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Impact of changing nature of injecting drug use on infections in UK

People who inject drugs (PWID) are vulnerable to a wide range of infections that can cause significant morbidity and mortality – including those caused by viruses such as HIV and hepatitis B and C, and bacteria such as *Clostridium botulinum* and *Staphylococcus aureus*.
The fourteenth annual report on infections among PWIDs in the UK – *Shooting Up* – examines the extent of infections and the associated risks under five headings [1].

HIV levels remain low, but risks continue

HIV infection among PWID remains uncommon compared with many other countries. Only 1% of those who inject psychoactive drugs have HIV, and the prevalence is similar among those injecting image and performance enhancing drugs. Most of those infected with HIV are aware of their infection and are accessing care. However, HIV is often diagnosed at a late stage among PWID.

HIV transmission continues among PWID in the UK, and both injecting and sexual risks remain common. Among those currently injecting psychoactive drugs 16% reported needle and syringe sharing in 2015. Though sharing is less common among those injecting image and performance enhancing drugs, 13% reported ever sharing a needle, syringe or vial of drugs. Of those with two or more sexual partners during the preceding year, only 22% of those injecting psychoactive drugs reported always using condoms, as did only 17% of those injecting image and performance enhancing drugs.

The recent outbreak of HIV among people injecting heroin in Glasgow is a concern, as is the emergence of injecting drug use around or during sex among some groups of HIV positive men who have sex with men.

Many hepatitis C infections remain undiagnosed

Hepatitis C remains a major problem among PWID in the UK, with half of those who inject psychoactive drugs having antibodies to hepatitis C. Data indicate that hepatitis C transmission is probably stable in this group and further effort is needed to reduce this. Although the uptake of diagnostic testing is high (86%), about half of the hepatitis C infections remain undiagnosed.

Key facts on the uptake of testing for hepatitis C are presented in an infographic associated with the new report. Undiagnosed hepatitis C infection among PWID is either because people have never had a test (1 in 5) or have become infected since their last test (as 41% have not been

tested recently). Those PWID with undiagnosed hepatitis C typically make use of a range of health services. This underlines the need to identify, and make use of, the opportunities for regularly offering tests to those at risk.

Hepatitis B remains rare, but vaccine uptake needs to be sustained

Less than 1% of those who inject psychoactive drugs are currently infected with hepatitis B. The proportion ever infected with hepatitis B has fallen from 26% in 2005 to 13% in 2015. This public health success reflects a marked increase in the uptake of the vaccine against hepatitis B during the 2000s. In 2015, 75% reported vaccination uptake, but this level is no longer increasing. Most of those who have not been vaccinated have been in contact with health services where they could have received a dose of the vaccine.

Bacterial infections continue to be a problem

A third (33%) of those who inject psychoactive drugs reported having a symptom of an injecting site infection during the preceding year. Outbreaks of infections due to bacteria, such as *Clostridium botulinum*, continue to occur in this group. Some of these infections are severe and place substantial demands on the healthcare system.

Changing patterns of psychoactive drug injection remain a concern

Heroin, alone or in combination with crack-cocaine, remains the most commonly injected psychoactive drug. However, there is evidence of an increase in the injection of stimulants, including recently emerged psychoactive drugs such as mephedrone. People injecting stimulants often report higher levels of risk behaviours.

Provision of effective interventions needs to be maintained

The findings presented in the report indicate a need to maintain, and improve services that aim to reduce injecting-related harms and to support those who want to stop injecting. A range of services, including locally appropriate provision of needle and syringe programmes, opioid substitution treatment, and other drug treatment, should be provided. Local areas need to be responsive to changes in drug use and the associated risks and offer these interventions in appropriate settings. Vaccination and diagnostic tests for infections need to be accessible, and routinely and regularly offered to people who inject or have previously injected drugs in line with guidance [2,3,4,5] to ensure sufficient coverage. Care pathways and treatments should be readily available to those testing positive.

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Impact of changing nature of injecting drug use on infections in UK

PHE had published the NHSBT/PHE Epidemiology Unit's annual review, *Safe Supplies: A Picture for Policy*, comprising a series of infographics to describe infections among blood, tissue, and organ donors during 2015, along with highlights on research and development activities [1]. Each infographic summarises information previously contained within individual chapters of the Annual Review report published in earlier years (blood, tissue, organs, research, etc). In each case, key findings relevant to policy decisions are emphasised. A set of data tables are published separately [1].

