Public Health England

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Current News

- **Mandatory HCAI reports quarterly trends (England): January to March 2016 (in summary)**
- ***Corrigendum*: COVER data for October to December 2015**

Infection Reports *(publication date)*

Bacteraemia

- **Voluntary surveillance of bacteraemia caused by *Klebsiella* spp. in England: 2011-2015** *(17 June)*
- **Voluntary surveillance of bacteraemia caused by *Escherichia coli* in England: 2008-2015** *(17 June)*

Enteric

- **Salmonella infections (faecal specimens) England and Wales, laboratory reports (PHE salmonella data set): Apr-May 2016** *(10 June)*
- **Suspected and laboratory-confirmed reported norovirus outbreaks in hospitals: outbreaks occurring in weeks 18 to 21, 2016** *(10 June)*

Respiratory

- **Laboratory reports of respiratory infections (England and Wales), weeks 18 to 21, 2016** *(3 June)*

News

Volume 10 Number 19 Published on: **17 June 2016**

Mandatory HCAI reports quarterly trends (England): January to March 2016 (in summary)

PHE's latest quarterly epidemiological commentary on trends in reports of *Staphylococcus aureus* (MRSA and MSSA) and *Escherichia coli* bacteraemia, and of *Clostridium difficile* infections, mandatorily reported by NHS acute Trusts in England up to January-March 2016, has been published on the GOV.UK website [1].

MRSA bacteraemia

There has been a 6.6% decrease (1.6 to 1.5 reports per 100,000 population) in rates of total MRSA bacteraemia reports between October-December 2012 and the current quarter (January-March 2016). This continues an overall decreasing trend beginning from April 2007. Most recently (between January-March 2015 and January-March 2016) decreases have been seen in both counts and rates of all reported MRSA bacteraemia (from 222 to 206 and from 1.7 to 1.5 reports per 100,000 population, respectively). This decrease has also been observed for Trust-assigned counts and rates (from 91 to 82 reports, and from 1.0 to 0.9 per 100,000 bed-days) and CCG-assigned counts and rates (from 90 to 82 reports, and from 0.7 to 0.6 per 100,000 population), while Third Party-assigned counts and rates have remained stable or unchanged (from 41 to 42 reports, and an unchanged 0.3 reports per 100,000 population).

MSSA bacteraemia

Compared with the same quarter in the previous year (January-March 2015), both counts and rates of all reported MSSA bacteraemias in the current quarter (January-March 2016) were increased: by 8.2% and 7.0% respectively (from 2,526 to 2,732 reports and 18.9 to 20.2 reports per 100,000 population). Similarly, both the counts and rates of Trust-apportioned MSSA bacteraemia reports increased: 8.2% and 7.2% up (from 716 to 775 reports, and 8.1 to 8.7 reports per 100,000 bed-days, respectively), over the same time period.

E coli bacteraemia

An 8.8% increase (from 63.5 to 69.1 reports per 100,000 population) has been observed in the rate of all reported *E. coli* bacteraemias in the current quarter (January-March 2016) compared with the same quarter of the previous year (January-March 2015). There has been an overall increase of 16.8% in the rate of *E. coli* bacteraemia since October-December 2012: from 59.2 to 69.1 reports per 100,000 population.

C. difficile infection (CDI)

Between January-March 2015 and the current quarter (January-March 2016), there has been 13.4% and 14.4% decrease in the counts and rates of all reported CDI cases (from 3,398 to 2,941 reports and from 25.4 to 21.7 reports per 100,000 population, respectively).

Reference

1. PHE (9 June 2016). Quarterly Epidemiological Commentary: Mandatory MRSA, MSSA and *E. coli* bacteraemia, and *C. difficile* infection data (up to January-March 2016).

Corrigendum: COVER data for October to December 2015

The *HPR* report "Quarterly vaccination coverage statistics for children aged up to five years in the UK (COVER programme): October to December 2015" (HPR 10(12), 24 March 2016), has been republished following corrections to the data in table 3b (Completed primary immunisations and boosters at five years by NHS England Area Team).

The data in the associated, separately published statistical report have not been subject to any change.

The updated documents are available on the webpage "Cover of vaccination evaluated rapidly (COVER) programme 2015 to 2016: quarterly data".

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Infection reports

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Infection reports / Bacteraemia

Volume 10 Number 19 Published on; **17 June 2016**

Voluntary surveillance of bacteraemia caused by *Klebsiella* spp. in England: 2011-2015

These analyses are based on data relating to diagnoses of bloodstream infections caused by *Klebsiella* spp. between 2011 and 2015 in England, extracted on 20 May 2016 from Public Health England's (PHE) voluntary surveillance database Second Generation Surveillance System (SGSS). Data for Wales and Northern Ireland were extracted separately (DataStore on 10 April and CoSurv on 17 May 2016 resepctively) and are included in the geographical and species analyses only.

SGSS comprises a communicable disease module that includes antimicrobial susceptibility data (CDR; formerly CoSurv/LabBase2) and a separate comprehesive antimicrobial resistance module (AMR; formerly AmSurv). Compared to CDR's antimicrobial susceptibility data, the AMR module captures more comprehensive antibiogram data (involving all antibiotics tested); however, until the launch of SGSS in 2014 there was a lower laboratory coverage to the AMR module. Therefore, antimicrobial non-susceptibility trends cannot currently be undertaken using data from the AMR module but data for 2015 were extracted to assess multi-drug resistance rates.

The data presented here for earlier years 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 with the exception of 2015 rates, which were based on 2014 population estimates as population estimates for 2015 were not available at the time of producing this report [1,2]. 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 one of 15 local PHE centres (PHECs) formed from administrative local authority boundaries.

