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Bacteraemia

Voluntary surveillance of pyogenic and non-pyogenic streptococcal bacteraemia in England, Wales and Northern Ireland: 2012

These analyses are based on data extracted from the Public Health England (PHE) voluntary surveillance database, LabBase2, on the 24th October 2013 for the period 2008-2012. The exception to this is group A streptococcal (GAS) infection for which data on isolates submitted to the PHE Respiratory and Vaccine Preventable Bacteria Reference Unit (RVPBRU, Colindale) are merged with routine laboratory reports. From October 2010, microbiological diagnoses of invasive GAS infection must be notified by law [1]. Owing to the new legislation taking effect part-way through the year, statutory notifications were not analysed for this report.

Rates were calculated using 2012 mid-year resident population estimates based on the 2011 census for England, Wales, and Northern Ireland [2][3]. Rates of group B streptococcal (GBS) bacteraemia in infants were calculated using 2012 live birth denominators [4][5]. Geographical analyses were made based on the residential location of the patient with reference to the former Government Office Regions.

The report includes analyses on the trends, age and sex distribution, geographical distribution of and the antimicrobial susceptibility data in cases of pyogenic and non-pyogenic streptococcal bacteraemia.

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

Key points

- Between 2011 and 2012 there was a 3% increase in the number streptococcal bacteraemia reports (9,511 cases and 9,734 reports respectively) in England, Wales and Northern Ireland.
- The overall reporting rate of group A streptococci bacteraemia in 2012 for England, Wales and Northern Ireland was 2.4 per 100,000 population. The equivalent rates for the other pyogenic streptococci were 2.7 (group B streptococci), 1.0 (group C streptococci) and 1.6 (group G streptococci).
- The reporting rate in the majority of non-pyogenic streptococcal groups decreased over the period 2008 to 2012, the exceptions being the salivarius group with a 24% increase and the sanguinis group with a 21% increase.
- Rates of infection by age group in the pyogenic and non-pyogenic streptococci were highest in the elderly, with the notable exception of group B streptococci where rates were highest in infants.
- Rates of GBS bacteraemia in infants (less than 90 days) in England, Wales and Northern Ireland in 2012 decreased by 8% since 2011 from 0.63 to 0.58 per 1000 live births.
- Resistance to erythromycin remained elevated in group B (19%), C (25%) and G (37%) streptococci in 2012.
- Between 2 and 23% of non-pyogenic streptococcal group isolates either had reduced susceptibility or were resistant to penicillin in 2012.
- Erythromycin resistance was high in the majority of the non-pyogenic streptococcal groups compared to the pyogenic groups, with between 26% and 46% of isolates reported as resistant.

Trends in episode numbers and rates

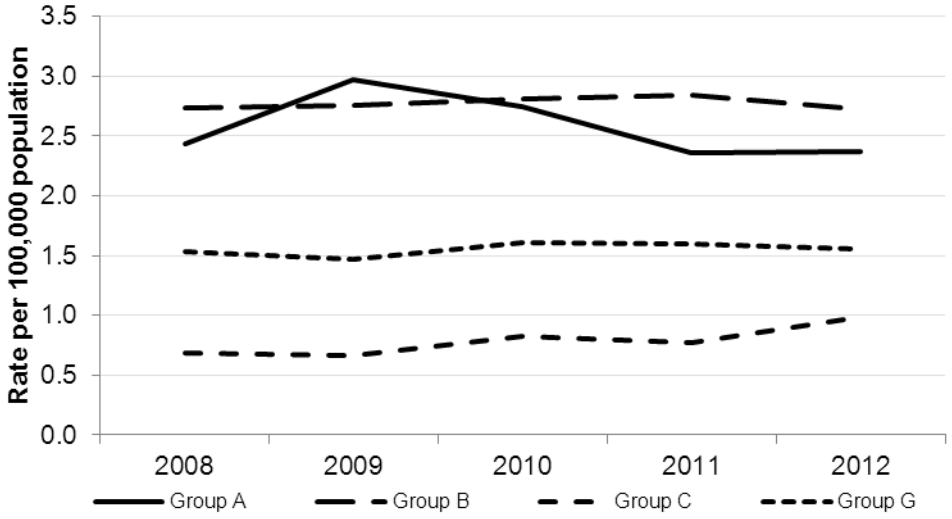
Between 2011 and 2012 there was a 3% increase in the number of laboratory reports of streptococcal bacteraemia (9511 and 9734 reports respectively; table 1) in England, Wales and Northern Ireland, a 4% increase in non-pyogenic streptococci (5327 to 5543) and a 1% increase in pyogenic streptococci (4134 to 4191).

Pyogenic streptococci and non-pyogenic streptococci accounted for 4.6% and 8.5% of monomicrobial infections in 2011 [6] with the total number of bacteraemias reported to LabBase2 increasing by 1% between 2008 and 2012 (108,424 to 109,166 cases).

In 2012, 81% of *Streptococcus* spp. isolates from blood were identified to species level (8154 reports), this is in line with the previous five years where between 79% and 81% included species information.