The NHSBT/PHE Epidemiology Unit emphasises that donor selection policy ensures eligible donors are at low risk of infection and that routine donation testing mitigates most remaining risk. Blood donors are the biggest donor group: in 2015, 2.1 million whole blood and platelet donations were made by around one million donors in the UK. Routine screening for infectious disease markers found 198 positive (including one dual infection); this represents a low rate of detection – one in 10,000 donations – with markers of hepatitis B and syphilis the most common. Positive donations are removed from the blood supply. The overall rate of markers detected among blood donors has declined in recent years, and this trend continued in 2015.

The burden of infection remains disproportionately in new donors (one in 1,000), as testing donors for the first time identifies previously undiagnosed infections generally acquired a long time in the past. Very few recently-acquired infections were detected (26) suggesting donor selection remains effective at deferring most individuals with current high risk behaviour and as such the risk that a donation is made in the window period and not detected on testing is extremely low.

In 2015, the risk that testing would not detect an HBV, HCV or HIV window period infection was less than one per million donations tested; the highest risk was for HBV. Among the 19 recent

infections detected in 2015 with a source of infection reported, 12 were through sex between men and women and six were through sex between men within 12 months and thus represents non-compliance with the MSM selection policy. MSM are disproportionately affected by HIV and syphilis.

The donor selection criteria concerning behaviours associated with increased risk of infection such as sex and injecting drug use are currently under review by the Advisory Committee on the Safety of Blood, Tissues and Organs (SaBTO) which advises UK ministers and health departments.

The number of living tissue donors is decreasing each year with falling demand for surgical bone. Among the 1,381 tested by NHSBT in 2015, five were positive for markers of infection, ie 3.6 per 1000 donors. Despite similarly stringent donor selection, this is approximately 3.5 times greater than the rate among new blood; reflecting the older age of surgical bone donors with higher rates of previously undiagnosed infections. In 2014 a new question was added to the Tissue Donor Health Check form to defer individuals with a past history of syphilis; while this significantly reduced the total number of donors found positive it has not eliminated it entirely and very low numbers of previously undiagnosed infections are detected. NHSBT also test deceased tissue donors who give bone, skin, heart valves, corneas and tendons, and donors are selected through a similarly stringent policy to other tissue donors. In 2015, among 2,917 donors tested, six were found positive for markers of infection, representing a rate of two per 1000 donors. Donations from tissue donors found positive are not used.

Donor selection policy also applies for deceased donors giving organs, but surgeons balance risk of using an organ from an infected donor against the risks for a patient who is waiting for a transplant. In 2015, there were 1879 potential organ donors who were consented for donation and tested; 1311 proceeded to donation, among whom 34 were positive for markers of HBV (HBsAg), HCV, HIV, HTLV and syphilis (18 per 1000 proceeding donors). Of those who proceeded to donation, 1237 became actual donors from whom 3422 organs were transplanted, including 10 who were positive for markers of HBV (HBsAg), HCV, HIV and syphilis (eight per 1000 actual donors), suggesting infection was not a barrier for transplant. The Unit is currently working to quantify the window period risk associated with transplantation.

In 2015, NHSBT tested 1,853 cord blood donors. One was positive for markers of HCV, one for syphilis and two for HTLV, representing a rate of 2.2 per 1000. Collection of cord blood by NHSBT is targeted at ethnically diverse populations in the London area to ensure a diverse supply of donations, accounting for the higher rates of infections detected. Positive donations

are not used, and donors are referred for specialist advice, particularly on the risk of maternal HTLV transmission through breast feeding.

Reference

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Gonococcal Resistance to Antimicrobials Surveillance Programme (GRASP) report 2016

PHE has published its annual Gonococcal Resistance to Antimicrobials Surveillance Programme (GRASP) report, presenting latest data from surveillance of antimicrobial resistance in Neisseria gonorrhoeae [1].

Current first-line treatment for gonorrhoea involves dual therapy with ceftriaxone and azithromycin, but treatment effectiveness is threatened by antimicrobial resistance. Azithromycin resistance is of concern because GRASP sentinel surveillance indicates the prevalence of azithromycin resistance (minimum inhibitory concentration (MIC) >0.5 mg/L) was approximately 10% in 2015, although 91% of these resistant isolates had MICs only just above the breakpoint for resistance. There were no ceftriaxone resistant isolates identified by the sentinel surveillance programme in 2015.

