UK Health Security Agency

Laboratory surveillance of pyogenic and non-pyogenic streptococcal bacteraemia in England: 2020 update

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Contents

Introduction

The analyses in this report are based on data relating to diagnoses of pyogenic and non-pyogenic streptococcal bloodstream infections between 2011 and 2020 in England. Data for England was extracted from the UK Health Security Agency's (UKHSA; formerly Public Health England) Second Generation Surveillance System (SGSS), a voluntary surveillance database, on 20 October 2021.

Invasive group A streptococcal disease is notifiable in England and Wales under the Health Protection (Notification) Regulations 2010. Records of group A streptococcal (GAS) bacteraemia based on isolates submitted to the UKHSA Antimicrobial Resistance and Hospital Associated Infections Reference Unit (AMRHAI, Colindale) were merged with laboratory reports (services have moved from the Respiratory and Vaccine Preventable Bacteria Reference Unit; RVPBRU). Most of the data collection for this report is based on voluntary reporting systems and as such it is important to note that regional and temporal incidence rates can be affected by completeness of and local variations in reporting.

In England, laboratories are requested to submit data individually to SGSS, with reporting based on clinically significant isolates.

Beta-haemolytic pyogenic streptococci are classified according to the type of major surface polysaccharide antigen (Lancefield group), namely: group A (*Streptococcus pyogenes*), group B (*Streptococcus agalactiae*), group C (multiple zoonotic species plus the human species *Streptococcus dysgalactiae* subsp. *equisimilis*) and group G (human and animal species *Streptococcus dysgalactiae* subsp. *equislimilis* and *Streptococcus canis*). Non-pyogenic streptococci are subdivided into groups: mitis; sanguinis; anginosus; salivarius; mutans and bovis. *Streptococcus pneumoniae* and group D streptococci (now classified as *Enterococcus* spp.) are not included in this report. A full list of the laboratory reported species assigned to each pyogenic and non-pyogenic group is available in the web appendix associated with this report.

The report includes analyses on the trends, age and sex distribution, geographical distribution and antimicrobial susceptibility of laboratory-reported cases of pyogenic and non-pyogenic streptococcal bacteraemia. Rates of bacteraemia were calculated using mid-year resident population estimates for the respective year and geography. Rates of group B streptococci (GBS) bacteraemia in infants were calculated using 2020 live birth denominators.

Geographical analyses were based on cases in England being assigned to one of 9 regions formed from administrative local authority boundaries.

The web appendix contains the data that underpins the findings of this report. It should be noted that the data presented here for earlier years may differ from that in previous publications due to the inclusion of late reports.

Main points

The main points highlighted in this report are:

- between 2016 and 2020 there was a 3% increase in the number of laboratory reports of streptococcal bacteraemia (from 14,592 to 15,003 reports) in England, although a 15% decrease was seen between 2019 (17,722 reports) and 2020 (15,003)
- the rate GAS bacteraemia decreased by 38% from 3.8 cases per 100,000 population in 2019 to 2.4/100,000 in 2020, a larger decline than noted for other pyogenic group streptococci
- resistance to tetracycline in GAS bacteraemia increased between 2016 and 2020, from 11% to 30%
- 2191 cases of GBS bacteraemia were reported by laboratories in England, an 11% increase since 2016
- in line with previous reports, rates of pyogenic streptococcal bacteraemia were highest in the elderly, except for GBS where rates were highest in infants
- the overall rate for England of GBS disease in infants less than 90 days old decreased from 0.84 to 0.80/1,000 live births between 2019 and 2020; both late (0.30 to 0.27/1,000 live births) and early onset infant disease (0.55 to 0.53/1,000 live births) fell between 2019 and 2020
- resistance to clindamycin and erythromycin in GBS bacteraemia increased between 2016 and 2020, from 25% to 30% for clindamycin and 31% to 36% for erythromycin
- a historic GBS isolate from an adult with invasive disease in 2016 has been confirmed as having resistance to penicillin, the first in the UK
- the rate of non-pyogenic streptococcal group bacteraemia declined for all groups between 2019 and 2020, with Mitis and Sanguinis group streptococcal bacteraemia seeing the biggest declines from 4.6 to 3.7/100,000 and 2.9 to 2.3/100,000 respectively
- resistance to penicillin was reported for 9% of Mitis isolates (a slight decrease from 14% in 2016), 12% of Salivarius isolates (a decrease from 17% in 2018), and 21% of Sanguinis isolates (unchanged since 2017)
- the coronavirus (COVID-19) pandemic reduced contact between individuals and affected the general case-mix of hospital patients during much of 2020, which has likely impacted any trends reported here, in particular, the reductions in incidence of reported streptococcal group bacteraemia in England; testing and reporting reductions may also have impacted the figures
- if laboratories suspect resistance to penicillin, glyopeptides, oxazolidinones, cephalosporins, lipopeptides and glycolipopeptides, tigecycline, fluoroquinolons or quinupristin-dalfopristin in a pyogenic group streptococci isolate it is recommended to send the isolate to the UKHSA AMRHAI reference unit for confirmation

Trends in England

Between 2016 and 2020 there was a 3% increase in the number of laboratory reports of streptococcal bacteraemia (from 14,592 to 15,003 reports; table 1) in England. However between 2019 and 2020, a 15% decrease in reports was seen. The decreased reports of streptococcal baceraemia are in line with other reported decreases in bloodstream infections seen between 2019 and 2020. The English Surveillance of Antimicrobial Usage and Resistance (ESPAUR) report 2020 to 2021 indicated that there was an overall reduction in monomicrobial bacterial and fungal bloodstream isolates, as well as specific reductions in key pathogens such as *Escherichia coli* and *Staphylococcus aureus* in 2020. These reported reductions are likely due, at least in part, to the COVID-19 pandemic, which resulted in reduced contact between individuals and overall fewer interactions with the healthcare system, although the underlying causes of reductions in bloodstream infection rates are likely to be complex and multifactorial. In 2020, there were significant changes in hospital patient admissions such as the cancellation of elective surgery, which may have resulted in a possible decline in surgical site and other hospital-onset infections.

In 2020, 87% (13,103/15,003) of *Streptococcus* spp. isolates from blood (excluding *Streptococcus pneumoniae*) were reported to species level. Of those identified to species level in 2020, 48% (6,328/13,103) were pyogenic group streptococci, similar to the overall distribution in 2019 (49%; table 1).

General declines in bacteraemia rates in 2020 compared to 2019 were seen for both pyogenic and non-pyogenic streptococcal species, with GAS seeing the largest decline among pyogenic streptococci (figure 1a), and Mitis and Sanguinis groups seeing the largest decreases among the non-pyogenic streptococci (figure 1b).