Figure 1. a) Pyogenic and b) non-pyogenic streptococcal bacteraemia rates per 100,000 population (England, Wales and Northern Ireland): 2008-2012

a)



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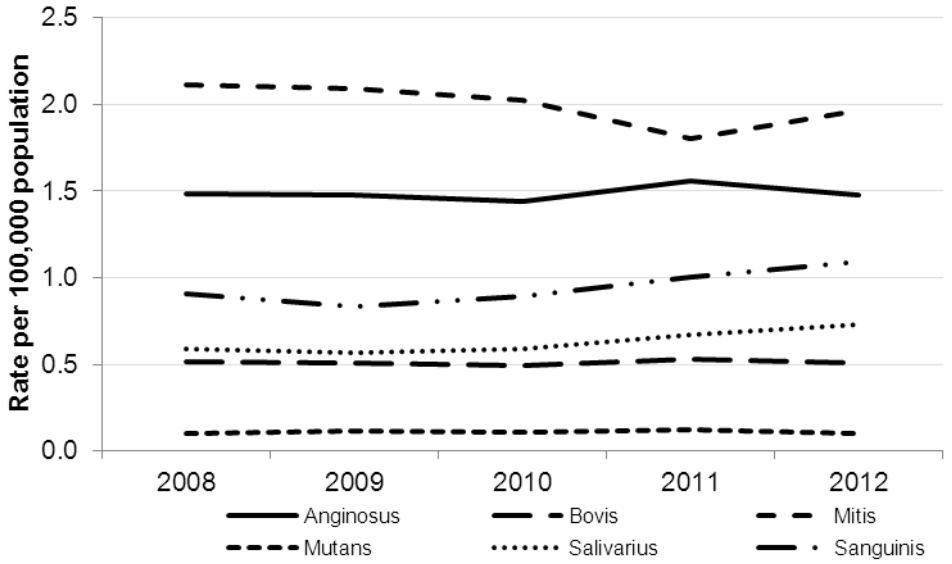


Source: PHE.

Group A streptococci

Of the pyogenic streptococci causing bacteraemia, group A streptococci (GAS) were the second most frequently reported (31%; 1,381 reports; table 1).

The overall rate of GAS bacteraemia in 2012 for England, Wales and Northern Ireland was 2.4 per 100,000 population (table 2). England had the highest reported incidence rate with 2.4/100,000 followed by Wales and Northern Ireland, both at 2.1 cases/100,000 population. There was wide variation within English regions from 1.8/100,000 in the East Midlands region to 2.8 in the East of England. Data collection is based on a voluntary reporting system and as such, it is important to note that regional incidence rates may be affected by completeness of reporting.

Rates of GAS bacteraemia reports were higher in females than males in the under one year, 15 to 44 year and the 75 and over age groups (figure 2). The highest rates were in adults aged 75 and over (15.1/100,000) whose rates increased from the 5 year low of 8.8/100,000 observed in 2011 [7]. In contrast, rates substantially decreased since 2011 in the less than one year (4.5 to 3.7/100,000) and 65 to 74 year (4.4 to 4.1/100,000) age groups.

Table 1. Reports of Pyogenic and non-pyogenic streptococcal bacteraemia by species (England, Wales and Northern Ireland): 2008 to 2012

	2008		2009		2010		2011		2012	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Pyogenic streptococci	**4182**	100%	**4480**	100%	**4587**	100%	**4391**	100%	**4453**	100%
Group A	1375	33%	1694	38%	1574	34%	1364	31%	1375	31%
Group B	1550	37%	1572	35%	1613	35%	1648	38%	1588	36%
Group C	390	9%	378	8%	474	10%	450	10%	574	13%
Group G	866	21%	836	19%	922	20%	927	21%	910	20%
Non-pyogenic streptococci	**3232**	100%	**3182**	100%	**3189**	100%	**3295**	100%	**3432**	100%
Anginosus group	**842**	26%	**842**	26%	**829**	26%	**903**	27%	**863**	25%
Streptococcus anginosus	261	8%	276	9%	307	10%	328	10%	353	10%
Streptococcus constellatus	198	6%	224	7%	201	6%	230	7%	210	6%
Streptococcus group F	48	1%	62	2%	30	1%	41	1%	39	1%
Streptococcus intermedius	89	3%	83	3%	86	3%	97	3%	107	3%
Streptococcus milleri group	246	8%	197	6%	205	6%	207	6%	154	4%
Bovis group	**290**	9%	**288**	9%	**285**	9%	**306**	9%	**296**	9%
Streptococcus alactolyticus	6	0%	5	0%	11	0%	6	0%	11	0%
Streptococcus bovis biotype I	24	1%	34	1%	18	1%	20	1%	22	1%
Streptococcus bovis untyped	223	7%	223	7%	223	7%	221	7%	166	5%
Streptococcus equinus	10	0%	9	0%	8	0%	11	0%	16	0%
Streptococcus gallolyticus	23	1%	16	1%	23	1%	38	1%	58	2%
Streptococcus infantarius sp *nov*	4	0%	1	0%	2	0%	10	0%	23	1%
Mitis group	**1196**	37%	**1191**	37%	**1162**	36%	**1044**	32%	**1148**	33%
Streptococcus mitis	125	4%	116	4%	80	3%	39	1%	79	2%
Streptococcus mitis group	700	22%	708	22%	705	22%	639	19%	722	21%
Streptococcus oralis	371	11%	367	12%	377	12%	366	11%	347	10%
Mutans group	**58**	2%	**64**	2%	**61**	2%	**73**	2%	**59**	2%
Streptococcus mutans	56	2%	62	2%	58	2%	71	2%	58	2%
Streptococcus sobrinus	2	0%	2	0%	3	0%	2	0%	1	0%
Salivarius group	**333**	10%	**323**	10%	**339**	11%	**389**	12%	**427**	12%
Streptococcus salivarius	300	9%	294	9%	316	10%	357	11%	387	11%
Streptococcus vestibularis	33	1%	29	1%	23	1%	32	1%	40	1%
Sanguinis group	**513**	16%	**474**	15%	**513**	16%	**580**	18%	**639**	19%
Streptococcus gordonii	53	2%	61	2%	58	2%	69	2%	74	2%
Streptococcus parasanguinis	146	5%	141	4%	184	6%	177	5%	235	7%
Streptococcus sanguinis	44	1%	31	1%	21	1%	30	1%	26	1%
Streptococcus sanguinis group	270	8%	241	8%	250	8%	304	9%	304	9%
Other streptococci	**2268**	100%	**2071**	100%	**2007**	100%	**2032**	100%	**2111**	100%
'Anaerobic streptococcus'	47	2%	21	1%	37	2%	36	2%	43	2%
Streptococci not fully identified	1970	87%	1831	88%	1776	88%	1788	88%	1799	85%
Streptococcus acidominimus	20	1%	13	1%	12	1%	13	1%	14	1%
Other named streptococci	219	10%	199	10%	173	9%	189	9%	249	12%
Streptococcus suis	7	0%	1	0%	2	0%	0	0%	2	0%

