
Infection reports

Pyogenic and non-pyogenic streptococcal bacteraemia, England, Wales and Northern Ireland: 2008

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Introduction

These data are based on records extracted from the voluntary routine surveillance database (LabBase2) on the 22nd October 2009 for the period 2004-2008. The exception to this is group A streptococcal (GAS) infection for which data on isolates submitted to the Streptococcus and Diphtheria Reference Unit (SDRU) are merged with routine laboratory reports.

Population rates for 2008 were calculated using 2008 mid year resident population estimates based on the 2001 census for England, Wales and Northern Ireland. Rates of GBS bacteraemia in infants were calculated using 2007 live birth denominators. Regional analyses were made according to the Government Office Regions introduced in April 2002.

The data presented here differ in some instances from data in earlier publications due to the addition of late reports to the database.

Group A streptococci

Data from laboratory reports and isolate referrals showed an increase in the number of reports of group A streptococcal (GAS) bacteraemia in 2008 compared with 2007, from 1262 to 1324 (Table 1).

Table 1 Number of laboratory reports of streptococcal bacteraemia, England, Wales and Northern Ireland: 2004-2008

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|-------------|-------------|-------------|-------------|-------------|
| <i>Pyogenic streptococci</i> | 3899 | 3553 | 3767 | 3809 | 4131 |
| Group A streptococci | 1724 | 1251 | 1279 | 1262 | 1324 |
| Group B streptococci | 1176 | 1250 | 1442 | 1403 | 1550 |
| Group C streptococci | 255 | 276 | 292 | 320 | 390 |
| Group G Streptococci | 744 | 776 | 754 | 824 | 867 |
| <i>Non-pyogenic streptococci</i> | 2519 | 2638 | 2831 | 3068 | 3214 |
| Anginosus group | 633 | 678 | 730 | 771 | 842 |
| <i>Streptococcus anginosus</i> | 195 | 174 | 175 | 222 | 261 |
| <i>Streptococcus constellatus</i> | 160 | 206 | 204 | 201 | 198 |
| <i>Streptococcus intermedius</i> | 77 | 74 | 93 | 93 | 89 |
| <i>Streptococcus milleri</i> group | 179 | 177 | 215 | 219 | 246 |
| <i>Streptococcus</i> group F | 22 | 47 | 43 | 36 | 48 |
| Bovis group | 230 | 215 | 252 | 261 | 286 |
| <i>Streptococcus bovis</i> (untyped) | 187 | 178 | 214 | 217 | 223 |

| | | | | | |
|--|-------------|-------------|-------------|-------------|-------------|
| <i>Streptococcus bovis</i> biotype I | 20 | 17 | 12 | 20 | 24 |
| <i>Streptococcus bovis</i> biotype II | 13 | 12 | 16 | 11 | 23 |
| <i>Streptococcus equinus</i> | 9 | 7 | 7 | 8 | 10 |
| <i>Streptococcus alactolyticus</i> | 1 | 1 | 3 | 5 | 6 |
| Mitis group | 1072 | 1046 | 1169 | 1248 | 1183 |
| <i>Streptococcus mitis</i> | 50 | 50 | 45 | 111 | 125 |
| <i>Streptococcus oralis</i> | 340 | 341 | 366 | 410 | 358 |
| " <i>Streptococcus mitis</i> group" | 682 | 655 | 758 | 727 | 700 |
| Mutans group | 41 | 49 | 44 | 53 | 58 |
| <i>Streptococcus mutans</i> | 40 | 48 | 44 | 53 | 56 |
| <i>Streptococcus sobrinus</i> | 1 | 1 | 0 | 0 | 2 |
| Salivarius group | 226 | 282 | 295 | 334 | 334 |
| <i>Streptococcus salivarius</i> | 195 | 249 | 263 | 302 | 301 |
| <i>Streptococcus vestibularis</i> | 31 | 33 | 32 | 32 | 33 |
| Sanguinis group | 317 | 369 | 341 | 401 | 513 |
| <i>Streptococcus gordonii</i> | 14 | 26 | 23 | 43 | 53 |
| <i>Streptococcus sanguinis</i> | 10 | 8 | 16 | 25 | 44 |
| <i>Streptococcus parasanguinis</i> | 58 | 73 | 85 | 112 | 146 |
| " <i>Streptococcus sanguinis</i> group" | 235 | 262 | 217 | 221 | 270 |
| Other streptococci | 1528 | 1493 | 1724 | 2054 | 2034 |
| <i>Streptococcus acidominimus</i> | 48 | 52 | 53 | 26 | 20 |
| <i>Streptococcus suis</i> | 1 | 3 | 3 | 1 | 7 |
| <i>Streptococcus uberis</i> | 4 | 6 | 8 | 9 | 5 |
| "Anaerobic streptococcus" | 48 | 31 | 37 | 55 | 47 |
| Streptococci not fully identified | 1427 | 1401 | 1623 | 1963 | 1955 |
| Total: | 7946 | 7684 | 8322 | 8931 | 9379 |
| Genera closely related to streptococci: | 453 | 468 | 518 | 555 | 480 |
| <i>Abiotrophia</i> spp | 20 | 26 | 34 | 28 | 25 |
| <i>Aerococcus</i> spp | 98 | 106 | 134 | 152 | 123 |
| <i>Gemella</i> spp | 92 | 98 | 111 | 139 | 123 |
| <i>Globicatella sanguis</i> | 0 | 0 | 2 | 3 | 0 |
| <i>Leuconostoc</i> spp | 35 | 31 | 43 | 39 | 38 |
| <i>Pediococcus</i> spp | 3 | 4 | 3 | 6 | 6 |
| <i>Peptostreptococcus</i> spp | 205 | 203 | 191 | 188 | 165 |

The rate of GAS bacteraemia reported in England, Wales and Northern Ireland for 2008 was 2.2 (95% CI 2.0-2.3) per 100,000 population (Table 2). Rates of reported GAS bacteraemia were the same in England and Northern Ireland (2.4), and lower in Wales (1.5), although there was a wide variation within England from 1.6 in the North East to 3.4/100,000 in the West Midlands.