There has been an improvement in antimicrobial susceptibility testing of gonoccocal isolates within primary diagnostic laboratories. In 2016, isolates tested for azithromycin susceptibility increased to over 97% (figure 1). Isolates tested for susceptibility to ceftriaxone increased from 87% at the beginning of 2014 to 96% in the second quarter of 2016 (figure 2). However, the outbreak of high-level azithromycin-resistant *N. gonorrhoeae* (MICs ≥256 mg/L), first identified in Leeds in 2015, persists and in 2016 spread to other parts of England. Therefore, it is important that all primary diagnostic laboratories test gonococcal isolates for susceptibility to first-line antimicrobials and refer suspected azithromycin- and/or ceftriaxone-resistant isolates to the PHE reference laboratory for confirmation and follow-up.

Practitioners should ensure all patients with gonorrhoea are treated and managed according to national guidelines and be alert to changes in antimicrobials recommended for front-line use [2]. Sexual health services should report possible cases of treatment failure to PHE via the online HIV and STI web-portal (contact HIVSTI@phe.gov.uk for details.

Figure 1. Percentage of gonococcal isolates tested for azithromycin susceptibility and reported as resistant by primary diagnostic labs in England by quarter: 2014 to June 2016

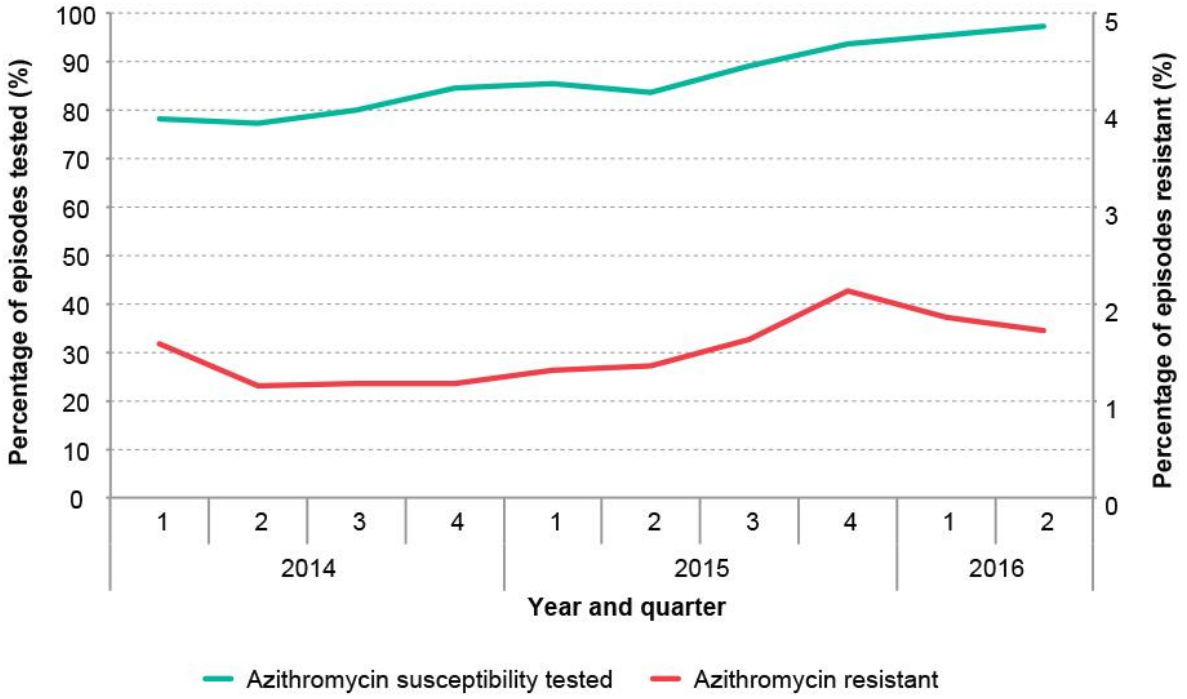
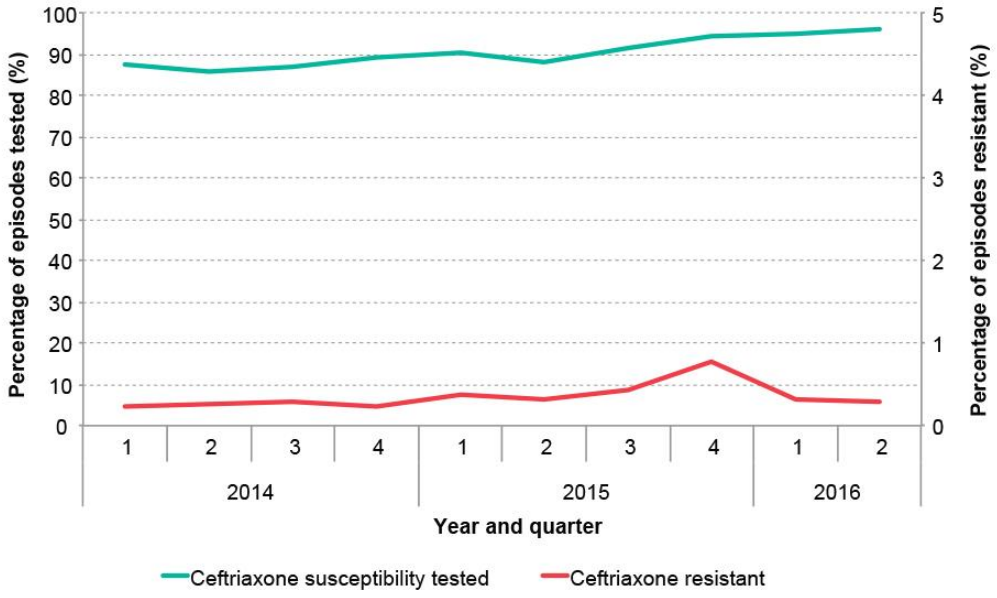