	2008		2009		2010		2011		2012	
	No.	%	No.	%	No.	%	No.	%	No.	%
Genera closely related to streptococci	**480**	100%	**478**	100%	**417**	100%	**410**	100%	**470**	100%
Abiotrophia spp	25	5%	25	5%	17	4%	29	7%	46	10%
Aerococcus spp	123	26%	153	32%	125	30%	127	31%	145	31%
Gemella spp	123	26%	115	24%	117	28%	88	21%	90	19%
Globicatella sanguis	0	0%	2	0%	4	1%	3	1%	0	0%
Leuconostoc spp	38	8%	38	8%	34	8%	34	8%	42	9%
Pediococcus spp	6	1%	1	0%	6	1%	2	0%	3	1%
Peptostreptococcus spp	165	34%	144	30%	114	27%	127	31%	144	31%

Source: PHE.

The proportion of GAS bacteraemia reports accompanied by susceptibility data has improved since 2008, with 42%, 68% and 54% GAS cases in 2012 including susceptibility to clindamycin, erythromycin and tetracycline respectively. In 2012 resistance to clindamycin, erythromycin and tetracycline was recorded in 4%, 5% and 11% of blood culture isolates respectively (table 3). Resistance to clindamycin and erythromycin among GAS has remained stable since 2008, whereas prevalence of tetracycline resistance has fluctuated over time but remaining around the 10% level.

Table 2. Rate per 100,000 population pyogenic streptococcal bacteraemia reports by region: 2012

	Rate per 100,000 population			
Region	**Group A**	**Group B**	**Group C**	**Group G**
East Midlands	1.8	2.4	0.7	1.8
East of England	2.8	3.2	0.9	2.2
London	2.0	3.3	0.6	1.3
North East	2.3	2.3	1.7	0.3
North West	2.6	3.2	1.1	1.9
South East	2.7	1.8	0.8	1.0
South West	2.6	2.6	1.0	2.0
West Midlands	2.1	3.0	1.5	1.9
Yorkshire and the Humber	2.4	2.5	1.0	1.6
England	**2.2**	**2.7**	**1.0**	**1.6**
Wales	**2.1**	**2.3**	**0.8**	**1.5**
Northern Ireland (NI)	**2.1**	**2.9**	**1.4**	**0.3**
England, Wales and NI	**2.4**	**2.7**	**1.0**	**1.6**

Source: PHE.

Table 3. Antimicrobial susceptibility for pyogenic streptococcal bacteraemia (England, Wales and Northern Ireland): 2008 to 2012

		2008		2009		2010		2011		2012	
		No. Tested	% resistant	No. Tested	% resistant	No. Tested	% resistant	No. Tested	% resistant	No. Tested	% resistant
Group A	clindamycin	318	3%	335	3%	378	3%	422	3%	466	4%
	erythromycin	896	5%	821	5%	851	5%	802	5%	760	5%
	tetracycline	615	11%	561	9%	667	9%	592	13%	605	11%
Group B	clindamycin	358	8%	398	10%	467	9%	562	17%	626	13%
	erythromycin	1095	12%	1059	14%	1,131	15%	1,081	18%	1,080	19%
	tetracycline	832	82%	815	79%	919	82%	892	83%	907	85%
Group C	clindamycin	82	11%	83	4%	129	12%	186	12%	228	12%
	erythromycin	260	11%	247	13%	334	14%	332	17%	409	25%
	tetracycline	214	24%	187	25%	263	26%	248	27%	350	33%
Group G	clindamycin	226	12%	192	8%	228	9%	292	12%	338	19%
	erythromycin	624	22%	547	24%	656	26%	665	32%	632	37%
	tetracycline	461	47%	421	50%	515	46%	508	49%	515	51%

Source: PHE.