Table 2 Region-specific rates (per 100,000 population) of pyogenic streptococcal bacteraemia: England, Wales and Northern, 2008

| Region | Rate per 100,000 population | | | |
|--------------------------------|-----------------------------|------------|------------|------------|
| | Group A | Group B | Group C | Group G |
| East Midlands | 2.7 | 3.3 | 0.8 | 1.9 |
| East of England | 2.3 | 2.7 | 0.5 | 1.8 |
| London | 1.7 | 2.5 | 0.3 | 1.0 |
| North East | 1.6 | 2.2 | 0.2 | 0.9 |
| North West | 2.4 | 2.3 | 0.8 | 1.6 |
| South East | 2.1 | 2.7 | 0.2 | 1.4 |
| South West | 2.6 | 2.4 | 0.4 | 1.7 |
| West Midlands | 3.4 | 3.9 | 1.1 | 2.2 |
| Yorkshire & Humber | 3.0 | 3.2 | 0.7 | 2.0 |
| England | 2.4 | 2.8 | 0.5 | 1.6 |
| Wales | 1.5 | 1.8 | 0.4 | 1.0 |
| Northern Ireland (N.I.) | 2.4 | 2.9 | 0.5 | 0.9 |
| England, Wales and N.I. | 2.2 | 2.5 | 0.5 | 1.4 |

The highest reported rates of GAS bacteraemia were in adults aged 75 and over (8.2/100,000, 95% CI 7.4-9.1) and those aged less than 1 year (8.0/100,000, 95% CI 6.0-10.3) (Figure 1). Rates of GAS bacteraemia reports were higher in males than females across most age groups, the exception being in the 15-44 years age group.

Figure 1 Age-specific rates of group A streptococcal bacteraemia reports: England, Wales and Northern Ireland, 2008

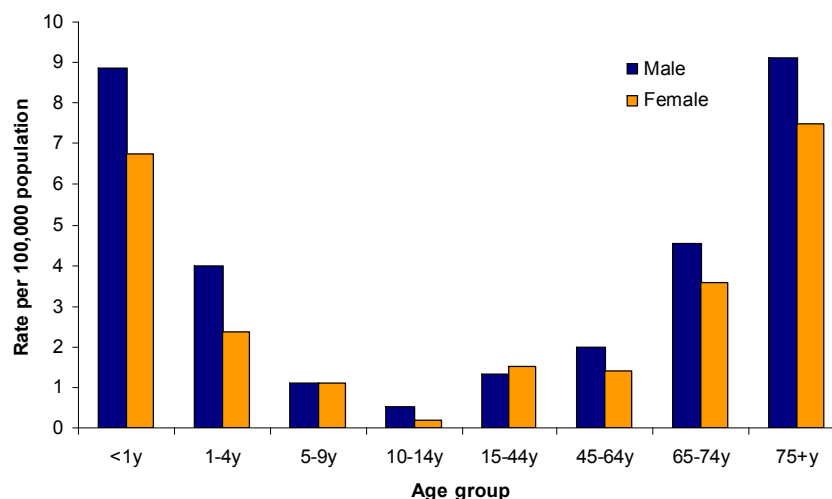


Table 3 Antibiotic resistance data for streptococcal bacteraemia reports: England, Wales and Northern Ireland: 2004-2008

| | | 2004 | | 2005 | | 2006 | | 2007 | | 2008 | |
|---------------------|--------------|------------|---------------|------------|---------------|------------|---------------|------------|---------------|------------|---------------|
| | | No. tested | (% resistant) | No. tested | (% resistant) | No. tested | (% resistant) | No. tested | (% resistant) | No. tested | (% resistant) |
| Group A | clindamycin | 209 | (7%) | 158 | (3%) | 171 | (6%) | 216 | (5%) | 318 | (3%) |
| | erythromycin | 899 | (4%) | 648 | (5%) | 708 | (5%) | 794 | (6%) | 907 | (5%) |
| | tetracycline | 567 | (14%) | 386 | (16%) | 464 | (17%) | 611 | (14%) | 686 | (11%) |
| Group B | clindamycin | 162 | (6%) | 155 | (9%) | 210 | (9%) | 257 | (8%) | 359 | (8%) |
| | erythromycin | 856 | (8%) | 862 | (10%) | 1029 | (11%) | 1038 | (11%) | 1103 | (12%) |
| | tetracycline | 566 | (78%) | 567 | (76%) | 715 | (80%) | 862 | (83%) | 946 | (82%) |
| Group C | clindamycin | 39 | (13%) | 32 | (9%) | 25 | (4%) | 48 | (4%) | 70 | (9%) |
| | erythromycin | 133 | (17%) | 158 | (15%) | 156 | (9%) | 186 | (9%) | 207 | (11%) |
| | tetracycline | 83 | (36%) | 108 | (23%) | 108 | (20%) | 163 | (16%) | 186 | (20%) |
| Group G | clindamycin | 123 | (6%) | 114 | (5%) | 115 | (6%) | 152 | (10%) | 226 | (12%) |
| | erythromycin | 570 | (14%) | 562 | (18%) | 541 | (20%) | 590 | (23%) | 624 | (22%) |
| | tetracycline | 367 | (50%) | 390 | (51%) | 382 | (47%) | 465 | (46%) | 462 | (47%) |
| 'Anginosus' | erythromycin | 398 | (8%) | 427 | (10%) | 454 | (9%) | 528 | (10%) | 579 | (9%) |
| | penicillin | 454 | (3%) | 486 | (4%) | 558 | (4%) | 641 | (5%) | 710 | (4%) |
| | tetracycline | 214 | (13%) | 222 | (21%) | 312 | (16%) | 382 | (15%) | 390 | (21%) |
| 'Bovis' | erythromycin | 144 | (16%) | 120 | (15%) | 147 | (21%) | 158 | (19%) | 179 | (21%) |
| | penicillin | 164 | (4%) | 138 | (9%) | 179 | (9%) | 195 | (6%) | 233 | (7%) |
| | tetracycline | 87 | (47%) | 81 | (58%) | 105 | (61%) | 122 | (66%) | 132 | (65%) |
| 'Mitis' | erythromycin | 620 | (36%) | 625 | (41%) | 687 | (43%) | 816 | (41%) | 816 | (40%) |
| | penicillin | 695 | (23%) | 728 | (23%) | 854 | (25%) | 1011 | (24%) | 1003 | (26%) |
| | tetracycline | 303 | (31%) | 364 | (31%) | 459 | (32%) | 576 | (28%) | 580 | (29%) |
| 'Salivarius' | erythromycin | 122 | (34%) | 159 | (31%) | 185 | (33%) | 210 | (31%) | 229 | (37%) |
| | penicillin | 156 | (21%) | 189 | (29%) | 216 | (29%) | 262 | (26%) | 257 | (23%) |
| | tetracycline | 78 | (21%) | 104 | (18%) | 125 | (17%) | 136 | (24%) | 151 | (21%) |
| 'Sanguinis' | erythromycin | 191 | (28%) | 230 | (36%) | 229 | (33%) | 272 | (35%) | 364 | (34%) |
| | penicillin | 218 | (21%) | 266 | (24%) | 276 | (21%) | 326 | (30%) | 412 | (29%) |
| | tetracycline | 111 | (23%) | 140 | (34%) | 154 | (29%) | 195 | (29%) | 237 | (30%) |