Table 1. Reports of pyogenic and non-pyogenic streptococcal bacteraemia by species in England: 2016 to 2020

	2016		2017		2018		2019		2020	
Species	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Pyogenic streptococci	**6,281**	**100**	**6,611**	**100**	**7,805**	**100**	**7,539**	**100**	**6,328**	**100**
Group A	1,963	31	1,969	30	2,674	34	2,151	29	1,330	21
Group B	1,977	31	2,079	31	2,288	29	2,283	30	2,191	35
Group C	1,150	18	1,283	19	1,526	20	1,695	22	1,491	24
Group G	1,191	19	1,280	19	1,317	17	1,410	19	1,316	21
Non-pyogenic streptococci	**8,311**	**100**	**9,018**	**100**	**9,597**	**100**	**10,183**	**100**	**8,675**	**100**
Anginosus group	**1,239**	**15**	**1,414**	**16**	**1,492**	**16**	**1,644**	**16**	**1,664**	**19**

Species	2016		2017		2018		2019		2020	
	No.	%	No.	%	No.	%	No.	%	No.	%
S. anginosus	563	7	651	7	708	7	853	8	817	9
S. constellatus	326	4	378	4	438	5	396	4	478	6
S. intermedius	188	2	193	2	192	2	226	2	217	3
S. milleri	144	2	170	2	145	2	160	2	145	2
Streptococcus. group F	18	<1	22	<1	9	<1	9	<1	7	<1
Bovis group	**426**	**5**	**559**	**6**	**661**	**7**	**752**	**7**	**665**	**8**
S. alactolyticus	54	1	50	1	64	1	64	1	49	1
S. bovis biotype ii	127	2	162	2	180	2	216	2	195	2
S. bovis untyped	155	2	238	3	309	3	355	3	296	3
S. equinus	17	<1	24	<1	21	<1	23	0	20	<1
S. gallolyticus	43	1	39	<1	38	<1	53	1	45	1
S. infantarius	30	0	46	1	49	1	41	0	60	1
Mitis group	**1,891**	**23**	**2,165**	**24**	**2,253**	**23**	**2,553**	**25**	**2,036**	**23**
S. mitis	1,074	13	1,258	14	1,294	13	1,398	14	1,056	12
S. oralis	794	10	875	10	920	10	1,108	11	945	11
S. cristatus	23	<1	32	<1	39	<1	47	<1	35	<1
Mutans group	**79**	**1**	**115**	**1**	**116**	**1**	**119**	**1**	**116**	**1**
S. mutans	78	1	110	1	115	1	118	1	114	1
S. sobrinus	1	<1	5	<1	1	<1	1	<1	2	<1
Salivarius group¥	**757**	**9**	**783**	**9**	**949**	**10**	**969**	**10**	**803**	**9**
S. salivarius	691	8	628	7	741	8	723	7	623	7
S. vestibularis	66	1	155	2	208	2	246	2	180	2
Sanguinis group$^{\alpha}$	**1,123**	**14**	**1,379**	**15**	**1,570**	**16**	**1,651**	**16**	**1,300**	**15**
S. gordonii	185	2	189	2	235	2	248	2	206	2
S. parasanguinis	523	6	690	8	818	9	881	9	679	8
S. sanguinis	415	5	500	6	517	5	522	5	415	5
Other streptococci§	**2,796**	**34**	**2,603**	**29**	**2,556**	**27**	**2,495**	**25**	**2,091**	**24**
'Anaerobic *Streptococcus*'	53	<1	43	<1	27	<1	18	<1	27	<1
S. acidominus	7	<1	2	<1	1	<1	2	<1	0	0
S. suis	0	0	2	<1	2	<1	2	<1	2	<1
S. uberis	3	<1	3	<1	3	<1	1	<1	1	<1
Streptococcus not fully identified	2,227	27	2,283	25	2,296	24	2,237	22	1,900	22

Species	2016		2017		2018		2019		2020	
	No.	%	No.	%	No.	%	No.	%	No.	%
Streptococcus spp. other named‡	506	6	269	3	225	2	232	2	160	2
Genera closely related to streptococci†	**481**	**100**	**472**	**100**	**554**	**100**	**564**	**100**	**549**	**100**
Aerococcus spp.	258	54	255	54	307	55	318	56	311	57
Gemella spp.	138	29	115	24	142	26	137	24	138	25
Globicatella spp.	15	3	14	3	23	4	28	5	20	4
Leuconostoc spp.	39	8	52	11	47	8	39	7	40	7
Pediococcus spp.	6	1	7	1	7	1	7	1	11	2
Peptostreptococcus spp.	25	5	29	6	28	5	35	6	28	5

¥ total includes those recorded as '*S. hyointestinalis'* without further information
ᵅ total includes those recorded as '*S. massiliensis*' without further information
‡ including: *Streptococcus thermophilus*, *Streptococcus infantis*, *Streptococcus lutetiensis*, *Streptococcus pluranimalium*, *Streptococcus pasteurianus*, *Streptococcus ovis*, *Streptococcus peroris*, *Streptococcus sobrinus*, *Streptococcus australis*, *Streptococcus pseudoporcinus*, *Streptococcus thoraltensis*, *Streptococcus peroris*, *Streptococcus porcinus*
† Total includes those recorded as 'nutritionally variant Streptococci' without further information

Figures 1a and 1b show the rate per 100,000 population trends of the pyogenic group streptococcal bacteraemia (figure 1a) and the non-pyogenic group streptococcal bacteraemia (figure 1b) between 2011 and 2020. All groups demonstrate a general increasing trend between 2011 and 2019 before levelling off or declining in 2020, exceptions are described further later in the report.

Figure 1a. Trends in pyogenic streptococcal bacteraemia reports, by group, per 100,000 population in England: 2011 to 2020

