (*ie*, 2003) marked another improvement in this, from 92% (2) to 93% of *S. aureus* bacteraemia reports having information on methicillin susceptibility compared to 2002.

Comparison with previous years under the voluntary scheme suggests that the proportion of *S. aureus* bacteraemias due to MRSA may be stabilising at around 40%. In Wales, the proportion of *S. aureus* bacteraemias due to MRSA appears to have stabilised at around 45% to 47% (2,3) whereas in Northern Ireland the proportion of *S. aureus* bacteraemias due to MRSA has increased from 38% in 2002 to 44% in 2003. The highest population rates of *S. aureus* bacteraemia reports in 2003 were in Northern Ireland (33.5/100,000) compared to England (27.8/100,000) and Wales (25.4/100,000). The rate for England under the mandatory scheme was 38.8/100,000. The reporting rate under the mandatory scheme probably now gives a reasonable idea of the true rate of *S. aureus* bacteraemias in the population.

Despite these general improvements in reporting, some regions still have large discrepancies in terms of numbers of bacteraemias reported under both the voluntary and mandatory schemes, and there is an urgent need to remedy this situation. It is notable, however, that despite these discrepancies, the proportion of *S. aureus* bacteraemias due to MRSA are remarkably similar in each region between the two schemes, there being only a 1% to 2% difference in all but two regions. For most regions, the proportion of MRSA is slightly lower under the mandatory scheme, indicating a slight bias towards reporting MRSA in the voluntary scheme.

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's Antibiotic Resistance Monitoring Reference Laboratory (ARMRL), Colindale. 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 enduring weekly contributions from microbiology colleagues in laboratories across England, Wales, and Northern Ireland, without which 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/feedback to Andrew Pearson (andrew.pearson@hpa.org.uk) or Allison Lee (allison.lee@hpa.org.uk). In addition, the support from colleagues within the Health Protection Agency's Specialist and Reference Microbiology Division, in particular, is valued in the preparation of the reports. These contributions are greatly appreciated.

### **Reference List**

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# Pyogenic and non-pyogenic streptococcal bacteraemias, England, Wales, and Northern Ireland: 2003

## Key points:

- This report contains data from 2003, derived from routine laboratory reports of streptococcal bacteraemia\* together with enhanced surveillance of group A streptococci derived from a combination of routine laboratory reporting and isolate referrals to the Health Protection Agency's Streptococcus and Diphtheria Reference Unit (SDRU)†.
- Reports of streptococcal bacteraemias from laboratories in England, Wales, and Northern Ireland in 2003 all increased from 2002: group A 1870, group B 1182, group C 257, group G 698, and non-pyogenics 3791. These continuing yearly increases are probably explained by improved ascertainment and the 2003 programme of enhanced surveillance for group A streptococci.
- Rates of both pyogenic and non-pyogenic streptococcal bacteraemia reports in males exceeded those for females across almost all age groups.
- An increasing proportion of reports were accompanied by susceptibility data in 2003 when compared to the previous two years, but reporting rates for antibiotic susceptibility results are still low for a number of streptococcal groups.
- Overall, there is not much change in resistance patterns for all mentioned streptococcal species groups compared to the previous year.
- As in 2001 and 2002, no penicillin resistance in pyogenic streptococci was confirmed in 2003.
- Erythromycin resistance in group C streptococci has increased from approximately 7% to 8% in 2001 and 2002, to 13% in 2003.
- Resistance to erythromycin has remained fairly constant in groups A, B, and G streptococci.
- High rates of tetracycline resistance were observed in group B streptococci (approximately 75%) as seen in other studies. This high rate remains, so far, unexplained, as pregnant/nursing women and children are not prescribed tetracycline.

\*With the exception of *Streptococcus pneumoniae* which is reported separately.

†Enhanced surveillance of group A streptococci commenced January 2003.

## Pyogenic streptococci Group A streptococci

Enhanced surveillance of severe invasive group A streptococcal infections was introduced in January 2003 (1). Group A streptococcal infections increased from 839 and 921 cases in 2001 and 2002, respectively, to 1870 in 2003 (an increase of 103% between 2002 and 2003) (2,3) (table 1). The rate of bacteraemia due to group A streptococci in England, Wales, and Northern Ireland in 2003 was 3.5 per 100,000 population, ranging from 2.8/100,000 in the East of England region to 6.3/100,000 in Yorkshire and Humberside (table 2). Resistance to penicillin was not found, while resistance to erythromycin (nationally) was between 3% and 4% over the three year period (table 3). Although the prevalence of resistance to tetracycline appeared to increase, from 10% in 2001, to 12% and 16% in 2002 and 2003, respectively, approximately half the reports

obtained in 2003 lacked data for tetracycline (tables 3 and 4).