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

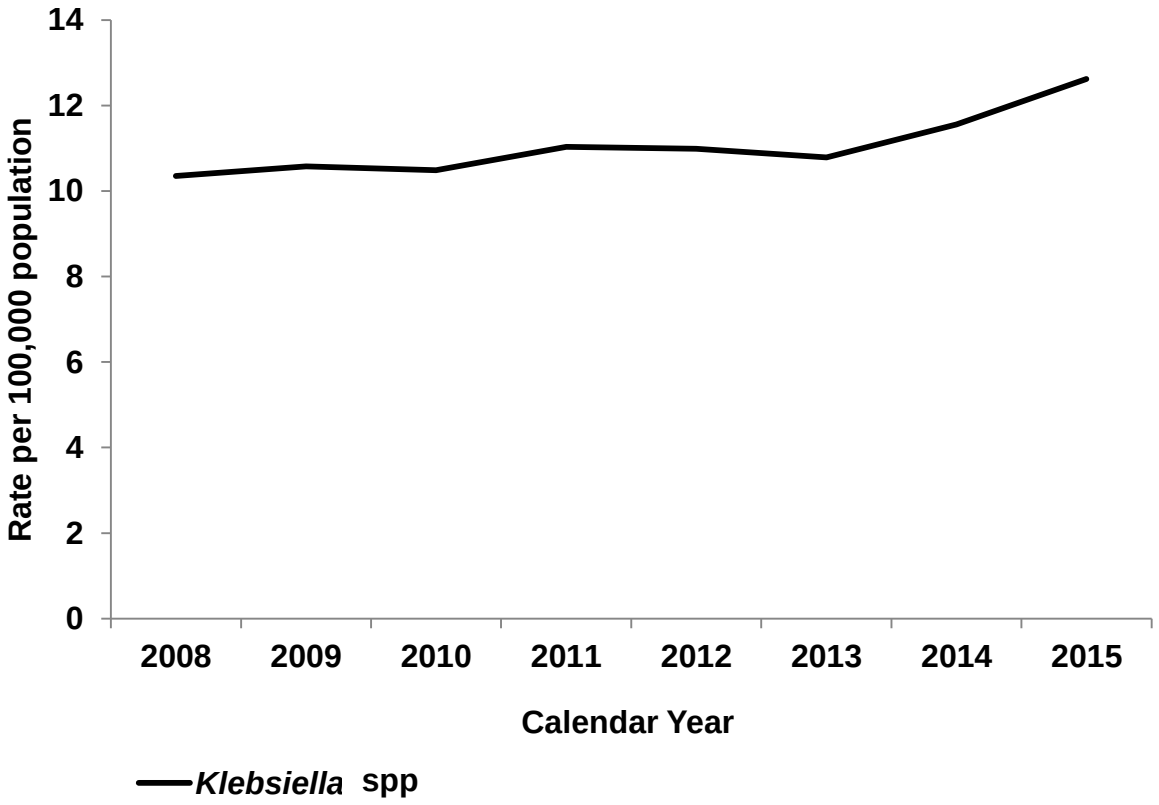
Key points

- between 2014 and 2015 the total number of reports of *Klebsiella* spp. bacteraemia in England increased by 9% (from 6,280 to 6,856 episodes), an increase in population rate from 11.6 to 12.6 per 100,000 population.
- in 2015, 99% of bacteraemia reports of *Klebsiella* spp. were identified to species level. This represented a continuing improvement in species reporting
- the rate of *Klebsiella* spp. bacteraemia reports was generally higher in males than females and among older adults (≥75 years) and infants (<1 year)
- in 2015, Northern Ireland had the highest rate of *Klebsiella* spp. bacteraemia reports (14.8/100,000) followed by Wales (14.1) and England (12.6)
- in England, Devon, Cornwall and Somerset PHE centre had the highest rate of reports at 19.4/100,000 population in 2015, followed by East Midlands at 15.8. The lowest rates were in Wessex (6.0) and Thames Valley (9.4). Trends from 2011 to 2015 showed that the majority of PHE centres had an increase with Devon, Cornwall and Somerset in particular seeing a substantial increase in 2015 over the previous years.
- antimicrobial susceptibility trends from 2011 to 2015 were examined for five classes of antibiotics
    - for the two third-generation cephalosporins examined, there was a marginal increase in resistance to cefotaxime and ceftazidime for *Klebsiella* spp., reaching 10% (12% for *K. pneumoniae*) for each antibiotic in 2015.
    - resistance to the fluoroquinolone ciprofloxacin also increased marginally, reported in 9% of *Klebsiella* spp. (11% for *K. pneumoniae*) in 2015.
    - resistance to the aminoglycoside gentamicin increased marginally from 6% in *2011* to 7% in 2015 *(*9% for *K. pneumoniae* although stable throughout for *K. oxytoca* at 1%).
    - further increases in *Klebsiella* spp. resistance to piperacillin/tazobactam were seen, reported in 17% of isolates in 2015 (19% for *K. pneumoniae*). This may reflect the recent switch from CLSI to EUCAST MIC breakpoint from 16 to 8 mg/L for this agent.
    - resistance to the carbapenems remained uncommon in 2015 (≤1%) at genus level and species level
- the most common dual resistance was to ciprofloxacin and third-generation cephalosporins among *K. pneumoniae* bacteraemia isolates (11.5%). The least frequent dual resistance was for ciprofloxacin and gentamicin (0.4%) among *K. oxytoca* bacteraemia isolates.

Trends in the number of bacteraemia reports and rates: England

Figure 1a is based on data for England only. This shows the trend in the rates of *Klebsiella* spp. bacteraemia laboratory reports of between 2008 and 2015 per 100,000 resident population. The annual rate was relatively stable around 11.0/100,000 between 2008 and 2013. Increases occurred after this with a 17% increase from 2013 to 2015. Between 2014 and 2015 in particular the rate increased by 9% from 11.6/100,000 to 12.6/100,000 population respectively.

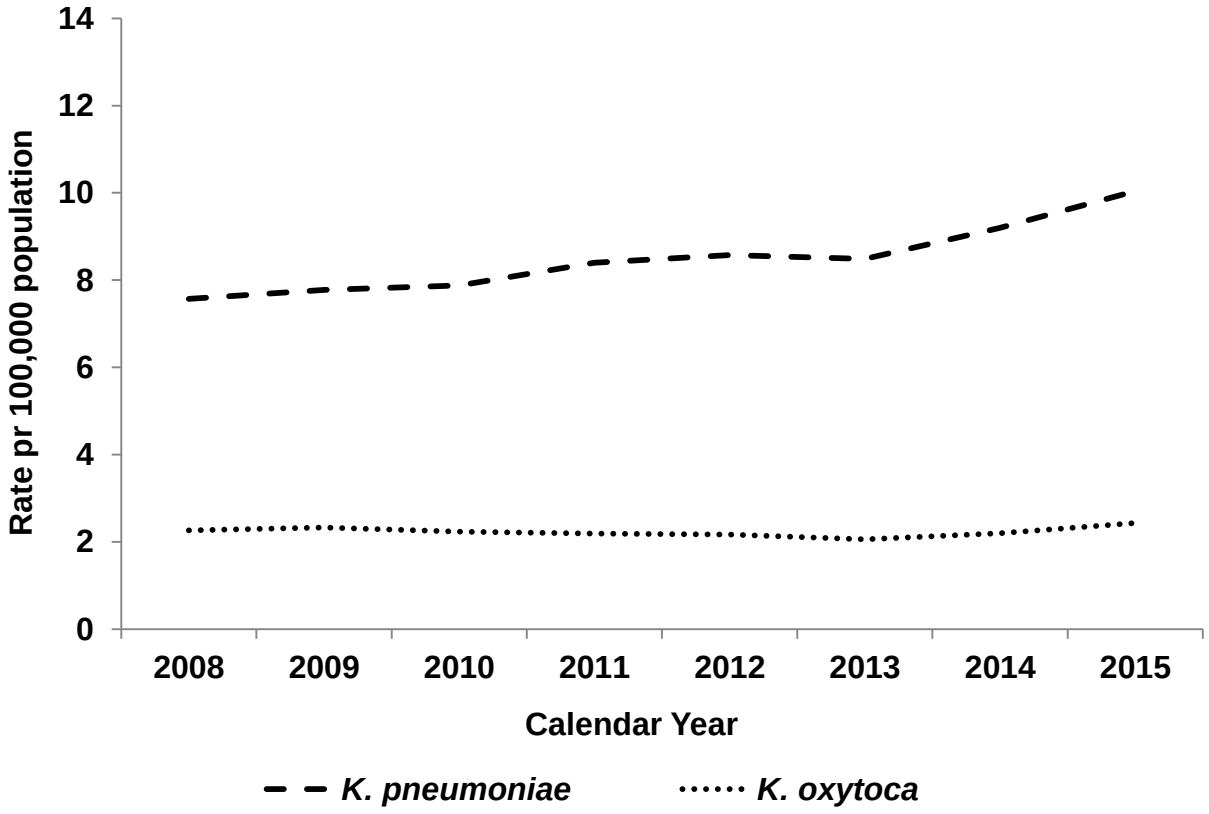
Figure 1a *Klebsiella* spp. bacteraemia rate per 100,000 population, England: 2008- 2015



Source: PHE, 2016

Figure 1b, also based on data for England, shows trends in the rates of bacteraemia laboratory reports between 2008 and 2015 per 100,000 resident population for the two main species. The rates of *K. pneumoniae* bacteraemia the rate was relatively stable at around 8.0/100,000 *per annum* until 2013. The rate increased by 18% from 2013 to 2015. The rate for *K. oxytoca* (figure 1b) was stable throughout the study period at around 2.0/100,000 *per annum*.

Figure 1b Bacteraemia rate per 100,000 population, *K. pneumonaie* and *K. oxytoca*, England: 2008- 2015



Geographical distribution: England, Wales and Northern Ireland

The geographical analyses presented here are not corrected for variation in reporting between geographical areas. Figure 2 is a graphical display of the regional variation in the rates in 2015. Table 2 shows five-year trends by geographical region from 2011 to 2015.

In 2015 the overall rate of laboratory reports of *Klebsiella* spp. bacteraemia for England, Wales and Northern Ireland was 12.8 per 100,000 population. The analysis by country showed that Northern Ireland had the highest rate (14.8) followed by Wales (14.1) then England (12.6).

Within England, there was variation in the rate between the 15 PHE regions (PHECs). In 2015, the highest rates were in Devon, Cornwall and Somerset at 19.4/100,000, East Midlands (15.8) and Cheshire and Merseyside (14.7). The lowest rates were in Wessex (6.0) and Thames Valley (9.4). Although the highest *Klebsiella* spp. bacteraemia rate was in Devon, Cornwall and Somerset, carbapenem-resistant isolates were more frequently reported by laboratories in London and Greater Manchester (described in the antimicrobial susceptibility section of this report).

Although no PHEC experienced a steady year-on-year increase over the five-year period, the majority showed an increase from 2013 (table 1). The analysis for Devon, Cornwall and Somerset in particular showed an increase from its fairly stable rate of around 16.0/100,000 *per annum* to 19.4/100,000 in 2015. The lowest rates were consistently observed in Wessex and Thames Valley over this five-year period.

The geographical variation may be explained by differences in completeness of reporting between PHECs. Local outbreaks, differences in case-mix and variation in the distribution of specialist care units may also influence these rates.

Figure 2. Geographical distribution of the rate of *Klebsiella* spp. bacteraemia reports per 100,000 population (England, Wales and Northern Ireland): 2015

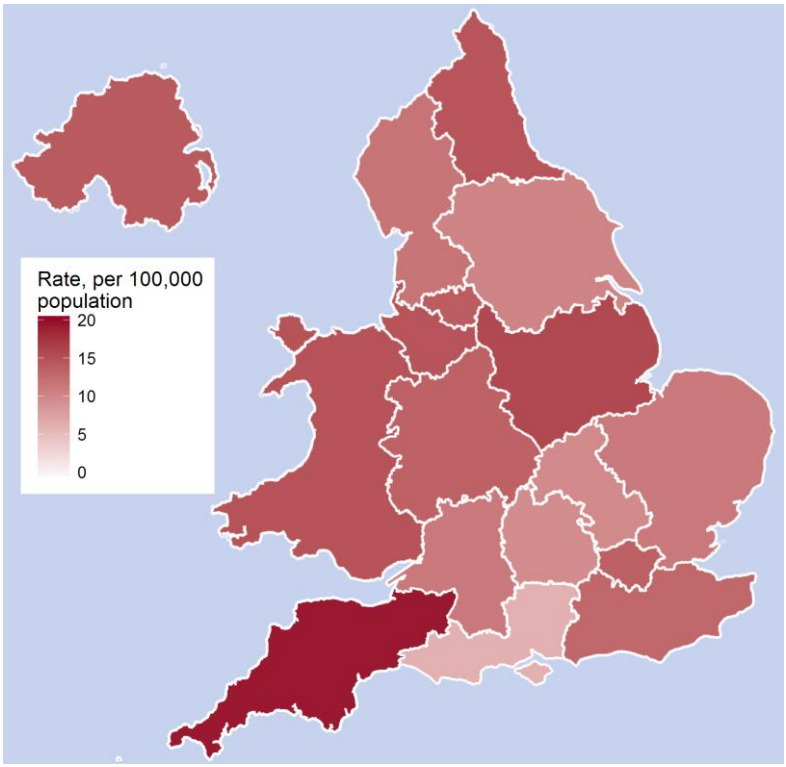


Table 1. Rate of *Klebsiella* spp. bacteraemia reports per 100,000 population by PHE Centre (England, Wales and Northern Ireland): 2011 to 2015