Figure 2. Percentage of gonococcal isolates tested for ceftriaxone susceptibility and reported as resistant by primary diagnostic labs in England by quarter: 2014 to June 2016



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Surveillance of *Streptococcus pneumoniae* causing bacteraemia in England, Wales and Northern Ireland: 2015

These analyses are based on data relating to diagnoses of *Streptococcus pneumoniae* bloodstream infections during 2008 – 2015 in England, Wales and Northern Ireland (EWNI). Data were extracted from Public Health England's (PHE) voluntary surveillance database Second Generation Surveillance System (SGSS; for cases within England), CoSurv (Northern Ireland) and Datastore (Wales). Data were extracted on 27 October 2016 for England, 27 October 2016 for Northern Ireland and 24 October 2016 for Wales.

SGSS comprises a communicable disease module (CDR; formerly CoSurv/LabBase2) and an antimicrobial resistance module (AMR; formerly AmSurv). Most analyses presented here are based on data extracted from the CDR module of SGSS data, except for the evaluation of multi-drug resistance data from the AMR module of SGSS. This module captures more comprehensive antibiogram data allowing more robust evaluation of multi-drug resistance rates. However, these data cannot be used for the trend analysis due to the addition of this data collection being relatively recent and therefore lower laboratory coverage in previous years.

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

Rates of bacteraemia laboratory reports were calculated using mid-year resident population estimates for the respective year and geography [1]. Geographical analyses were based on the residential postcode of the patient if known (otherwise the GP postcode if known or failing that the postcode of the laboratory) with cases in England being assigned to the catchment area of one of 15 local PHE centres (PHECs) formed from administrative local authority boundaries, which were correct at the time the data were reported.

This report includes analyses of the trends, patient demographic and geographical distribution as well as antimicrobial susceptibility among these bacteraemia episodes.