## Group B streptococci

Reports for bacteraemia due to group B streptococci have increased consistently for the past three years (table 1). Group B streptococcal bacteraemias were concentrated in the under 1 year age group, with rates of 57 and 54 per 100,000 population, for males and females respectively (figure 1). A total of 340 cases (229 early-onset disease and 111 late-onset disease) in infants aged under 90 days were reported during 2003 (table 5). The incidence rate per 1000 live births was 0.55 overall with a rate of 0.37 for early-onset and a rate of 0.18 for late-onset disease (table 5). Although the proportion of reports accompanied by susceptibility data increased between 2001 and 2003, there were, nonetheless, a substantial number of



Table 1 Laboratory reports of streptococcal bacteraemia, England, Wales, and Northern Ireland: 2003				
<i>Streptococcus</i> spp*		2001	2002	2003
Pyogenic streptococci	group A streptococci	839	921	1870 <sup>†</sup>
	group B streptococci	898	991	1182
	group C streptococci	154	206	257
	group G streptococci	542	580	698
	<b>Total</b>	<b>2433</b>	<b>2698</b>	<b>4007</b>
'anginosus group'	<i>Streptococcus anginosus</i>	140	137	140
	<i>Streptococcus constellatus</i>	96	131	163
	<i>Streptococcus intermedius</i>	68	60	55
	' <i>Streptococcus milleri</i> group'	101	143	197
	Streptococcus group F	24	37	36
<b>Total</b>	<b>429</b>	<b>508</b>	<b>591</b>	
'bovis group'	<i>Streptococcus bovis</i>	138	185	175
	<i>Streptococcus bovis</i> biotype I	20	7	17
	<i>Streptococcus bovis</i> biotype II	12	12	14
	<i>Streptococcus equinus</i>	13	9	10
	<i>Streptococcus alactolyticus</i>	1	2	2
<b>Total</b>	<b>184</b>	<b>215</b>	<b>218</b>	
'mitis group'	<i>Streptococcus mitis</i>	10	20	26
	<i>Streptococcus mitior</i>	–	3	5
	<i>Streptococcus oralis</i>	227	239	295
	' <i>Streptococcus mitis</i> group'	461	483	624
<b>Total</b>	<b>698</b>	<b>745</b>	<b>950</b>	
'mutans group'	<i>Streptococcus mutans</i>	30	41	42
	<b>Total</b>	<b>30</b>	<b>41</b>	<b>42</b>
'salivarius group'	<i>Streptococcus salivarius</i>	121	168	155
	<i>Streptococcus vestibularis</i>	17	19	26
	<b>Total</b>	<b>138</b>	<b>187</b>	<b>181</b>
'sanguinis group'	<i>Streptococcus gordonii</i>	14	19	19
	<i>Streptococcus sanguinis</i>	7	14	4
	<i>Streptococcus parasanguinis</i>	23	46	61
	' <i>Streptococcus sanguinis</i> group'	179	198	215
<b>Total</b>	<b>223</b>	<b>277</b>	<b>299</b>	
Other streptococci	<i>Streptococcus acidominimus</i>	33	34	45
	<i>Streptococcus suis</i>	1	1	2
	<i>Streptococcus uberis</i>	5	5	3
	'anaerobic streptococcus'	40	43	38
	<i>Streptococcus</i> spp	856	1016	1422
	<b>Total</b>	<b>935</b>	<b>1099</b>	<b>1510</b>
Genera closely related to streptococci	<i>Abiotrophia</i> spp	4	3	11
	<i>Aerococcus</i> spp	–	–	77 <sup>‡</sup>
	<i>Gemella</i> spp	–	–	75 <sup>‡</sup>
	<i>Leuconostoc</i> spp	19	14	27
	<i>Pediococcus</i> spp	1	2	4
	<b>Total</b>	<b>24</b>	<b>19</b>	<b>194</b>
<b>Grand total</b>		<b>5094</b>	<b>5789</b>	<b>7992</b>

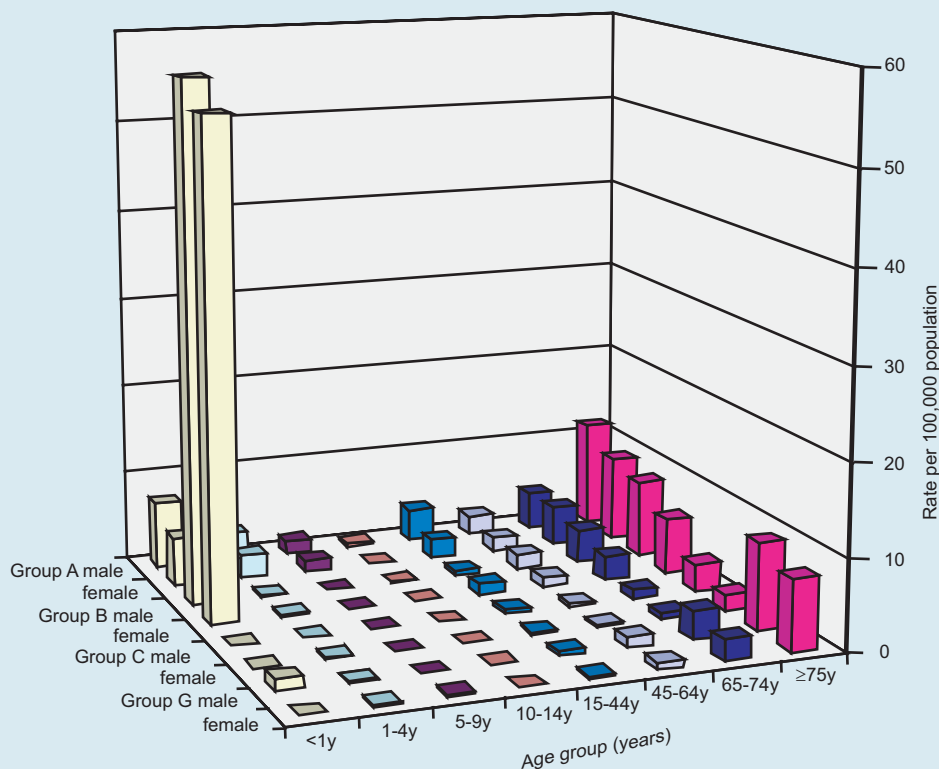
\*Pyogenic streptococci have been grouped according to traditional Lancefield serological groupings; non-pyogenic streptococci grouped according to their biochemical and genetic properties and based on their current taxonomy.