Region	PHE Centre	Rate per 100,000 resident population 2011	2012	2013	2014	2015
North of England	Cheshire and Merseyside	13.8	14.5	14.8	12.3	14.7
	Cumbria and Lancashire	10.4	11.2	10.7	13.7	11.7
	Greater Manchester	14.7	14.5	14.1	14.1	13.9
	North East	11.2	12.0	11.7	13.3	14.6
	Yorkshire and Humber	10.3	10.0	7.7	9.0	10.2
Midlands and East of England	Anglia and Essex	10.2	11.2	9.9	10.9	11.3
	East Midlands	14.3	11.6	12.1	12.4	15.8
	South Midlands and Hertfordshire	6.5	8.5	7.2	8.5	9.7
	West Midlands	11.5	11.1	11.1	12.6	13.5
London	London	11.8	11.6	12.2	12.8	13.6
South of England	Avon Gloucestershire and Wiltshire	8.3	8.9	8.5	10.2	11.2
	Devon Cornwall and Somerset	15.2	15.2	15.9	16.4	19.4
	Kent Surrey and Sussex	10.8	11.1	12.1	12.0	12.9
	Thames Valley	8.1	7.1	6.5	6.8	9.4
	Wessex	5.8	5.4	6.0	6.8	6.0
England*		**11.0**	**11.0**	**10.8**	**11.6**	**12.6**
Northern Ireland†		**13.7**	**14.0**	**15.6**	**14.3**	**14.8**
Wales‡		**11.7**	**11.7**	**12.4**	**12.9**	**14.1**
England, Wales and Northern Ireland		**11.2**	**11.2**	**11.1**	**11.7**	**12.8**

* Extracted on 20 May 2016; † extracted on 17 May 2016; ‡ extracted on 10 April 2016. Source: PHE, 2016

Table 2. Reports of bacteraemia due to *Klebsiella spp.* (England, Wales and Northern Ireland): 2011 to 2015

	2011		2012		2013		2014		2015	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
England										
K. oxytoca	1,161	19.8	1,158	19.7	1,107	19.1	1,194	19.0	1,322	19.3
K. pneumoniae	4,459	76.1	4,585	78.0	4,571	78.7	4,995	79.5	5,455	79.6
Klebsiella spp., other named	9	0.2	10	0.2	13	0.2	10	0.2	11	0.2
Klebsiella spp., sp. not recorded	233	4.0	127	2.2	119	2.0	81	1.3	68	1.0
***Klebsiella* spp.**	**5,862**	100.0	**5,880**	100.0	**5,810**	100.0	**6,280**	100.0	**6,856**	100.0
Wales										
K. oxytoca	98	23.3	97	22.5	101	21.0	80	18.1	80	17.5
K. pneumoniae	313	74.5	320	74.2	373	77.4	336	75.8	340	74.4
Klebsiella spp., other named	8	1.9	10	2.3	6	1.2	3	0.7	0	0.0
Klebsiella spp., sp. not recorded	1	0.2	4	0.9	2	0.4	24	5.4	37	8.1
***Klebsiella* spp.**	**420**	100.0	**431**	100.0	**482**	100.0	**443**	100.0	**457**	100.0
Northern Ireland										
K. oxytoca	63	29.7	57	26.6	57	25.2	58	24.4	67	25.8
K. pneumoniae	146	68.9	154	72.0	163	72.1	179	75.2	192	73.8
Klebsiella spp., other named	1	0.5	3	1.4	6	2.7	1	0.4	0	0.0
Klebsiella spp., sp. not recorded	2	0.9	0	0.0	0	0.0	0	0.0	1	0.4
***Klebsiella* spp.**	**212**	100.0	**214**	100.0	**226**	100.0	**238**	100.0	**260**	100.0

Source: PHE, 2016

Species distribution

In 2015, the majority of *Klebsiella* spp. from blood specimens were identified to species level (99%), a small improvement compared with previous years (table 2). In 2015, as in previous years, the predominant species was *K. pneumoniae* accounting for 79% of reports, followed by *K. oxytoca* (19%). It should be noted that *K. aerogenes* is not a valid species although it continues to be reported with numbers declining substantially in recent years (n<5 in 2015). Also a small number of reports of *K. ornithinolytica* continue to be reported, but these were excluded from all analyses in this report due to the taxonomic change to *Raoultella ornithinolytica* in 2001.

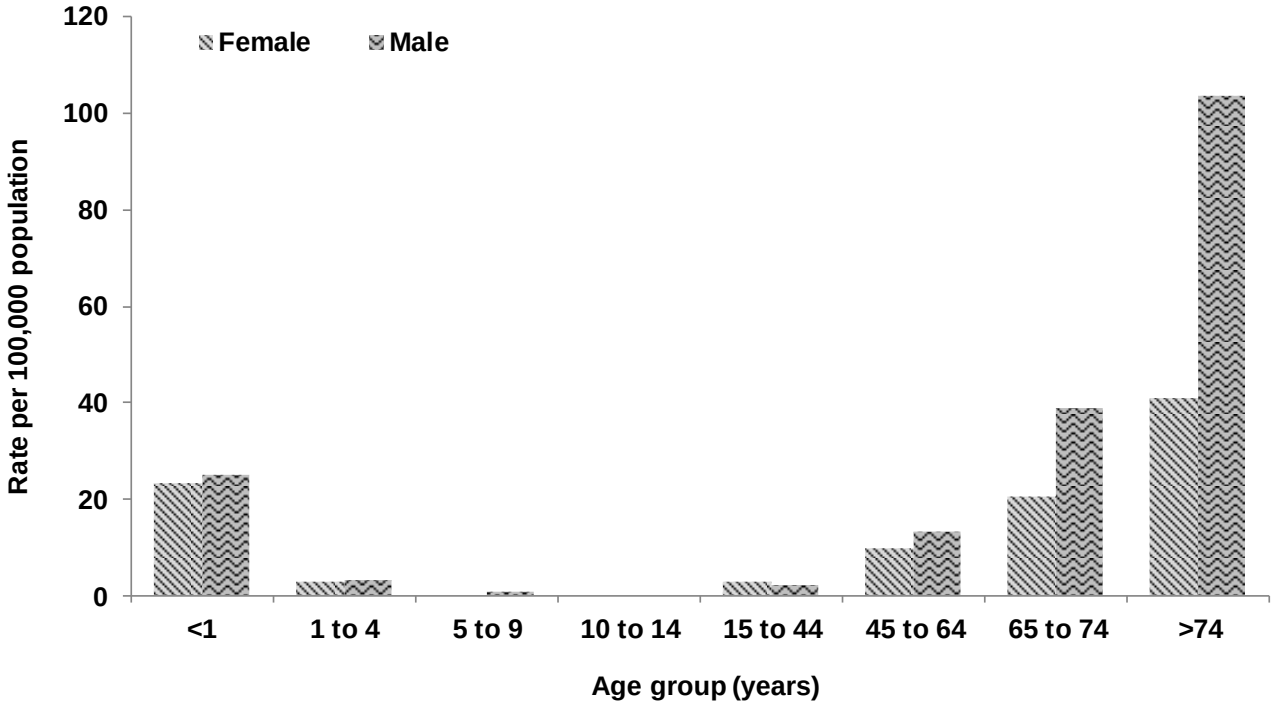
Table 2 shows the number of *Klebsiella* spp. bacteraemia reports based on data from England, Wales and Northern Ireland between 2011 and 2015. Between 2011 and 2013, the total number of *Klebsiella* spp. bacteraemia reports in England was stable at around 5,800 *per annum*; however, between 2013 and 2015, the number of reports increased by 18% for *Klebsiella* spp. (19% for *K. pneumoniae*), with a 9% increase between 2014 and 2015 alone for both *Klebsiella* spp. (from 6,280 to 6,856 episodes) and *K. pneumoniae* (from 4,995 to 5,455 episodes) (table 2). In Wales, although the total number of *Klebsiella* spp. bacteraemia reports increased by 9% from 2014 to 2015, these increases involved small absolute number (table 2). However a small but increasing trend is discernible from 212 episodes in 2011 to 260 in 2015, representing a 23% increase. In Northern Ireland, a 9% increase in *Klebsiella* spp. bacteraemia reports from 2014 to 2015 was also observed (table 2) but again involved small absolute numbers. The number of episodes peaked at 280 in 2013 in Northern Ireland with a subsequent decrease observed afterwards.

Age and sex distribution

Figure 3 shows the age and sex-specific rates of bacteraemia reports in England in 2015 per 100,000 resident population. The rates were higher in adults over 75 years and in infants (under one year). The rate of bacteraemia was higher among males than females across all age groups except for the age group 15 to 44 years where the rate was slightly higher for females.

The incidence rate ratio (IRR) for *Klebsiella* spp. bacteraemia in males and females was highest for 5 to 9 year-olds (IRR=3.3), indicating that the rate for males was more than three times higher than for females. However, in this age group the rate for each sex was <1 per 100,000 population. The second highest IRR was for the oldest age group (≥75 years; IRR=2.5) indicating that the rate was more than twice as high in males than females.

