UK Health Security Agency

Laboratory surveillance of pyogenic and non-pyogenic streptococcal bacteraemia in England: 2021 update

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Contents

Introduction 3
Main points 4
Trends in England 5
Pyogenic streptococci 11
  Group A streptococci 13
  Group B streptococci 14
  Group C and G streptococci 16
Non-pyogenic streptococci 18
Reference microbiology service 24
Acknowledgements 24
References 25
About the UK Health Security Agency 26

Introduction

The analyses in this report are based on data relating to diagnoses of pyogenic and non-pyogenic streptococcal bloodstream infections between 2012 and 2021 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 8 November 2022. In England, laboratories are requested to submit data individually to SGSS, with reporting based on clinically relevant isolates.

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 Staphylococcal and Streptococcoal Reference Service (SSRS) (part of the Antimicrobial Resistance and Healthcare Associated Infections (AMRHAI) Reference Unit (AMRHAI, Colindale)) were merged with laboratory reports.

Beta-haemolytic pyogenic streptococci are classified according to the type of major surface polysaccharide antigen (Lancefield group), namely: group A (*Streptococcus pyogenes*; GAS), group B (*Streptococcus agalactiae*; GBS), group C (multiple zoonotic species plus the human species *Streptococcus dysgalactiae* subsp. *equisimilis*; GCS) and group G (human and animal species *Streptococcus dysgalactiae* subsp. *equisimilis* and *Streptococcus canis*; GGS). 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.

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 GBS bacteraemia in infants were calculated using 2021 live birth denominators.

Geographical analyses were based on cases in England being assigned to 1 of 9 regions formed from administrative local authority boundaries.

A web appendix is available featuring 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

Key findings from this report are:

- between 2017 and 2021 there was a 6% decrease in the number of laboratory reports of streptococcal bacteraemia (from 15,756 to 14,850 reports) in England, although a 17% decrease was seen between 2019 (17,907 reports) and 2021 (14,850)
- declines in incidence rate were noted during the coronavirus (COVID-19) pandemic (2020 and 2021) for GAS, GBS, mitis group streptococci and sanguinis group streptococci bacteraemia, whereas little change was noted for GGS, anginosus group streptococci bacteraemia
- the rate of GAS bacteraemia decreased by 66% from 3.8 cases per 100,000 population in 2019 to 1.3 per 100,000 in 2021, a larger decline than noted for other pyogenic group streptococci
- resistance to tetracycline in GAS bacteraemia increased between 2017 and 2021, from 12% to 41%
- In 2021, 2,050 cases of GBS bacteraemia were reported by laboratories in England, a 6% decrease since 2020 (2,190), and a 10% reduction compared with 2019 (2,282)
- 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 0.80 to 0.75 per 1,000 live births between 2020 and 2021; both late (0.27 to 0.25 per 1,000 live births) and early onset infant disease (0.53 to 0.51 per 1,000 live births) fell between 2020 and 2021
- resistance to clindamycin and erythromycin in GBS bacteraemia increased between 2017 and 2021, from 27% to 33% for clindamycin and 32% to 38% for erythromycin
- the rate of non-pyogenic streptococcal 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 per 100,000 and 2.9 to 2.3 per 100,000 respectively
- resistance to penicillin was reported for 9% of mitis group isolates (a slight decrease from 14% in 2016), 12% of salivarius group isolates (a decrease from 17% in 2018), and 21% of Sanguinis isolates (unchanged since 2017)
- the COVID-19 pandemic reduced contact between individuals and affected the general case-mix of hospital patients during much of 2020 and 2021 – this has likely impacted any trends reported here
- all sterile site pyogenic streptococcal isolates should be referred to UKHSA Staphylococcus and Streptococcus reference service and any with suspected resistance to penicillin, cephalosporins, glycopeptides, lipoglycopeptides, lipopeptides, oxazolidinones, tigecycline, fluoroquinolones or quinupristin-dalfopristin referred to the UKHSA AMRHAI Reference Unit for confirmation

Trends in England

Year-on-year increases in streptococcal bacteraemia were noted between 2017 and 2019 (15,756 to 17,907; 14% increase) before declining in 2020 and again in 2021 (Table 1). Overall there was a 6% decrease in the number of laboratory reports of pyogenic and non-pyogenic streptococcal bacteraemia (from 15,756 to 14,850 reports; Table 1) in England between 2017 and 2021 continuing a declining trend noted in 2020 (2% decline between 2020 and 2021). These reported reductions are likely due, at least in part, to the COVID-19 pandemic, which resulted in reduced contact between individuals, decreased planned healthcare and an associated decline in infections associated with healthcare interventions, particularly surgery. The underlying causes of reductions in bloodstream infection rates are likely to be complex and multifactorial.

In 2021, 87% (12,969 out of 14,850) of *Streptococcus* spp. isolates from blood (excluding *Streptococcus pneumoniae*) were reported to species level. Of those identified to species level in 2021, 43% (5,592 out of 12,969) were pyogenic streptococci (groups A, B, C and G), which is lower compared with the distribution in 2020 (47%; Table 1).

Table 1. Reports of pyogenic and non-pyogenic streptococcal bacteraemia by species in England, 2017 to 2021

Note. 'Total streptococci' exclude *S. pneumoniae*.

Species	2017		2018		2019		2020		2021	
	Number	%	Number	%	Number	%	Number	%	Number	%
Pyogenic streptococci	**6,611**	**100**	**7,806**	**100**	**7,537**	**100**	**6,328**	**100**	**5,592**	**100**
Group A	1,969	30	2,673	34	2,151	29	1,331	21	732	13
Group B	2,080	31	2,289	29	2,282	30	2,190	35	2,050	37
Group C	1,282	19	1,527	20	1,694	22	1,491	24	1,563	28
Group G	1,280	19	1,317	17	1,410	19	1,316	21	1,247	22
Non-pyogenic streptococci	**9,145**	**100**	**9,769**	**100**	**10,370**	**100**	**8,901**	**100**	**9,258**	**100**
anginosus group	**1,414**	**15**	**1,492**	**15**	**1,645**	**16**	**1,664**	**19**	**1,749**	**19**
S. anginosus	651	7	708	7	853	8	817	9	849	9
S. constellatus	378	4	438	4	397	4	478	5	491	5
S. intermedius	193	2	192	2	226	2	217	2	253	3
S. milleri	170	2	145	1	160	2	145	2	145	2
Streptococcus group F	22	<1	9	<1	9	<1	7	<1	11	<1
bovis group	**660**	**7**	**795**	**8**	**889**	**9**	**849**	**10**	**824**	**9**
S. alactolyticus	50	<1	64	<1	64	<1	49	<1	35	<1
S. bovis biotype II	162	2	180	2	216	2	195	2	202	2
S. bovis untyped	238	3	309	3	355	3	296	3	288	3
S. equinus	24	<1	21	<1	23	<1	20	<1	16	<1
S. gallolyticus	39	<1	38	<1	53	<1	45	<1	30	<1
S. infantarius	46	<1	49	<1	41	<1	60	<1	62	<1
S. lutetiensis	94	1	114	1	121	1	156	2	160	2
S. pasteurianus	7	<1	20	<1	16	<1	28	<1	31	<1

