Public Health England

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News

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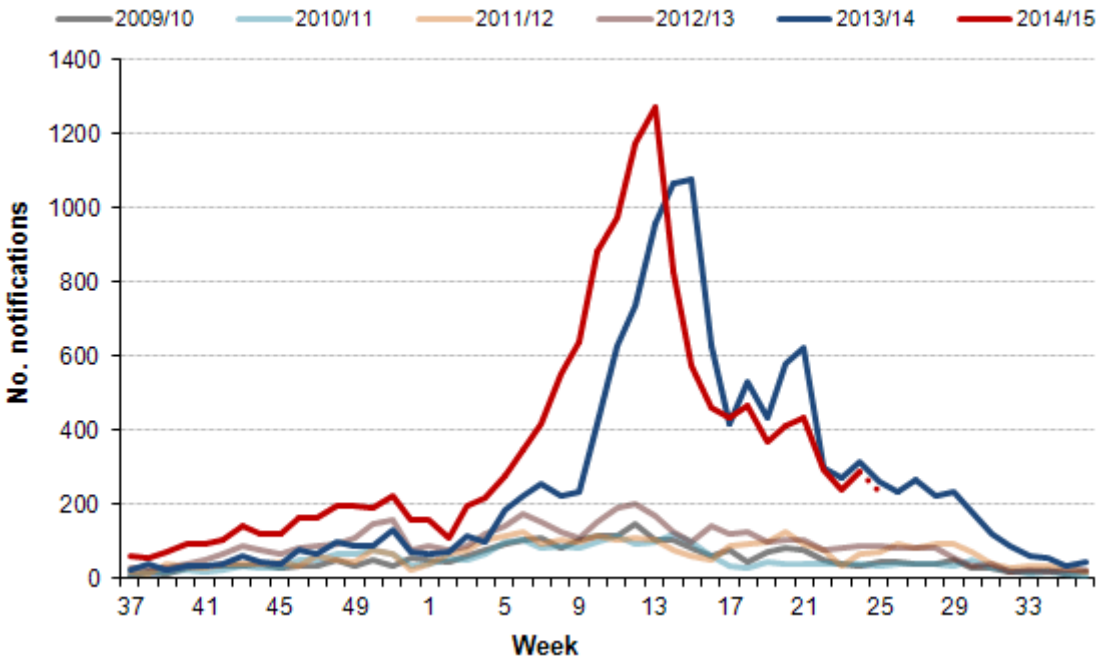
Group A streptococcal infections: sixth update on seasonal activity, 2014/15

Continued declines in scarlet fever notifications have been seen over the past few weeks in line with the expected seasonal fall in incidence. Levels of notified cases remain elevated in all parts of England compared to pre 2014 seasons [1]. Laboratory notifications and isolate referrals of invasive group A streptococcal (iGAS) disease remain elevated for the time of year and due to rare but potentially severe complications associated with GAS infections, clinicians, microbiologists and health protection teams should continue to be mindful of potential increases in invasive disease and maintain a high degree of suspicion in relevant patients.

Scarlet fever

A total of 14,387 scarlet fever notifications have been made in England so far this season (weeks 37 2014 to 25 2015). Notifications peaked in week 13 of 2015 with over 1200 cases notified after which average weekly declines of 11% were seen with 232 notifications made in week 25 (figure 1).