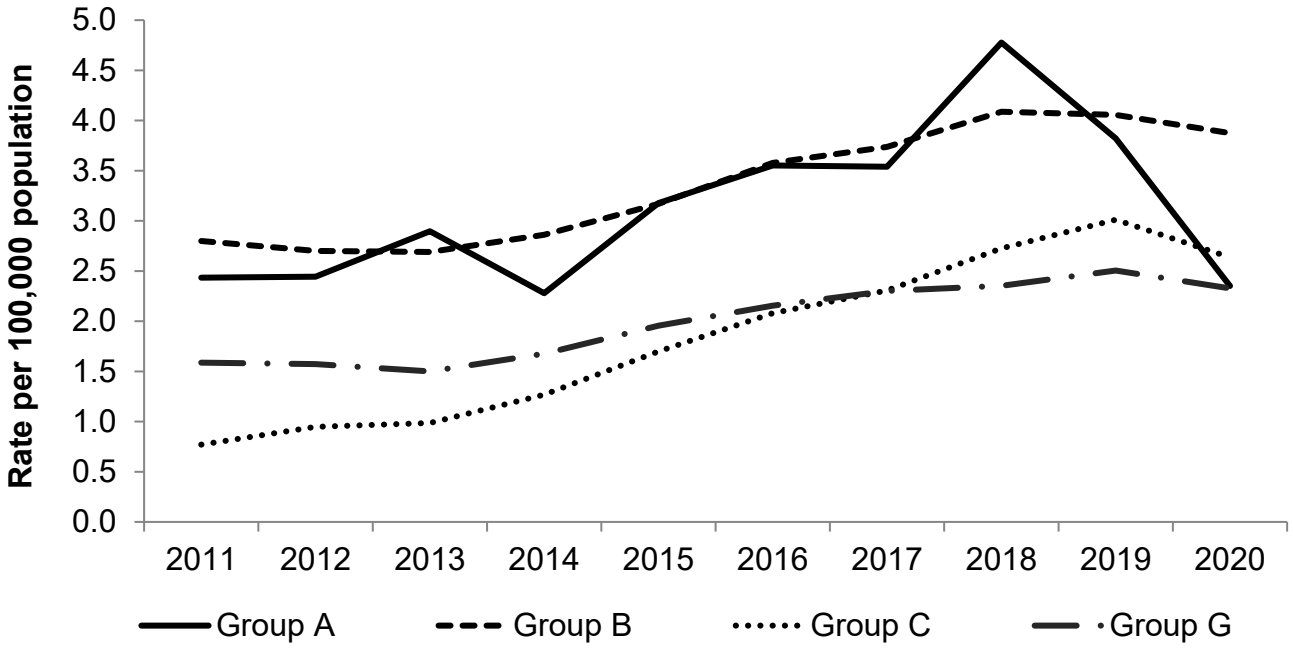
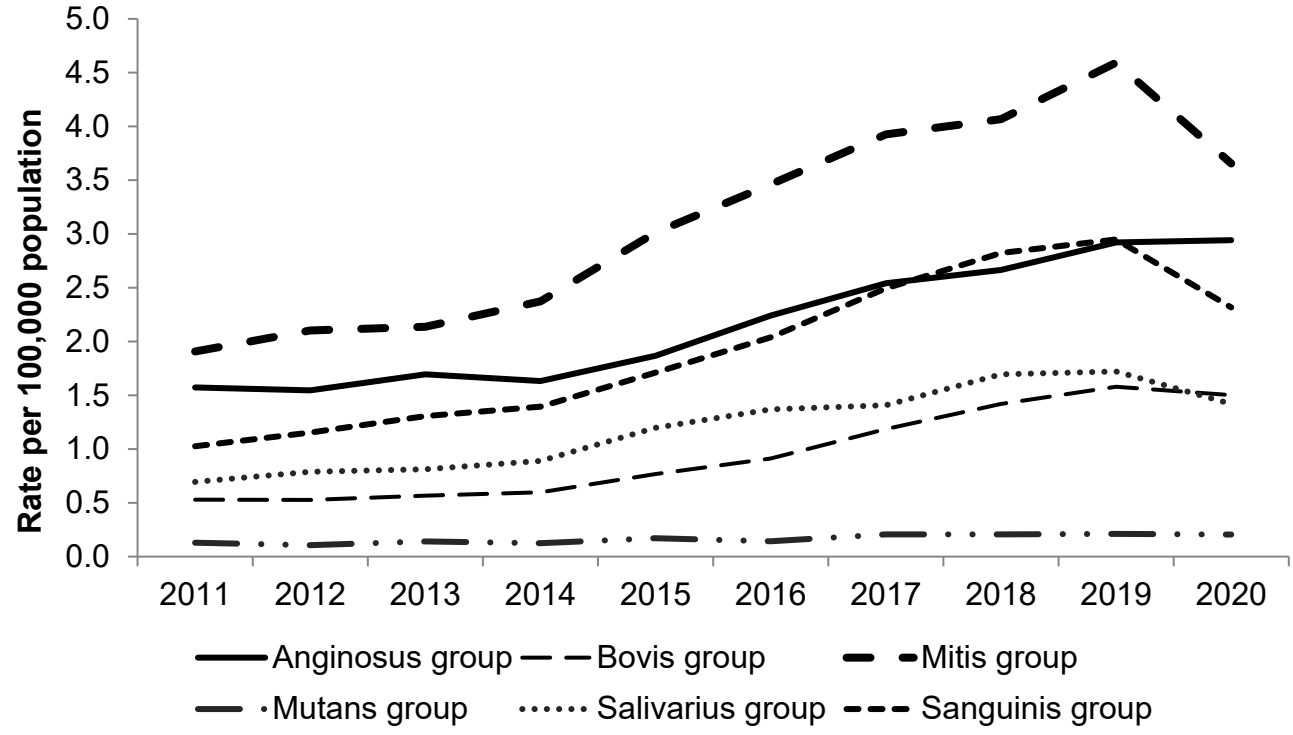


Figure 1b. Trends in non-pyogenic streptococcal bacteraemia reports, by group, per 100,000 population in England: 2011 to 2020



Pyogenic Streptococci

Table 2 shows the regional rates of the pyogenic streptococcal bacteraemia by Group in 2020.

Table 2. Rate per 100,000 population of pyogenic streptococcal bacteraemia reports by Region in England: 2020

		Rate per 100,000 population			
Region/Centre		**Group A**	**Group B**	**Group C**	**Group G**
North of England	North East	2.7	4.3	4.7	1.1
	North West	3.1	4.0	1.7	2.4
	Yorkshire and Humber	3.6	3.8	3.9	2.5
Midlands and East of England	East Midlands	2.0	3.3	2.7	3.4
	East of England	1.6	3.6	2.0	3.0
	West Midlands	2.8	3.5	3.6	3.1
London	London	1.5	3.9	1.4	0.8
South of England	South East	2.2	4.0	2.9	1.9
	South West	2.3	4.6	2.9	3.0
England		**2.4**	**3.9**	**2.6**	**2.3**

Table 3 shows the number of reports for each pyogenic group streptococcal bacteraemia that are tested and the proportion that are resistant to for key antibiotics (clindamycin, erythromycin and tetracycline) in England between 2016 and 2020.

In this table R = resistant.

Key antibiotic resistance and trends for each pyogenic streptococcal group are described within relevant sections of the report.

Table 3. Antimicrobial susceptibility for pyogenic streptococci causing bacteraemia in England: 2016 to 2020

		2016		2017		2018		2019		2020	
	Antimicrobial agent	**No. tested**	**R (%)**	**No. tested**	**R (%)**	**No. tested**	**R (%)**	**No. tested**	**R (%)**	**No. tested**	**R (%)**
Group A	clindamycin	961	6	1053	6	1605	6	1345	10	872	9
	erythromycin	1148	7	1288	7	1779	7	1365	10	806	8
	tetracycline	1315	11	1412	12	2009	15	1661	24	992	30
Group B	clindamycin	1225	25	1436	27	1774	29	1780	30	1521	31
	erythromycin	1580	31	1739	32	1836	33	1825	34	1615	36
	tetracycline	1730	85	1899	84	2106	83	2124	84	1907	85
Group C	clindamycin	764	19	929	23	1182	23	1305	26	1148	25
	erythromycin	857	26	1050	28	1245	29	1308	32	1085	30
	tetracycline	1001	32	1185	29	1460	30	1553	32	1323	31
Group G	clindamycin	693	30	900	30	1061	37	1127	35	1009	43
	erythromycin	875	39	1114	37	1086	41	1116	39	946	44
	tetracycline	1063	45	1240	46	1320	41	1398	41	1182	44

Group A streptococci

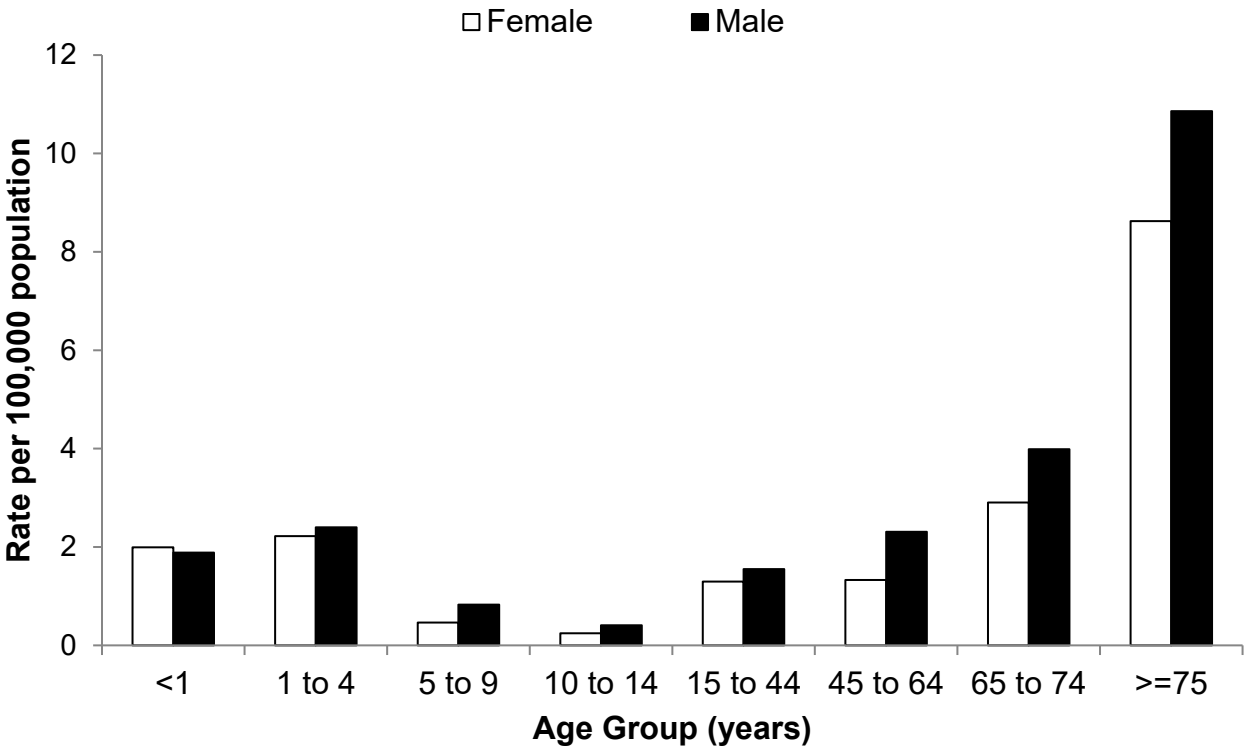
Of the pyogenic streptococci causing bacteraemia in England in 2020, group A streptococci (GAS) accounted for 21% (2,330/6,328) of reports (table 1).