mitis group	**2,183**	**24**	**2,277**	**23**	**2,585**	**25**	**2,067**	**23**	**2,059**	**22**
S. mitis	1,258	14	1,294	13	1,398	13	1,056	12	1,020	11
S. oralis	874	10	920	9	1,108	11	945	11	971	10
S. cristatus	32	<1	39	<1	47	<1	35	<1	45	<1
mutans group	**115**	**1**	**116**	**1**	**119**	**1**	**116**	**1**	**139**	**2**
S. mutans	110	1	115	1	118	1	114	1	133	1
S. sobrinus	5	<1	1	<1	1	<1	2	<1	6	<1
salivarius group ¥	**783**	**9**	**949**	**10**	**969**	**9**	**803**	**9**	**974**	**11**
S. salivarius	628	7	741	8	723	7	623	7	717	8
S. vestibularis	155	2	208	2	246	2	180	2	257	3
sanguinis group α	**1,387**	**15**	**1,580**	**16**	**1,660**	**16**	**1,309**	**15**	**1,430**	**15**
S. gordonii	189	2	235	2	248	2	206	2	256	3
S. parasanguinis	690	8	818	8	881	8	678	8	746	8
S. sanguinis	500	5	517	5	522	5	415	5	414	4
Other streptococci §	**2,603**	**28**	**2,560**	**26**	**2,503**	**24**	**2,093**	**23**	**2,083**	**22**
Anaerobic *Streptococcus*	43	<1	27	<1	18	<1	18	<1	18	<1
S. acidominus	2	<1	1	<1	2	<1	0	0	1	<1
S. suis	2	0	2	<1	2	<1	2	<1	4	<1
S. uberis	3	<1	3	<1	1	<1	1	<1	1	<1
Streptococcus not fully identified	2,283	25	2,300	24	2,245	22	1,902	21	1,881	20
Streptococcus spp. other named ‡	270	3	227	2	235	2	161	2	178	2
Total Streptococci	**15,756**		**17,575**		**17,907**		**15,229**		**14,850**	

Genera closely related to streptococci †	**471**	**100**	**554**	**100**	**560**	**100**	**543**	**100**	**621**	**100**
Aerococcus spp.	255	54	307	55	318	57	311	57	377	61
Gemella spp.	114	24	142	26	137	24	138	25	153	25
Globicatella spp.	14	3	23	4	24	4	15	3	14	2
Leuconostoc spp.	52	11	47	8	39	7	40	7	38	6
Pediococcus spp.	7	1	7	1	7	1	11	2	7	1
Peptostreptococcus spp.	29	6	28	5	35	6	28	5	32	5

¥ total includes those recorded as '*S. hyointestinalis'* without further information

α total includes those recorded as '*S. massiliensis*' without further information

‡ including: *Streptococcus thermophilus*, *Streptococcus infantis*, *Streptococcus pluranimalium*, *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

General declines in bacteraemia rates in 2021 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 species of the Mitis and Sanguinis groups seeing the largest decreases among the non-pyogenic streptococci (Figure 1b).

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 2021. All groups demonstrate a general increasing trend between 2012 and 2019 before levelling off or declining in 2021, exceptions are described further later in the report.

Figure 1a. Trends in pyogenic streptococcal bacteraemia reports, by group, per 100,000 population in England, 2012 to 2021

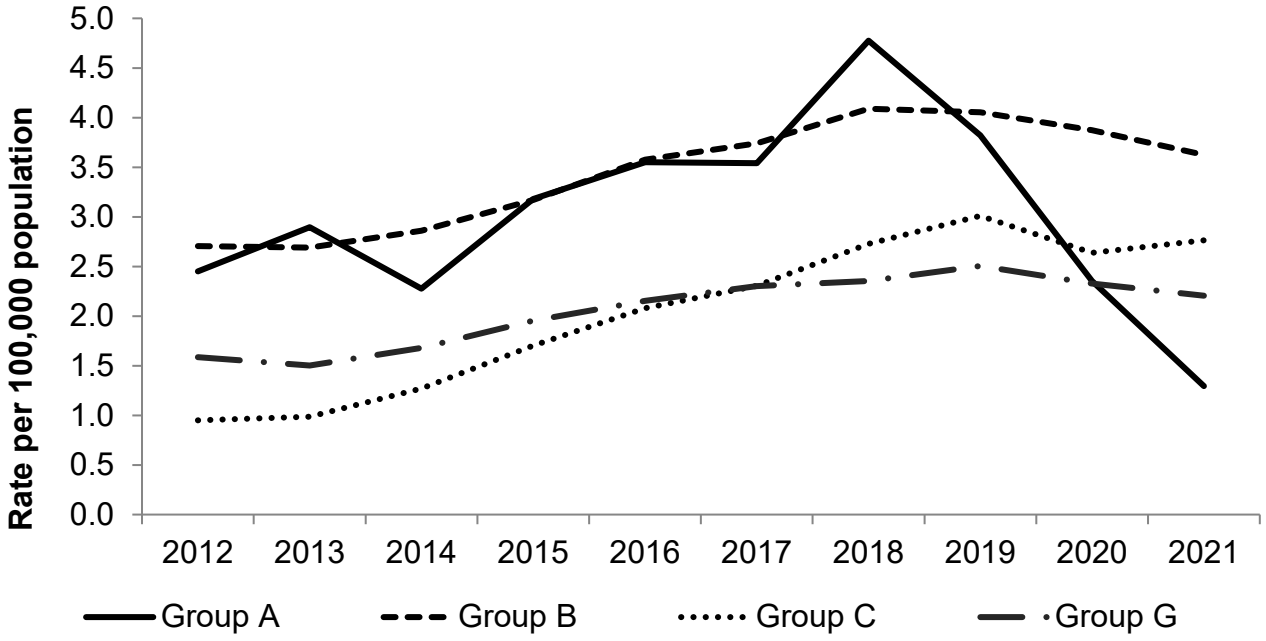
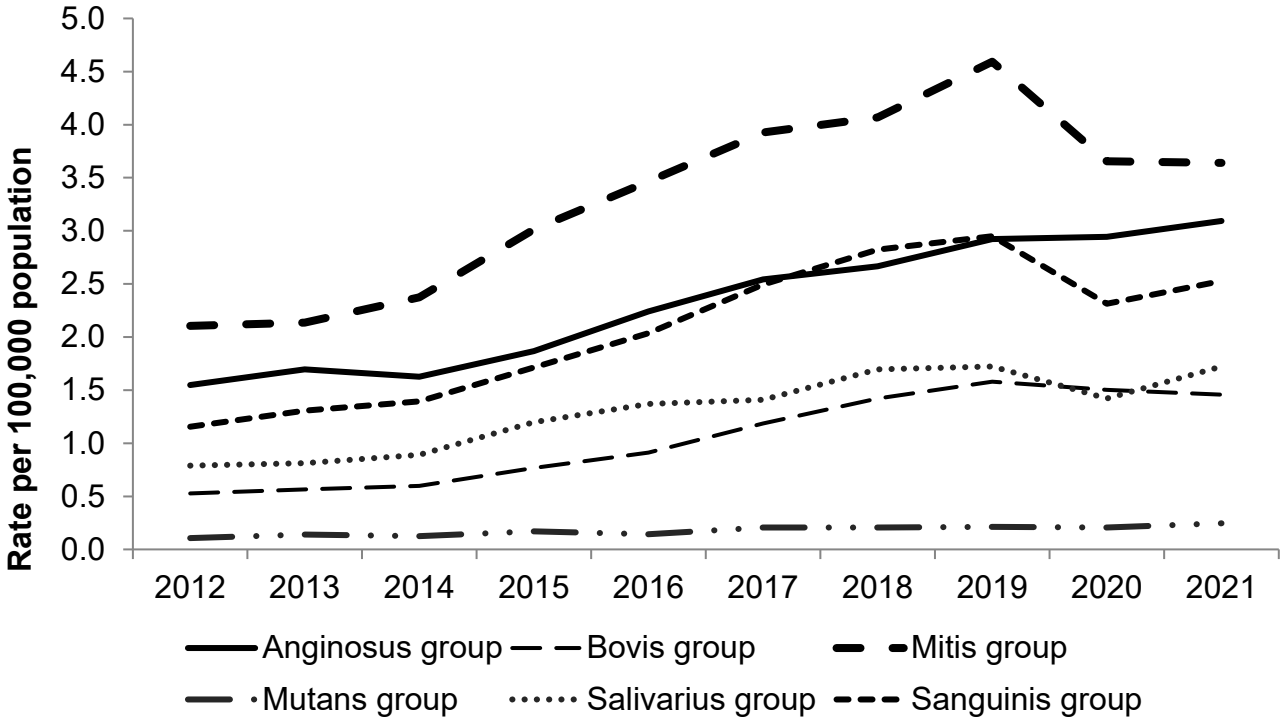