<sup>†</sup>Commencement of enhanced surveillance - January 2003.

<sup>‡</sup>Data given for 2003 only.

All laboratory reports described refer to isolations of streptococci from blood culture, with or without related cerebrospinal fluid (CSF).

**Figure 1** Age-specific rates of pyogenic streptococcal bacteraemia reports, England, Wales, and Northern Ireland: 2003



reports for which key susceptibilities were not reported (tables 3 and 6). Resistance to penicillin was not found, while resistance to erythromycin, nationally, increased from 5% in 2001 to 7% in 2003. Inter-region variation in erythromycin resistance was difficult to evaluate due to marked variation in the level of reporting (tables 3 and 6). The prevalence of resistance to tetracycline was  $\geq 70\%$  with the exception of the North West (61%) (table 6).

### Group C streptococci

Reports for bacteraemia due to group C streptococci showed a year-on-year increase between 2001 and 2003 (table 1). The rate of bacteraemia due to group C streptococci in England, Wales, and Northern Ireland in 2003 was 0.47/100,000 population, ranging from 0.12/100,000 in Northern Ireland to 1.08/100,000 in Yorkshire and Humberside (table 2). Resistance to penicillin was not found, while resistance to erythromycin, nationally, increased from 7% to 8% in 2001 and 2002 to 13% in 2003 (tables 3 and 7).

### Group G streptococci

Reports of bacteraemia due to group G streptococci increased consistently between 2001 and 2003 (table 1). The rate of bacteraemia due to group G streptococci in England, Wales and Northern Ireland in 2003 was 1.3 per 100,000 population, ranging from 0.6 in London to 1.9 in the West Midlands (table 2). Resistance to penicillin was not found, while

resistance to erythromycin, nationally, remained fairly constant between 14% and 15% over the three year period (tables 3 and 8).

### Non-pyogenic streptococci (excluding *Streptococcus pneumoniae*)

Reports of bacteraemias due to non-pyogenic streptococci have also increased consistently for the past three years (table 1). Reporting rates in England, Wales and Northern Ireland in 2003 ranged from 0.33/100,000 in the 'salivarius group' to 1.75/100,000 population in the 'mitis group' (table 9). Distribution of non-pyogenic streptococcal bacteraemia reports by age group and gender show a concentration in the youngest and oldest age groups, and among males compared to females (figure 2). Although the proportion of reports accompanied by susceptibility data has increased, there remains a large number of reports for which key susceptibilities have not been reported (table 10). This makes for difficulty in analysis of trends and comparison with data from previous years.

### Discussion

The trend towards an increase in the number of pyogenic and non-pyogenic streptococcal bacteraemia reported by laboratories in 2001 and 2002 (2,3), continued in 2003. For group A streptococci, whose

	<b>Group A (95% CI)</b>	<b>Group B (95% CI)</b>	<b>Group C (95% CI)</b>	<b>Group G (95% CI)</b>
<b>North East</b>	3.30 (2.63-4.09)	3.10 (2.45-3.87)	0.68 (0.39-1.08)	0.76 (0.46-1.18)
<b>Yorkshire &amp; Humberside</b>	6.26 (5.59-7.00)	3.25 (2.77-3.79)	1.08 (0.81-1.41)	1.71 (1.36-2.11)
<b>East Midlands</b>	3.53 (2.99-4.15)	2.30 (1.87-2.81)	0.31 (0.16-0.53)	1.61 (1.25-2.04)
<b>Eastern</b>	2.75 (2.33-3.23)	2.69 (2.27-3.17)	0.46 (0.30-0.68)	1.40 (1.10-1.75)
<b>London</b>	2.95 (2.57-3.37)	1.31 (1.06-1.59)	0.30 (0.19-0.45)	0.60 (0.43-0.80)
<b>South East</b>	2.97 (2.61-3.38)	1.70 (1.43-2.02)	0.32 (0.21-0.47)	1.06 (0.84-1.31)
<b>South West</b>	4.09 (3.55-4.70)	2.50 (2.08-2.98)	0.63 (0.42-0.89)	1.77 (1.42-2.19)
<b>West Midlands</b>	3.71 (3.21-4.27)	2.60 (2.19-3.07)	0.53 (0.35-0.76)	1.89 (1.53-2.29)
<b>North West</b>	3.01 (2.61-3.45)	1.69 (1.39-2.03)	0.49 (0.34-0.69)	1.05 (0.82-1.33)
<b>England</b>	3.54 (3.37-3.71)	2.20 (2.08-2.34)	0.50 (0.44-0.57)	1.28 (1.19-1.39)
<b>Wales</b>	2.54 (1.99-3.18)	1.23 (0.86-1.71)	0.21 (0.08-0.45)	1.71 (1.27-2.26)
<b>Northern Ireland</b>	2.59 (1.88-3.48)	3.18 (2.39-4.15)	0.12 (0.01-0.43)	0.65 (0.32-1.16)
<b>England, Wales, and Northern Ireland</b>	<b>3.45 (3.30-3.61)</b>	<b>2.18 (2.06-2.31)</b>	<b>0.47 (0.42-0.54)</b>	<b>1.29 (1.19-1.39)</b>