In comparison with other organism categories causing bacteraemia, GAS were ranked 14th in the monomicrobial and 24th in the polymicrobial bacteraemia 2020 summary tables (published in the ESPAUR report 2020 to 2021), down from 11th and 21st in 2019 respectively.

The overall rate of GAS bacteraemia in 2020 was 2.4 cases per 100,000 population (figure 1a), a 38% decrease from 3.6/100,000 in 2019. The rate of GAS bacteraemia reports across England in 2020 ranged from 1.5 in London to 3.6/100,000 in Yorkshire and Humber (table 2).

Figure 2 shows the rates of GAS bacteraemia were higher in males than females in all ages except the under one year age group. The highest rates were in the elderly (≥75 years), with rates of 10.9/100,000 in males and 8.6/100,000 in females, followed by those 65 to 74 years, with rates of 4.0/100,000 in males and 2.9/100,000 in females.

Figure 2. Group A streptococcal bacteraemia age and sex rates per 100,000 population in England: 2020



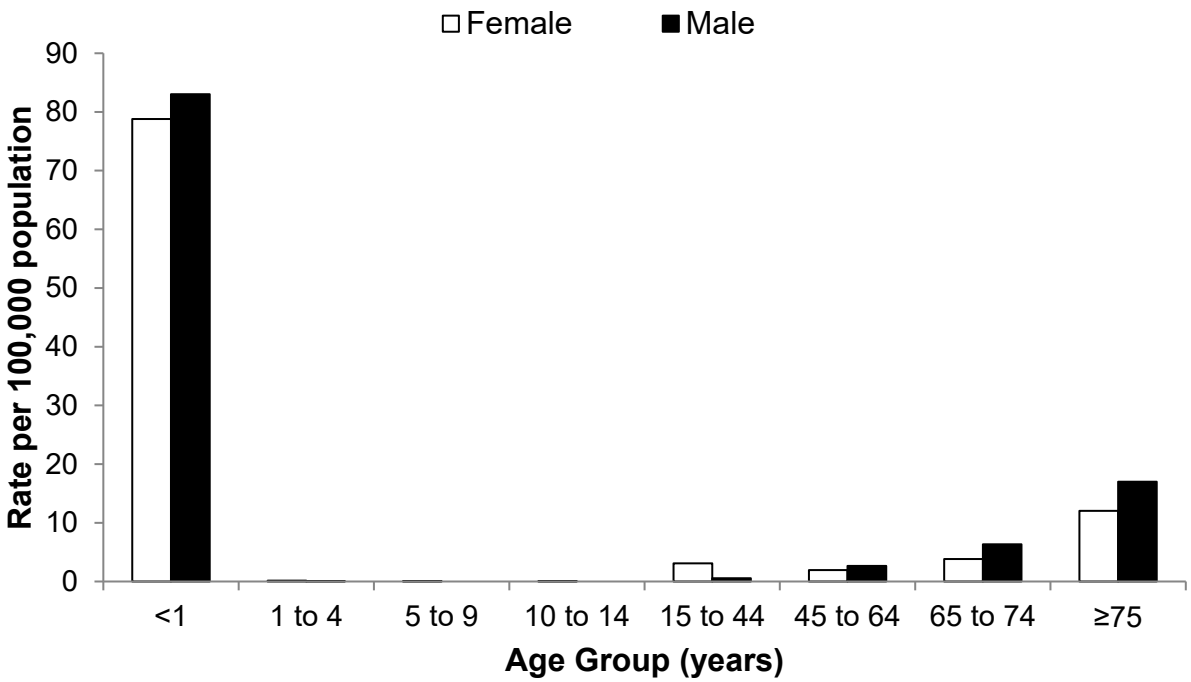
In England, the proportions of GAS bacteraemia reports accompanied by antimicrobial susceptibility data in 2020 were 81% (75% in 2019), 75% (76%) and 92% (92%) for clindamycin, erythromycin and tetracycline, respectively. In 2020, resistance to clindamycin, erythromycin and tetracycline was recorded for 9%, 8% and 30% of cases, respectively (table 3). This highlights a large increase (177%) in tetracycline resistance over the five-year timeframe, from 11% resistant in 2016. Tetracycline resistance in *S pyogenes* has been detected in multiple but not all *emm* gene sequence types [1].

Group B streptococci

In 2020, 2,191 cases of GBS bacteraemia were reported by laboratories in England, an 11% increase compared to 2016, though a 4% decrease from 2019 (table 1). GBS bacteraemia accounted for 35% of the pyogenic streptococcal bacteraemia reported in 2020, higher than seen in previous years, reflecting the substantial reduction in GAS bacteraemia during the first COVID-19 pandemic year (2020; table 1). The rate of reported GBS bacteraemia in England was 3.9 per 100,000 population in 2020 (table 2), compared with 4.1/100,000 in 2019. Within England, the East Midland region reported the lowest rate of infection (3.3/100,000), and South West (4.6) the highest.

Figure 3 shows that the rates of GBS bacteraemia were highest in those aged less than one year, at 81.3 per 100,000 population (78.8 in females and 83.0/100,000 in males). Rates were higher in males than females in the oldest age groups: 65 to 74 years, males 6.3/100,000, females 3.8/100,000; ≥75 years age group, males 17.0/100,000, females 12.0/100,000.

Figure 3. Group B streptococcal bacteraemia age and sex rates per 100,000 population in England: 2020



In infants under 90 days old, the rate of GBS bacteraemia in England in 2020 was 0.80 per 1,000 live births (table 4), a slight decrease compared with what was reported for 2019 (0.84/1,000).

In England, rates of early onset disease (<7 days old) were higher than late onset disease (7 to 90 days old) (0.53 compared with 0.27 per 1,000 live births). The rate of late onset disease decreased slightly from 2019 (0.30 to 0.27/1,000 live births), as did the rate of early onset disease (0.55 to 0.53/1,000 live births).