Antimicrobial resistance

Reported resistance rates to clindamycin, erythromycin and tetracycline were 3%, 5% and 11% respectively in 2008 (Table 3). Whilst tetracycline and erythromycin resistance have remained relatively stable since 2003, prevalence of clindamycin resistance has fluctuated substantially. Rates of erythromycin resistance varied geographically, with no resistant isolates reported from Northern Ireland, 3% in Wales and 5% in England (Table 4). Within England, substantial variation in erythromycin resistance was evident, from 1% in the East Midlands to 11% in the South West.

Table 4 Region-specific antibiotic susceptibility data for pyogenic streptococcal bacteraemia reports: England, Wales, and Northern Ireland: 2008

| Group A streptococci | | | | | | |
|--------------------------------|-------------|---------------|--------------|---------------|--------------|---------------|
| Region | clindamycin | | erythromycin | | tetracycline | |
| | no. tested | (% resistant) | no. tested | (% resistant) | no. tested | (% resistant) |
| East Midlands | 14 | (0%) | 351 | (1%) | 52 | (4%) |
| East of England | 50 | (0%) | 576 | (4%) | 80 | (4%) |
| London | 29 | (3%) | 459 | (4%) | 46 | (22%) |
| North East | 11 | (0%) | 196 | (3%) | 20 | (5%) |
| North West | 54 | (2%) | 680 | (4%) | 66 | (15%) |
| South East | 43 | (0%) | 544 | (4%) | 49 | (6%) |
| South West | 37 | (8%) | 464 | (11%) | 79 | (13%) |
| West Midlands | 48 | (8%) | 606 | (5%) | 114 | (21%) |
| Yorkshire & Humber | 19 | (0%) | 402 | (6%) | 53 | (13%) |
| England | 305 | (3%) | 834 | (5%) | 560 | (13%) |
| Wales | 1 | (0%) | 31 | (3%) | 25 | (4%) |
| Northern Ireland (N.I.) | 12 | (8%) | 32 | (0%) | 32 | (0%) |
| England, Wales and N.I. | 318 | (4%) | 897 | (5%) | 617 | (12%) |

| Group B streptococci | | | | | | |
|--------------------------------|-------------|---------------|--------------|---------------|--------------|---------------|
| Region | clindamycin | | erythromycin | | tetracycline | |
| | no. tested | (% resistant) | no. tested | (% resistant) | no. tested | (% resistant) |
| East Midlands | 11 | (18%) | 105 | (12%) | 58 | (86%) |
| East of England | 50 | (0%) | 123 | (12%) | 87 | (79%) |
| London | 58 | (9%) | 170 | (14%) | 91 | (76%) |
| North East | 12 | (0%) | 51 | (8%) | 35 | (86%) |
| North West | 45 | (4%) | 125 | (14%) | 90 | (84%) |
| South East | 52 | (6%) | 179 | (8%) | 116 | (83%) |
| South West | 19 | (26%) | 85 | (14%) | 90 | (78%) |
| West Midlands | 67 | (7%) | 134 | (11%) | 135 | (84%) |
| Yorkshire & Humber | 20 | (10%) | 44 | (11%) | 52 | (85%) |
| England | 334 | (7%) | 1016 | (12%) | 754 | (82%) |
| Wales | 0 | (0%) | 42 | (14%) | 35 | (80%) |
| Northern Ireland (N.I.) | 24 | (17%) | 37 | (8%) | 43 | (91%) |
| England, Wales and N.I. | 358 | (8%) | 1095 | (12%) | 832 | (82%) |

Group C streptococci

| Region | clindamycin | | erythromycin | | tetracycline | |
|--------------------------------|-------------|---------------|--------------|---------------|--------------|---------------|
| | no. tested | (% resistant) | no. tested | (% resistant) | no. tested | (% resistant) |
| East Midlands | 5 | (0%) | 23 | (0%) | 12 | (8%) |
| East of England | 10 | (30%) | 20 | (15%) | 18 | (39%) |
| London | 6 | (0%) | 21 | (5%) | 11 | (45%) |
| North East | 2 | (0%) | 4 | (0%) | 1 | (0%) |
| North West | 17 | (6%) | 48 | (15%) | 34 | (21%) |
| South East | 4 | (0%) | 13 | (38%) | 11 | (18%) |
| South West | 4 | (0%) | 11 | (9%) | 12 | (25%) |
| West Midlands | 12 | (8%) | 35 | (6%) | 45 | (16%) |
| Yorkshire & Humber | 7 | (14%) | 12 | (17%) | 13 | (15%) |
| England | 67 | (9%) | 187 | (11%) | 157 | (22%) |
| Wales | 0 | (0%) | 10 | (0%) | 9 | (11%) |
| Northern Ireland (N.I.) | 3 | (0%) | 7 | (0%) | 6 | (0%) |
| England, Wales and N.I. | 70 | (9%) | 204 | (10%) | 172 | (20%) |