Rates were calculated using mid-year 2002 resident population estimates for England, Wales and Northern Ireland. Regional analyses were performed using the English regional boundaries introduced in 2002. CI= Confidence interval.

	<b>2001</b>			<b>2002</b>			<b>2003</b>		
	<b>No. with susceptibility data</b>	<b>Resistant (%*)</b>	<b>No Information (%†)</b>	<b>No. with susceptibility data</b>	<b>Resistant (%*)</b>	<b>No Information (%†)</b>	<b>No. with susceptibility data</b>	<b>Resistant (%*)</b>	<b>No Information (%†)</b>
<b>Group A streptococci</b>									
penicillin	571	– (–)	268 (32)	732	– (–)	189 (21)	1357	– (–)	513 (27)
erythromycin	535	24 (4)	304 (36)	634	22 (3)	287 (31)	1282	53 (4)	588 (31)
tetracycline	274	28 (10)	565 (67)	389	48 (12)	532 (58)	975	152 (16)	895 (48)
<b>Group B streptococci</b>									
penicillin	584	– (–)	314 (35)	724	– (–)	267 (27)	858	– (–)	324 (27)
erythromycin	559	29 (5)	339 (38)	656	43 (7)	335 (34)	797	57 (7)	385 (33)
tetracycline	279	195 (70)	619 (69)	391	274 (70)	600 (61)	516	389 (75)	666 (56)
<b>Group C streptococci</b>									
penicillin	103	– (–)	51 (33)	139	– (–)	67 (33)	188	– (–)	69 (27)
erythromycin	90	6 (7)	64 (42)	127	10 (8)	79 (38)	162	21 (13)	95 (37)
tetracycline	52	16 (31)	102 (66)	74	23 (31)	132 (64)	104	32 (31)	153 (60)
<b>Group G streptococci</b>									
penicillin	357	– (–)	185 (34)	458	– (–)	122 (21)	561	– (–)	137 (20)
erythromycin	338	47 (14)	204 (38)	422	65 (15)	158 (27)	521	80 (15)	177 (25)
tetracycline	195	84 (43)	347 (64)	247	120 (49)	333 (57)	328	162 (49)	370 (53)

\*Calculated as a proportion of isolates with susceptibility data provided.

†Calculated as a percentage of total reports.

numbers increased by 103% between 2002 and 2003, the increase may largely reflect the introduction of enhanced surveillance, which commenced in January 2003 (1) and is reported on in *CDR Weekly* – Volume 14 number 16 (4). It has been shown that voluntary routine laboratory reporting may underestimate rates of bacteraemia by up to one third (5), thus a proportion

of the increase in group A streptococcal bacteraemias seen in 2003 will be due to increased ascertainment as a consequence of the inclusion of isolates referred to the Health Protection Agency's Streptococcus and Diphtheria Reference Unit (SDRU) as well as the routine laboratory reports used in previous years.

For the non-pyogenic streptococci, the largest



Table 4 Antibiotic susceptibility data for group A streptococcal bacteraemia reports: England, Wales, and Northern Ireland: 2003										
	Penicillin			Erythromycin			Tetracycline			
	No. with susceptibility data	Resistant (%*)	No Information (%†)	No. with susceptibility data	Resistant (%*)	No Information (%†)	No. with susceptibility data	Resistant (%*)	No Information (%†)	
North East	52	- (-)	31 (37)	60	- (-)	23 (28)	40	4 (10)	43 (52)	
Yorkshire & Humberside	220	- (-)	92 (29)	172	4 (2)	140 (45)	133	32 (24)	179 (57)	
East Midlands	111	- (-)	38 (26)	106	3 (3)	43 (29)	98	19 (19)	51 (34)	
Eastern	136	- (-)	13 (9)	127	8 (6)	22 (15)	107	15 (14)	42 (28)	
London	142	- (-)	75 (35)	142	7 (5)	75 (35)	95	12 (13)	122 (56)	
South East	157	- (-)	82 (34)	148	4 (3)	91 (38)	125	15 (12)	114 (48)	
South West	152	- (-)	51 (25)	145	10 (7)	58 (29)	122	20 (16)	81 (40)	
West Midlands	159	- (-)	38 (19)	160	7 (4)	37 (19)	92	7 (8)	105 (53)	
North West	152	- (-)	51 (25)	148	4 (3)	55 (27)	91	21 (23)	112 (55)	
England	1281	- (-)	471 (27)	1208	47 (4)	544 (31)	903	145 (16)	849 (48)	
Wales	55	- (-)	19 (26)	54	5 (9)	20 (27)	51	3 (6)	23 (31)	
Northern Ireland	21	- (-)	23 (52)	20	1 (5)	24 (55)	21	4 (19)	23 (52)	
England, Wales, and Northern Ireland	1357	- (-)	513 (27)	1282	53 (4)	588 (31)	975	152 (16)	895 (48)	