Table 4. Number and rate per 1,000 live births of group B streptococcal bacteraemia in infants 0 to 90 days old in England: 2020

	All cases (0-90 days old)		Early onset (0-6 days old)		Late onset (7-90 days old)	
Region	No.	rate	No.	rate	No.	rate
England	488	0.80	326	0.53	162	0.27

The proportions of GBS bacteraemia reports from England in 2020 accompanied by antimicrobial susceptibility test result data were available for 73% (77% in 2019), 78% (79%) and 92% (91%) for clindamycin, erythromycin and tetracycline, respectively. Clindamycin and erythromycin resistance increased in GBS bacteraemia isolates between 2016 and 2020, from 25% to 31% for clindamycin and 31% to 36% for erythromycin (table 5). Tetracycline resistance remained steady at 85%. These results support guidance by the Royal College of Obstetricians and Gynaecologists regarding the prevention of early-onset neonatal GBS disease, specifically that clindamycin is not recommended due to the rate of resistance [2].

A historic GBS isolate from an adult with invasive disease in 2016 has been confirmed as having resistance to penicillin, the first in the UK. GBS resistance to penicillin remains exceedingly rare. If laboratories suspect penicillin resistance in a pyogenic group streptococci isolate it is recommended to send the isolate to the UKHSA Antimicrobial Resistance and Healthcare Associated Infections (AMRHAI) Reference Unit for confirmation.

Group C and G streptococci

The number of cases of Group C streptococci (GCS) bacteraemia increased by 47% between 2016 and 2019 in England, from 1,150 to 1,695 reports, with a subsequent decrease in 2020 to 1,491 reports (table 1). However, the rate of GCS bacteraemia in England was 2.6 per 100,000 population in 2020, more than 3 times the rate observed in 2011 (0.8/100,000) (figure 1a). The numbers of Group G streptococci (GGS) bacteraemia reported in England followed a similar trend to GCS with an increase between 2016 to 2019 from 1,191 to 1,410 reports and a subsequent decrease in 2020 to 1,316. The rate increased by 56% since 2011 (figure 1a), from 1.6 to 2.3/100,000 population in 2020 (table 2).

Within England, GCS bacteraemia rates varied considerably by region in 2020, from 1.4/100,000 in London to 4.7 in the North East (table 2). Rates of GGS bacteraemia also varied substantially in 2020, ranging from 0.8 in the North East to 3.4/100,000 in the East Midlands.

Rates of GCS and GGS bacteraemia were highest in the 75 years and over age group for both species in 2020, 18.9 and 17.4/100,000 respectively (figures 4 and 5). Rates were higher in males than females in all age groups.

Figure 4. Group C streptococcal bacteraemia age and sex rates per 100,000 population in England: 2020

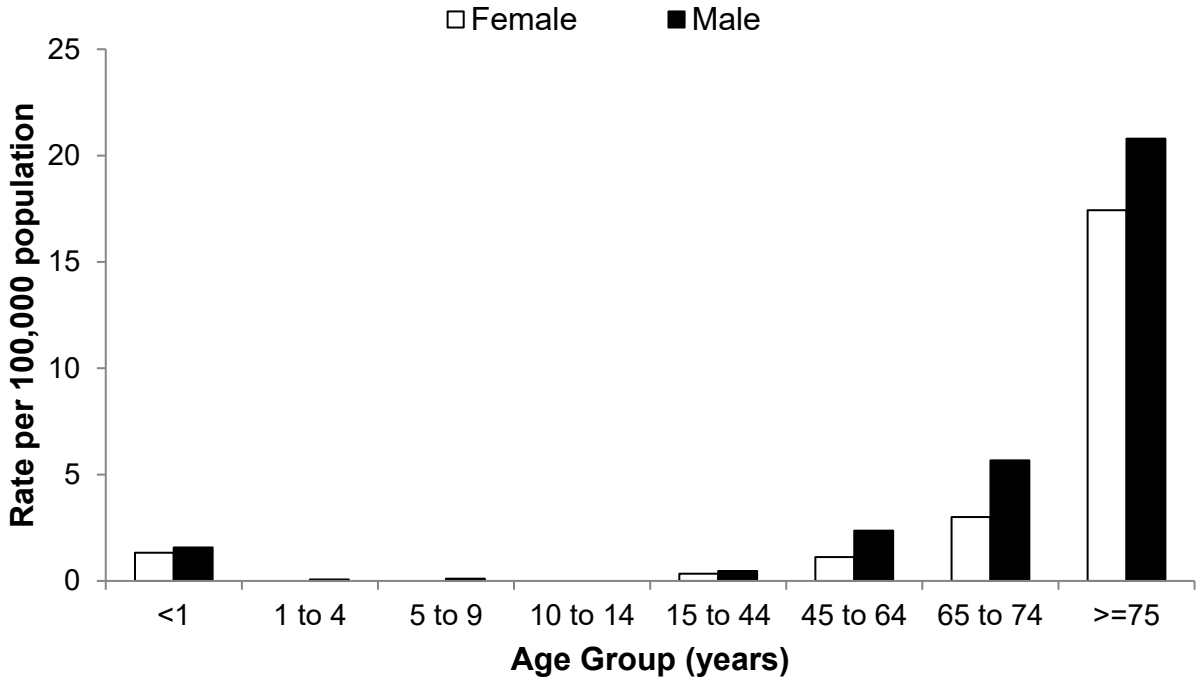
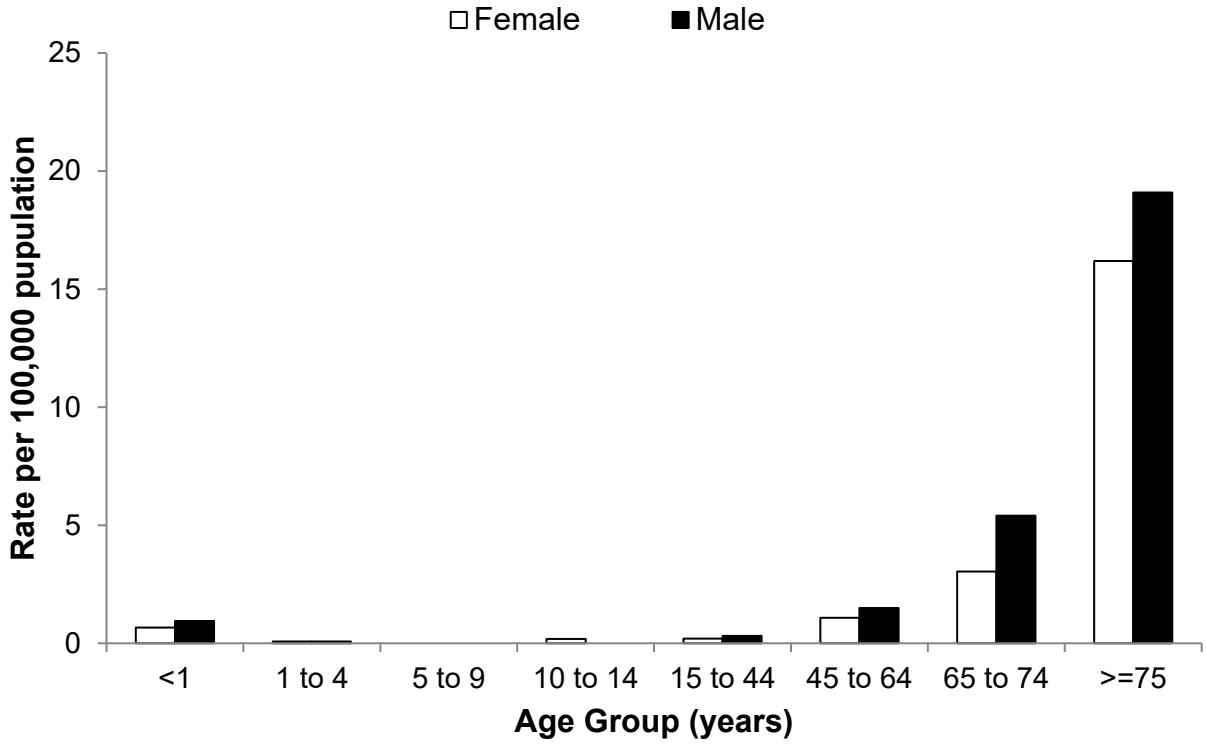