Figure 1b. Trends in non-pyogenic streptococcal bacteraemia reports, by group, per 100,000 population in England, 2012 to 2021



Pyogenic streptococci

Table 2 shows the regional rates of the pyogenic streptococcal bacteraemia by group in 2021.

Table 2. Rate per 100,000 population of pyogenic streptococcal bacteraemia reports by region in England, 2021

Region		Rate per 100,000 population			
		Group A	Group B	Group C	Group G
North of England	North East	1.7	4.3	5.0	0.6
	North West	1.7	3.9	2.1	2.6
	Yorkshire and Humber	2.0	3.8	3.5	2.9
Midlands and East of England	East Midlands	1.1	3.6	2.6	2.8
	East of England	1.0	2.9	2.3	3.1
	West Midlands	1.9	4.0	4.3	2.4
London	London	0.6	3.9	1.2	0.7
South of England	South East	1.2	3.0	2.9	1.9
	South West	1.0	3.9	3.4	2.7
England		**1.3**	**3.6**	**2.8**	**2.2**

Table 3 shows the number of reports for each pyogenic group streptococcal bacteraemia that are tested and the proportion that are resistant to key antibiotics (clindamycin, erythromycin and tetracycline) in England between 2017 and 2021.

Key antibiotic resistance 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, 2017 to 2021

In this table R = resistant.

Antimicrobial agent		2017		2018		2019		2020		2021	
		Number tested	R (%)	Number tested	R (%)	Number tested	R (%)	Number tested	R (%)	Number tested	R (%)
Group A	clindamycin	1,053	6	1,605	6	1,344	9	874	9	491	11
	erythromycin	1,287	7	1,779	7	1,364	10	811	8	453	14
	tetracycline	1,411	12	2,009	15	1,660	24	995	30	564	41
Group B	clindamycin	1,440	27	1,774	29	1,781	30	1,549	31	1,549	33
	erythromycin	1,744	32	1,836	33	1,826	34	1,650	36	1,610	38
	tetracycline	1,907	84	2,106	83	2,125	84	1,946	84	1,898	83
Group C	clindamycin	934	23	1,181	23	1,307	26	1,168	25	1,291	28
	erythromycin	1,056	28	1,245	29	1,310	32	1,109	30	1,204	32
	tetracycline	1,192	29	1,460	30	1,555	32	1,345	31	1,473	33
Group G	clindamycin	904	30	1,062	37	1,127	35	1,020	43	995	38
	erythromycin	1,122	37	1,089	40	1,116	39	957	44	917	44
	tetracycline	1,249	46	1,323	41	1,397	41	1,195	44	1,180	43

Group A streptococci

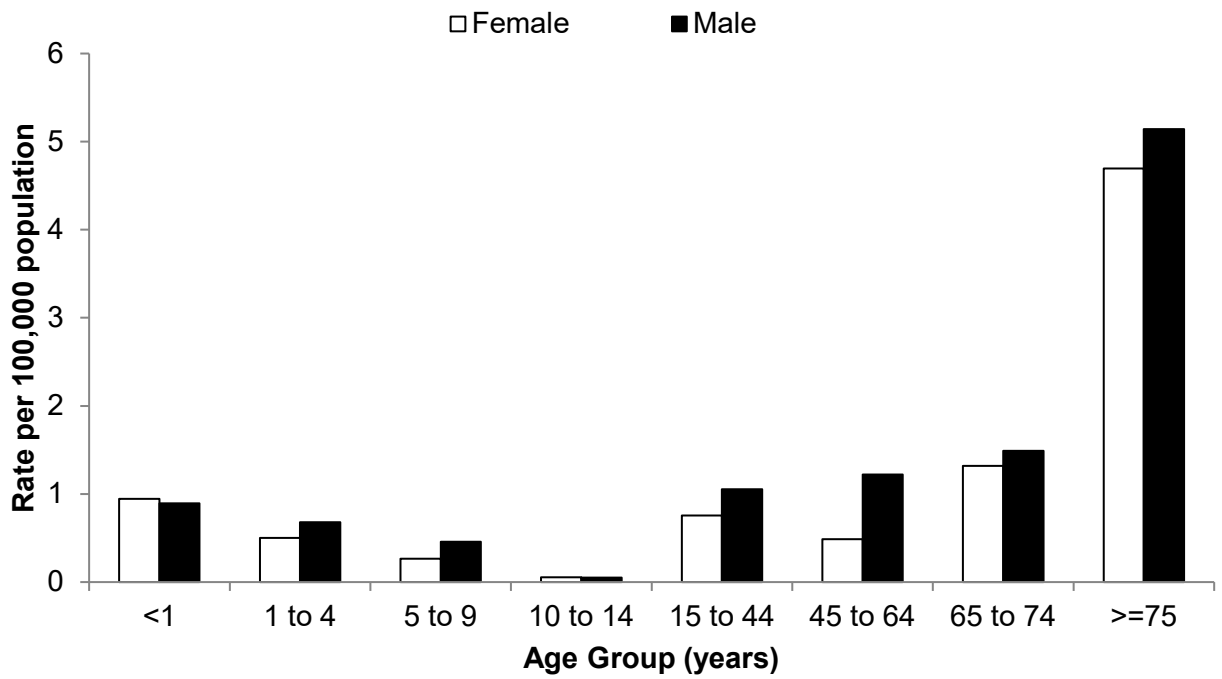
Of the pyogenic streptococci causing bacteraemia in England in 2021, group A streptococci (GAS) accounted for 13% (732 out of 5,592) of reports (Table 1).