Figure 3. Age and sex-specific rates of *Klebsiella* spp. bacteraemia reports per 100,000 population (England): 2015



Source: PHE, 2016

Antimicrobial susceptibility data

Tables 3-5 present antibiotic susceptibility trends from 2011 to 2015 in England for blood culture isolates using data from the CDR module of SGSS. This analysis examines five classes of antibiotics: third-generation cephalosporins (cefotaxime or ceftazidime), carbapenems (meropenem or ertapenem), a fluoroquinolone (ciprofloxacin), a penicillin/beta-lactamase inhibitor combination (piperacillin/tazobactam), and an aminoglycoside (gentamicin).

Table 6 shows dual resistance in England in 2015 based on a defined combination of antimicrobial drugs based on data from SGSS's AMR module. Trends using data from this module cannot be undertaken at present owing to lower laboratory coverage in previous years.

Among *Klebsiella* spp. the most common mechanism of resistance to third-generation cephalosporins (cefotaxime or ceftazidime) is plasmid-mediated extended-spectrum β-lactamase (ESBL) production. The analysis for *Klebsiella* spp. isolates (all species) showed that resistance to cefotaxime and to ceftazidime increased marginally from 9% in 2011 to 10% in 2015 for each agent (table 3). Similarly, for *K. pneumoniae,* resistance to these agents increased marginally for cefotaxime (from 10% in 2011 to 12% in 2015) and for ceftazidime (from 11% in 2011 to 12% in 2015) (table 4). *K. oxytoca* showed a lower level of resistance to these agents and no trend was observed (table 5).

The proportion of isolates reported resistant to piperacillin/tazobactam increased gradually over the five-year period for *Klebsiella* spp. isolates (from 12% in 2011 to 17% in 2015) (table 3). This was similarly reflected in the analysis for *K. pneumoniae*, which also showed an increase from 13% in 2011 to 19% in 2015 (table 4). These results are likely to reflect laboratories switching from the CLSI MIC breakpoint of 16 mg/L to the EUCAST breakpoint of 8 mg/L for this agent for Enterobacteriaceae introduced in 2011. However among *K. oxytoca* isolates, there was no evidence of change with levels of resistance to this antibiotic fluctuating between 10% and 13% over the five-year period (table 5).

A marginal increase in resistance to ciprofloxacin was observed from 8% in 2011 to 9% in 2015 at genus level (table 3). At species level, although *K. pneumoniae* tended to have a higher resistance rate to this agent than *K. oxytoca*, neither species exhibited a change in resistance level to this antibiotic (tables 4 and 5).

Resistance to gentamicin increased marginally at genus level (from 6% in 2011 to 7% in 2015) (table 3) and for *K. pneumoniae* (from 7% in 2011 to 9% in 2015) (table 4). However resistance to this agent remained low and stable for *K. oxytoca* (being <3% throughout the five-year period) (table 5). The reason for the small increase at genus level is due to the small increase of *K. pneumoniae* given that this species accounts for the majority of *Klebsiella* spp.

Of the two carbapenems, resistance to meropenem remained uncommon between 2011-2015 with 1% or fewer of isolates reported as resistant. At genus level, the marginal increases observed from 0.6% in 2012 to 1.2% 2014 was not sustained in 2015 (table 3). For *K. pneumoniae* marginal increases were also observed (from 0.6% in 2012 to 1.5% in 2014) but this trend was not sustained into 2015 (table 4). Resistance to ertapenem was slightly higher than that for meropenem and although a marginal increase was observed at genus level (from 1.1% in 2012 to 1.7% in 2014) this trend was not sustained in 2015. *K. pneumoniae* was more often resistant to ertapenem than *K. oxytoca* (tables 4 and 5). A small but notable increase in the proportion of isolates that were resistant to this agent was reported for *K. pneumoniae* isolates (from 1.3% in 2012 to 2.1% in 2014) but this trend was not sustained in 2015. Resistance to ertapenem among *K. oxytoca* isolates was much less common and no trend was identified in the five-year period.

It should be noted that EUCAST's clinical breakpoint for determining susceptibility to ertapenem is lower than that for meropenem (0.5 mg/L vs 2 mg/L, respectively). However, ertapenem is more prone to resistance due to ESBL production together with porin deficiency arising via mutation. Meropenem resistance is rarer owing to the higher breakpoint and lower vulnerability

to this combination of mechanisms. Consequently resistance to meropenem is more likely to be due to true carbapenemases, hence of public health concern.

In England, the majority of carbapenem-resistant isolates reported between 2011 and 2015 (n=273) were reported from laboratories in London (n=61) and Greater Manchester (n=48), which combined accounted for 40% (109/273) of total carbapenem-resistant isolates.

Klebsiella spp. organisms are the commonest hosts of carbapenemase enzymes which belong to the KPC, OXA-48-like, NDM, VIM or IMP families; other types of carbapenemase, such as GES enzymes, also occur (both in Enterobacteriaceae and non-fermenters such as *Pseudomonas aeruginosa*) and have caused outbreaks in some UK hospitals. Among Enterobacteriaceae in general, resistance to carbapenems may also be mediated by ESBL or AmpC production combined with impermeability (porin loss). However, data on all Enterobacteriaceae isolates from all specimen types referred to PHE's national reference laboratory, the Antimicrobial Resistance and Healthcare Associated Infections (AMRHAI) Reference Unit, indicate an increasing trend in carbapenemase-producing Enterobacteriaceae (CPE) from 2008 with sporadic cases reported as far back as 2003. Resistance to the carbapenem class warrants close vigilance given that this class of antibiotics is a powerful last-line treatment for serious infections caused by Gram-negative bacteria. The increases in CPE based on all specimen types observed by PHE's ARMHAI are occurring in the context of the emergence of resistance to these antibiotics among Enterobacteriaceae reported internationally in recent years [3,4].

In recognition of the importance of CPE, PHE issued a toolkit in December 2013 on the identification and management of affected patients in acute healthcare settings [5]. This toolkit includes a risk assessment to identify those individuals who should be screened for colonisation or infection with CPE as part of the routine admission procedure. A toolkit for non-acute settings was issued in June 2015 [6].

As CPE pose significant treatment and public health challenges, PHE launched an enhanced surveillance of CPE in May 2015 to better understand the epidemiology of these organisms. A web-based electronic reporting system (https://cro.phe.nhs.uk/) has been designed to enable laboratories in NHS Trusts in England to capture specimen, demographic, healthcare setting and risk factor details as part of the core and enhanced dataset [7].

Table 3. Antibiotic susceptibility of *Klebsiella* spp. bacteraemia isolates, England: 2011-2015

	2011		2012		2013		2014		2015	
	No. Tested	% Resistant	No. Tested	% Resistant	No. Tested	% Resistant	No. Tested	% Resistant	No. Tested	% Resistant
Gentamicin	5,230	6%	5,268	6%	5,176	7%	5,414	6%	6,200	7%
Ciprofloxacin	4,798	8%	4,904	8%	4,801	9%	4,991	9%	5,814	9%
Ceftazidime	4,137	9%	4,145	10%	3,907	10%	4,083	10%	4,956	10%
Cefotaxime	2,974	9%	3,023	10%	2,964	10%	3,065	10%	3,371	10%
Meropenem	3,961	1%	4,101	1%	4,222	1%	4,640	1%	5,637	1%
Ertapenem	1,385	2%	1,993	1%	2,392	1%	3,166	2%	4,815	1%
Piperacillin/Tazobactam	4,791	12%	4,984	13%	4,948	16%	5,047	16%	5,853	17%
Total reports	**5,862**		**5,880**		**5,810**		**6,280**		**6,856**	

Source: PHE, 2016

Table 4. Antibiotic susceptibility of *K. pneumoniae* bacteraemia isolates, England: 2011-2015

	2011		2012		2013		2014		2015	
	No. Tested	% Resistant	No. Tested	% Resistant	No. Tested	% Resistant	No. Tested	% Resistant	No. Tested	% Resistant
Gentamicin	3,991	7%	4,133	7%	4,060	8%	4,306	7%	4,936	9%
Ciprofloxacin	3,652	10%	3,852	10%	3,773	11%	3,991	11%	4,613	11%
Ceftazidime	3,163	11%	3,267	11%	3,100	12%	3,243	12%	3,939	12%
Cefotaxime	2,316	10%	2,405	11%	2,366	12%	2,441	12%	2,720	12%
Meropenem	3,018	<1%	3,231	<1%	3,319	<1%	3,699	1%	4,479	1%
Ertapenem	1,081	2%	1,559	1%	1,889	2%	2,534	2%	3,834	1%
Piperacillin/Tazobactam	3,646	13%	3,911	13%	3,876	17%	4,022	17%	4,654	19%
Total reports	**4,459**		**4,585**		**4,571**		**4,995**		**5,455**	

Source: PHE, 2016

Table 5. Antibiotic susceptibility of *K. oxytoca* bacteraemia isolates, England: 2011-2015

	2011		2012		2013		2014		2015	
	No. Tested	% Resistant	No. Tested	% Resistant	No. Tested	% Resistant	No. Tested	% Resistant	No. Tested	% Resistant
Gentamicin	1,025	1%	1,022	1%	1,004	1%	1,026	2%	1,194	1%
Ciprofloxacin	941	2%	949	2%	921	2%	921	1%	1,133	2%
Ceftazidime	792	3%	807	2%	735	3%	786	2%	964	2%
Cefotaxime	567	4%	568	4%	551	5%	572	3%	604	3%
Meropenem	781	0%*	783	<1%	808	<1%	868	<1%	1,094	<1%
Ertapenem	264	<1%	393	<1%	464	<1%	597	<1%	937	<1%
Piperacillin/Tazobactam	935	12%	959	10%	958	13%	951	13%	1,133	11%
Total reports	**1,161**		**1,158**		**1,107**		**1,194**		**1,322**	

* Due to 0 cases

Source: PHE, 2016

The SGSS AMR data for 2015 showed that 99.9% of total blood culture isolates for *Klebsiella* spp. had antimicrobial susceptibility data (6,489/6,496). Multi-drug resistance was based on combinations of two different defined antibiotics (table 6). *K. pneumoniae* exhibited the highest frequency of dual resistance and *K. oxytoca* the least.