Figure 1. Weekly scarlet fever notifications in England, 2009/10 onwards*

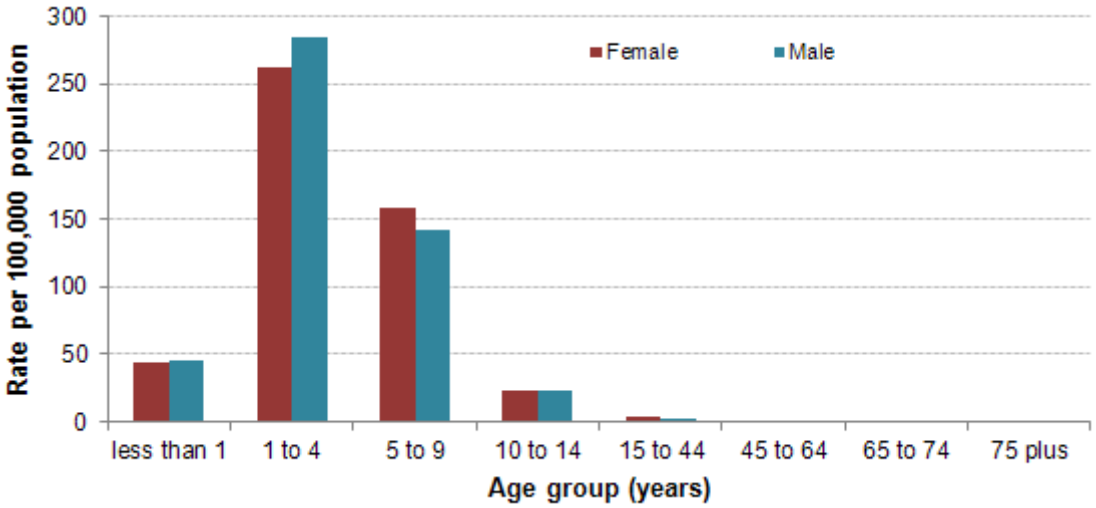


* Dashed line indicates that numbers may increase as further notifications expected.

Scarlet fever notifications remain elevated in the majority of areas in England. The areas with the highest notification rates so far this season are Yorkshire and the Humber (43.2/100,000), East Midlands (41.7), Wessex (34.1) and Cumbria and Lancashire (33.5). London had the lowest scarlet fever notification rate (15.8/100,000).

The age distribution of scarlet fever cases notified this season remains similar to previous years, with 89% of cases reported in children under 10 years of age (median 4 years; range <1y to 93y). The incidence of scarlet fever in children ranged from 23.5/100,000 population in 10 to 14 year olds to 274.0/100,000 in 1 to 4 year olds this season (figure 2). Notifications were evenly distributed by sex across all age groups.

Figure 2. Age and sex specific rates of scarlet fever notification, England, week 37, 2014, to week 25, 2015



Invasive Group A Streptococcus

The total number of laboratory notifications of iGAS infection in England received so far this season stands at 1322 (weeks 37 to 25), slightly above average for the same period over the last five years (1135 reports; figure 3). The median age of patients with iGAS infection so far this season is 62 years (range <1y to 105y).

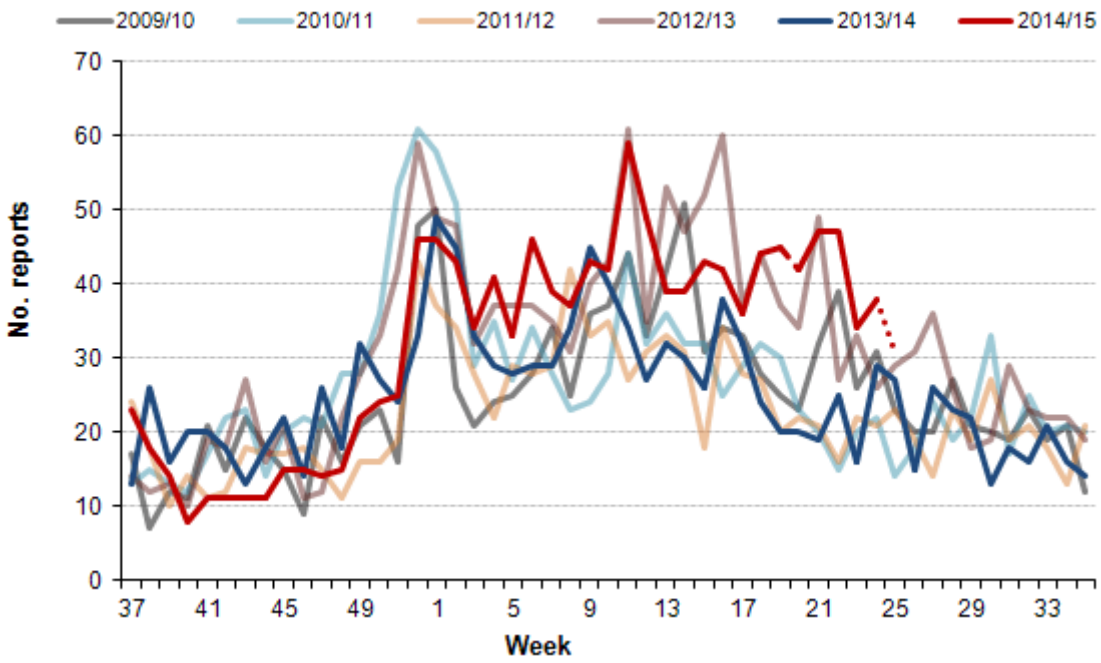
Geographical variation in iGAS infection reports was noted across England, with all but two of the 15 English regions reporting slightly higher infection rates so far this season (weeks 37 2014 to 25 2015) when compared with the same time last season. The areas with the highest reporting rates so far this year are the North East (2.9 per 100,000 population), Devon, Cornwall and Somerset (2.9), Cumbria and Lancashire (2.8) and Yorkshire and the Humber (2.8).