In comparison with other causes of bacteraemia, GAS were ranked 21st in the monomicrobial and 45th in the polymicrobial bacteraemia 2021 summary tables (published in the ESPAUR report 2020 to 2021), down from 14th and 24th in 2020, respectively. An increasing trend in the rate of GAS bacteraemia was seen between 2012 (2.4 per 100,000 population) and 2018 (4.8 per 100,000) after which a year-on-year decline was noted (Figure 1). The overall rate of GAS bacteraemia in 2021 was 1.3 cases per 100,000 population (Figure 1a), a 45% decrease from 2.4 per 100,000 in 2020. However, seasonal reports for invasive GAS and scarlet fever do indicate an increase during for first half of 2022.

The rate of GAS bacteraemia reports across England in 2021 ranged from 0.6 in London to 2.0 per 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 5.1 in males and 4.7 per 100,000 in females, followed by those 65 to 74 years, with rates of 1.5 in males and 1.3 per 100,000 in females.

Figure 2. Group A streptococcal bacteraemia age and sex rates per 100,000 population in England, 2021



In England, the percentage of GAS bacteraemia reports accompanied by antimicrobial susceptibility data in 2021 were 67% (66% in 2019), 62% (61%) and 77% (75%) for clindamycin, erythromycin and tetracycline, respectively. In 2021, resistance to clindamycin,

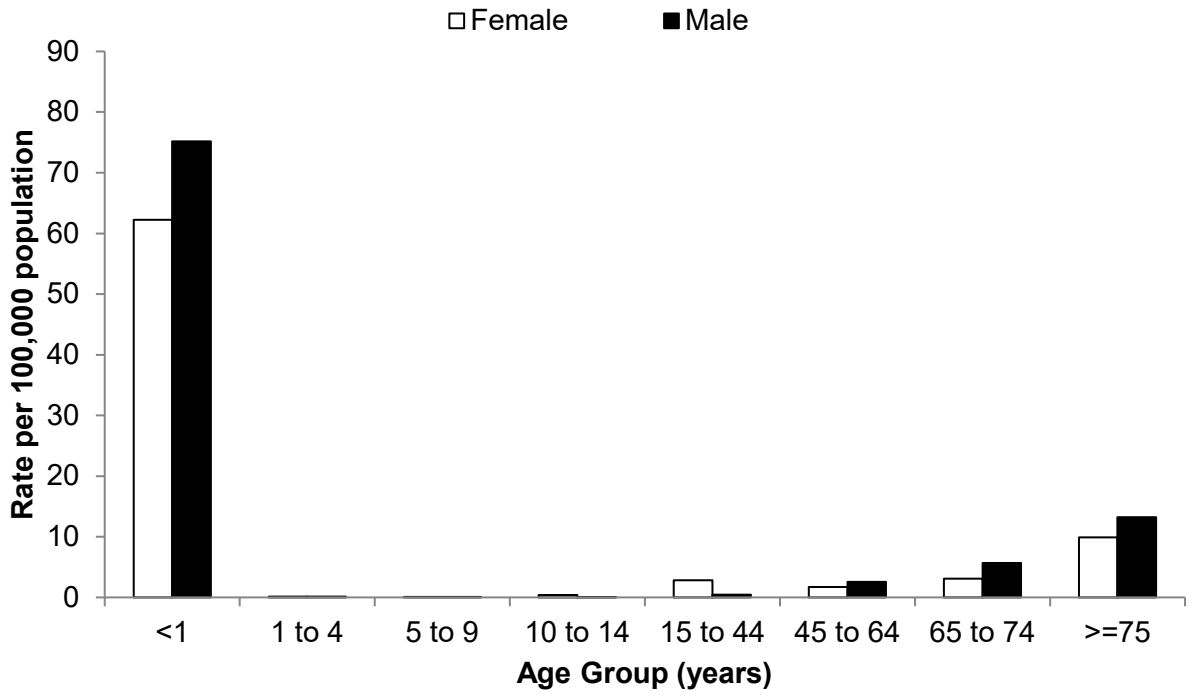
erythromycin and tetracycline was recorded for 11%, 14% and 41% of cases, respectively (Table 3). This highlights a large increase (242%) in tetracycline resistance over the 5 year timeframe, from 12% resistant in 2017. Tetracycline resistance in *S. pyogenes* has been detected in multiple but not all emm gene sequence types (1).

Group B streptococci

GBS is a clinically relevant pathogen of particular note in the extremes of age. In 2020, 2,050 cases of GBS bacteraemia were reported by laboratories in England, similar with the numbers reported in 2017, though a 6% decrease from 2020 (Table 1). GBS bacteraemia accounted for 37% of the pyogenic streptococcal bacteraemia reported in 2021, higher than seen in previous years, reflecting the substantial reduction in GAS bacteraemia during coronavirus (COVID-19) pandemic (2020 and 2021; Table 1). The rate of reported GBS bacteraemia in England was 3.6 per 100,000 population in 2021 (Table 2), compared with 3.9 per 100,000 in 2020. Within England, the East of England region reported the lowest rate of infection (2.9 per 100,000), and North East (4.3) the highest.

Figure 3 shows that in 2021 the rates of GBS bacteraemia were highest in those aged less than one year, at 69.2 per 100,000 population (62.2 in females and 75.2 per 100,000 in males), the higher rate in males compared to females in this age group differs from the pattern noted for GAS bacteraemia (Figure 2). Rates were higher in males than females in the oldest age groups: 65 to 74 years, males 5.7, females 3.1 per 100,000; ≥75 years age group, males 13.2, females 9.9 per 100,000.

Figure 3. Group B streptococcal bacteraemia age and sex rates per 100,000 population in England, 2021



In infants under 90 days old, the rate of GBS bacteraemia in England in 2021 was 0.75 per 1,000 live births (Table 4), a slight decrease compared with what was reported for 2020 (0.80 per 1,000).

In England, rates of early-onset neonatal infection (<7 days old) were higher than late-onset neonatal infection (7 to 90 days old) (0.51 compared with 0.25 per 1,000 live births). The rate of late onset disease decreased slightly from 2020 (0.27 per 1,000 live births), as did the rate of early onset disease (0.53 per 1,000 live births). This is the second year in a row where the rates of early and late onset GBS bacteraemia have declined.

Table 4. Number and rate per 1,000 live births of group B streptococcal bacteraemia in infants 0 to 90 days old in England, 2021

Region	All cases (0-90 days old)		Early onset (0-6 days old)		Late onset (7-90 days old)	
	Number	Rate	Number	Rate	Number	Rate
England	441	0.75	297	0.51	144	0.25

The percentage of GBS bacteraemia reports from England in 2021 accompanied by antimicrobial susceptibility test result data was available for 76% (71% in 2020), 79% (75%) and 93% (89%) for clindamycin, erythromycin and tetracycline, respectively. Clindamycin and erythromycin resistance increased in GBS bacteraemia isolates between 2017 and 2021, from 27% to 33% for clindamycin and 32% to 38% for erythromycin (Table 5). Tetracycline resistance remained steady at 83% in 2021. Resistance levels were similar in infants <1y, in 2021 31%, 35% and 88% were resistant to clindamycin, erythromycin and tetracycline, respectively. 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).