\*Calculated as a proportion of isolates with susceptibility data provided.

†Calculated as a percentage of total reports.

Table 5 Incidence of group B streptococcal bacteraemia in infants in England, Wales, and Northern Ireland: 2003							
Region	Live births 2002*	Total cases	Early-onset cases (0-6 days)	Late-onset cases (7-90 days)	Incidence per 1000 live births (95% CI)		
					Total	Early-onset	Late-onset
England & Wales	596,122	311	208	103	0.52 (0.47-0.58)	0.35 (0.30-0.40)	0.17 (0.14-0.21)
Northern Ireland	21,385	29	21	8	1.36 (0.91-1.95)	0.98 (0.61-1.50)	0.37 (0.16-0.74)
Total	617,507	340	229	111	0.55 (0.49-0.61)	0.37 (0.32-0.42)	0.18 (0.15-0.22)

\*Incidence calculated using the number of live births in 2002 (data from ONS and Northern Ireland Statistics and Research Agency).

increase was for the 'mitis group', 28% between 2002 and 2003. This has been the largest of the non-pyogenic groups implicated in streptococcal bacteraemia in England and Wales for, at least, the last three years. In other parts of Europe, 'mitis group' organisms have also been shown to be the most numerous of the non-pyogenic streptococci in bloodstream infections (6).

An improvement in the number of reports of bacteraemia involving pyogenic streptococci that included antibiotic susceptibilities was seen in 2003 (89%, 76%, 77%, and 83% for groups A, B, C, and G, respectively) compared to 2002 (81%, 73%, 71%, and 81%) (3). These figures show, however, that there is

still a substantial proportion of susceptibility data not being submitted. Rates of resistance of pyogenic streptococci to erythromycin were in agreement with those found in the British Society for Antimicrobial Chemotherapy (BSAC) Bacteraemia Resistance Surveillance Programme in 2002 (7) for group B and group G streptococci; however, a higher rate was seen in group A streptococci in the BSAC programme (12% in 2002) than in the enhanced surveillance (4% in 2003). No group C data was publicly available for the BSAC programme. Rates of tetracycline resistance in the BSAC programme were consistently higher than those seen with routine laboratory reporting in both 2002 and 2003 of the routine laboratory reporting. BSAC

Table 6 Antibiotic susceptibility data for group B streptococcal bacteraemia reports, England, Wales, and Northern Ireland: 2003									
	Penicillin			Erythromycin			Tetracycline		
	No. with susceptibility data	Resistant (%*)	No Information (%†)	No. with susceptibility data	Resistant (%*)	No Information (%†)	No. with susceptibility data	Resistant (%*)	No Information (%†)
North East	43	- (-)	35 (45)	61	7 (11)	17 (22)	21	18 (86)	57 (73)
Yorkshire & Humberside	99	- (-)	63 (39)	75	3 (4)	87 (54)	52	40 (77)	110 (68)
East Midlands	79	- (-)	18 (19)	60	1 (2)	37 (38)	51	40 (78)	46 (47)
Eastern	142	- (-)	4 (3)	134	8 (6)	12 (8)	90	70 (78)	56 (38)
London	51	- (-)	45 (47)	48	6 (13)	48 (50)	30	24 (80)	66 (69)
South East	81	- (-)	56 (41)	75	7 (9)	62 (45)	54	38 (70)	83 (61)
South West	99	- (-)	25 (20)	94	8 (9)	30 (24)	80	64 (80)	44 (35)
West Midlands	113	- (-)	25 (18)	111	10 (9)	27 (20)	47	35 (74)	91 (66)
North West	95	- (-)	19 (17)	94	5 (5)	20 (18)	41	25 (61)	73 (64)
England	802	- (-)	290 (27)	752	55 (7)	340 (31)	466	354 (76)	626 (57)
Wales	26	- (-)	10 (28)	25	1 (4)	11 (31)	23	17 (74)	13 (36)
Northern Ireland	30	- (-)	24 (44)	20	1 (5)	34 (63)	27	18 (67)	27 (50)
<b>England, Wales, and Northern Ireland</b>	<b>858</b>	<b>- (-)</b>	<b>324 (27)</b>	<b>797</b>	<b>57 (7)</b>	<b>385 (33)</b>	<b>516</b>	<b>389 (75)</b>	<b>666 (56)</b>

\*Calculated as a proportion of isolates with susceptibility data provided.

†Calculated as a percentage of total reports.