Antimicrobial susceptibility results from laboratory notifications of iGAS infection for the season so far indicate erythromycin non-susceptibility is within the usual range at 6%. The susceptibility

testing of iGAS isolates against other key antimicrobials indicate no changes in resistance (tetracycline, 10%; clindamycin, 3%; and penicillin, 0%).

The national reference laboratory have undertaken *emm* strain diversity testing for 1271 iGAS isolates sent so far this season (October to June 2015). The results indicate that *emm* st1 was the most common (29% of referrals) followed by *emm* st3 (12%), *emm* st12 (11%) and *emm* st89 (8%). No identification of novel strains or unusual increases in specific strain types has been seen.

Figure 3. Weekly routine laboratory reports of iGAS infection, England, 2009/10 onwards*



***** Dashed line indicates that numbers may increase as further notifications expected.

Whilst the levels of scarlet fever are in seasonal decline the scale of the elevation noted over the last two seasons remains a concern with efforts ongoing to assess the impact on complications including rates of hospitalisation. The slight elevation in invasive disease (compared with recent years) is of some concern and emphasises the need for continued vigilance amongst frontline healthcare professionals. Early recognition and prompt initiation of specific and supportive therapy for patients with iGAS infection can be life-saving. Invasive disease isolates and those from suspected clusters or outbreaks should be submitted to the Respiratory and Vaccine Preventable Bacteria Reference Unit at Public Health England, 61 Colindale Avenue, London NW9 5HT.

Relevant guidelines and FAQs are available on the PHE website, as follows:

- Guidelines on infection control in schools and other childcare settings, including recommended exclusion periods for scarlet fever and guidelines on management of scarlet fever outbreaks, can be found at:
  https://www.gov.uk/government/publications/scarlet-fever-managing-outbreaks-in-schools-and-nurseries
  https://www.gov.uk/government/publications/infection-control-in-schools-poster

- FAQs on scarlet fever can be found at: https://www.gov.uk/government/publications/scarlet-fever-symptoms-diagnosis-treatment

- Guidelines for the management of close community contacts of invasive GAS cases and the prevention and control of GAS transmission in acute healthcare and maternity settings are also available here: https://www.gov.uk/government/collections/group-a-streptococcal-infections-guidance-and-data.

Reference

1. PHE (June 2015). Group A streptococcal infections: fifth update on seasonal activity, 2014/15. *Health Protection Report* **9**(19): Infection (News) Report.

Legionnaires' disease annual report 2014

The latest annual report on Legionnaires Disease in residents in residents of England and Wales has been published by Public Health England [1], describing the epidemiological features of confirmed cases with onset of symptoms in 2014 [1].

A total of 331 confirmed cases were reported in 2014, of which 56.2% were deemed to be community-acquired (a category which includes cases that may have been associated with travel within the UK). Forty two per cent of all cases (139) were associated with travel abroad. Six cases (1.8%) were thought to have been healthcare-associated (nosocomial).

Cases associated with travel abroad increased as a proportion of all England and Wales cases: from 30.9% (88) of all cases, in 2013, to 42.0% (139) in 2014. Travel to China, Thailand and United Arab Emirates ranked highly, taking account of the extent of travel to those countries by England and Wales residents. However, in terms of absolute numbers, once again travel to Spain was the destination associated with the highest number of cases (15) in England and Wales residents during 2014.

Legionnaires Disease remains an important cause of both morbidity and mortality in England and Wales. The elderly continue to account for most infections and deaths, for which the age

profile is heavily weighted to the over-sixties. Those aged between 60 years and above account for the highest proportion of cases overall. Almost three-quarters, 73.4%, of cases in 2014 reported at least one underlying condition/risk factor which is in line with 2013 figures when 74.7% cases suffered one or more underlying conditions. Smoking followed by heart disease, diabetes and immunosuppression were the most commonly recorded underlying conditions.