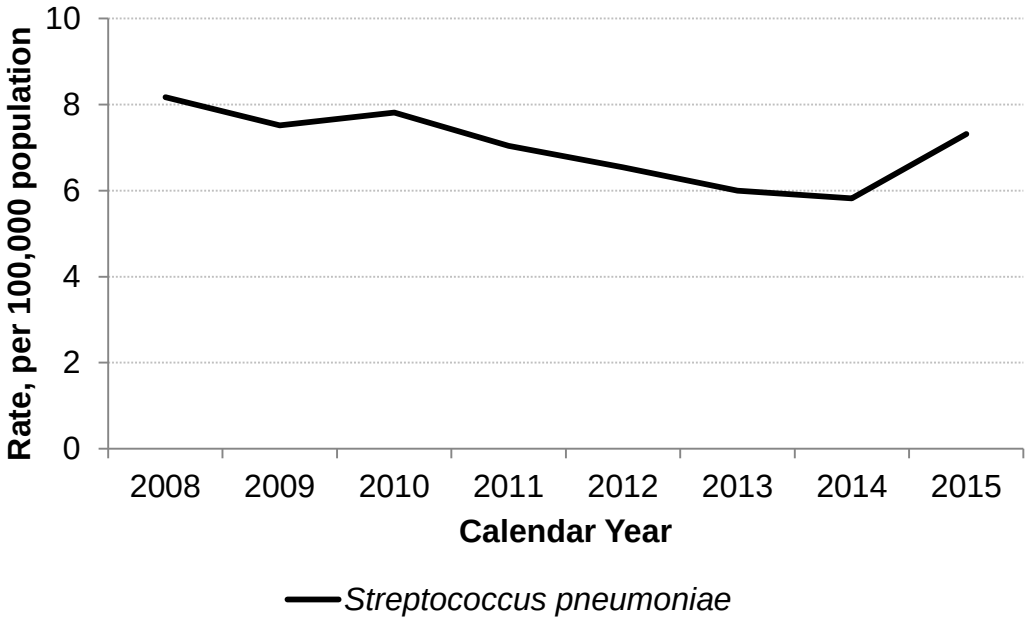
Key points

- Between 2011 and 2014 there was a 13% decrease in the number of *Streptococcus pneumoniae* laboratory reports (3,650 to 3,175 reports) followed by a sharp increase in 2015 (4,196 reports) in England
- In 2015 the overall rate of *S. pneumoniae* bacteraemia for EWNI was 7.8 cases per 100,000 population
- the highest regional rate of *S. pneumoniae* was in Devon, Cornwall and Somerset (13.1/100,000) compared to the lowest regional rate in London (4.7/100,000)
- rates of *S. pneumoniae* bacteraemia were higher in males than females across all the age-groups, with the highest rates in the elderly and children aged less than 1 year
- susceptibility to the key antibiotics remained stable for penicillin (3-4%), tetracycline (5-8%) and erythromycin (5-8%)
- the proportion of dual resistance in England was low in 2015, at between 2% and 4% for the erythromycin, tetracycline and penicillin; 2% were resistant to all three antibiotics.

Trends: England

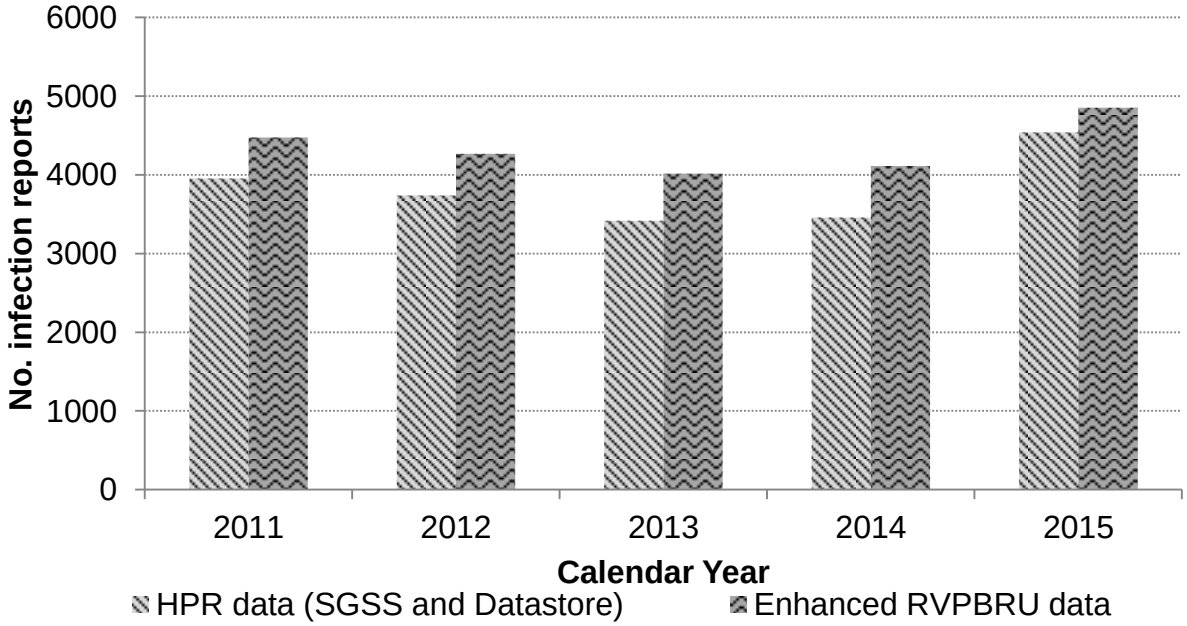
Between 2011 and 2014 there was a 13% decrease in the number of *Streptococcus pneumoniae* laboratory reports (3,650 to 3,175 reports) followed by a sharp increase in 2015 (4,196 reports) in England. This is reflected in the rate of *S. pneumoniae* reports per 100,000 population (figure 1). The reduction between 2008 (as shown in figure 1) until 2014 may be related to the introduction and use of pneumococcal vaccines (Prevenar7 and Prevenar13) [2][3]. The increase in 2015 may be an artefact resulting from the change of reporting database from its predecessor (LabBase2) to the current SGSS. It may also be related to the interaction between *S. pneumoniae* and the influenza virus. Surveillance of *S. pneumoniae* is of additional importance because of the potential impact the pathogen can cause as a secondary bacterial infection following primary infection with the influenza virus [4].