Group B streptococci

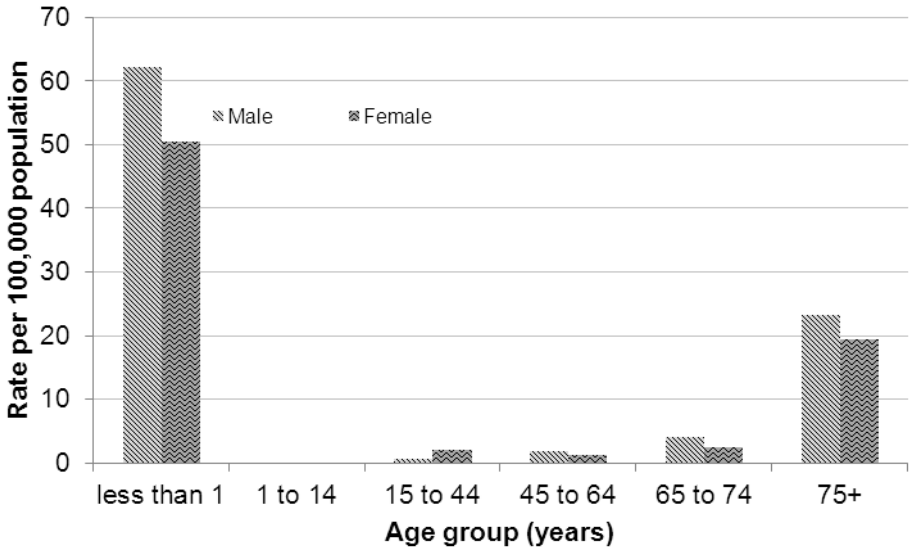
In 2012, reports of bacteraemia due to GBS decreased in England, Wales and Northern Ireland (1648 to 1588 reports in 2011 and 2012 respectively) ending a period of year-on-year increase seen since 2008.

The overall rate of GBS bacteraemia in 2012 for England, Wales and Northern Ireland was 2.7 per 100,000 population (table 2). Rates were similar in both England and Northern Ireland (2.7 and 2.9/100,000 population) and in line with those seen in 2011 (2.8 and 2.7/100,000 respectively).

In Wales the rate of infection decreased in 2012 compared with 2011 from 2.9 to 2.3/100,000. There was wide variation within English regions from 1.8 in the South East region to 3.3 in London.

Rates of GBS bacteraemia remain highest in infants, 50.4 and 62.1/100,000 population in females and males aged less than 1 year respectively (figure 3), the rate in males showing a slight increase on the previous year (55.9/100,000).

Figure 3. Group B streptococcal bacteraemia age and sex rates per 100,000 population (England, Wales and Northern Ireland): 2012



Source: PHE.

Rates of GBS bacteraemia were generally higher in males than females across most age groups, with the exception of the 15 to 44 age group (0.5 and 1.9/100,000 population in males and females respectively).

Rates of GBS bacteraemia reports in infants (less than 90 days) in England, Wales and Northern Ireland decreased by 8% between 2011 and 2012, from 0.63 to 0.58 per 1000 live births (table 4). The decrease is largely accounted for by a drop in the late onset (7 to 90 days) GBS rates (0.26 to 0.22/1000 live births in 2011 and 2012 respectively), the most pronounced decrease being seen in Northern Ireland (0.47 to 0.24/1000 live births) compared with England (0.25 to 0.22) and Wales (0.25 to 0.24). Rates of early onset (0 to 6 days) infant disease decreased slightly between 2011 and 2012 (0.38 to 0.36) in England, Wales and Northern Ireland. This varied by individual country with Northern Ireland seeing an increase (0.24 to 0.44) and England and Wales observing decreases (0.38 to 0.36 and 0.42 to 0.23 respectively). Caution should be exercised when interpreting these results given the small sample sizes in Wales and Northern Ireland.

The proportion of GBS bacteraemia reports accompanied by susceptibility data has improved since 2005, with 39%, 68% and 57% GBS cases in 2012 including susceptibility data for clindamycin, erythromycin and tetracycline respectively. In England, Wales and Northern Ireland resistance to erythromycin has increased each year since 2008 (12% to 19%). Increases in clindamycin resistance have also been since 2009 although a decrease was noted in 2012 to 13% (table 3).

Table 4. Number and rate per 100,000 live births of group B streptococcal bacteraemia in infants 0-90 days old (England, Wales and Northern Ireland): 2012

	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	406	0.58	(0.53 - 0.64)	251	0.36	(0.32 - 0.41)	155	0.22	(0.19 - 0.26)
Northern Ireland (NI)	17	0.67	(0.39 - 1.08)	11	0.44	(0.22 - 0.78)	6	0.24	(0.09 - 0.52)
Wales	15	0.43	(0.24 - 0.70)	8	0.23	(0.10 - 0.45)	7	0.20	(0.08 - 0.41)
England, Wales & NI	438	0.58	(0.53 - 0.64)	270	0.36	(0.32 - 0.40)	168	0.22	(0.19 - 0.26)

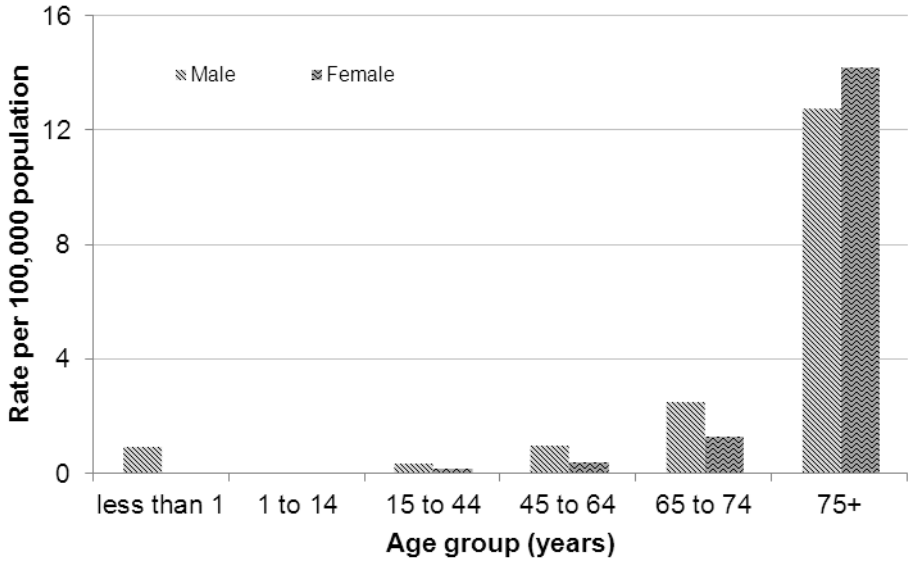
Source: PHE.