Table 7 Antibiotic susceptibility data for group C streptococcal bacteraemia reports: England, Wales, and Northern Ireland: 2003									
	Penicillin			Erythromycin			Tetracycline		
	No. with susceptibility data	Resistant (%*)	No Information (%†)	No. with susceptibility data	Resistant (%*)	No Information (%†)	No. with susceptibility data	Resistant (%*)	No Information (%†)
North East	7	- (-)	10 (59)	9	- (-)	8 (47)	-	- (-)	17 (100)
Yorkshire & Humberside	36	- (-)	18 (33)	22	1 (5)	32 (59)	19	7 (37)	35 (65)
East Midlands	12	- (-)	1 (8)	9	- (-)	4 (31)	7	4 (57)	6 (46)
Eastern	24	- (-)	1 (4)	20	5 (25)	5 (20)	16	3 (19)	9 (36)
London	15	- (-)	7 (32)	14	3 (21)	8 (36)	7	1 (14)	15 (68)
South East	14	- (-)	12 (46)	13	2 (15)	13 (50)	10	3 (30)	16 (62)
South West	26	- (-)	5 (16)	23	3 (13)	8 (26)	16	5 (31)	15 (48)
West Midlands	20	- (-)	8 (29)	22	4 (18)	6 (21)	15	6 (40)	13 (46)
North West	29	- (-)	4 (12)	25	2 (8)	8 (24)	9	2 (22)	24 (73)
England	183	- (-)	66 (27)	157	20 (13)	92 (37)	99	31 (31)	150 (60)
Wales	5	- (-)	1 (17)	5	1 (20)	1 (17)	5	1 (20)	1 (17)
Northern Ireland	-	- (-)	2 (100)	-	- (-)	2 (100)	-	- (-)	2 (100)
<b>England, Wales, and Northern Ireland</b>	<b>188</b>	<b>- (-)</b>	<b>69 (27)</b>	<b>162</b>	<b>21 (13)</b>	<b>95 (37)</b>	<b>104</b>	<b>32 (31)</b>	<b>153 (60)</b>

\*Calculated as a proportion of isolates with susceptibility data provided.

†Calculated as a percentage of total reports.

	Penicillin			Erythromycin			Tetracycline		
	No. with susceptibility data	Resistant (%*)	No Information (%†)	No. with susceptibility data	Resistant (%*)	No Information (%†)	No. with susceptibility data	Resistant (%*)	No Information (%†)
North East	15	- (-)	4 (21)	17	3 (18)	2 (11)	8	6 (75)	11 (58)
Yorkshire & Humberside	58	- (-)	27 (32)	43	8 (19)	42 (49)	30	20 (67)	55 (65)
East Midlands	61	- (-)	8 (12)	55	10 (18)	14 (20)	44	23 (52)	25 (36)
Eastern	73	- (-)	3 (4)	67	11 (16)	9 (12)	43	11 (26)	33 (43)
London	31	- (-)	13 (30)	30	6 (20)	14 (32)	14	5 (36)	30 (68)
South East	63	- (-)	22 (26)	59	8 (14)	26 (31)	44	21 (48)	41 (48)
South West	75	- (-)	13 (15)	66	11 (17)	22 (25)	55	29 (53)	33 (37)
West Midlands	82	- (-)	18 (18)	87	15 (17)	13 (13)	35	23 (66)	65 (65)
North West	58	- (-)	13 (18)	56	3 (5)	15 (21)	22	9 (41)	49 (69)
England	516	- (-)	121 (19)	480	75 (16)	157 (25)	295	147 (50)	342 (54)
Wales	39	- (-)	11 (22)	37	5 (14)	13 (26)	27	12 (44)	23 (46)
Northern Ireland	6	- (-)	5 (45)	4	- (-)	7 (64)	6	3 (50)	5 (45)
<b>England, Wales, and Northern Ireland</b>	<b>561</b>	<b>- (-)</b>	<b>137 (20)</b>	<b>521</b>	<b>80 (15)</b>	<b>177 (25)</b>	<b>328</b>	<b>162 (49)</b>	<b>370 (53)</b>

\*Calculated as a proportion of isolates with susceptibility data provided.

†Calculated as a percentage of total reports.