GBS resistance to penicillin remains exceedingly rare with just one confirmed report from the UK in 2016 (3). If laboratories suspect penicillin resistance in a pyogenic group streptococci isolate it is recommended to send the isolate to the UKHSA AMRHAI Reference Unit for confirmation.

Group C and G streptococci

The number of cases of group C streptococcal (GCS) bacteraemia increased by 22% between 2017 and 2021 in England, accounting for 28% of the reported pyogenic streptococcal bacteraemia (Table 1). The rate of GCS bacteraemia in England was 2.8 per 100,000 population in 2021, an increase of 191% compared with the rate observed in 2012 (0.9 per 100,000) (Figure 1a). The number of cases of Group G streptococcal (GGS) bacteraemia reported in England was 1,247, similar to the number reported in 2017, however a decline from 1,410 reported in 2019 (Table 1). The rate increased by 39% since 2012 (Figure 1a), from 1.6 to 2.2 per 100,000 population in 2021 (Table 2).

Within England, GCS bacteraemia rates varied considerably by region in 2021, from 1.2 per 100,000 in London to 5.0 in the North East (Table 2). Rates of GGS bacteraemia also varied substantially in 2021, ranging from 0.6 in the North East to 3.1 per 100,000 in the East of England region.

Rates of GCS and GGS bacteraemia were highest in the 75 years and over age group for both species in 2020, 17.9 and 15.3 per 100,000, respectively (figures 4 and 5). Rates were higher in males than females in all age groups.

Susceptibility data was available for 83%, 77% and 94% of GCS bacteraemia isolates in 2021 for clindamycin, erythromycin and tetracycline, respectively, compared with 75%, 71% and 86% in 2020. For GGS bacteraemia, susceptibility data for clindamycin, erythromycin and tetracycline was reported for 80%, 74% and 95% of isolates, respectively, compared with 78%, 73% and 91% in 2020. In 2021, the percentage of GCS bacteraemia isolates resistant to clindamycin, erythromycin and tetracycline were 28%, 32% and 33%, respectively (Table 3). The percentage of resistant isolates was higher in GGS bacteraemia isolates, with 38%, 44% and 43% resistant to clindamycin, erythromycin and tetracycline, respectively. Resistance to clindamycin has increased since 2017 for GCS (from 23%) and GGS (from 30%).

Figure 4. Group C streptococcal bacteraemia age and sex rates per 100,000 population in England, 2021

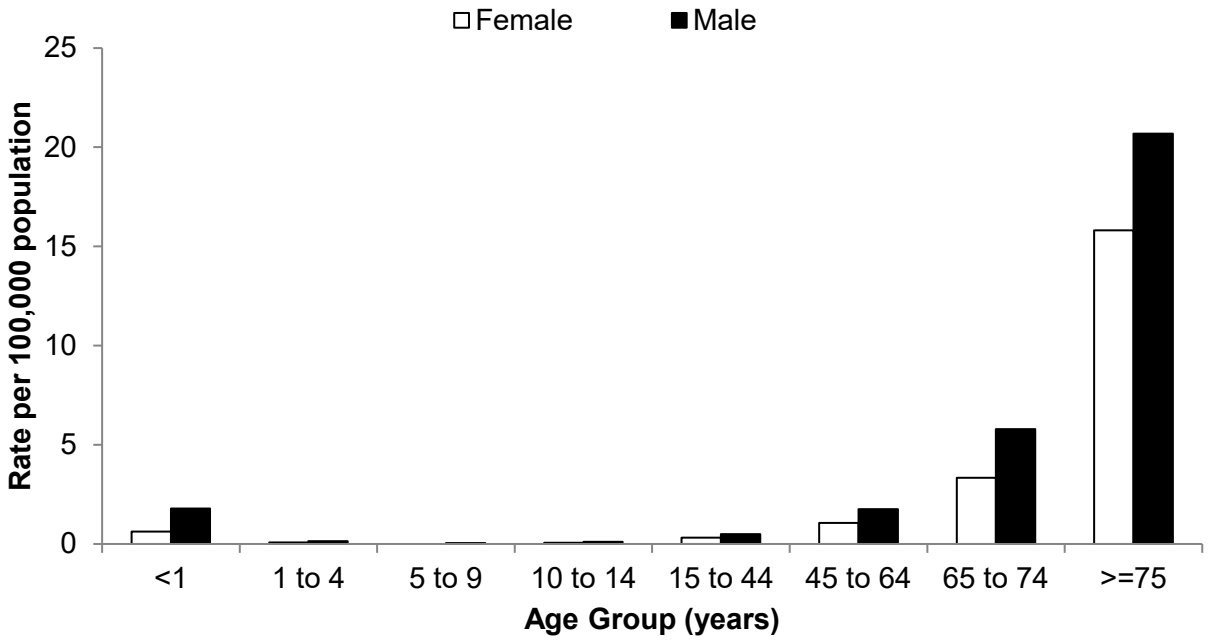
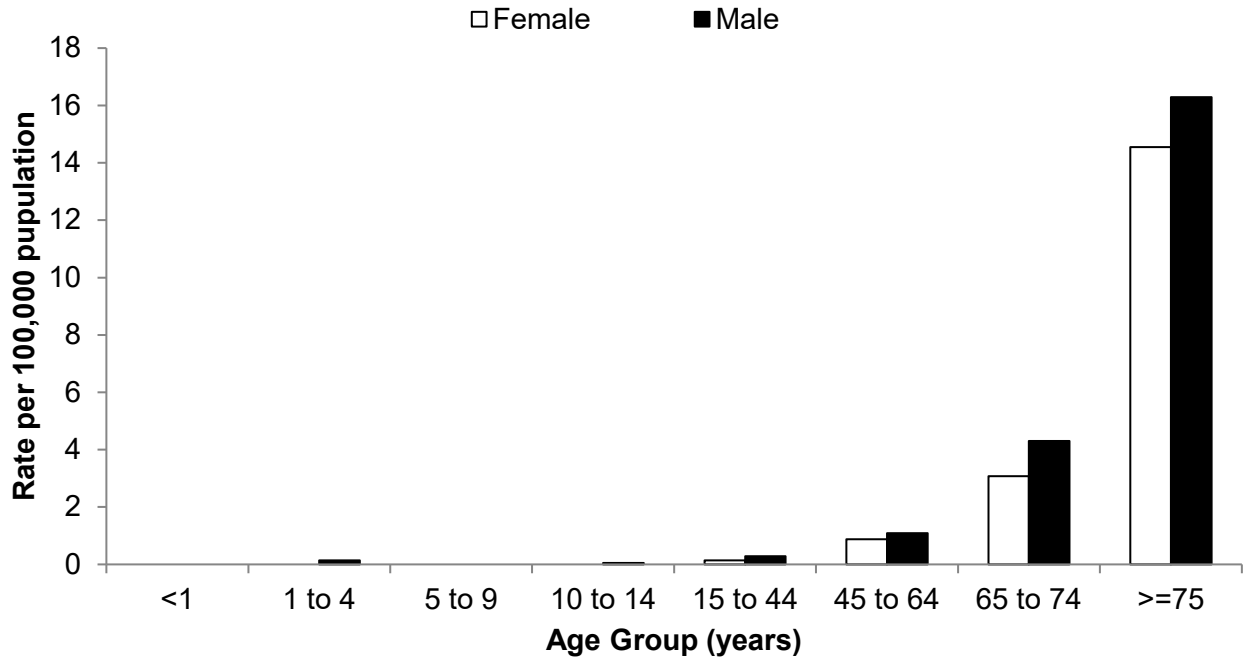