Group G streptococci

| Region | clindamycin | | erythromycin | | tetracycline | |
|--------------------------------|-------------|---------------|--------------|---------------|--------------|---------------|
| | no. tested | (% resistant) | no. tested | (% resistant) | no. tested | (% resistant) |
| East Midlands | 11 | (18%) | 69 | (13%) | 35 | (43%) |
| East of England | 47 | (28%) | 78 | (33%) | 66 | (41%) |
| London | 22 | (5%) | 66 | (20%) | 29 | (52%) |
| North East | 1 | (0%) | 22 | (18%) | 8 | (63%) |
| North West | 35 | (6%) | 92 | (20%) | 61 | (38%) |
| South East | 47 | (4%) | 90 | (24%) | 50 | (48%) |
| South West | 19 | (5%) | 55 | (20%) | 60 | (55%) |
| West Midlands | 23 | (30%) | 82 | (32%) | 81 | (47%) |
| Yorkshire & Humber | 10 | (0%) | 35 | (9%) | 45 | (56%) |
| England | 215 | (13%) | 589 | (22%) | 435 | (47%) |
| Wales | 1 | (0%) | 22 | (27%) | 20 | (45%) |
| Northern Ireland (N.I.) | 10 | (0%) | 13 | (8%) | 6 | (33%) |
| England, Wales and N.I. | 226 | (8%) | 624 | (22%) | 461 | (47%) |

Erythromycin resistance was commonly associated with resistance to other antibiotics (Table 6), with 38% and 60% of erythromycin isolates being resistant to clindamycin and tetracycline respectively. Of the 211 isolates reported as having been tested against all three agents, four (2%) were reported as resistant to all three. This is a decrease from that seen in 2007 where 4% showed multiple resistances to the three antibiotics.

Surveillance of GAS diseases during winter 2008/09 identified levels of activity above the seasonally expected in England for both invasive and non-invasive diseases. This triggered a number of public health actions including cascaded alerts to frontline medical staff and initiation of national enhanced surveillance of severe GAS disease from 1st January 2009. Updates on the current situation are published in the *HPR Weekly*[1].

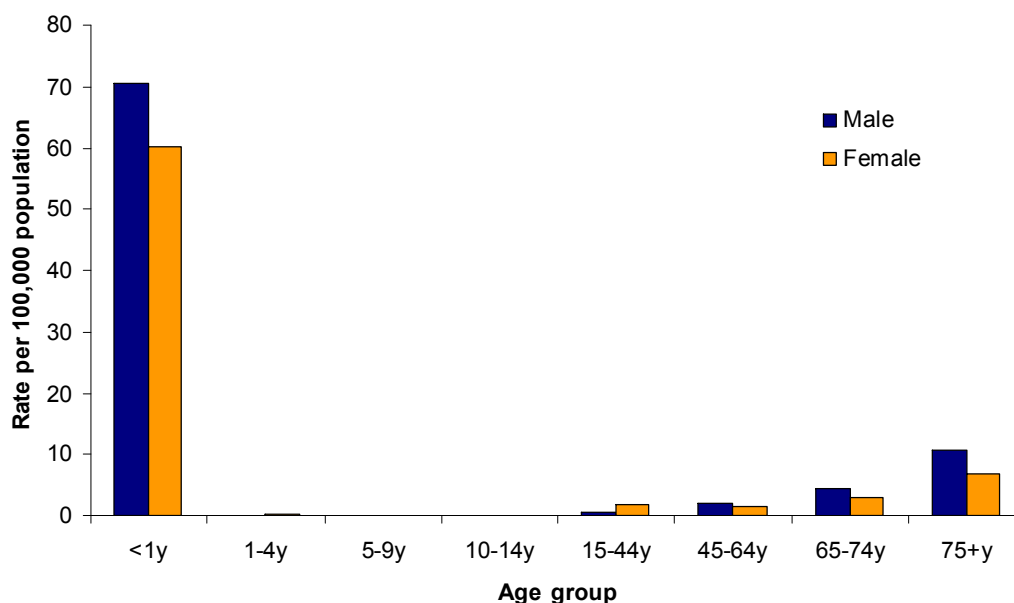
Group B streptococci

Having increased substantially between 2005 to 2006 (Table 1), from 1249 to 1442 (15% increase), reports of bacteraemia due to group B streptococcus (GBS) in England, Wales and Northern Ireland showed a further increase in 2008 from 2007, 1403 to 1550 (10% increase).

The overall rate of GBS bacteraemia in 2008 for England, Wales and Northern Ireland was 2.9 per 100,000 population (Table 2). Rates were lower in Wales (1.8/100,000) than Northern Ireland (2.9/100,000 population) and England (2.8). Within England, rates varied considerably from 2.2 (North East) to 3.9 (West Midlands) per 100,000 population.

Rates of GBS bacteraemia were highly concentrated in infants, 70 and 60 per 100,000 population in males and females <1y, with rates generally higher in males than females across most age groups, with the notable exception of 15-44 year olds (1.71 and 0.51 in females and males respectively) (Figure 2).

Figure 2 **Age-specific rates of group B streptococcal bacteraemia reports: England, Wales and Northern Ireland, 2008**



Rates of GBS bacteraemia in 0-90 day old infants, 0.66 (0.60-0.72) per 1000 live births for England, Wales and Northern Ireland (Table 5), increased slightly from 2007 (0.61). Both early (0-6 days) and late (7-90 days) onset disease increased over this period.

Table 5 Number and rate (per 1000 live births) of group B streptococcal bacteraemia reports in infants 0-90 days old in England, Wales and Northern Ireland: 2008

| Country | All cases (0-90 days old) | | | Early onset (0-6 days old) | | | Late onset (7-90 days old) | | |
|----------------------------------|---------------------------|------|-------------|----------------------------|------|-------------|----------------------------|------|-------------|
| | number | rate | (95% CI) | number | rate | (95% CI) | number | rate | (95% CI) |
| England | 439 | 0.67 | (0.61-0.74) | 262 | 0.40 | (0.35-0.45) | 177 | 0.27 | (0.23-0.31) |
| Northern Ireland (N.I.) | 18 | 0.74 | (0.44-1.16) | 11 | 0.45 | (0.22-0.80) | 7 | 0.29 | (0.12-0.59) |
| Wales | 13 | 0.38 | (0.20-0.65) | 6 | 0.17 | (0.06-0.38) | 7 | 0.20 | (0.08-0.42) |
| England, Wales & N.I. | 470 | 0.66 | (0.60-0.72) | 279 | 0.39 | (0.35-0.44) | 191 | 0.27 | (0.23-0.31) |

Antimicrobial resistance

The proportion of GBS bacteraemia reports accompanied by susceptibility data has increased since 2004 although only 26% reports included results for clindamycin in 2008. Resistance of GBS blood culture isolates to clindamycin, erythromycin and tetracycline was recorded in 8%, 12% and 82% respectively (Table 3). All regions except the South East and North East reported erythromycin resistance in over 10% of isolates (Table 4).