	'Anginosus Group'		'Bovis Group'		'Mitis Group'		'Salivarius Group'		'Sanguis Group'	
		(95% CI)		(95% CI)		(95% CI)		(95% CI)		(95% CI)
North East	1.23	(0.84-1.75)	0.64	(0.39-1.03)	3.22	(2.56-4.01)	0.28	(0.11-0.57)	0.68	(0.39-1.08)
Yorkshire & Humberside	1.55	(1.22-1.93)	0.44	(0.28-0.67)	1.69	(1.34-2.09)	0.18	(0.08-0.34)	0.56	(0.37-0.81)
East Midlands	1.40	(1.07-1.81)	0.43	(0.25-0.67)	1.28	(0.96-1.67)	0.36	(0.20-0.59)	0.45	(0.27-0.70)
Eastern	1.07	(0.81-1.38)	0.39	(0.24-0.59)	1.40	(1.10-1.75)	0.39	(0.24-0.59)	0.90	(0.67-1.20)
London	0.80	(0.61-1.03)	0.20	(0.11-0.34)	1.14	(0.91-1.41)	0.19	(0.10-0.32)	0.22	(0.12-0.35)
South East	0.68	(0.52-0.89)	0.29	(0.18-0.43)	1.34	(1.10-1.62)	0.32	(0.21-0.47)	0.41	(0.28-0.58)
South West	1.51	(1.19-1.90)	0.54	(0.36-0.79)	1.77	(1.42-2.19)	0.44	(0.28-0.67)	0.73	(0.51-1.00)
West Midlands	1.24	(0.96-1.58)	0.45	(0.29-0.67)	2.39	(2.00-2.85)	0.41	(0.26-0.63)	0.75	(0.54-1.03)
North West	1.07	(0.83-1.34)	0.44	(0.30-0.63)	2.99	(2.59-3.44)	0.55	(0.39-0.76)	0.59	(0.42-0.81)
England	1.11	(1.02-1.21)	0.40	(0.34-0.46)	1.82	(1.71-1.95)	0.35	(0.30-0.41)	0.56	(0.50-0.63)
Wales	0.79	(0.50-1.18)	0.45	(0.24-0.76)	0.93	(0.61-1.35)	0.07	(0.01-0.25)	0.48	(0.26-0.80)
Northern Ireland	0.94	(0.54-1.53)	0.53	(0.24-1.01)	1.12	(0.67-1.75)	0.35	(0.13-0.77)	0.41	(0.17-0.85)
<b>England, Wales, and Northern Ireland</b>	<b>1.09</b>	<b>1.01-1.18</b>	<b>0.40</b>	<b>0.35-0.46</b>	<b>1.75</b>	<b>1.64-1.87</b>	<b>0.33</b>	<b>0.29-0.39</b>	<b>0.55</b>	<b>0.49-0.62</b>

Rates were calculated using mid-year 2002 resident population estimates for England, Wales and Northern Ireland.

Regional analyses were performed using the English regional boundaries introduced in 2002.

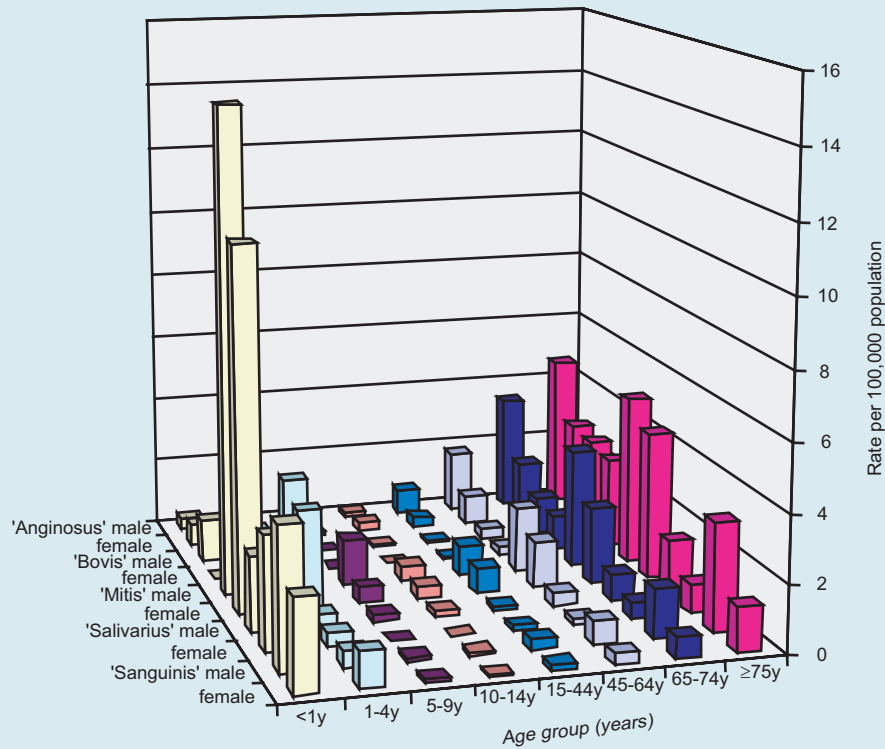
CI= Confidence interval.

rates of tetracycline resistance in 2002 were 21%, 83% and 65% for group A, B, and G streptococci, respectively, compared to 16%, 75%, and 49% in routine reporting. The high rate of tetracycline resistance seen in group B streptococci has been seen in previous years, and other studies, but remains, so far, unexplained and warrants

further investigation, as pregnant/nursing women and children are not prescribed tetracycline.

Group A streptococcal bacteraemias are known to have occurred in injecting drug users in England and Wales, primarily young male adults (8). In 2003, the rate of group A bacteraemias for those adults in the

**Figure 2** Age-specific rates of non-pyogenic streptococcal bacteraemia reports, England, Wales, and Northern Ireland: 2003



15 to 44 years age group was greater than in the 45 to 64 years age group, with a greater incidence in males than females. Also of interest is the incidence of group B streptococcal bacteraemia in females aged from 15 to 44 years, which was twice that of their male counterparts in the same age group, and higher than that of females aged between 45 and 64 years. This increase possibly relates to the carriage of these organisms in the genital tract of women of child-bearing age. The incidence of group B streptococcal bacteraemia was by far the greatest in infants aged under 1 year. A recent publication in the *Lancet* (9) highlights the importance of group B streptococcal disease in infants aged under 90 days, citing incidence rates which are generally higher than those seen here. It may be that the rates presented in table 7 are an underestimation of the true incidence of the disease due to the voluntary nature of the reporting, as discussed previously.