Figure 5. Group G streptococcal bacteraemia age and sex rates per 100,000 population in England: 2020



Susceptibility data was available for 81%, 77% and 93% of GCS bacteraemia isolates in 2020 for clindamycin, erythromycin and tetracycline, respectively, compared with 78%, 78% and 93% in 2019. For GGS bacteraemia, susceptibility to clindamycin, erythromycin and tetracycline was reported for 80%, 75% and 94% of isolates, respectively, compared with 75%, 75% and 93% in

2019. In 2020, the proportions of GCS bacteraemia isolates resistant to clindamycin, erythromycin and tetracycline were 25%, 30% and 31%, respectively (table 3). The proportion of resistant isolates was higher in GGS bacteraemia isolates, with 43%, 44% and 44% resistant to clindamycin, erythromycin and tetracycline, respectively. Resistance to clindamycin has increased since 2016 for GCS (from 19% to 25%) and GGS (from 30% to 43%). For GCS, resistance to erythromycin and tetracycline is relatively unchanged since 2016; for GGS, resistance to erythromycin increased slightly from 39% to 44% between 2016 and 2020, whereas resistance to tetracycline remained relatively unchanged.

Non-pyogenic streptococci

The number of cases of non-pyogenic streptococcal bacteraemia reported in England has increased each year between 2016 to 2019 (from 8,311 to 10,183 reports; table 1), with a subsequent decrease in 2020 to 8,675 reports. Rates decreased in all the non-pyogenic groups in England from 2019 to 2020 (figure 1b), most notably in Mitis and Sanguinis group streptococci (4.6 to 3.7, and 2.9 to 2.3 per 100,000 population, respectively).

Of the non-pyogenic streptococci, the rate of bacteraemia reports in England in 2020 was highest for Mitis group streptococci (3.7 per 100,000 population; table 4), with the lowest rates for Mutans group (0.2/100,000).

Among all non-pyogenic streptococci bacteraemia reported in 2020 in England, the Mitis group accounted for the largest proportion of reports accounting for 2,036 of the 8,675 reports (23%); in this group, reports increased between 2015 and 2019, to 2,553 reports in 2019 and subsequent decrease in 2020 (table 1). A decrease in the number of non-pyogenic streptococcal bacteraemia reports was seen in all groups between 2019 and 2020, with the exception of the Anginosus group streptococci where a slight increase was noted.

The previous increases in reports and subsequent distribution of less common non-pyogenic streptococcal species may in part be due to increasing use of matrix-assisted laser desorption/ionisation time of flight (MALDI-ToF) analysis in hospitals, which allows for rapid species identification, facilitating reporting of species not previously recognised by clinical laboratories. It is of note that identification of *Streptococcus* to species level using MALDI-ToF alone is undergoing evaluation by the reference laboratory. Accurate species determination may not be achieved with this standalone test for all species, and this needs to be accounted for when species such as *S. alactolyticus*, *S.equinus*, *S. acidominimus* and *S. uberis*, amongst others, which are not usually associated with human infection, are currently being reported, and the isolate should be referred to the AMRHAI Reference Unit for a full identification.

It is also of note that the reference laboratory has detected *Streptococcus dysgalactiae* subspecies *equisimillis* (SDSE) with the ‘A’ surface antigen. These isolates would be reported as SDSE by laboratories that perform MALDI-ToF alone, and as GAS by laboratories that do not use MALDI-ToF and perform only Lancefield grouping on beta-haemolytic streptococci.

Table 5 shows that the incidence rates for each of the non-pyogenic groups varied within England. Rates of Mitis group bacteraemia ranged from 4.5/100,000 in the North West to

3.0/100,000 in the Yorkshire and Humber region. Anginosus group bacteraemia rates ranged from 3.4 per 100,000 population in the East Midlands to 2.4/100,000 in the London region.

Table 5. Rate per 100,000 population of non-pyogenic streptococcal bacteraemia reports by Region in England: 2020

		Rate per 100,000 population					
Region/Centre		**Anginosus Group**	**Bovis Group**	**Mitis Group**	**Mutans Group**	**Salivarius Group**	**Sanguinis Group**
North of England	North East	3.0	2.2	3.7	0.3	1.5	2.9
	North West	3.2	1.7	4.5	0.2	1.5	2.6
	Yorkshire and Humber	2.8	1.2	3.0	0.2	1.3	2.0
Midlands and East of England	East Midlands	3.4	1.5	3.4	0.2	1.1	2.1
	East of England	2.6	1.2	3.1	0.1	1.2	2.0
	West Midlands	3.2	2.5	4.3	0.2	1.6	2.5
London	London	2.4	1.0	3.3	0.2	1.0	2.1
South of England	South East	3.1	1.2	3.8	0.2	1.6	2.5
	South West	2.9	1.7	3.7	0.3	2.1	2.4
England		**2.9**	**1.5**	**3.7**	**0.2**	**1.4**	**2.3**

Figure 6. Anginosus group streptococcal bacteraemia age and sex rates per 100,000 population in England: 2020

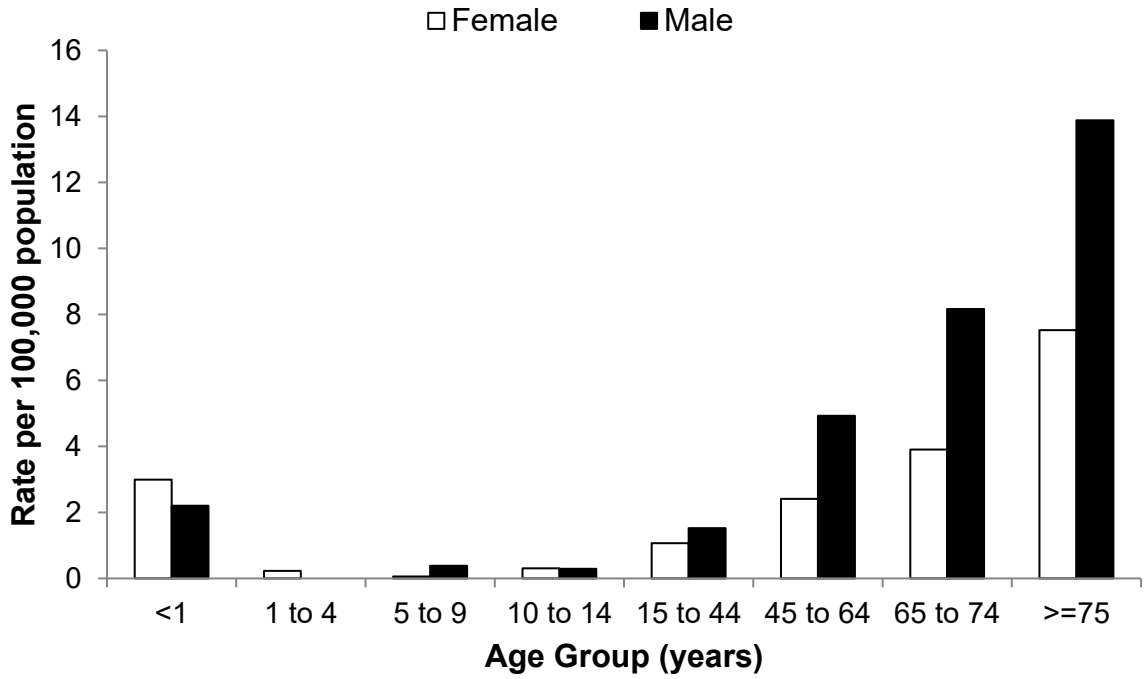


Figure 7. Bovis group streptococcal bacteraemia age and sex rates per 100,000 population in England: 2020