Among *K. pneumoniae* bacteraemia isolates, the most common dual resistance was to third generation cephalosporins and ciprofloxacin (11.5%). The least common dual resistance was among *K. oxytoca* isolates to ciprofloxacin and gentamicin at <0.5% of isolates tested. Resistance to third generation cephalosporins, ciprofloxacin, gentamicin and meropenem was uncommon (<1%) among *K. pneumoniae* isolates (14/2,439) and *K. oxytoca* (zero cases in 577 isolates) (data not shown).

While the percentage of all *K. pneumoniae* bacteraemia isolates tested for pair-wise resistance for both a third-generation cephalosporin and either gentamicin or ciprofloxacin were relatively low, of the 539 isolates that were non–susceptible to third-generation cephalosporins, 55% (299/539) were non-susceptible to ciprofloxacin and 53% (287/539) were non-susceptible to gentamicin (data not shown). The corresponding proportions for *K. oxytoca* were 16% (9/55) and 12% (7/55) although this is based on only a small number of bacteraemia isolates that were non-susceptible to third-generation cephalosporins. Resistance to both ciprofloxacin and gentamicin among *K. pneumoniae* isolates resistant to third-generation cephalosporins was 40% (218/539) with the corresponding proportion being 7% (4/55) *for K. oxytoca* (data not shown).

Table 6. Dual resistance among isolates of bacteraemia due to *K. pneumoniae or K. oxytoca*, England, 2015

	Gentamicin and ciprofloxacin		Gentamicin and 3rd-generation cephalosporin*		Ciprofloxacin and 3rd generation cephalosporin*	
	No. tested	% Resistant	No. tested	% Resistant	No. tested	% Resistant
K. pneumoniae	4,899	5.8	2,647	10.8	2,593	11.5
K. oxytoca	1,259	0.4	632	1.1	612	1.5

* Any of cefotaxime, ceftazidime, cefpodoxime or ceftriaxone

Source: PHE, 2016

For advice on treatment of antibiotic-resistant infections due to these organisms or for reference services including species identification and confirmation of susceptibility testing results, laboratories should contact PHE's AMRHAI Reference Unit in London [8].

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These reports would not be possible without the weekly contributions from microbiology colleagues in laboratories across England, Wales, and Northern Ireland, without whom there would be no surveillance data. Feedback and specific queries about this report are welcome and can be sent to: hcai.amrdepartment@phe.gov.uk

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Infection reports / Bacteraemia

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Voluntary surveillance of bacteraemia caused by *Escherichia coli* in England: 2008-2015

These analyses are based on data relating to diagnoses of bloodstream infections caused by *E. coli*. between 2011 and 2015 in England, extracted on 25 April 2016 from Public Health England's (PHE) voluntary surveillance database Second Generation Surveillance System (SGSS). Data for Wales and Northern Ireland were extracted separately (DataStore on 10 April 2016 and CoSurv on 17 May 2016 resepctively) and are included in the geographical and species analyses only.

SGSS comprises a communicable disease module that includes antimicrobial susceptibility data (CDR; formerly CoSurv/LabBase2) and a separate comprehesive antimicrobial resistance module (AMR; formerly AmSurv). Compared to CDR's antimicrobial susceptibility data, the AMR module captures more comprehensive antibiogram data (involving all antibiotics tested); however, until the launch of SGSS in 2014 there was lower laboratory coverage to the AMR module. Therefore, antimicrobial non-susceptibility trends cannot currently be undertaken using data from the AMR module but data for 2015 were extracted to assess multi-drug resistance rates.

The data presented here may differ from data in previous publications due to inclusions of late reports.

Rates of bacteraemia laboratory reports were calculated using mid-year resident population estimates for the respective year and geography with the exception of 2015 rates, which were based on 2014 population estimates as population estimates for 2015 were not available at the time of producing this report [1,2]. 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 one of 15 local PHE centres (PHECs) formed from administrative local authority boundaries.

The report includes analyses on the trends, age and sex distribution, level of ascertainment, and antibiotic susceptibility of *E. coli* bacteraemia cases in England. In addition, analysis of resistance to more than one antibiotic is based on England's data reported to the AMR module (previously AmSurv) and extracted on 25 April 2016.

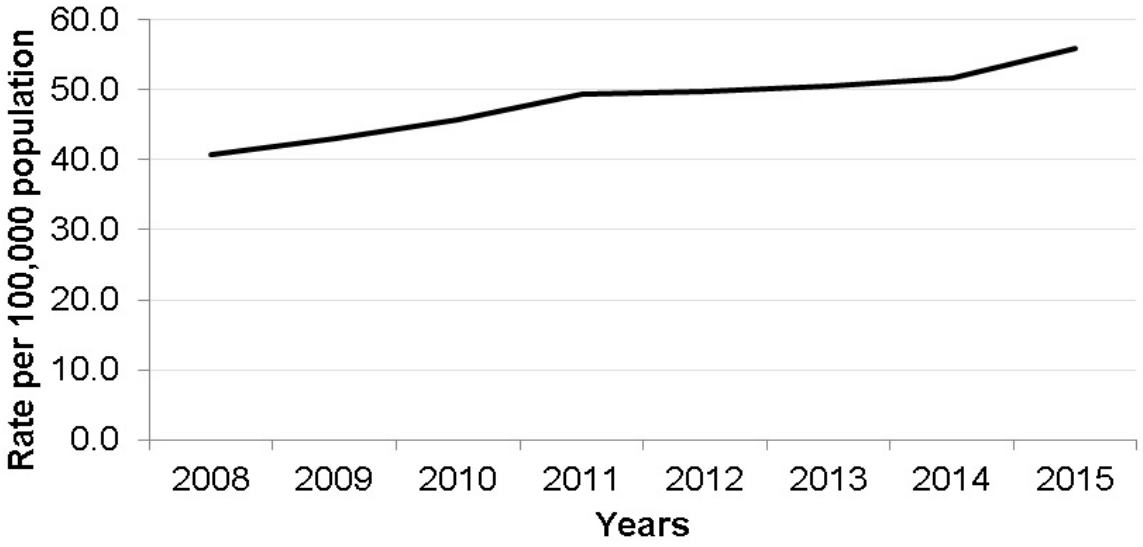
Key points

- There has been a sustained year-on-year increase in the number of *E. coli* bacteraemia.
- In 2015, the rate of *E. coli* bacteraemia per 100,000 population was highest in Northern Ireland (80.7) followed by Wales (74.9) and England (56.0), with an overall rate for England, Wales and Northern Ireland of 57.7 reports per 100,000 population.
- Between 2011 and 2015, the overall rate of *E. coli* bacteraemia in England, Wales and Northern Ireland increased by 14% (50.7 to 57.7 reports per 100,000 population)
- Between 2011 and 2015, England, Wales and Northern Ireland rates increased by 13.5% 11.9% and 30.7% respectively. However between 2014 and 2015 the rates only increased in England and Northern Ireland, while it decreased by 7% in Wales.
- The age group with the highest rates of *E. coli* bacteraemia in England were observed among the elderly (75 years and over) with 402.9 and 313.5 reports per 100,000 population for males and females respectively.
- In 2015, the highest rate of *E. coli* bacteraemia within England was observed in the Devon, Cornwall and Somerset PHE centre (86.0 reports per 100,000 population), while the lowest was observed in Wessex (36.0 reports per 100,000 population)
- The antibiotic non-susceptibility of *E. coli* isolates to selected antimicrobials increased between 2011 and 2015, non-susceptibility to piperacillin/tazobactam and Amoxycillin\clavulanate increased from 8.5% to 11.7% and from 31.5% to 42.2% respectively. However this is due to a change in the Minimum Inhibitory Concentration (MIC) breakpoint within that period (data for England only).
- A total of 3,292 isolates were non–susceptible to third generation cephalosporins. 65.9% (n=2,169) and 37.6% (n=1,237) of these were also non-susceptible to ciprofloxacin and gentamicin respectively.
- Comparison of voluntary reporting with the mandatory surveillance dataset showed a case ascertainment rate of 81.6% in 2015 (data for England only).

Trends in episode numbers and rates: England

There has been an increasing trend in rates of reported *E. coli* bacteraemia in England over the last eight years, with a slight plateau between 2011 to 2013 (figure 1). The overall increase was 37.2% (40.8 to 56.0 reports per 100,000 population).

Figure 1. *E. coli* bacteraemia rate per 100,000 population in England: 2008 to 2015



Geographical distribution: England, Wales and Norther Ireland

The overall rate of reported *E. coli* bacteraemia in England, Wales and Northern Ireland increased by 14.0% (50.7 to 57.7 reports per 100,000 population, table 1) between 2011 and 2015. In the most recent year 2015, compared to the rate in 2014, the rate of *E. coli* bacteraemia increased by 6.9% (54.0 and 57.7 reports per 100,000 population).

Between 2011 and 2015 the rate of *E. coli* bacteraemia in England alone increased by 13.5% (from 49.3 to 56.0 reports per 100,000 population). In Wales, this increase was slightly lower at 11.9% (from 67.0 to 74.9 reports per 100,000 population) while in Northern Ireland, the rate increased by 30.7% (from 61.8 to 80.7 reports per 100,000 population) (table 1). However, between 2014 and 2015, only the rates in England (51.8 to 56.0 reports per 100,000 population) and Northern Ireland (74.9 to 80.7 reports per 100,000 population) increased, while it decreased by 7% in Wales (80.6 to74.9 reports per 100,000 population) (table 1).