The crude case fatality rate is lower in 2014 at 7.6% compared to 2013 when it reached 11.2%. By type of exposure, fatality rate is slightly higher, 13.6%, for nosocomial cases compared to cases exposed in the community, 12.1, and more than three times the rate for cases linked to travel abroad. Those aged 70 years and above show by far the highest fatality rate of any age group.

Cases were detected in all regions of England and PHE will shortly publish separate epidemiological reports for each area covered by its 16 Centres, and a report for Wales.

Fifteen clusters or outbreaks were identified in England and Wales in 2014, fewer than in 2012 and 2013; none were associated with hospitals or healthcare facilities. The number of cluster-outbreaks associated with travel abroad remained the same as in 2013 at 11. The number of community- and UK-travel-associated cluster-outbreaks both decreased compared to 2013 from four to three community-acquired cluster-outbreaks, and from three to one UK-travel-associated cluster-outbreak.

Reference

1. PHE (June 2015). Legionnaires' disease in England and Wales 2014.

Independent workplace health expert committee established

The Health and Safety Executive has established a new scientific and medical advisory committee to provide independent, expert advice on emerging workplace health issues and trends – and on new evidence, and the quality of the current evidence base, relating to existing workplace health issues [1].

The Workplace Health Expert Committee (WHEC) will be concerned primarily with chemical and physical hazards, and with behavioural and organisational factors in the workplace – such as shiftwork – that could lead to physiological and psychosocial ill health.

Through its website, WHEC will encourage collaborative working with stakeholders and partners whilst helping to identify issues of potential concern to Government Departments and business [2]. It will inform HSE policy through the supply of advice to the Executive's chief scientific advisor and director of research, Professor Andrew Curran, and to its Board.

It will not be concerned with wellbeing, sickness absence management or rehabilitation, as these issues are dealt with elsewhere in government. Nor will the committee consider individual cases of ill health or disease. The nine-member committee is chaired by Professor Sir Anthony Newman Taylor, professor of occupational and environmental medicine in Imperial College and a non-executive director of Imperial College Healthcare NHS Trust.

Official statistics show that around 13,000 people die each year from occupational lung disease and cancer as a consequence of past workplace exposure, primarily to chemicals and dusts. In addition, an estimated 1.2 million people who worked in 2013 to 2014 were suffering from an illness they believed was caused or made worse by work, of which 535,000 were new cases which started in the year [1].

References

2. "HSE launches new workplace health expert committee", HSE press release 22 June 2015.
3. Workplace Health Expert Committee website.

Public Health England

Health Protection Report
weekly report

Infection reports

Volume 9 Number 23 Published on: **3 July 2015**

Infection Reports

Respiratory

- **Laboratory reports of respiratory infections made to CIDSC from PHE and NHS laboratories in England and Wales: weeks 23-26/2015**
- **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: weeks 23-26/2015**
- **Respiratory viral detections by age group: weeks 23-26/2015**
- **Laboratory reports of infections associated with atypical pneumonia, by week of report: weeks 23-26/2015**
- **Laboratory reports of Legionnaires Disease cases in England and Wales, by week of report: weeks 23-26/2015**

Bacteraemia

- ***E. coli* bacteraemia in EWNI (voluntary reporting): 2008-2014**

Infection reports / Respiratory

Volume 9 Number 23 Published on: 3 July 2015

Laboratory reports of respiratory infections made to CIDSC from PHE and NHS laboratories in England and Wales: weeks 23-26/2015

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

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

Week	Week 23	Week 24	Week 25	Week 26	Total
Week ending	**7/6/15**	**14/6/15**	**21/6/15**	**28/6/15**	
Influenza A	**7**	**8**	**19**	**8**	**42**
Isolation	–	–	–	1	**1**
DIF *	–	–	1	–	**1**
PCR	5	5	10	4	**24**
Other †	2	3	8	3	**16**
Influenza B	**29**	**54**	**18**	**6**	**107**
Isolation	4	–	2	–	**6**
DIF *	4	8	5	–	**17**
PCR	19	44	5	5	**73**
Other †	2	2	6	1	**11**

* 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 23	Week 24	Week 25	Week 26	Total
Week ending	**7/6/15**	**14/6/15**	**21/6/15**	**28/6/15**	
Adenovirus*	106	84	90	90	**370**
Coronavirus	7	6	3	4	**20**
Parainfluenza†	90	80	85	84	**339**
Rhinovirus	233	202	196	184	**815**
RSV	59	46	43	30	**178**