Of the erythromycin-resistance GBS isolates tested against clindamycin, 61% were reported to be resistant (Table 8). Of the 230 isolates reported as being tested against all three agents, 14 (6%) were found to be resistant to all three.

Group C & G streptococci

Voluntary reporting has shown a general increase in the numbers of reports of bacteraemia caused by group C streptococci (GCS) from 255 in 2004 to 390 in 2008 (Table 1). Reports of bacteraemia due to group G streptococci (GGS) increased in 2008 to 867 compared with 744 in 2004 (Table 1). Population rates of GCS bacteraemia were similar in England (0.5/100,000), Wales (0.4) and Northern Ireland (0.4), and varied from 0.2 (South East) to 1.1 (West Midlands) within England (Table 2).

The age distributions of rates of both GCS and GGS bacteraemia reports were concentrated in the elderly, with rates tending to be higher in males than females in all age groups (Figures 3,4).

Figure 3 **Age-specific rates of group C streptococcal bacteraemia reports: England, Wales and Northern Ireland, 2008**

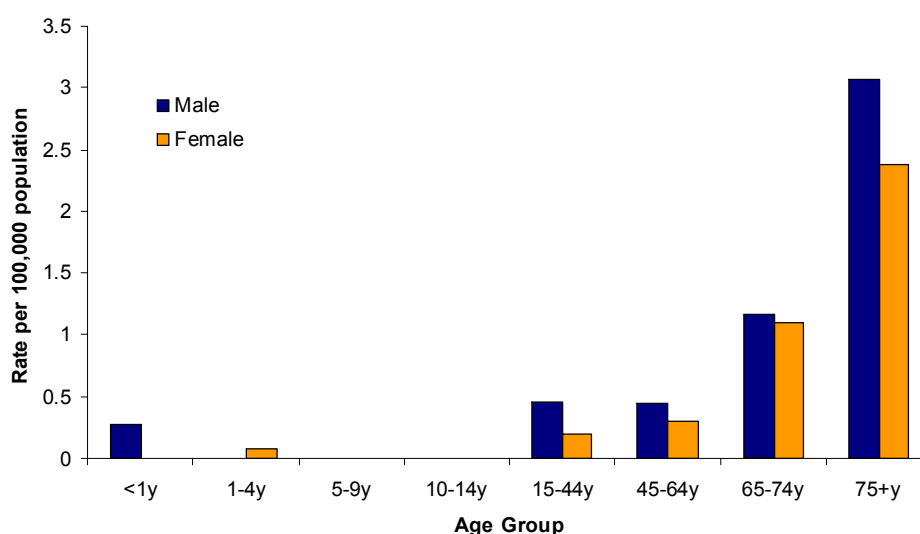
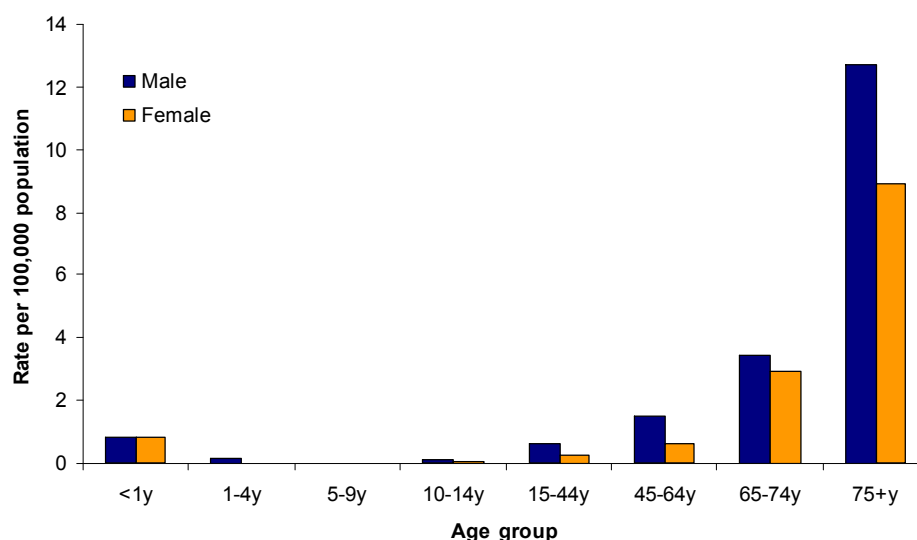


Figure 4 Age-specific rates of group G streptococcal bacteraemia reports: England, Wales and Northern Ireland, 2008



Antimicrobial resistance

For both GGS and GCS bacteraemia, resistance to clindamycin, erythromycin and tetracycline showed some changes between 2004 and 2008. After the low prevalence of clindamycin resistance in 2006 and 2007 (4%), resistance to clindamycin for GCS increased to 9% in 2008 (Table 3), with erythromycin following a broadly similar pattern, increasing from 9% to 11% between 2007 and 2008. In contrast, prevalence of erythromycin and clindamycin showed a general increase between 2004 and 2008 for GGS, 6% to 12% for clindamycin and 15% to 22% for erythromycin.

Small numbers of reports preclude analysis of antibiotic resistance by region for GCS bacteraemia. For GGS bacteraemic isolates, erythromycin resistance was substantially lower in Northern Ireland (8%) than for England (22%) or Wales (27%) (Table 4).

Multidrug resistance patterns for GCS and GGS are given in Tables 9-10. Five per cent of GCS bacteraemia reports indicated multiple resistance to clindamycin, erythromycin and tetracycline and 6% of GGS bacteraemia reports.