Groups C and G streptococci

Reports of bacteraemia due to group C streptococcal (GCS) in England, Wales and Northern Ireland increased by 28% in 2012 compared to 2011 (574 and 450 reports respectively); this is part of an overall increase since 2008 (table 1).This translates to an increased rate from 0.7 to 1.0/100,000 population (figure 1a).

Comparatively little change has been observed in the number of GGS bacteraemia reports received, with a decrease of 2% seen between 2011 and 2012 (927 to 910 reports respectively). The overall rate of GGS bacteraemia in 2012 for England, Wales and Northern Ireland was 1.6/100,000 population.

Figure 4. Group C streptococcal bacteraemia age and sex rates per 100,000 population (England, Wales and Northern Ireland): 2012



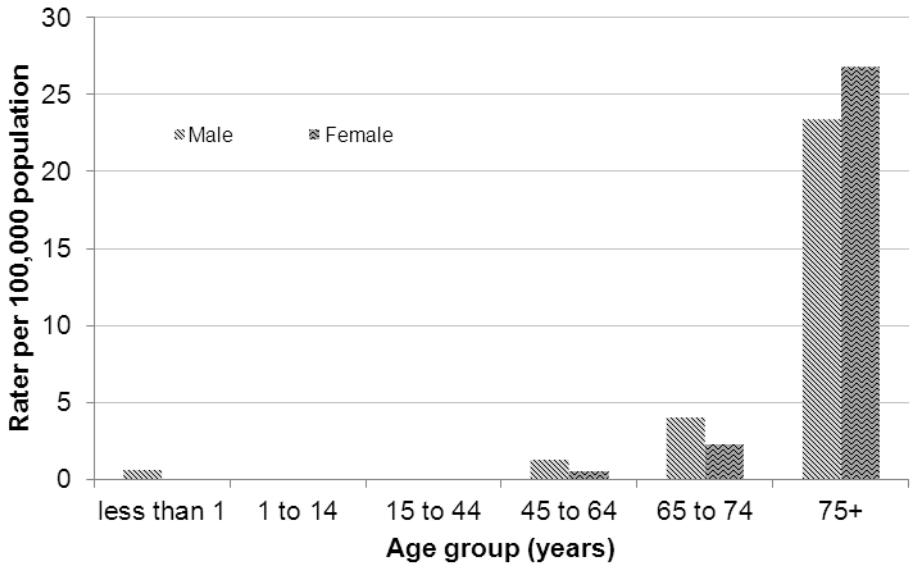
Source: PHE.

Rates varied by individual country for both GCS and GGS bacteraemia with GCS rates of 1.0, 0.8 and 1.4/100,000 and GGS bacteraemia rates of 1.6, 1.5 and 0.3/100,000 in England, Wales and Northern Ireland respectively (table 2).

Within English regions the rates also varied, with GCS bacteraemia rates ranging from 0.6/100,000 in the London region to 1.7 in the North East region, and GGS bacteraemia rates ranging from 0.3 in the North East region to 2.2 in the East of England region.

The rates of both GCS and GGS bacteraemia were highest in the elderly, with 13.6 and 25.4/100,000 in the 75 years and over age group for GCS and GGS bacteraemia respectively (figures 4 and 5). Rates tended to be higher in males than females in the majority of age groups.

Figure 5. Group C streptococcal bacteraemia age and sex rates per 100,000 population (England, Wales and Northern Ireland): 2012



Source: PHE.

The proportion of GCS bacteraemia reports accompanied by susceptibility data has increased since 2008, with 40%, 71% and 61% GCS cases in 2012 including susceptibility data for clindamycin, erythromycin and tetracycline respectively. A similar picture was seen in GGS bacteraemia reports in 2012, with 37%, 69% and 57% cases including susceptibility data for clindamycin, erythromycin and tetracycline respectively.

In 2012 resistance to clindamycin, erythromycin and tetracycline in GCS bacteraemia was recorded in 12%, 25% and 33% of laboratory reports respectively (table 3). Erythromycin and tetracycline resistance levels showed an increase on resistance levels seen in 2011 (17% and 27% respectively).

For GGS blood isolates in 2012, resistance to clindamycin (19%), erythromycin (37%) and tetracycline (51%) increased from levels reported in 2011 (12%, 32% and 49% respectively), an increasing trend since 2008.