Figure 1. *S. pneumoniae* reports of bacteraemia per 100,000 population (England); 2008 to 2015



In comparison to the enhanced surveillance of *S. pneumoniae*, which combines data from SGSS and the Respiratory and Vaccine Preventable Bacteria Reference Unit (RVPBRU [5]), this report (combining England and Wales data) captured between 84-94% of the total enhanced surveillance data (figure 2).

Figure 2. Comparison of *S. pneumoniae* reports of bacteraemia in this HPR (England data from SGSS; Wales data from Datastore) versus the RVPBRU enhanced surveillance system (England and Wales); 2011 to 2015



Geographic distribution: England, Wales and Northern Ireland

In 2015 the overall rate of *S. pneumoniae* bacteraemia for England, Wales & Northern Ireland was 7.8 cases per 100,000 population (table 1). Wales reported the highest incidence rate (11.2), followed by England (7.7) and Northern Ireland (7.5; table 1). There was wide variation in *S. pneumoniae* bacteraemia reports within England in 2015, with rates ranging from 4.7/100,000 in London to 13.1/100,000 in Devon, Cornwall and Somerset. The rate of all regions increased between 2014 and 2015, where Devon, Cornwall and Somerset had the largest rate increase (72%) between 2014 and 2015 (7.6 to 13.1/100,000; table 1; figure 3).

Figure 3. Geographical distribution of *S. pneumoniae* per 100,000 population (England, Wales and Northern Ireland); 2015