Figure 5. Group G streptococcal bacteraemia age and sex rates per 100,000 population in England, 2021



Non-pyogenic streptococci

The number of cases of non-pyogenic streptococcal bacteraemia reported in England has increased between 2017 to 2019 (from 9,044 to 10,233 reports; Table 1), before declining to 9,067 reports in 2021. Rates of bacteraemia showed an overall increase across all non-pyogenic streptococcal groups in England between 2012 and 2021 (Figure 1b).

Of the non-pyogenic streptococci, bacteraemia rates were highest for mitis group streptococci (3.6 per 100,000 population; Table 4), and lowest rates for mutans group (0.2 per 100,000).

Among all non-pyogenic streptococcal bacteraemia reported in 2020 in England, the mitis group accounted for the largest percentage of reports accounting for 2,059 of the 9,258 reports (22%; Table 1).

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/ionization 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 Staphylcoccus and Streptococcus Reference Section (SSRS) 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 streptococci bacteraemia ranged from 2.4 per 100,000 in the North East to 4.3 per 100,000 in the South West and West Midlands regions. Anginosus group streptococcal bacteraemia rates ranged from 2.4 in London to 3.7 per 100,000 in the Yorkshire and Humber region.

Table 5. Rate per 100,000 population of non-pyogenic streptococcal bacteraemia reports by Region in England, 2021

Region		Rate per 100,000 population					
		anginosus group	bovis group	mitis group	mutans group	salivarius group	sanguinis group
North of England	North East	3.2	1.8	2.4	0.1	1.8	2.6
	North West	3.3	1.9	4.2	0.2	2.1	2.6
	Yorkshire and Humber	3.7	1.4	3.3	0.2	1.9	2.8
Midlands and East of England	East Midlands	3.2	1.3	3.0	0.3	1.2	2.2
	East of England	2.7	1.2	3.3	0.3	1.5	2.2
	West Midlands	3.1	2.2	4.3	0.2	1.6	3.5
London	London	2.4	0.7	3.3	0.1	1.6	2.1
South of England	South East	3.2	1.5	4.0	0.3	1.7	2.4
	South West	3.5	1.7	4.3	0.3	2.0	2.5
England		**3.1**	**1.5**	**3.6**	**0.2**	**1.7**	**2.5**

Distributions of non-pyogenic streptococcal bacteraemia reports by age and sex showed higher rates among males compared to females, and in the youngest (<1 year) and oldest age groups (figures 6 to 10). Rates were highest in those aged 75 years and above for anginosus (Figure 6) and bovis (Figure 7) streptococcal group bacteraemia (10.0 and 9.1 per 100,000 population, respectively). In contrast, rates were highest in those aged under one year old for mitis (23.3 per 100,000, Figure 8), salivarius (22.2 per 100,000, Figure 9) and sanguinis (14.8 per 100,000, Figure 10) streptococcal groups.

Figure 6. Anginosus group streptococcal bacteraemia age and sex rates per 100,000 population in England, 2021

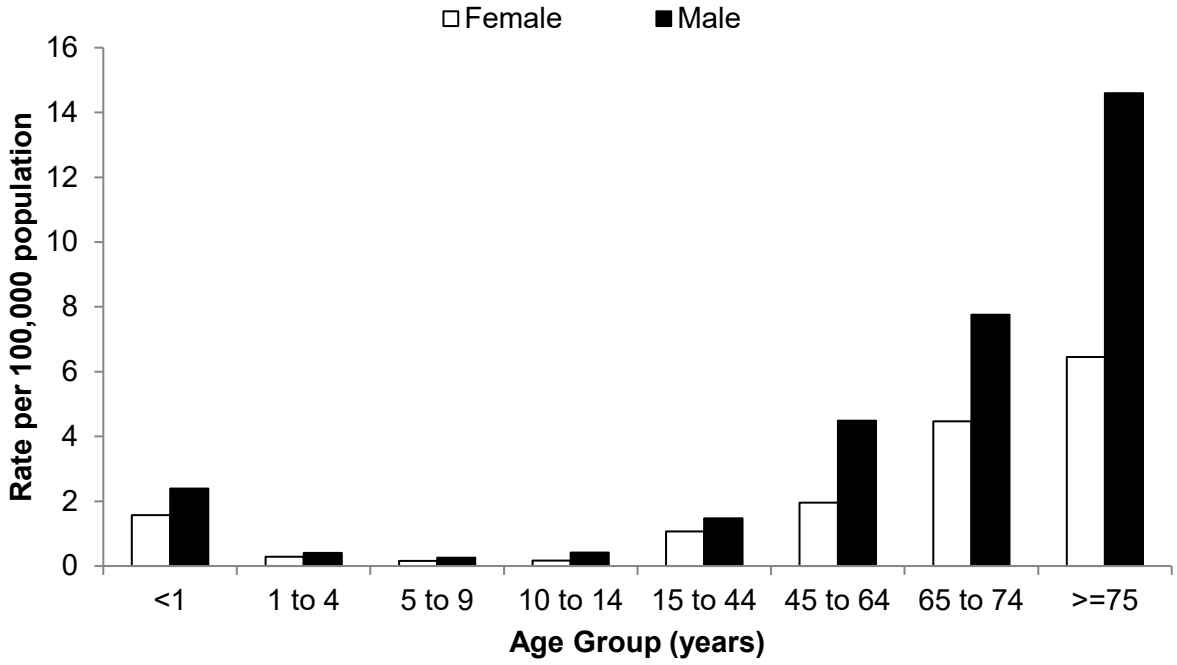


Figure 7. Bovis group streptococcal bacteraemia age and sex rates per 100,000 population in England, 2021