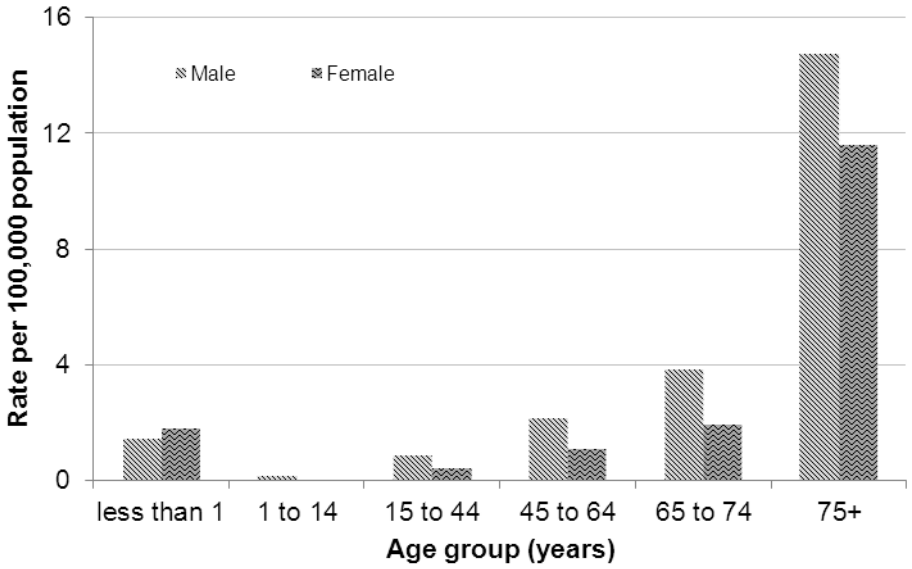
Non-pyogenic streptococci

The rate of reports for the majority of non-pyogenic streptococcal groups has decreased over the period 2008 to 2012, the exceptions being the salivarius group with a 24% increase (0.6 to 0.7/100,000 population) and the sanguinis group with a 21% increase (0.9 to 1.1/100,000; figure 1b). Rates varied by non-pyogenic group, from 0.5 per 100,000 population for bacteraemia due to bovis group streptococci to 2.0/100,000 for the mitis group (table 5).

The rates varied by individual country. In England the rate was highest for mitis group streptococci (2.1/100,000) and lowest for bovis group (0.5), whereas in Wales and Northern Ireland the rate was highest in anginosus group (0.6 and 1.6/100,000 respectively) and lowest in salivarius group streptococci (0.1 and 0.5/100,000 respectively).

Within English regions the reporting rates also varied, with mitis group streptococcal bacteraemia rates ranging from 0.8 in the North East region to 2.7 in the South West region, and anginosus group streptococcal bacteraemia rates ranging from 1.3 in the London and Yorkshire and Humber regions to 1.8 in the South East region. Data collection is based on a voluntary reporting system and as such it is important to note that regional incidence rates can be affected by completeness of reporting.

Figure 6. Anginosus group streptococcal bacteraemia age and sex rates per 100,000 population (England, Wales and Northern Ireland): 2012



Source: PHE.

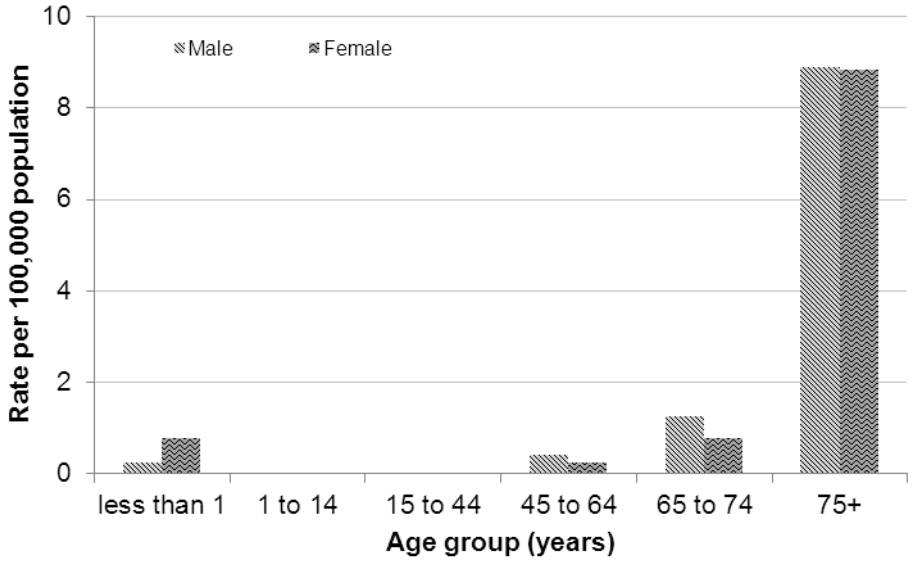
Within the non-pyogenic streptococcal groups, the mitis group accounted for the majority of bacteraemia reports (33%) in 2012 (table 1). Reports of bacteraemia due this group increased by 10% compared with 2011 (1044 to 1148). Other non-pyogenic streptococci where an increase was seen are the salivarius group (10% increase; 389 to 427 reports) and the sanguinis group (10% increase; 580 to 639 reports). Between 2011 and 2012 a slight decrease was seen in the anginosus group and bovis group streptococci, reductions of 4% and 3% respectively.

Within the non-pyogenic streptococci reports there was a wide variation in age distribution between groups, although rates in all groups were highest in those aged 75 years and over (figures 6 to 10).

For both anginosus and bovis group streptococci, rates were higher in males than females in all age groups except those aged less than 1 year (1.5 and 1.8/100,000 in the anginosus group and 0.2 and 0.8/100,000 in the bovis group in males and females respectively).