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

Table 3. Respiratory viral detections by age group: weeks 23-26/2015

Age group (years)	<1 year	1-4 years	5-14 years	15-44 years	45-64 years	≥65 years	Un-known	Total
Adenovirus *	71	79	29	112	54	25	–	**370**
Coronavirus	–	3	1	5	6	5	–	**20**
Influenza A	2	1	3	8	15	19	–	**48**
Influenza B	5	10	7	24	28	32	–	**106**
Parainfluenza †	61	56	16	49	85	71	1	**339**
Respiratory syncytial virus	61	27	16	16	21	36	1	**178**
Rhinovirus	250	154	91	139	103	75	3	**815**

* 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 23	Week 24	Week 25	Week 26	Total
Week ending	**7/6/15**	**14/6/15**	**21/6/15**	**28/6/15**	
Coxiella burnettii	–	–	–	–	**0**
Respiratory *Chlamydia* sp.*	2	3	2	–	**7**
Mycoplasma pneumoniae	13	5	7	–	**25**
Legionella sp.	3	8	12	12	**35**

* 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 23	Week 24	Week 25	Week 26	Total
Week ending	**7/6/15**	**14/6/15**	**21/6/15**	**28/6/15**	
Nosocomial	–	–	2	–	**2**
Community	1	3	3	2	**9**
Travel Abroad	2	5	6	10	**23**
Travel UK	–	–	1	–	**1**
Total	**3**	**8**	**12**	**12**	**35**
Male	1	5	9	9	**24**
Female	2	3	3	3	**11**

* Cases with onset of symptoms in 2015.

Thirty-five cases were reported with pneumonia. Twenty-four males aged 36 to 89 years and 11 females aged 33 to 86 years. Nine cases had community-acquired infection and two cases were reported to be associated with hospital/healthcare facilities. Two deaths were reported in males aged 79 and 86 years.

Twenty-four cases were reported with travel association: China (1), Croatia (1), Cruise (1), cruise/France/Italy/Spain (1), Greece (2), Greece/Turkey (1), Greece/United Kingdom (1), India (1), Italy (2), Pakistan (1), Portugal (2), Spain (4), Turkey/United Kingdom(1), United Arab Emirates (2), United Kingdom (1) and United States of America (2).

Table 6. Reports of Legionnaires Disease cases in England and Wales, by PHE Centre: weeks 23-26/2015

Region/Country	Nosocomial	Community	Travel Abroad	Travel UK	Total
North of England					
North East	–	1	4	–	**5**
Cheshire & Merseyside	–	–	1	–	**1**
Greater Manchester	–	–	2	–	**2**
Cumbria & Lancashire	–	–	1	–	**1**
Yorkshire & the Humber	1	–	3	–	**3**
South of England					
Devon, Cornwall & Somerset	–	–	1	–	**1**
Avon, Gloucestershire & Wiltshire	–	–	2	–	**2**
Wessex	–	1	1	1	**3**
Thames Valley	–	–	1	–	**1**
Sussex, Surrey & Kent	–	–	1	–	**1**
Midlands & East of England					
East Midlands	1	4	1	–	**6**
South Midlands & Hertfordshire	–	1	–	–	**1**
Anglia & Essex	–	1	1	–	**2**
West Midlands	–	–	3	–	**4**
London Integrated Region					
London	–	–	1	–	**1**
Public Health Wales					
Mid & West Wales	–	–	–	–	**0**
North Wales	–	–	–	–	**0**
South East Wales	–	–	–	–	**0**
Miscellaneous					
Other	–	–	–	–	**0**
Not known	–	–	–	–	**0**
Total	2	**9**	**23**	**1**	**35**

Infection reports / Bacteraemia

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Voluntary surveillance of *Escherichia coli* bacteraemia in England, Wales and Northern Ireland: 2008-2014

This report is based on data extracted from the Public Health England (PHE) voluntary surveillance database, Second Generation Surveillance System (SGSS), on the 14th April 2015 for bacteraemias caused by *Escherichia coli* (*E. coli*) between 2010 and 2014 in England, Wales and Northern Ireland. The data presented here may differ from data in previous publications due to inclusions of late reports and the change in surveillance systems.