The percentage change in rates has varied among PHE centres over time; between 2011 and 2015 only one PHE centre, Greater Manchester, observed a decrease (8.7%; from 65.8 to 60.1 reports per 100,000 population, respectively) in its rate of reported *E. coli* bacteraemia. During the same period, (2011-2015) the highest increases were observed in South Midlands and Hertfordshire (38.6%: 27.4 to 38.0 reports per 100,000 population) and Avon, Gloucestershire and Wiltshire (30.8%: 35.0 to 45.8 reports per 100,000 population) (table 1). Conversely, in recent years (2014-2015) the highest increases were observed in Wessex (22.8%; 29.3 to 36.0 reports per 100,000 population) and Yorkshire and Humber (22.1%; 44.0 to 53.7 reports per 100,000 population) (table 1). However, caution is required when interpreting these increases as we are yet to ascertain if they represent increases of bacteraemia within the area or artefacts of organisational/laboratory restructuring.

Figure 2. Geographical distribution of *E. coli* bacteraemia rates per 100,000 population (England, Wales, and Northern Ireland): 2015

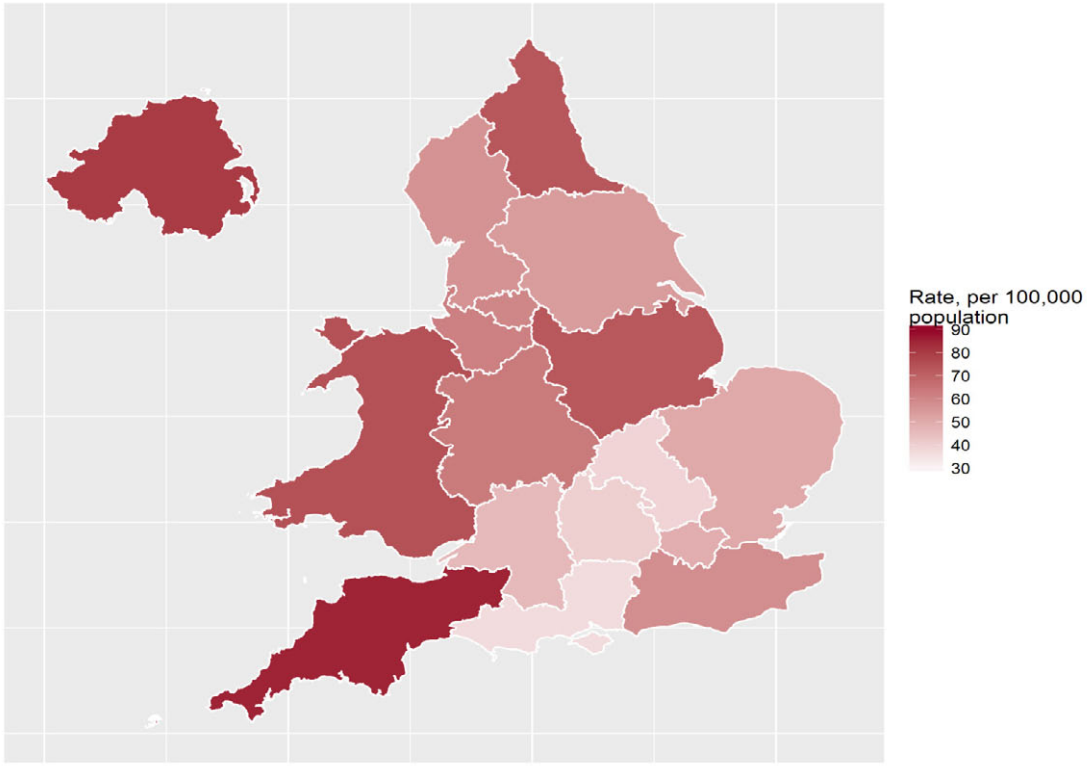


Table 1. *E. coli* bacteraemia rate per 100,000 population by region (England, Wales, and Northern Ireland): 2011to 2015

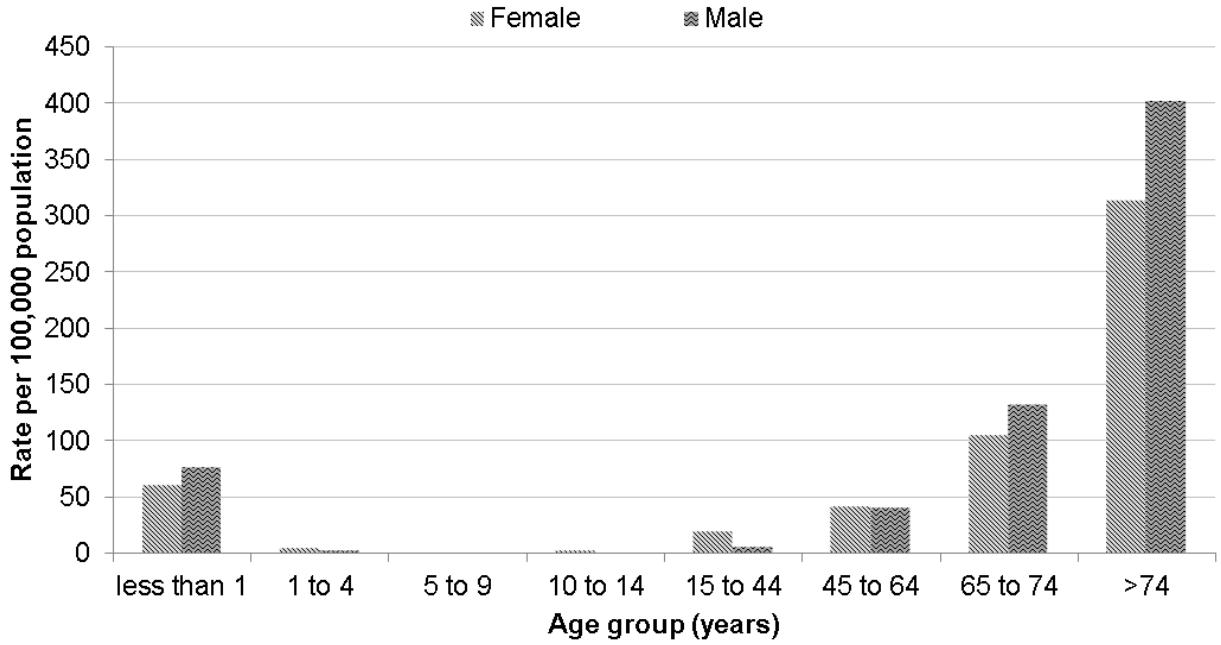
Region		Rate per 100,000				
		2011	**2012**	**2013**	**2014**	**2015**
London	London	44.5	45.0	46.9	46.8	48.9
Midlands	South Midlands and Hertfordshire	27.4	35.7	36.5	40.5	38.0
	East Midlands	62.3	60.8	61.5	65.1	73.1
	Anglia and Essex	47.5	50.0	50.4	50.5	50.0
	West Midlands	54.6	52.3	54.5	58.6	63.6
Northern	Cheshire and Merseyside	57.7	61.1	62.2	62.6	61.8
	Cumbria and Lancashire	50.1	51.5	54.3	56.4	56.6
	Greater Manchester	65.8	61.1	61.7	57.4	60.1
	North East	62.7	66.2	64.9	64.9	73.5
	Yorkshire and Humber	49.9	47.6	43.9	44.0	53.7
Southern	Avon Gloucestershire and Wiltshire	35.0	40.0	35.7	46.8	45.8
	Devon Cornwall and Somerset	69.1	68.6	74.4	78.3	86.0
	Wessex	29.0	28.1	28.0	29.3	36.0
	Kent Surrey and Sussex	47.9	51.1	54.4	50.3	58.2
	Thames Valley	35.7	29.5	32.8	33.7	39.5
England*		**49.3**	**49.8**	**50.6**	**51.8**	**56.0**
Northern Ireland†		**61.6**	**65.0**	**69.0**	**74.9**	**80.7**
Wales¥		**67.0**	**66.2**	**72.9**	**80.6**	**74.9**
England, Wales and Northern Ireland		**50.7**	**51.1**	**52.3**	**54.0**	**57.7**

* Data extracted on 25 April 2016. † Data extracted on 17 May 2016. ¥ Data extracted on 10 April 2016

Age and sex distribution

The highest rates of *E. coli* bacteraemia in England was observed among the elderly (75 years and over) at 402.9 and 313.5 reports per 100,000 population for males and females respectively, followed by older adults (65-74 years) at 132.3 and 104.3 reports per 100,000 population for males and females respectively, and in infants (below 1 year old) at 76.1 and 60.8 reports per 100,000 population for males and females respectively (figure 2).

Figure 3. *E. coli* bacteraemia rates per 100,000 population by age and sex (England): 2015



Antimicrobial susceptibility

Between 2011 and 2015, the antimicrobial non-susceptibility of *E. coli* bacteraemia isolates to selected antimicrobials increased (table 2). The greatest increase in non-susceptibility was for piperacillin/tazobactam, which increased from 8.5% to 11.7%; however, this is due to a change in the Minimum Inhibitory Concentration (MIC) breakpoint within that period (data for England only). More recently, between 2014 and 2015, non-susceptibility to the selected antibiotics have remained relatively stable.