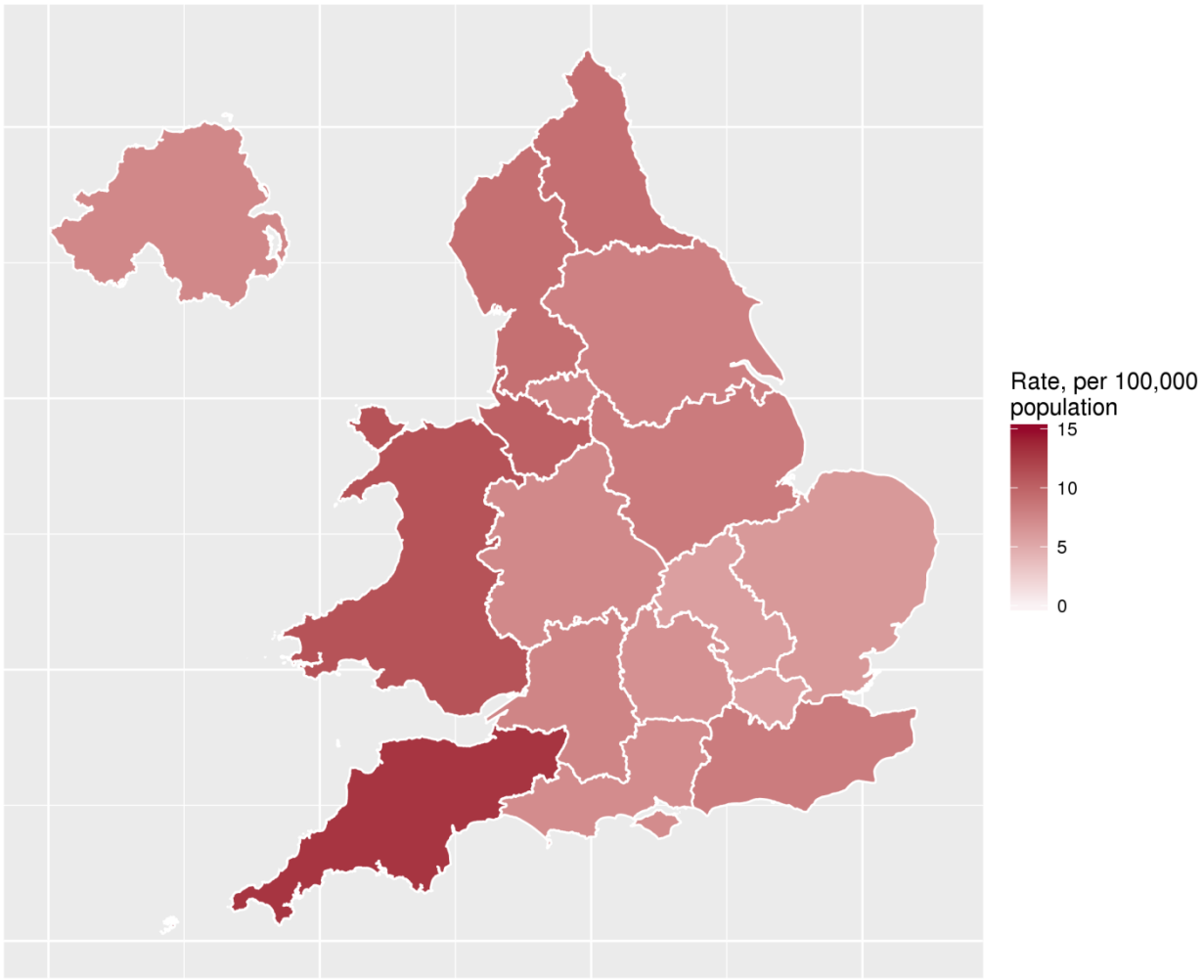


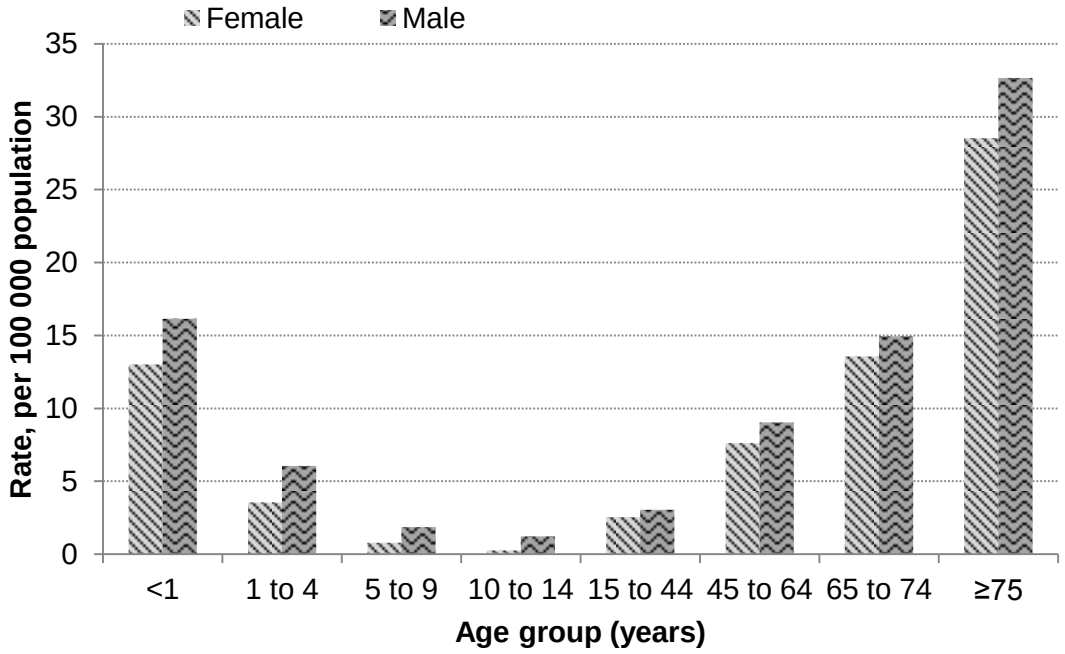
Table 1. *S. pneumoniae* bacteraemia per 100,000 population by region (England, Wales and Northern Ireland): 2011 to 2015

Region		Rate per 100,000 population				
		2011	2012	2013	2014	2015
North of England	Cheshire and Merseyside	8.8	9.4	8.2	8.4	10.3
	Cumbria and Lancashire	6.1	5.6	4.3	6.3	9.2
	Greater Manchester	9.4	7.9	7.7	7.2	7.7
	North East	7.7	7.6	5.5	5.6	9.2
	Yorkshire and Humber	8.4	6.6	5.7	5.7	7.9
Midlands and East of England	Anglia and Essex	6.7	5.5	6.1	4.8	6.3
	East Midlands	7.4	7.5	5.0	6.5	8.3
	South Midlands and Hertfordshire	5.7	4.8	4.0	4.2	5.8
	West Midlands	7.3	6.2	6.2	6.0	7.4
London	London	4.9	5.4	5.4	5.5	5.7
South of England	Avon, Gloucestershire and Wiltshire	5.5	5.3	5.1	6.2	7.7
	Devon, Cornwall and Somerset	7.9	7.6	8.3	7.6	13.1
	Kent, Surrey and Sussex	6.5	6.7	6.1	5.6	8.3
	Thames Valley	5.8	5.3	4.7	4.7	6.8
	Wessex	7.1	6.8	5.7	4.9	7.1
England		6.9	6.4	5.8	5.8	7.7
Northern Ireland		6.3	4.9	5.9	5.6	7.5
Wales		10.0	10.0	8.9	9.2	11.2
England, Wales and Northern Ireland		7.0	6.6	6.0	6.0	7.8