Most analyses presented here are based on data extracted from the CDR module (previously CoSurv/LabBase2) of SGSS, except for the analysis of resistance to more than one antibiotic, which is based on data reported to the AMR module (previously AmSurv).

The report includes analyses on the trends, age and sex distribution, geographical distribution, level of ascertainment, and antibiotic susceptibility of *E. coli* bacteraemia cases in England, Wales and Northern Ireland.

Rates were calculated using mid-2013 year resident population estimates based on the 2011 census for England, Wales, and Northern Ireland [1,2]. Geographical analyses were made based on the residential location of the patient with reference to the Public Health England Centres.

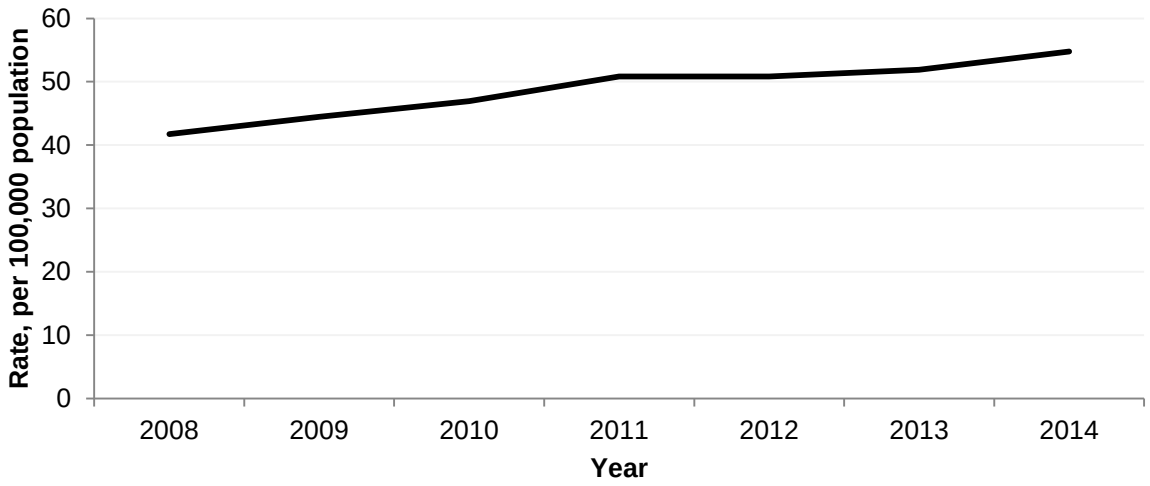
Key points

- There was a year-on-year increase in the number of *E. coli* bacteraemia reports across the period reviewed.
- The incidence rate of *E. coli* bacteraemia per 100,000 population increased by 16.7% between 2010 and 2014.
- In 2014, the rates per 100, 000 population were highest amongst elderly (>75 years). Men had higher bacteraemia rates than women in older age groups (>65 years) and in those below one year.
- In 2014, the rate of *E. coli* bacteraemia per 100,000 population was highest in England (55.3), followed by Northern Ireland (53.3) and Wales (46.4).
- Within England, the highest incidence rate of *E. coli* bacteraemia was observed in the North East (67.8 per 100,000 population), followed by Cheshire and Merseyside (67.6 per 100,000 population), and Devon, Cornwall and Somerset (66.0 per 100,000 population).
- Comparison of voluntary reporting with the mandatory surveillance dataset showed a case ascertainment rate of 83.7% in 2014.
- Percentage of non-susceptibility for *E. coli* isolates to tested antibiotics changed very little with the exception of amoxicillin/clavulanate, where it increased from 25.2% in 2010 to 40.9% in 2014.

Trends in episode numbers and rates

The rate of *E. coli* bacteraemia per 100,000 population in England, Wales and Northern Ireland increased between 2008 and 2010, levelled off in 2011 and 2012, then resumed its increase (figure 1). The rate of reports per 100,000 population has increased by 31.2% since 2008, and 5.6% since 2013.