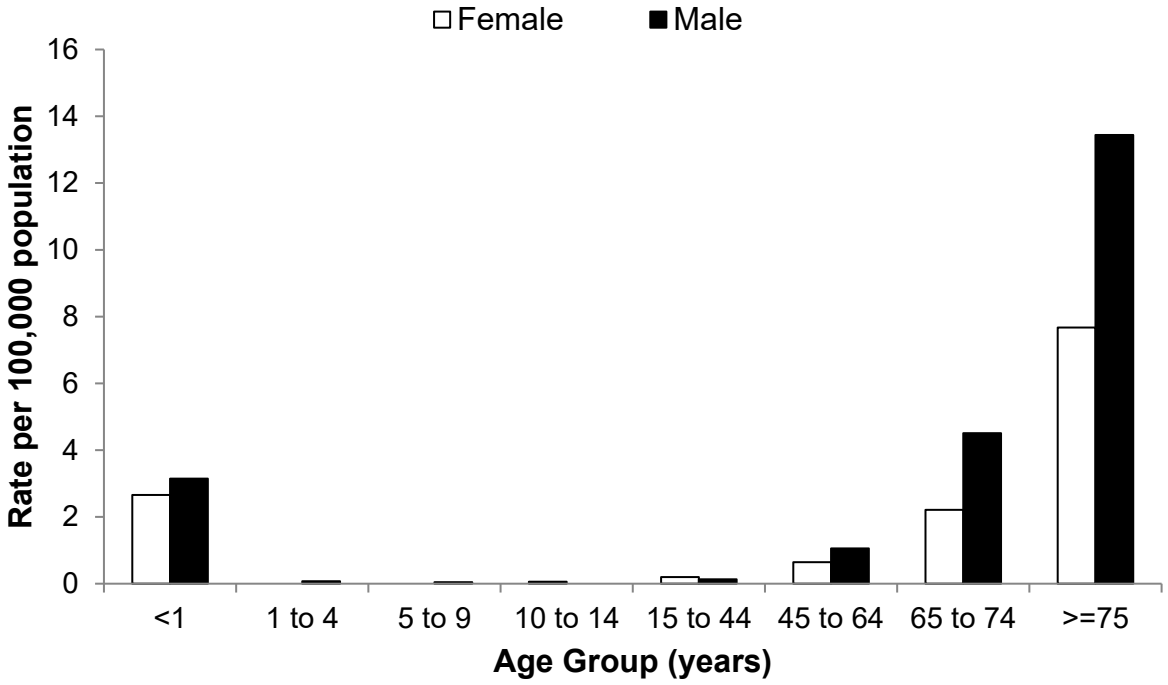


Figure 8. Mitis group streptococcal bacteraemia age and sex rates per 100,000 population in England: 2020

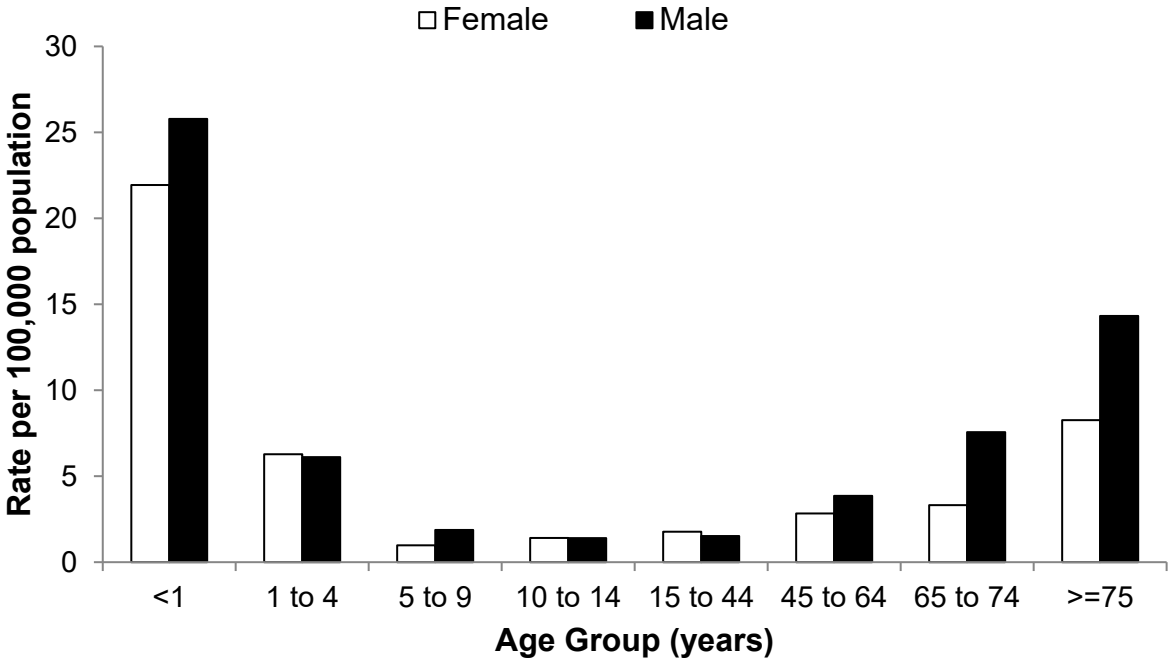


Figure 9. Salvarius group streptococcal bacteraemia age and sex rates per 100,000 population in England: 2020

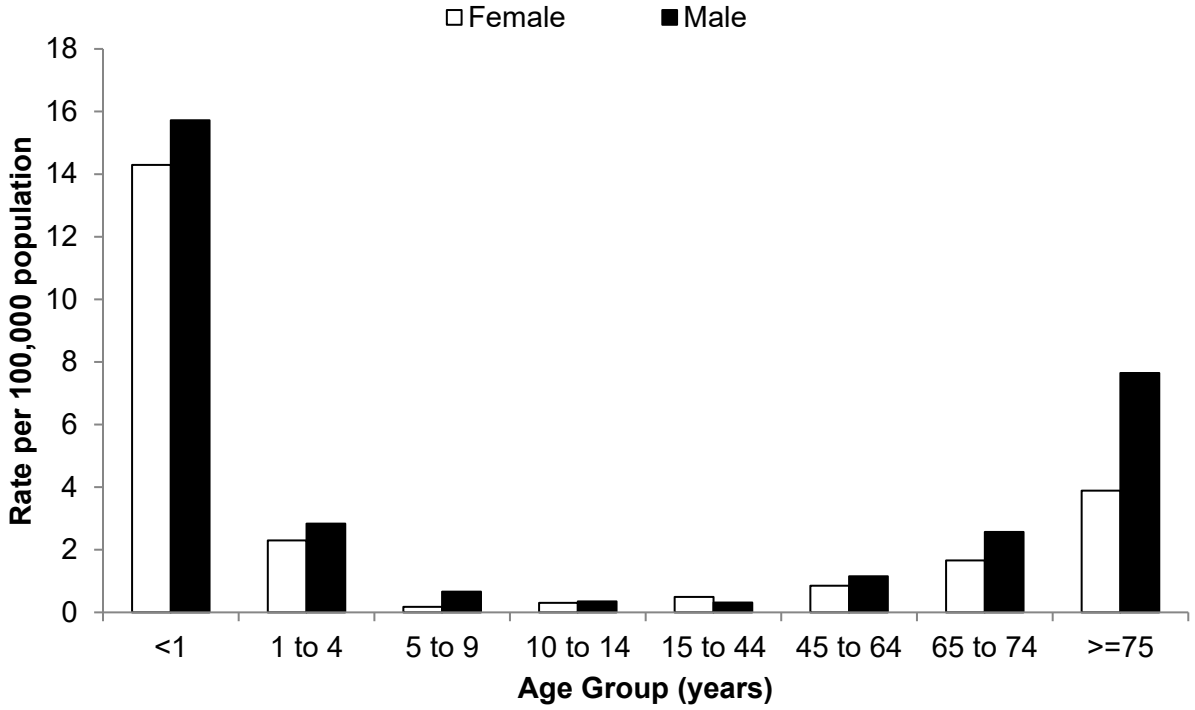


Figure 10. Sanguinis group streptococcal bacteraemia age and sex rates per 100,000 population in England: 2020