The non-pyogenic streptococci showed fewer similarities in resistance rates than the pyogenic groups when 2003 data was compared to 2002 data. Antibiotic susceptibility information was received for 66% to 73% of reports, depending on the group. This is a great improvement from 2002, where susceptibility data was received for between 44% and 63% of reports (3). The changes in resistance rates seen could therefore relate to the increase in susceptibility information reported for isolates in 2003 compared to 2002, which may be improving the accuracy of susceptibility information. Rates of penicillin resistance vary

between the non-pyogenic groups, ranging from 3% in the 'anginosus group' to 22% in the 'salivarius' group. Other studies undertaken in Europe grouping all non-pyogenic streptococci together have found penicillin resistance rates of approximately 29% (6,10). Rates of erythromycin resistance also vary between the non-pyogenic groups, ranging from 7% in the 'anginosus group' to 36% in the 'mitis group'. The aforementioned European studies reported erythromycin resistance rates between 26% and 27%, a rate which falls within the range reported here.

There were no penicillin-resistant group A, B, C, or G streptococcal bacteraemias confirmed in 2003. Laboratories are reminded that any pyogenic streptococcal isolates exhibiting a decreased sensitivity to penicillin or suspected resistance should be sent to the Health Protection Agency's Antibiotic Resistance Monitoring and Reference Laboratory (ARMRL) for confirmation. Any streptococci (both pyogenic and non-pyogenic) with suspected glycopeptide or linezolid resistance should also be referred for further investigation.

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**Table 10** Antibiotic susceptibility data for non-pyogenic streptococcal bacteraemia reports, England, Wales, and Northern Ireland: 2001-2003

	2001				2002				2003			
	No. with susceptibility data	Resistant (%*)		No. Information (%†)	No. with susceptibility data	Resistant (%*)		No. Information (%†)	No. with susceptibility data	Resistant (%*)		No. Information (%†)
<b>Anginosus' group</b>												
penicillin	86	1	(1)	343 (80)	290	4	(1)	218 (43)	403	13	(3)	188 (32)
amoxycillin/ampicillin	58	–	(–)	371 (86)	167	3	(2)	341 (67)	240	1	(0.4)	351 (59)
erythromycin	80	2	(3)	349 (81)	256	21	(8)	252 (50)	355	26	(7)	26 (40)
tetracycline	48	6	(13)	381 (89)	137	22	(16)	371 (73)	207	34	(16)	383 (65)
<b>Bovis' group</b>												
penicillin	59	1	(2)	370 (86)	122	6	(5)	386 (76)	129	8	(6)	89 (41)
amoxycillin/ampicillin	54	1	(2)	130 (71)	106	2	(2)	109 (51)	102	–	(–)	116 (53)
erythromycin	52	13	(25)	132 (72)	106	19	(18)	109 (51)	113	15	(13)	105 (48)
tetracycline	26	20	(77)	158 (86)	59	36	(61)	156 (73)	67	38	(57)	151 (69)
<b>Mitis' group</b>												
penicillin	164	33	(20)	265 (62)	370	73	(20)	138 (27)	605	127	(21)	345 (36)
amoxycillin/ampicillin	125	7	(6)	573 (82)	255	12	(5)	490 (66)	409	34	(8)	541 (57)
erythromycin	152	43	(28)	546 (78)	340	123	(36)	405 (54)	564	204	(36)	386 (41)
tetracycline	66	22	(33)	632 (91)	166	39	(23)	579 (78)	320	91	(28)	630 (66)
<b>Salivarius' group</b>												
penicillin	41	11	(27)	388 (90)	78	14	(18)	430 (85)	119	26	(22)	62 (34)
amoxycillin/ampicillin	29	1	(3)	109 (79)	49	2	(4)	138 (74)	87	–	(–)	94 (52)
erythromycin	39	12	(31)	99 (72)	68	18	(26)	119 (64)	108	20	(19)	73 (40)
tetracycline	20	2	(10)	118 (86)	36	2	(6)	151 (81)	73	16	(22)	108 (60)
<b>Sanguinis' group</b>												
penicillin	58	9	(16)	371 (86)	148	35	(24)	360 (71)	204	39	(19)	95 (32)
amoxycillin/ampicillin	47	3	(6)	176 (79)	97	7	(7)	180 (65)	132	7	(5)	167 (56)
erythromycin	53	8	(15)	170 (76)	126	40	(32)	151 (55)	174	48	(28)	125 (42)
tetracycline	28	5	(18)	195 (87)	67	17	(25)	210 (76)	122	32	(26)	177 (59)

\*Calculated as a proportion of isolates with susceptibility data provided

†Calculated as a percentage of total reports

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