Figure 1. *E. coli* bacteraemia rates per 100,000 population (England, Wales, and Northern Ireland): 2008-2014*

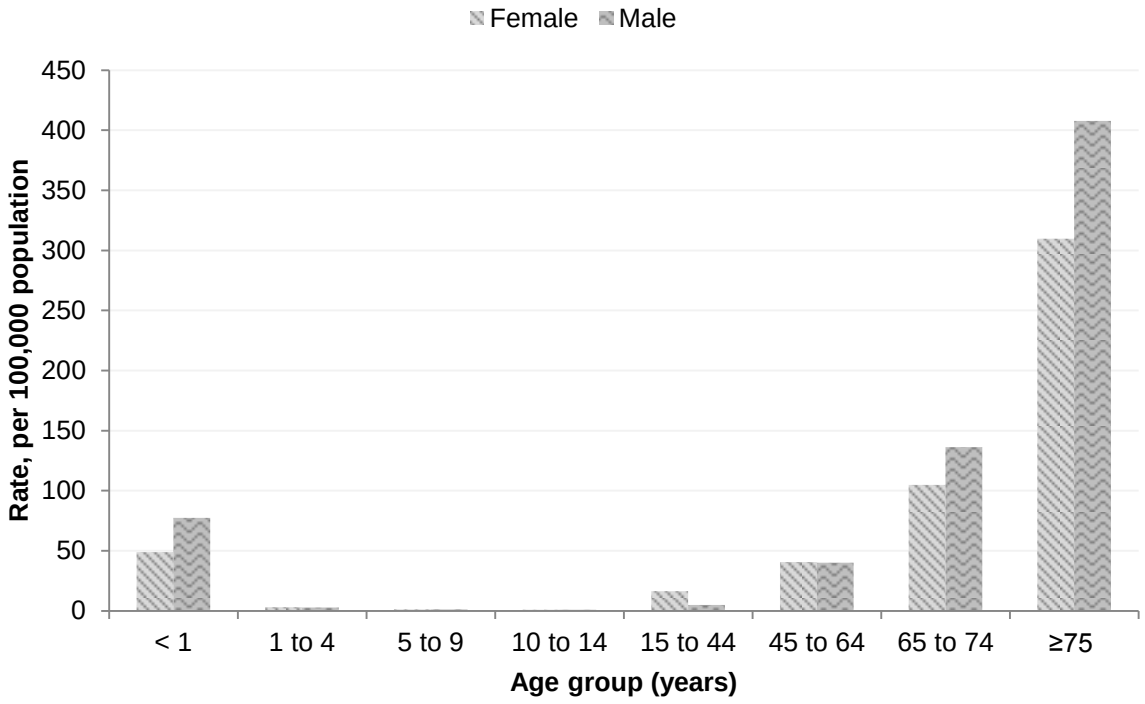


* Data extracted on 14 April 2015

Age and sex distribution

The highest incidence rate of *E. coli* bacteraemia per 100,000 population was in those aged 75 and over (combined rate of 350.4 per 100,000 population), followed by those aged between 65-74 years (combined rate of 120.1 per 100,000 population), and in infants below one year old (combined rate of 61.7 per 100,000 population) (figure 2). Gender differences were observed between younger and older age groups, with rates being higher in older males (65 years and over) and those below one year old (309.8/100,000 and 407.9/100,000 in ≥75 year-olds, 104.8/100,000 and 136.4/100,000 in 65-74 year-olds, and 48.9/100,000 and 77.4/100,000 in <1 year old in females and males, respectively). The percentage differences in infection rates between sexes were larger for age groups with higher male *E. coli* bacteraemia rates (<1, 65-74, and ≥ 75 year-olds; 58.3%, 30.2%, and 31.2%, respectively).

Figure 2. *E. coli* rates† by age and sex per 100,000 population (England, Wales and Northern Ireland): 2014*