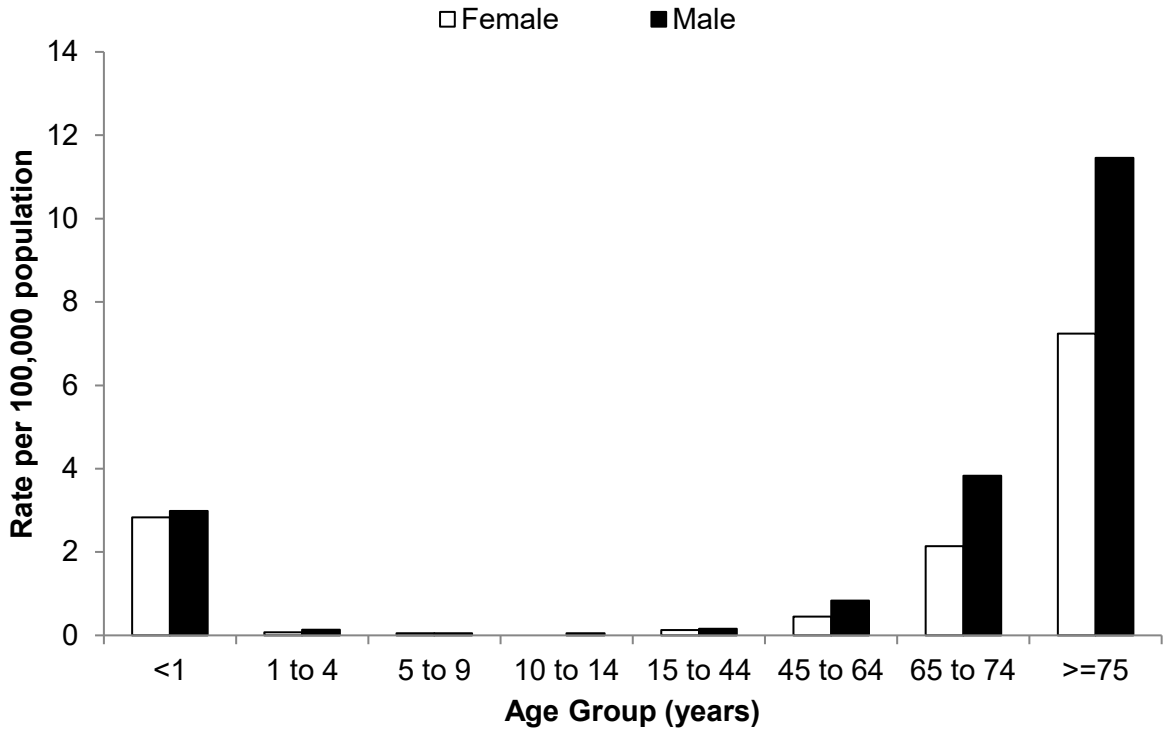


Figure 8. Mitis group streptococcal bacteraemia age and sex rates per 100,000 population in England, 2021

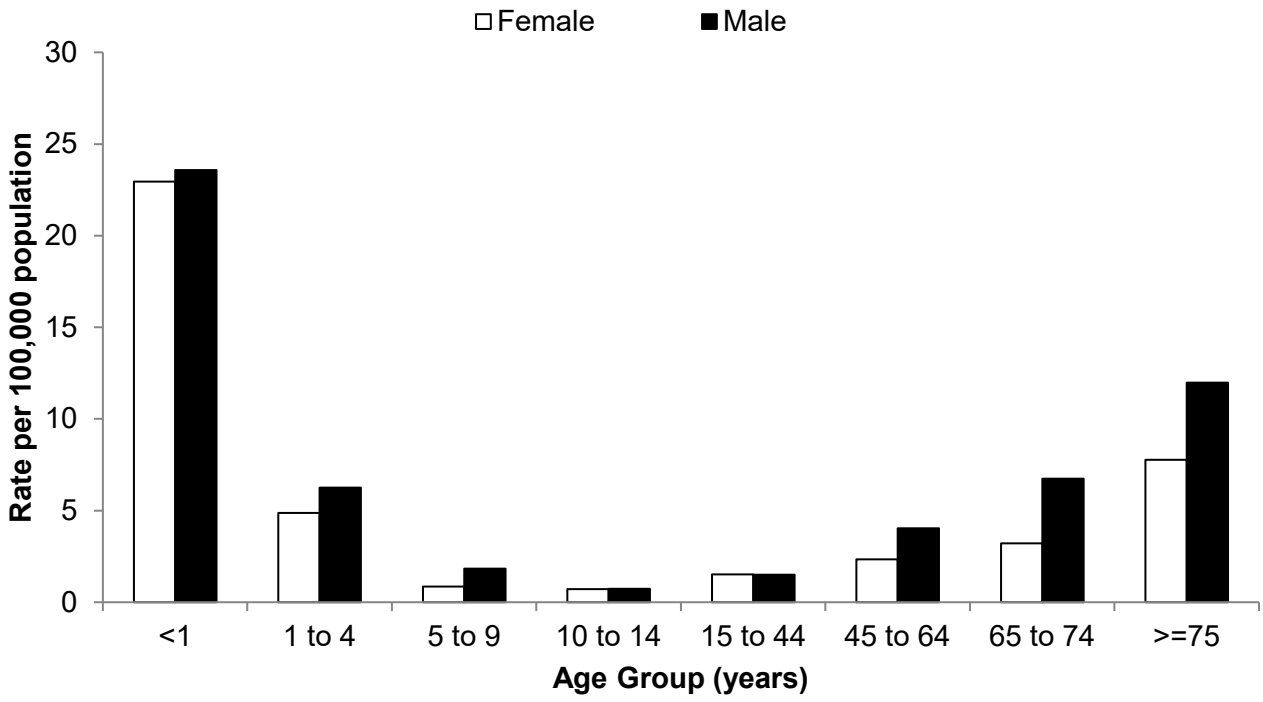


Figure 9. Salvarius group streptococcal bacteraemia age and sex rates per 100,000 population in England, 2021