Similarly non-susceptibility to Amoxycillin\clavulanate has also increases steadily from 31.5% in 2011 to 42.2% in 2015. This is due to a change in testing method from a fixed 2:1 ratio of amoxicillin:clavulanate to a fixed 2mg/L clavulanate concentration (as stipulated by current EUCAST guidance). Similar increases due to this switch were also reported by Leverstein-van Hall et al. (2013) [2].

Analysis of resistance to more than one antibiotic (table 3) is based on data extracted from the AMR module of SGSS. As a result figures here may be different from those included in table 4 (analysis of susceptibility to individual antibiotics extracted from the CDR module of SGSS). The data are also limited to isolates from England in 2015.

In 2015 for England, 27,480 isolates were tested against any two combinations of ciprofloxacin, gentamicin and third generation cephalosporins. Of 14,681 isolates tested for ciprofloxacin, gentamicin and third generation cephalosporins, 1,075 (7.3%) were resistant to all three antibiotics. In addition, of the 13,999 isolates tested for ciprofloxacin, gentamicin, third generation cephalosporins and meropenem, only eight (<0.1%) were resistant to all antibiotics.

Strains of *E. coli* with extended spectrum β-lactamases are of a great concern due to their resistance to third generation cephalosporins, and frequent cross-resistance to fluoroquinolones and gentamicin [3]. Table 3 shows that 6.8% of *E. coli* bacteraemias tested for gentamicin and ciprofloxacin were non-susceptible to both, while 8.2% of isolates tested against ciprofloxacin and third generation cephalosporins were non-susceptible to both, while isolates tested against gentamicin and third generation cephalosporins had the highest (14.7%) pair-wise resistance observed.

However, of note, while the percentage of all *E. coli* bacteraemia tested for pair-wise resistance for both a third generation cephalosporin and either gentamicin or ciprofloxacin were relatively low, of the 3,292 isolates which were non–susceptible to third generation cephalosporins, the majority (65.9%, n=2,169) were also non-susceptible to ciprofloxacin and just over a third (37.6%, n=1,237) were non-susceptible to gentamicin.

Table 2. Antibiotic susceptibility† for *E. coli* bacteraemia in England: 2011 to 2015

Antimicrobial	2011		2012		2013		2014		2015	
	No. tested	% Resistant*	No. tested	% Resistant*	No. tested	% Resistant*	No. tested	% Resistant*	No. tested	% Resistant*
Gentamicin	23,345	9.1	24,156	9.3	24,127	9.5	24,384	9.6	27,759	10.1
Ciprofloxacin	21,797	18.7	22,587	18.3	22,893	18.0	22,454	18.6	26,148	18.7
Ceftazidime	18,546	10.4	18,975	9.9	18,231	9.9	18,221	10.8	21,815	11.2
Cefotaxime	13,370	10.9	14,350	10.7	14,185	11.0	13,428	11.8	15,627	12.2
Meropenem	17,538	<0.1	18,896	0.1	19,609	<0.1	20,430	0.1	25,160	0.1
Ertapenem	6,517	0.3	9,419	0.3	11,048	0.3	13,897	0.2	21,436	0.4
Ampicillin\amoxicillin	22,320	63.7	23,044	63.8	22,834	63.4	22,311	63.8	25,991	64.5
Amoxycillin\clavulanate	21,934	31.5	22,889	37.3	23,240	38.8	22,944	42.0	26,166	42.2
Piperacillin\tazobactam	20,651	8.5	22,292	9.6	22,946	10.4	22,446	10.9	26,176	11.7
Total Reports	**25,968**		**26,421**		**27,064**		**27,881**		**30,401**	

† Defined as reduced- or non-susceptible

* Isolates can be tested against multiple antimicrobials

Table 3. Pair-wise antimicrobial testing and resistance summary among *E. coli* isolates causing bacteraemia in England: 2015

Antimicrobial	No. tested	% Resistant
Gentamicin and ciprofloxacin	26,937	6.8
Gentamicin and third generation cephalosporins	14,784	14.7
Ciprofloxacin and 3rd generation cephalosporins*	15,121	8.2

*"3rd generation cephalosporins" includes Cefotaxime, Ceftazidime, Ceftriaxone and Cefpodoxime

Ascertainment: Comparison of voluntary laboratory reported *E. coli* bacteraemia versus *E. coli* bacteraemia from the mandatory surveillance scheme in England

The following data compares *E. coli* bacteraemias reported to the voluntary laboratory surveillance scheme with those reported to the mandatory surveillance scheme. In order for the data to be comparable, the laboratory reports from the voluntary surveillance scheme have been limited to England for June 2011 onwards.

Between 2012 and 2015, the number of *E. coli* reports made to the voluntary surveillance increased by 15.1% (26,421 to 30,401, respectively), similarly, there was a 15.0% (32,405 to 37,275, respectively) increase in the number of reports made to the mandatory surveillance (table 4). However, between 2014 and 2015 the number of *E. coli* bacteraemia reported to the voluntary scheme increased by 9.0% (27,881 to 30,401 reports) compared to the 4.6% increase to the mandatory surveillance scheme (35,647 to 37,275 reports). There has been a slight overall reduction in case ascertainment of *E. coli* bacteraemia between 2011 (82.5%) and 2015 (81.6%), with the lowest percentage ascertainment seen in 2014 (78.2%).

Table 4. Ascertainment of *E. coli* data for the mandatory* and voluntary reporting schemes in England: 2011- 2015**

Year	Voluntary reports	Mandatory reports	% Ascertainment
2011†	15,693	19,019	82.5
2012	26,421	32,405	81.5
2013	27,064	33,497	80.8
2014	27,881	35,647	78.2
2015	30,401	37,275	81.6

* Date extracted 20th April 2016

** Date extracted 25th April 2016

† Data from June to December only

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Infection reports / Enteric

Volume 10 Number 19 Advance Access report published 10 June 2016

- **Salmonella infections (faecal specimens) England and Wales, reports to Public Health England (salmonella data set): April-May 2016**
- **Suspected and laboratory-confirmed reported norovirus outbreaks in hospitals, with regional breakdown: outbreaks occurring in weeks 18-21/2016**

Salmonella infections (faecal specimens) England and Wales, reports to Public Health England (salmonella data set): April-May 2016

Details of 474 serotypes of salmonella infections recorded in April 2016 are given in the table below. In May 2016, 285 salmonella infections were recorded.

Organism	Cases: April 2016
S. Enteritidis	110
S. Typhimurium	133
S. Virchow	11
Others (typed)	220
Total salmonella (provisional data)	**474**

Notes:
1. Phage typing ceased as of 1 November 2015
2. Following the introduction of a new laboratory reporting system (SGSS) in December 2014, direct comparisons with data generated by the previous system (LabBase2) may not be valid.

Suspected and laboratory-confirmed reported norovirus outbreaks in hospitals, with regional breakdown: outbreaks occurring in 18-21/2016

The hospital norovirus outbreak reporting scheme (HNORS) recorded 19 outbreaks occurring between weeks 18 and 21, 2016, 18 of which led to ward/bay closures or restriction to admissions. Twelve outbreaks (63%) were recorded as laboratory confirmed due to norovirus. Between week 1 (January 2016) and week 21 (week beginning 23 May 2016) 319 outbreaks were reported. Ninety-seven per cent (308) of reported outbreaks resulted in ward/bay closures or restrictions to admissions and 81% (258) were laboratory confirmed as due to norovirus.

Suspected and laboratory-confirmed reported norovirus outbreaks in hospitals, with regional breakdown: outbreaks occurring in weeks 18-21/2016

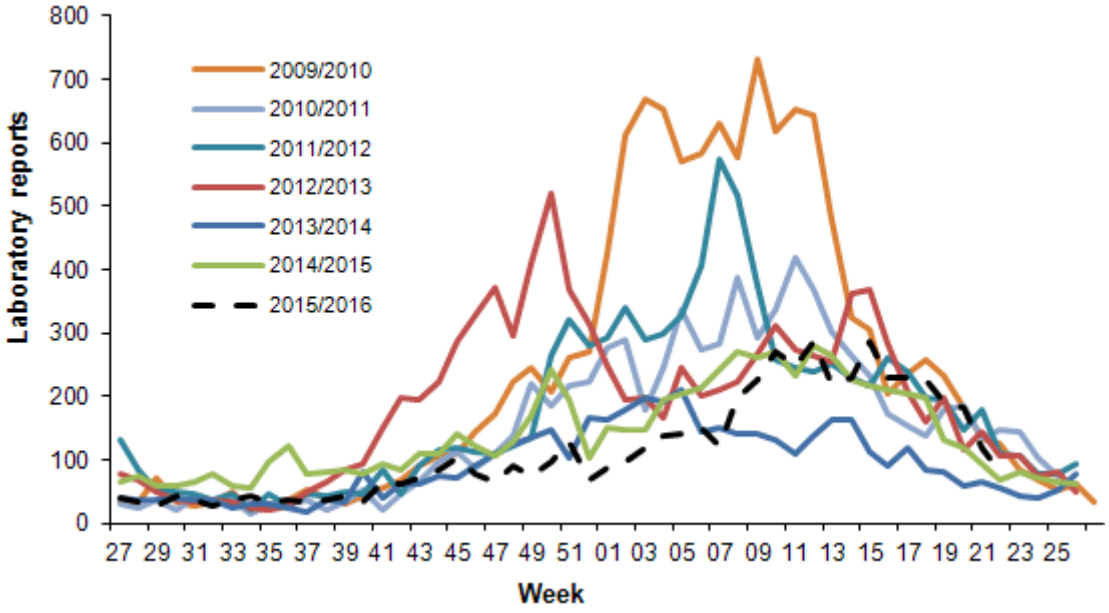
Region/ PHE Centre	Outbreaks between weeks 18-21/2016			Total outbreaks 1-21/2016		
	Outbreaks	Ward/bay closure*	Lab-confirmed	Outbreaks	Ward/bay closure*	Lab-confirmed
Avon, Gloucestershire and Wiltshire	3	3	3	48	48	37
Bedfordshire, Herts. and Northants.	–	–	–	–	–	–
Cheshire and Merseyside	–	–	–	5	5	5
Cumbria and Lancashire	4	4	3	17	17	11
Devon, Cornwall and Somerset	1	1	–	19	19	14
Greater Manchester	1	1	–	11	11	8
Hampshire, IoW and Dorset	–	–	–	25	25	21
Lincolnshire, Leicestershire, Nottinghamshire and Derbyshire	–	–	–	21	20	20
London	–	–	–	1	1	–
Norfolk, Suffolk, Cambs. and Essex	–	–	–	–	–	0
North East	5	4	4	58	54	50
Sussex, Surrey and Kent	–	–	–	5	4	5
Thames Valley	1	1	–	12	12	9
West Midlands	4	4	1	31	30	22
Yorkshire and the Humber	–	–	–	66	62	56
Total	**19**	**18**	**12**	**319**	**308**	**258**

* Note: not all outbreaks result in whole wards closures, some closures are restricted to bays only.