Non-pyogenic streptococci

Reports of bacteraemia due to non-pyogenic streptococci increased steadily between 2004 and 2008 from 2519 to 3214 reports for all groups combined (Table 1). 'Anginosus' group streptococci increased by 9% between 2007 and 2008, compared with a 6% increase the year before. The largest increases were observed for the 'sanguinus' group where reports increased by 62% since 2004. All other groups also increased except for 'mitis' group where a 5% decrease was observed.

Table 6 Region-specific rates (per 100,000 population) of non-pyogenic streptococcal bacteraemia: England, Wales and Northern Ireland, 2008

| Region | Rate per 100,000 population | | | | |
|----------------------------------|-----------------------------|---------------|---------------|--------------------|-------------------|
| | 'Anginosus group' | 'Bovis group' | 'Mitis group' | 'Salivarius group' | 'Sanguinis group' |
| East Midlands | 1.7 | 0.3 | 1.8 | 0.7 | 0.6 |
| East of England | 1.4 | 0.4 | 2.2 | 0.5 | 1.1 |
| London | 1.2 | 0.5 | 2.6 | 0.7 | 0.7 |
| North East | 1.3 | 0.6 | 2.5 | 0.3 | 0.9 |
| North West | 1.6 | 0.6 | 3.0 | 0.6 | 1.2 |
| South East | 1.9 | 0.7 | 3.4 | 0.6 | 1.3 |
| South West | 1.2 | 0.6 | 2.5 | 0.5 | 0.7 |
| West Midlands | 2.0 | 0.7 | 3.7 | 0.9 | 1.2 |
| Yorkshire & Humber | 1.5 | 0.5 | 2.8 | 0.6 | 0.4 |
| England | 1.5 | 0.5 | 2.8 | 0.6 | 0.9 |
| Wales | 0.7 | 0.5 | 1.1 | 0.2 | 0.6 |
| Northern Ireland (N.I.) | 1.4 | 0.6 | 1.6 | 0.6 | 1.0 |
| England, Wales & N.I. | 1.4 | 0.5 | 2.4 | 0.5 | 0.8 |

Reporting rates for England, Wales and Northern Ireland in 2008 ranged from 0.5 per 100,000 population (95% CI 0.45-0.56) for bacteraemia due to 'bovis group' streptococci to 2.4/100,000 (95% CI 2.31-2.57) for the 'mitis group' (Table 6).

Distribution of non-pyogenic streptococcal bacteraemia reports by age group and sex showed a concentration in the youngest and oldest age groups, and in most cases among males compared to females (Figures 5-9). For the 'mitis', 'salivarius' and 'sanguinis' streptococcal groups, the rates were highest in infants.

Figure 5 Age specific rates of ‘anginosus group’ streptococcal bacteraemia reports: England, Wales and Northern Ireland, 2008

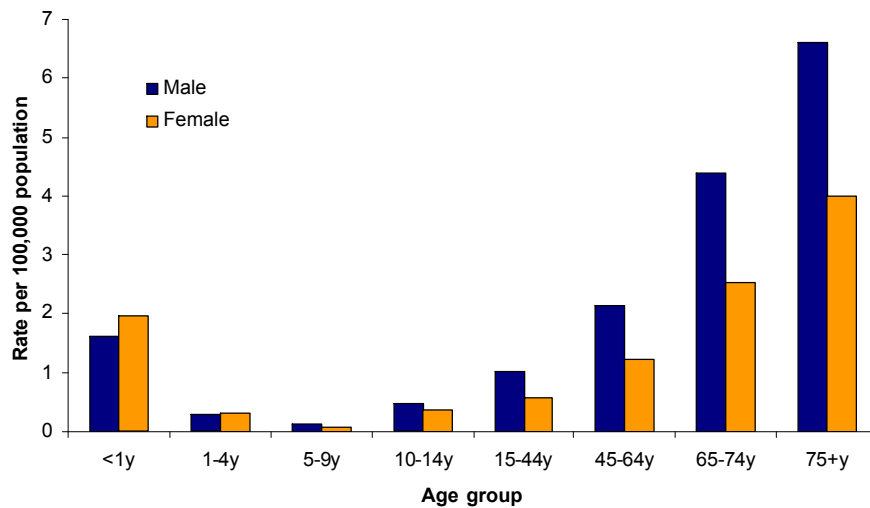


Figure 6 Age-specific rates of ‘bovis group’ streptococcal bacteraemia reports: England, Wales and Northern Ireland, 2008

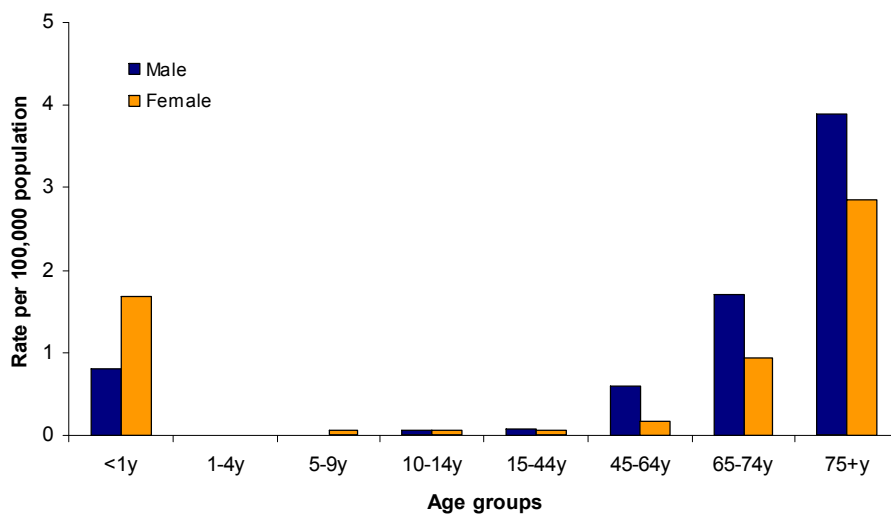


Figure 7 Age-specific rates of 'mitis group' streptococcal bacteraemia reports: England, Wales and Northern Ireland, 2008