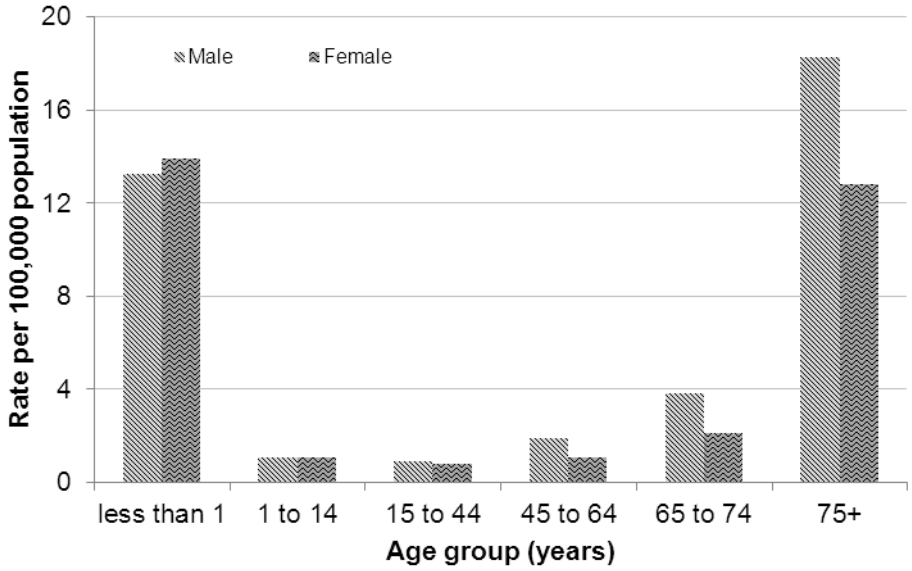
Rates in the mitis, salivarius and sanguinis groups followed a similar pattern (figures 8, 9 and 10).

Figure 7. Bovis group streptococcal bacteraemia age and sex rates per 100,000 population (England, Wales and Northern Ireland): 2012



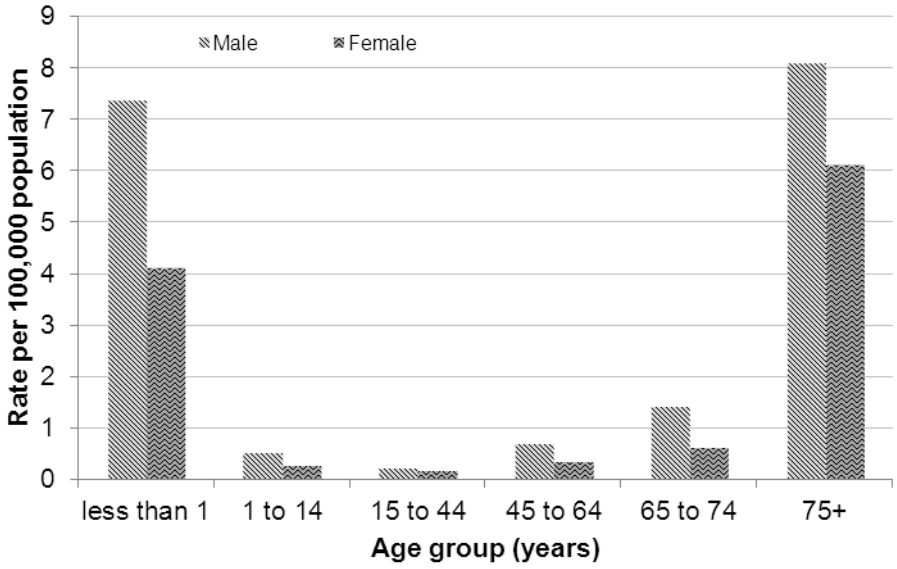
Source: PHE.

Figure 8. Mitis group streptococcal bacteraemia age and sex rates per 100,000 population (England, Wales and Northern Ireland): 2012



Source: PHE.

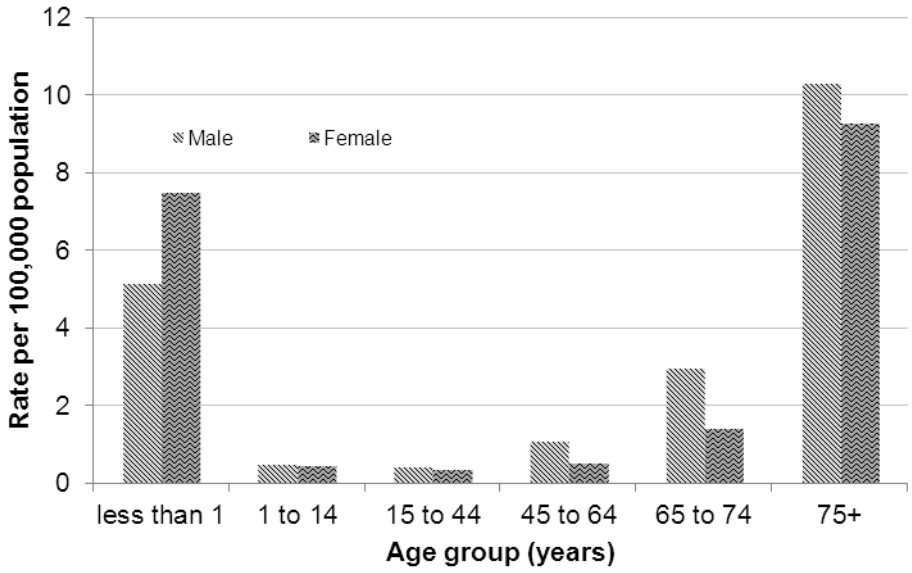
Figure 9. Salivarius group streptococcal bacteraemia age and sex rates per 100,000 population (England, Wales and Northern Ireland): 2012



Source: PHE.