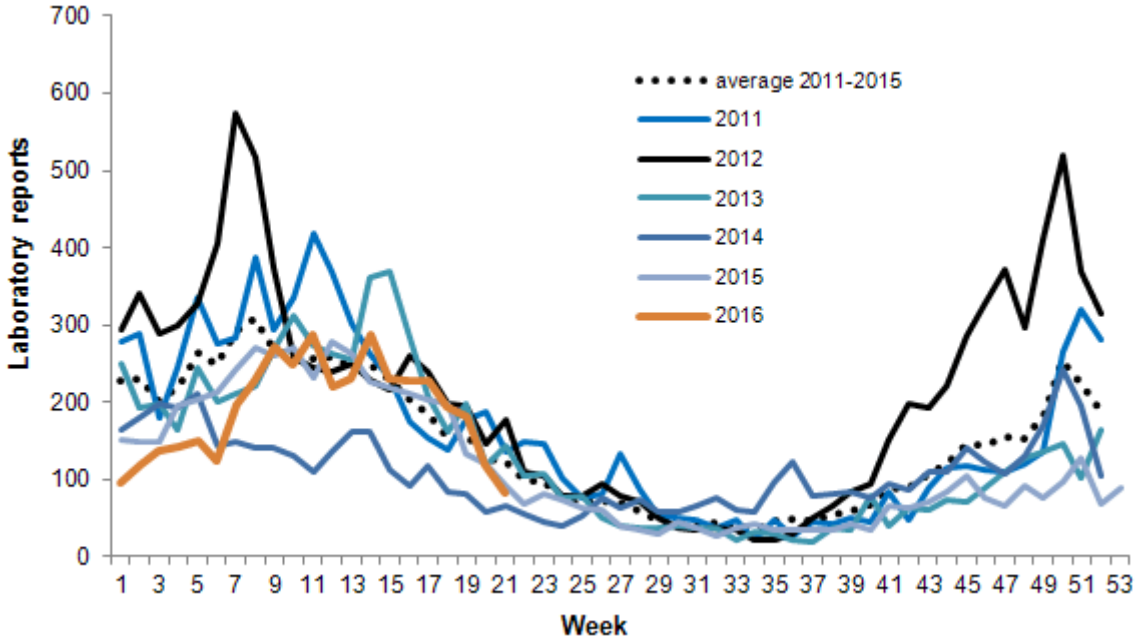
Seasonal comparison of laboratory reports of norovirus (England and Wales)

In the current season to date (from week 27, 2015, to week 21, 2016), there were 4000 laboratory reports of norovirus. This is 15% lower than the average number of laboratory reports for the same period in the seasons between 2009/10 and 2014/2015 (4713). The number of laboratory reports in the most recent weeks will increase as further reports are received.

Current season's laboratory reports (to week 21, 2016) compared to previous seasons' weekly average (England and Wales)



Calendar year 2016 (to week 21) norovirus laboratory reports compared to previous years' weekly mean (2010-2015)



Infection reports / Respiratory

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Laboratory reports of respiratory infections made to PHE from PHE and NHS laboratories in England and Wales: weeks 18 to 21, 2016

Data are recorded by week of report, but include only specimens taken in the last eight weeks (ie recent specimens)

Table 1. Reports of influenza infection made to CIDSC, by week of report

Week	Week 18	Week 19	Week 20	Week 21	Total
Week ending	**8/5/16**	**15/5/16**	**22/5/16**	**29/5/16**	
Influenza A	**150**	**60**	**32**	**31**	**273**
Isolation	5	1	1	–	**7**
DIF *	15	6	5	2	**28**
PCR	118	46	18	24	**206**
Other †	12	7	8	5	**32**
Influenza B	**213**	**106**	**57**	**61**	**437**
Isolation	18	9	3	1	**31**
DIF *	29	14	5	1	**49**
PCR	156	78	44	52	**330**
Other †	10	5	5	7	**27**

* DIF = Direct Immunofluorescence. † Other = "Antibody detection - single high titre" or "Method not specified".

Table 2. Respiratory viral detections by any method (culture, direct immunofluorescence, PCR, four-fold rise in paired sera, single high serology titre, genomic, electron microscopy, other method, other method unknown), by week of report

Week	Week 18	Week 19	Week 20	Week 21	Total
Week ending	**8/5/16**	**15/5/16**	**22/5/16**	**29/5/16**	
Adenovirus *	108	146	111	88	**453**
Coronavirus	29	20	33	18	**100**
Parainfluenza†	113	138	155	135	**541**
Rhinovirus	251	391	274	225	**1141**
RSV	87	90	63	71	**311**

* Respiratory samples only. † Includes parainfluenza types 1, 2, 3, 4 and untyped.

Table 3. Respiratory viral detections by age group: weeks 18-21/2016

Age group (years)	<1 year	1-4 years	5-14 years	15-44 years	45-64 years	≥65 years	Un-known	Total
Adenovirus *	81	113	40	132	59	28	–	**453**
Coronavirus	15	14	6	16	17	32	–	**100**
Influenza A	6	10	6	56	55	51	–	**184**
Influenza B	19	53	39	157	68	108	–	**444**
Parainfluenza †	151	119	18	66	81	106	–	**541**
Respiratory syncytial virus	112	50	24	63	31	31	–	**311**
Rhinovirus	375	253	110	175	113	115	–	**1141**

***** Respiratory samples only.
† Includes parainfluenza types 1, 2, 3, 4 and untyped.

Table 4 Laboratory reports of infections associated with atypical pneumonia, by week of report

Week	Week 18	Week 19	Week 20	Week 21	Total
Week ending	**8/5/16**	**15/5/16**	**22/5/16**	**29/5/16**	
Coxiella burnettii	–	–	–	–	0
Respiratory *Chlamydia* sp. *	–	–	1	–	1
Mycoplasma pneumoniae	18	10	9	–	37
Legionella sp.	2	7	–	7	16

***** Includes *Chlamydia psittaci*, *Chlamydia pneumoniae*, and *Chlamydia* sp detected from blood, serum, and respiratory specimens.

Table 5 Reports of Legionnaires Disease cases in England and Wales, by week of report

Week	Week 18	Week 19	Week 20	Week 21	Total
Week ending	**8/5/16**	**15/5/16**	**22/5/16**	**29/5/16**	
Nosocomial	–	1	–	–	1
Community	–	3	–	5	8
Travel Abroad	1	3	–	2	6
Travel UK	1	–	–	–	1
Total	**2**	**7**	–	**7**	**16**
Male	2	5	–	3	10
Female	–	2	–	4	6

Sixteen cases were reported with pneumonia. Ten males aged 48 - 81 years and six females aged 45 – 86 years. Eight cases had community-acquired infection and one case was reported to be associated with a hospital/healthcare facility.

Seven cases were reported with travel association: Barbados (1), China (1), Greece (1), India (1), Italy (1), United Arab Emirates (1) and United Kingdom (1).

Table 6. Reports of Legionnaires Disease cases in England and Wales, by PHE Centre: weeks 18-21/2016

Region/Country	Nosocomial	Community	Travel Abroad	Travel UK	Total
North of England					
North East	–	1	–	–	1
Cheshire & Merseyside	–	–	–	–	0
Greater Manchester	–	–	1	–	1
Cumbria & Lancashire	–	–	1	–	1
Yorkshire & the Humber	–	–	–	–	0
South of England					
Devon, Cornwall & Somerset	–	–	–	–	0
Avon, Gloucestershire & Wiltshire	–	1	–	–	1
Wessex	–	–	–	–	0
Thames Valley	–	2	–	–	2
Sussex, Surrey & Kent	–	–	–	–	0
Midlands & East of England					
East Midlands	1	1	1	–	3
South Midlands & Hertfordshire	–	–	1	–	1
Anglia & Essex	–	–	–	–	0
West Midlands	–	1	2	–	3
London Integrated Region					
London	–	–	–	–	0
Public Health Wales					
Mid & West Wales	–	1	–	–	1
North Wales	–	1	–	–	1
South East Wales	–	–	1	–	1
Miscellaneous					
Other	–	–	–	–	0
Not known	–	–	–	–	0
Total	**1**	**8**	**6**	**1**	**16**