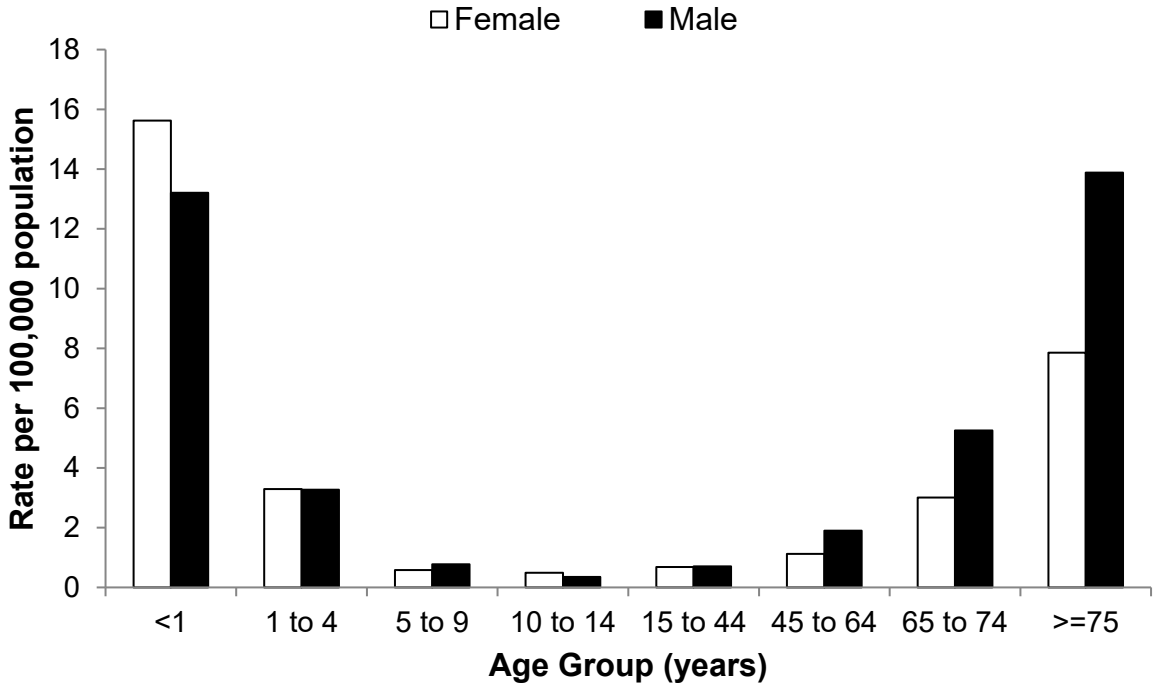


Table 6 shows the number of reports for each non-pyogenic streptococcal group bacteraemia that are tested and the proportion that are resistant to key antibiotics (penicillin, erythromycin and tetracycline) in England between 2016 and 2020.

Erythromycin susceptibility data was available for 31 to 41% of Anginosus, Bovis, Mitis, Salivarius and Sanguinis bacteraemia isolates from England; for tetracycline, data availability was 33 to 40% and for penicillin, 90 to 95% in 2020. Resistance to penicillin was reported for 9% of Mitis isolates (a decrease from 14% in 2016), 12% of Salivarius isolates (a decrease from 14% in 2016), and 21% of Sanguinis isolates (unchanged since 2016) (table 6). The proportion of isolates reported as resistant to erythromycin increased between 2016 and 2020 for Anginosus and Bovis groups, from 10% to 12% and 28% to 30% respectively.

Table 6. Antimicrobial susceptibility for non-pyogenic streptococci causing bacteraemia in England: 2016 to 2020

In this table R = resistant

		2016		2017		2018		2019		2020	
Species	**Antimicrobial agent**	**No. tested**	**R (%)**	**No. tested**	**R (%)**	**No. tested**	**R (%)**	**No. tested**	**R (%)**	**No. tested**	**R (%)**
Anginosus	erythromycin	943	10	927	12	758	12	771	12	585	12
	tetracycline	860	17	824	19	799	21	763	22	621	21
	penicillin	1252	<1	1395	<1	1497	<1	1613	<1	1481	<1
Bovis	erythromycin	343	28	362	31	411	33	348	34	341	30
	tetracycline	308	69	327	68	418	72	386	68	362	70
	penicillin	485	<1	584	2	716	1	811	<1	760	<1
Mitis	erythromycin	1513	50	1350	51	1046	52	899	47	617	43
	tetracycline	1117	28	1073	28	973	26	949	26	666	25
	penicillin	2008	14	2118	13	2264	11	2449	9	1910	9
Salivarius	erythromycin	579	47	516	52	457	39	374	42	275	41
	tetracycline	493	19	413	19	410	16	386	17	285	13
	penicillin	773	14	743	16	865	17	867	15	668	12
Sanguinis	erythromycin	863	49	853	47	720	45	627	49	428	46
	tetracycline	712	34	705	29	730	33	665	32	480	33
	penicillin	1168	22	1361	21	1535	21	1555	21	1173	21

Reference Microbiology Service

In 2020, the proportion of reports of streptococcal bacteraemia in which the organism was not fully identified was 13%. Precise species identification of isolates would improve the monitoring of trends in non-pyogenic streptococci and related genera. The UKHSA AMRHAI Reference Unit (Colindale; previously undertaken by the RVPBRU) offers a referred (charged for) taxonomic identification service for streptococci and other related Gram-positive, catalase-negative genera from systemic and other significant infections. A free-of-charge reference service is available for urgent public health investigations. All such isolates should be submitted to the AMRHAI Reference Unit along with all GAS, GBS, GCS and GGS isolates from normally sterile sites.

Laboratories are also requested to send any pyogenic streptococcal isolates exhibiting a resistance to penicillin, cephalosporin, daptomycin, quinupristin-dalfopristin, fluorquinolones or tigecycline to the AMRHAI Reference Unit for confirmation. In addition, any streptococci (pyogenic or non-pyogenic) with suspected glycopeptide (vancomycin, teicoplanin, telavancin or dalbavancin) linezolid (or tedizolid) resistance should be referred for further investigation.

Guidelines for the management of close community contacts of invasive GAS cases [3] and the prevention and control of GAS transmission in acute healthcare and maternity settings [4] are available at Invasive group A streptococcal disease: managing close contacts.

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These reports would not be possible without the weekly contributions from microbiology colleagues in laboratories across England, without whom there would be no surveillance data. The support from colleagues within the UKHSA Antimicrobial Resistance and Healthcare Associated Infections Reference Unit (Colindale) and the UKHSA Respiratory and Vaccine Preventable Bacteria Reference Unit (Colindale) is greatly valued in the preparation of the report. Feedback and specific queries about this report are welcome and can be sent to: hcai.amrdepartment@phe.gov.uk

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About the UK Health Security Agency

The UK Health Security Agency is an executive agency, sponsored by the Department of Health and Social Care.

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