Age and sex distribution: England

In England, the rates of *S. pneumoniae* bacteraemia were higher in males than females across all the age groups in 2015 (figure 4). The highest rates were in the elderly, aged 75 years and over (30.5 per100,000 population), followed by those less than 1 year old (14.6/100,000) and those aged 65 to 74 years (14.3/100,000).

Figure 4. *S. pneumoniae* bacteraemia rates per 100,000 population by age and sex (England); 2015



Antimicrobial Resistance

In 2015, *S. pneumoniae* blood specimens were frequently tested for susceptibility to penicillin (86% tested), tetracycline (79% tested) and erythromycin (64% tested; table 2). Penicillin is the most tested as it is one of the recommended first line antibiotics for the treatment of bloodstream infections in the British National Formulary (BNF) [6]. The proportion of *S. pneumoniae* isolates that are resistant to penicillin, tetracycline or erythromycin has remained broadly stable over the five year period, but the data may suggest an overall upward creep in antibiotic resistance (3 to 4%, 5 to 8%, and 5 to 8% respectively between 2011 and 2015; table 2). There was a slight increase in resistance to cefotaxime between 2014 and 2015 (<1% to 2% resistance).

Table 2. Antimicrobial susceptibility for *S. pneumoniae* bacteraemia (England); 2011 to 2015

	2011		2012		2013		2014		2015	
	No. Tested	**% Resistant***	**No. Tested**	**% Resistant***	**No. Tested**	**% Resistant***	**No. Tested**	**% Resistant***	**No. Tested**	**% Resistant***
Clindamycin	349	3	361	9	443	9	465	11	761	9
Erythromycin	2,370	5	2,304	9	2,075	9	1,907	7	2,686	8
Tetracycline	2,469	5	2,464	6	2,241	7	2,199	7	3,291	8
Penicillin	3,060	3	2,916	4	2,641	4	2,570	4	3,590	4
Cefotaxime	697	<1	651	<1	568	<1	533	<1	619	2
Vancomycin	1,485	0	1,428	0	1,356	0	1,238	0	1,875	0
Teicoplanin	342	0	338	0	256	0	213	0	319	0
Total Reports	**3,650**		**3433**		**3144**		**3177**		**4169**	

* Defined as reduced- or non-susceptible

Following the national introduction of a 23-valent pneumococcal polysaccharide vaccine (23vPPV) in 2003, and the pneumococcal heptavalent conjugate vaccine (PCV7) vaccination in 2006, there was a reduction in invasive *S. pneumoniae* isolates reported in England and Wales [7]. Coinciding with this reduction in incidence was a reduction in resistance to erythromycin, reducing to 5% in 2009 [7]. There has also been a reduction since the PCV13 was introduced [8].

Table 3 displays the proportion of dual antimicrobial resistance in blood specimens where a susceptibility result was reported for both antibiotics in each combination. The proportion of dual resistance in England was low in 2015, at between 2% and 4% for the three combinations using data from the AMR module of SGSS.

Of the 2,225 isolates that had a susceptibility test result to all three antibiotics (erythromycin, tetracycline and penicillin) in England in 2015, 2% were multi-drug resistant.

Table 3. Pair-wise antimicrobial testing and resistance summary for *S. pneumoniae* bacteraemia (England); 2015

Antimicrobial combinations	No. Tested	% Resistant
Erythromycin & Tetracycline	2,357	4
Erythromycin & Penicillin	2,550	3
Tetracycline & Penicillin	3,097	2

* Defined as reduced- or non-susceptible

Reference microbiology service

The Respiratory and Vaccine Preventable Bacteria Reference Unit (RVPBRU, Colindale) offers a pneumococcal capsular serotyping service. The analysis of referred isolates helps to inform the composition of pneumococcal conjugate vaccines. A free-of-charge reference service is available for urgent public health investigations, either hospital or community based. All such isolates should be submitted to RVPBRU from normally sterile sites. The RVPBRU is based at the Public Health England, Colindale.

Acknowledgements

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Feedback and specific queries about this report are welcome and can be sent to hcai.amrdepartment@phe.gov.uk.

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