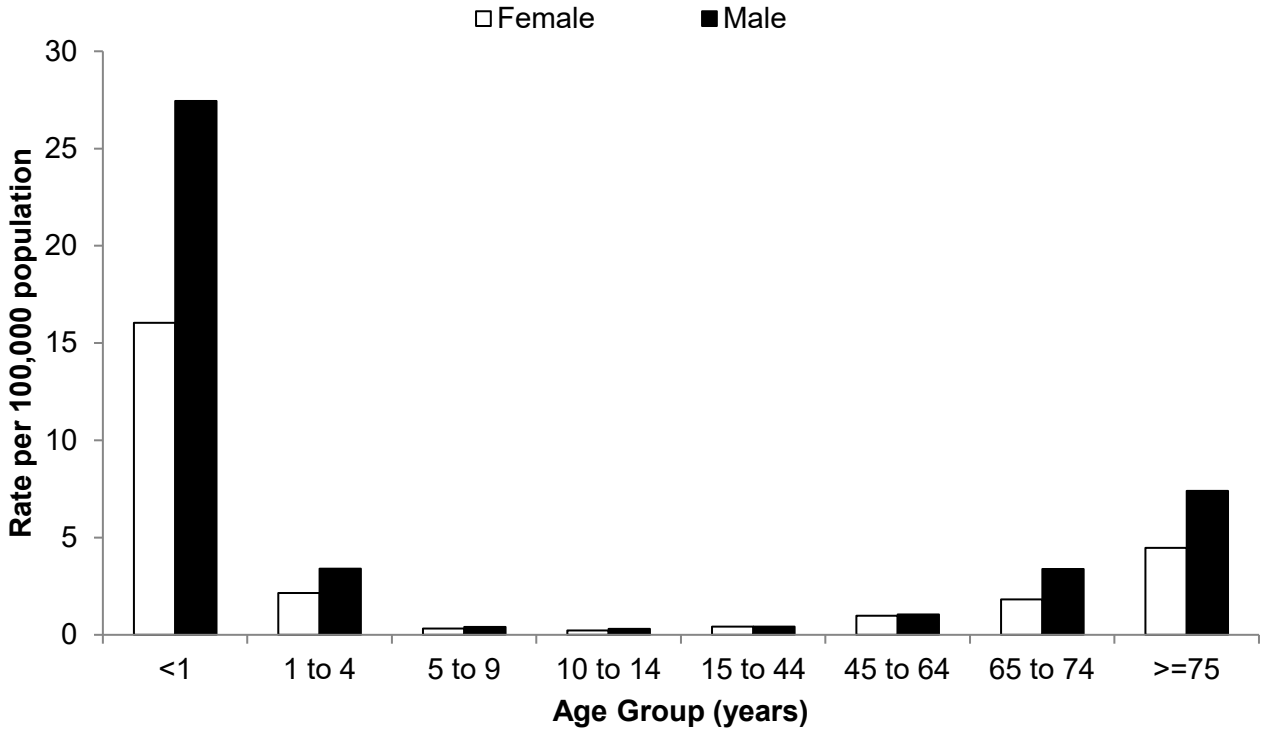


Figure 10. Sanguinis group streptococcal bacteraemia age and sex rates per 100,000 population in England, 2021

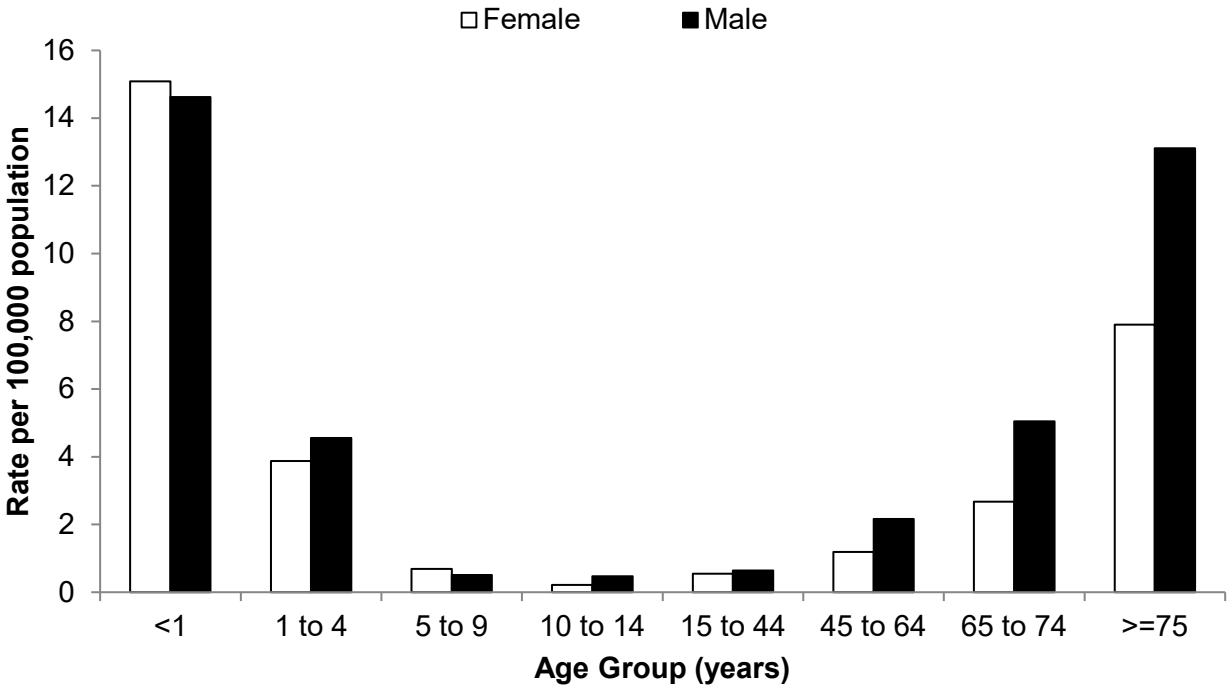


Table 6 shows the number of reports for each non-pyogenic streptococcal group bacteraemia that are tested and the percentage that are resistant to key antibiotics (penicillin, erythromycin and tetracycline) in England between 2017 and 2021.

Erythromycin susceptibility data was available for 17 to 37% of anginosus, bovis, mitis, salivarius and sanguinis bacteraemia isolates from England; for tetracycline, data availability was 17 to 37% and for penicillin, 90 to 95% in 2021. Resistance to penicillin was reported for 9% of mitis isolates (a decrease from 13% in 2017), 9% of salivarius isolates (a decrease from 16% in 2017), and 20% of sanguinis isolates (a slight reduction from 21% in 2017) (Table 6). The percentage of isolates reported as resistant to erythromycin increased between 2017 and 2021 for bovis group, from 31% to 34%.

Table 6. Antimicrobial susceptibility for non-pyogenic streptococci causing bacteraemia in England, 2017 to 2021

In this table R = resistant

Species	Antimicrobial agent	2017		2018		2019		2020		2021	
		Number tested	R (%)	Number tested	R (%)	Number tested	R (%)	Number tested	R (%)	Number tested	R (%)
Anginosus	erythromycin	88	12	758	12	771	12	589	12	655	12
	tetracycline	81	19	799	21	763	22	625	20	647	18
	penicillin	99	1	1497	1	1614	0	1499	1	1649	0
Bovis	erythromycin	362	31	411	33	348	34	347	30	297	34
	tetracycline	327	68	418	72	386	68	369	70	296	70
	penicillin	584	2	716	1	811	1	772	0	760	0
Mitis	erythromycin	1350	51	1046	52	899	47	622	43	639	42
	tetracycline	1072	28	974	26	949	26	673	25	619	22
	penicillin	2118	13	2265	11	2448	9	1933	9	1956	9
Salivarius	erythromycin	516	52	457	39	374	42	279	41	339	41
	tetracycline	413	19	410	16	386	17	290	12	326	10
	penicillin	743	16	865	17	867	15	678	12	887	9
Sanguinis	erythromycin	853	47	721	45	627	49	429	45	441	46
	tetracycline	705	29	730	33	665	32	484	32	484	30
	penicillin	1361	21	1536	21	1555	21	1185	21	1322	20

Reference microbiology service

In 2021, the percentage of reports of streptococcal bacteraemia in which the organism was not fully identified was 20%. Precise species identification of isolates would improve the monitoring of trends in non-pyogenic streptococci and related genera. The UKHSA Staphylococcus and Streptococcus reference service in the AMRHAI 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. 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 (4,5).

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

Guidelines for the management of close community contacts of invasive GAS cases (6) and the prevention and control of GAS transmission in acute healthcare and maternity settings (7) are available at Invasive group A streptococcal disease: managing close contacts.

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