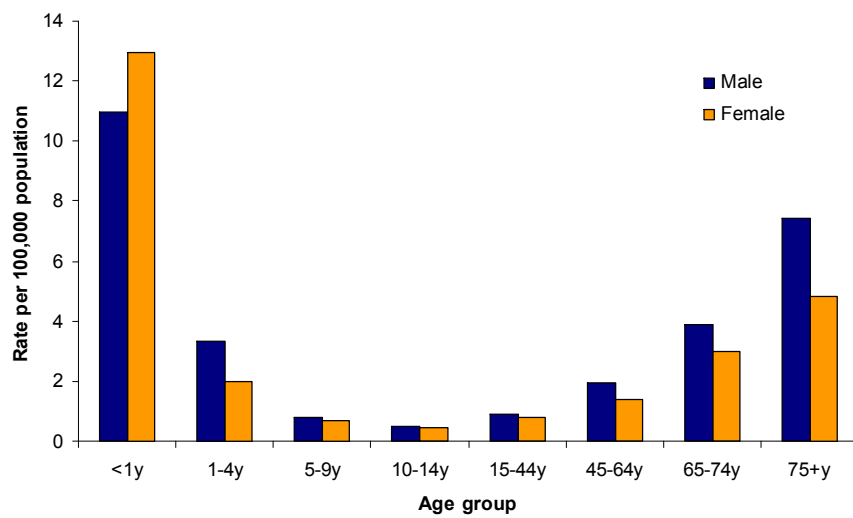


Figure 8 Age-specific rates of 'salivarius group' streptococcal bacteraemia reports: England, Wales and Northern Ireland, 2008

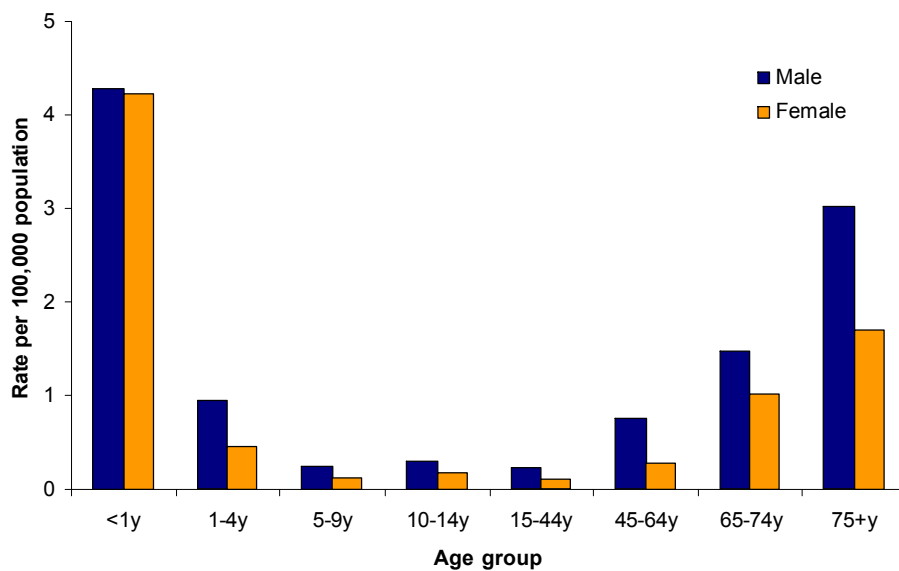
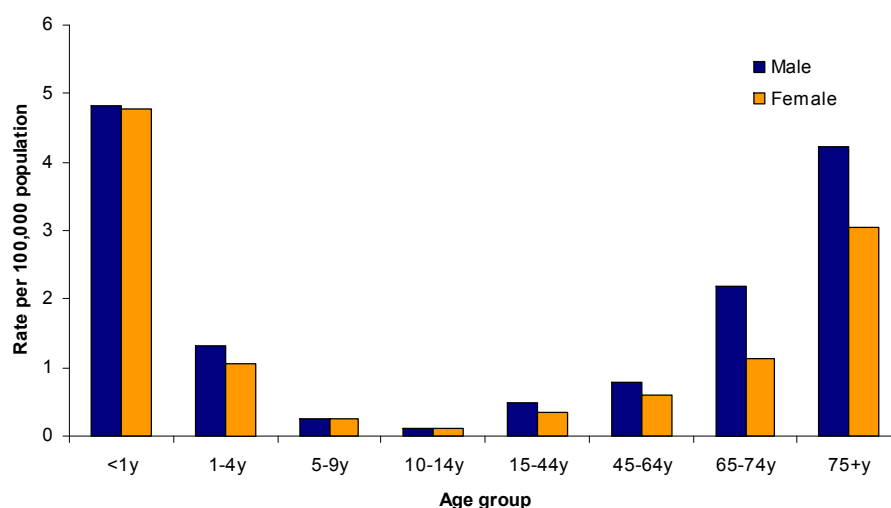


Figure 9 Age-specific rates of ‘sanguinis group’ streptococcal bacteraemia reports: England, Wales and Northern Ireland, 2008



Antimicrobial resistance

Since 2004, the proportion of non-pyogenic streptococcal bacteraemia reports accompanied by susceptibility data has increased markedly for all non-pyogenic groups, with over 80% including information on susceptibility to penicillin.

In contrast to the pyogenic streptococci, where penicillin resistance is very rare, between 4% and 29% of isolates from non-pyogenic groups were reported as penicillin resistant, the highest frequency being observed in the ‘sanguinis group’. Erythromycin resistance was also high in the non-pyogenic groups compared to the pyogenic groups, with between 21% and 40% of isolates from non-pyogenic groups being reported as erythromycin resistant, with the exception of the ‘anginosus group’ (9%; Table 3). The highest levels of tetracycline resistance were observed in the ‘bovis group’ where 65% isolates were reported as resistant.

Reference microbiology service

Substantial numbers of reports continue to be made of streptococcal bacteraemia in which the organism is not fully identified, with the proportion of such reports rising between 2004 and 2008 (18% to 21%). Precise species identification of isolates would improve the monitoring of disease trends of non-pyogenic streptococci and related genera in particular. The Streptococcus and Diphtheria Reference Unit offers a referred (charged for) taxonomic identification service for streptococci and other related Gram-positive, catalase-negative genera from systemic and other significant infections. However, a free-of-charge reference service will continue to be available for urgent public health investigations, outbreaks and incident management, either hospital or community based.