The proportion of anginosus group streptococcal bacteraemia reports accompanied by susceptibility data for each of erythromycin, penicillin and tetracycline has remained steady since 2008, with 64%, 85% and 50% cases in 2012 including susceptibility data for erythromycin, penicillin and tetracycline respectively. A similar picture was seen in the other non-pyogenic streptococci, with the proportion of reports with susceptibility to erythromycin, penicillin and tetracycline remaining similar between 2008 and 2012. Over 79% of reports include information on susceptibility to penicillin in all groups of non-pyogenic streptococci.

Figure 10. Sanguinis group streptococcal bacteraemia age and sex rates per 100,000 population (England, Wales and Northern Ireland): 2012



Source: PHE.

Table 5. Rate per 100,000 population non-pyogenic streptococcal bacteraemia reports by region: 2012

	Rate per 100,000 population				
Region	**Anginosus Group**	**Bovis Group**	**Mitis Group**	**Salivarius Group**	**Sanguinis Group**
East Midlands	1.5	0.3	2.3	0.7	1.3
East of England	1.5	0.5	2.2	0.7	1.5
London	1.3	0.6	2.0	0.8	1.2
North East	1.6	0.4	0.8	0.3	0.9
North West	1.7	0.6	2.1	0.7	1.1
South East	1.8	0.5	2.0	0.7	1.1
South West	1.6	0.4	2.7	0.9	1.2
West Midlands	1.4	0.7	2.5	1.1	1.2
Yorkshire and the Humber	1.3	0.4	1.5	0.7	0.8
England	**1.5**	**0.5**	**2.1**	**0.8**	**1.2**
Wales	**0.6**	**0.2**	**0.3**	**0.1**	**0.3**
Northern Ireland (NI)	**1.6**	**0.8**	**1.1**	**0.5**	**0.8**
England, Wales and NI	**1.5**	**0.5**	**2.0**	**0.7**	**1.1**

Source: PHE.

In England, Wales and Northern Ireland in 2012 between 2 and 23% of non-pyogenic streptococcal isolates either had reduced susceptibility or were resistant to penicillin, with resistance frequency in all non-pyogenic groups showing a general decreasing trend since 2008 (table 6). This is a contrast from the pyogenic streptococci where penicillin resistance is still undocumented.

Erythromycin resistance was also high in the non-pyogenic streptococcal groups compared to the pyogenic groups, with between 26% and 46% of isolates reported as resistant, with the exception of the anginosus group (11%). The highest level of tetracycline resistance were observed in the bovis group streptococci where 67% of isolates were reported as resistant in 2012; this is in line with what has been reported in earlier years.

Table 6. Antibiotic susceptibility for non-pyogenic streptococcal bacteraemia reports (England, Wales and Northern Ireland): 2008-2012

		2008		2009		2010		2011		2012	
		No. Tested	% resistant	No. Tested	% resistant	No. Tested	% resistant	No. Tested	% resistant	No. Tested	% resistant
Anginosus	erythromycin	579	9%	550	9%	535	9%	615	10%	550	11%
	penicillin	710	4%	713	3%	677	1%	767	1%	730	2%
	tetracycline	390	21%	390	19%	402	24%	448	23%	432	21%
Bovis	erythromycin	183	21%	169	23%	171	30%	185	22%	175	26%
	penicillin	236	7%	220	5%	227	7%	244	5%	234	3%
	tetracycline	133	65%	143	66%	132	61%	145	68%	128	67%
Mitis	erythromycin	828	40%	751	43%	747	44%	698	46%	758	46%
	penicillin	1016	26%	971	24%	959	23%	869	19%	977	19%
	tetracycline	582	29%	556	28%	558	25%	545	24%	544	29%
Salivarius	erythromycin	229	37%	225	36%	219	39%	244	34%	271	42%
	penicillin	256	23%	254	23%	265	21%	309	22%	336	18%
	tetracycline	150	21%	156	21%	146	18%	182	24%	182	21%
Sanguinis	erythromycin	364	34%	310	40%	340	43%	383	34%	404	38%
	penicillin	412	29%	354	31%	404	26%	481	26%	527	23%
	tetracycline	237	30%	222	32%	239	34%	276	27%	298	32%

Source: PHE

Reference microbiology service

In 2012, the proportion of reports of streptococcal bacteraemia in which the organism was not fully identified remained the same as in 2009, 2010 and 2011 at 19%. Precise species identification of isolates would improve the monitoring of trends in non-pyogenic streptococci and related genera in particular. The Respiratory and Vaccine Preventable Bacteria Reference Unit (RVPBRU, Colindale) 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. All such isolates should be submitted to RVPBRU along with GAS, GBS, GCS and GGS isolates from normally sterile sites.

Laboratories are requested to send any pyogenic streptococcal isolates exhibiting a decreased sensitivity to penicillin to the Antimicrobial Resistance and Healthcare Associated Infections Reference Unit (AMRHAI, Colindale) for confirmation. In addition, any streptococci (pyogenic or non-pyogenic) with suspected glycopeptide or linezolid resistance should be referred for further investigation. Both AMRHAI and RVPBRU are based at the Public Health England, Colindale.

Guidelines for the management of close community contacts of invasive GAS cases [8] and the prevention and control of GAS transmission in acute healthcare and maternity settings [9] are available at the following web-page: http://www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/StreptococcalInfections/Guidelines.

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