Laboratories are requested to send any pyogenic streptococcal isolates exhibiting a decreased sensitivity to penicillin to the Antibiotic Resistance Monitoring and Reference Laboratory (ARMRL) for confirmation. Both laboratories are based at the Health Protection Agency, Centre for Infections in Colindale. In addition, any streptococci (pyogenic or non-pyogenic) with suspected glycopeptide or linezolid resistance should be referred for further investigation.

References

- [1] HPA. Group A streptococcal infections: fourth update on seasonal activity, 2008/09. *Health Protection Report [serial online]*. 2009; 3(29):news (available at <http://www.hpa.org.uk/hpr/archives/2009/news2909.htm#gas0809>)

Table 7 Multiple antibiotic resistance patterns for group A streptococcal bacteraemia reports: England, Wales, and Northern Ireland: 2008

| | | Erythromycin | | | | Clindamycin | | | | Tetracycline | | | |
|---------------------|--------------------|--------------|--------|-----------|---------|-------------|-------|-----------|---------|--------------|-------|-----------|---------|
| | | resistant | (%) | sensitive | no info | resistant | (%) | sensitive | no info | resistant | (%) | sensitive | no info |
| Erythromycin | resistant (n= 41) | | | | | 6 | (38%) | 10 | 25 | 18 | (60%) | 12 | 11 |
| | sensitive (n= 866) | | | | | 1 | (0%) | 250 | 615 | 46 | (8%) | 504 | 316 |
| Clindamycin | resistant (n= 10) | 6 | (100%) | 0 | 4 | | | | | 6 | (75%) | 2 | 2 |
| | sensitive (n= 308) | 10 | (4%) | 250 | 48 | | | | | 26 | (11%) | 212 | 70 |
| Tetracycline | resistant (n= 77) | 18 | (28%) | 46 | 13 | 6 | (19%) | 26 | 45 | | | | |
| | sensitive (n= 609) | 12 | (2%) | 504 | 93 | 2 | (1%) | 212 | 395 | | | | |

Table 8 Multiple antibiotic resistance patterns for group B streptococcal bacteraemia reports: England, Wales, and Northern Ireland: 2008

| | | Erythromycin | | | | Clindamycin | | | | Tetracycline | | | |
|---------------------|--------------------|--------------|-------|-----------|---------|-------------|-------|-----------|---------|--------------|-------|-----------|---------|
| | | resistant | (%) | sensitive | no info | resistant | (%) | sensitive | no info | resistant | (%) | sensitive | no info |
| Erythromycin | resistant (n= 128) | | | | | 20 | (61%) | 13 | 95 | 76 | (90%) | 8 | 44 |
| | sensitive (n= 975) | | | | | 3 | (1%) | 255 | 717 | 558 | (80%) | 140 | 277 |
| Clindamycin | resistant (n= 28) | 20 | (91%) | 2 | 6 | | | | | 19 | (90%) | 2 | 7 |
| | sensitive (n= 331) | 14 | (5%) | 255 | 62 | | | | | 210 | (82%) | 47 | 74 |
| Tetracycline | resistant (n= 772) | 76 | (12%) | 558 | 138 | 19 | (8%) | 210 | 543 | | | | |
| | sensitive (n= 174) | 9 | (6%) | 140 | 25 | 2 | (4%) | 47 | 125 | | | | |

Table 9 Multiple antibiotic resistance patterns for group C streptococcal bacteraemia reports: England, Wales, and Northern Ireland: 2008

| | | Erythromycin | | | | Clindamycin | | | | Tetracycline | | | |
|---------------------|--------------------|--------------|-------|-----------|---------|-------------|-------|-----------|---------|--------------|-------|-----------|---------|
| | | resistant | (%) | sensitive | no info | resistant | (%) | sensitive | no info | resistant | (%) | sensitive | no info |
| Erythromycin | resistant (n= 30) | | | | | 3 | (33%) | 6 | 21 | 13 | (57%) | 10 | 7 |
| | sensitive (n= 233) | | | | | 1 | (2%) | 51 | 181 | 33 | (20%) | 133 | 67 |
| Clindamycin | resistant (n= 9) | 3 | (75%) | 1 | 5 | | | | | 3 | (75%) | 1 | 5 |
| | sensitive (n= 73) | 6 | (11%) | 51 | 16 | | | | | 11 | (22%) | 40 | 22 |
| Tetracycline | resistant (n= 55) | 13 | (28%) | 33 | 9 | 3 | (21%) | 11 | 41 | | | | |
| | sensitive (n= 175) | 10 | (7%) | 133 | 32 | 1 | (2%) | 40 | 134 | | | | |

Table 10 Multiple antibiotic resistance patterns for group G streptococcal bacteraemia reports: England, Wales, and Northern Ireland: 2008

| | | Erythromycin | | | | Clindamycin | | | | Tetracycline | | | |
|---------------------|--------------------|--------------|--------|-----------|---------|-------------|-------|-----------|---------|--------------|-------|-----------|---------|
| | | resistant | (%) | sensitive | no info | resistant | (%) | sensitive | no info | resistant | (%) | sensitive | no info |
| Erythromycin | resistant (n= 142) | | | | | 24 | (45%) | 29 | 89 | 49 | (53%) | 44 | 49 |
| | sensitive (n= 492) | | | | | 0 | (0%) | 136 | 356 | 153 | (44%) | 195 | 144 |
| Clindamycin | resistant (n= 28) | 24 | (100%) | 0 | 4 | | | | | 13 | (59%) | 9 | 6 |
| | sensitive (n= 198) | 30 | (18%) | 136 | 32 | | | | | 73 | (50%) | 74 | 51 |
| Tetracycline | resistant (n= 244) | 50 | (25%) | 152 | 42 | 13 | (15%) | 72 | 159 | | | | |
| | sensitive (n= 287) | 44 | (18%) | 195 | 48 | 9 | (11%) | 74 | 204 | | | | |