† Rates are calculated using 2013 ONS mid-year population estimates

* Data extracted on 14 April 2015

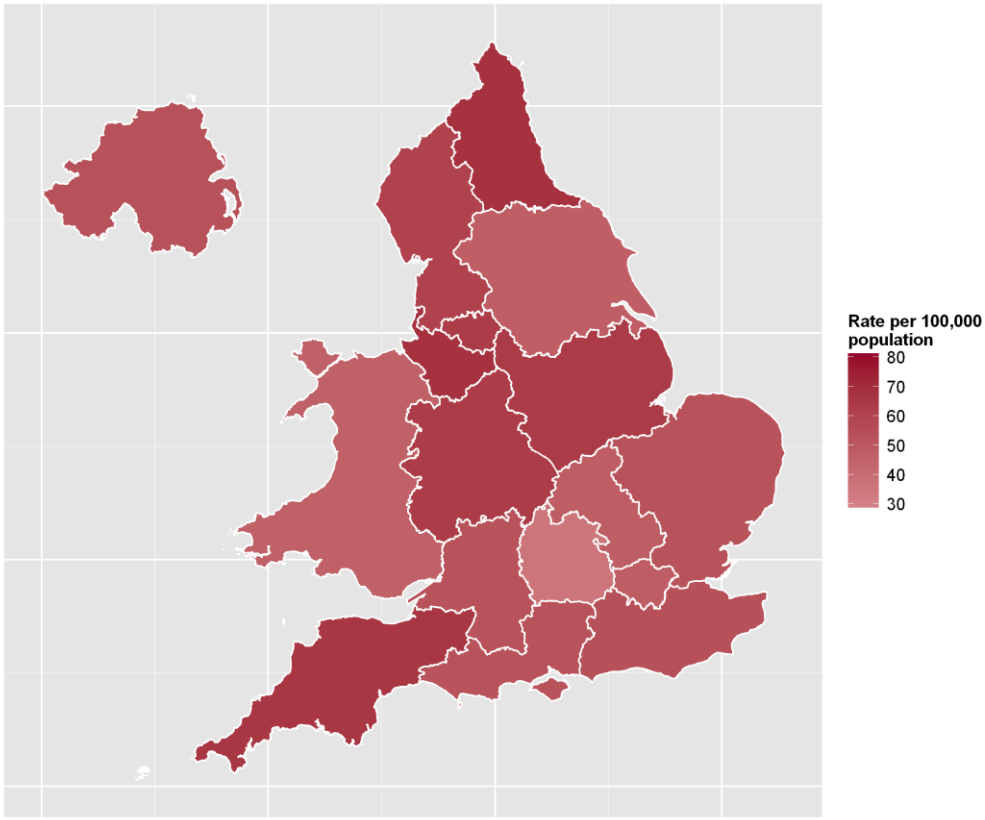
Geographical distribution

The overall *E. coli* bacteraemia rate in England, Wales and Northern Ireland in 2014 was 54.8 per 100,000 population (table 1). This was a 16.7% increase since 2010 (47.0 per 100,000 population) and 5.5% increase since 2013 (51.9 per 100,000 population) (table 1). The total number of bacteraemia reports has been also increasing since 2010, with *E. coli* being the most frequently reported pathogen in monomicrobial infections, in 31.5% of cases in 2013 [3]. While there was a steady year-on-year *E. coli* bacteraemia rate increase in England between 2010 and 2014, the rates in Wales and Northern Ireland peaked in 2011 and 2013, respectively, and decreased thereafter.

England had the highest incidence of *E. coli* bacteraemia of 55.3 per 100,000 population in 2014, followed by Northern Ireland (53.3/100,000) and Wales (46.4/ 100,000). The rate in England increased by 18.9% since 2010 (46.5/100,000) and by 7.9% since 2013 (51.3/100,000). The rate of *E. coli* bacteraemia in Northern Ireland decreased by 2.4% since 2010 (54.6/100,000) and by 21.4% since 2013 (67.8/ 100,000). Similarly, the incidence rate in Wales decreased by 7.2% since 2010 (49.9/100,000) and by 13.4% since 2013 (53.6/100,000).

Regions with the highest infection rate per 100,000 population in 2014 included the North East (67.8), Cheshire and Merseyside (67.6) and Devon, Cornwall and Somerset (66.0) (figure 3) (table 1). Conversely, the region with lowest rate in 2014 was the Thames Valley (36.0). The incidence rate of *E. coli* bacteraemia in Avon, Gloucestershire and Wiltshire increased by 90.4% between 2010 and 2014 (27.9/100,000 vs 53/100,000, respectively).

Figure 3. *E. coli* bacteraemia rates per 100,000 population by PHE Centres in England, Wales, and Northern Ireland: 2014*



* Data extracted on 14 April 2015

Table 1. *E. coli* bacteraemia rate per 100,000 population by PHE Centre (England, Wales, and Northern Ireland): 2010-2014*

PHE Centre	2010	2011	2012	2013	2014
London	41.2	44.2	44.8	46.5	48.1
South Midlands and Hertfordshire	35.5	34.0	42.2	44.5	47.8
East Midlands	57.1	59.9	57.4	56.8	63.7
Anglia and Essex	45.2	48.2	50.6	51.4	52.8
West Midlands	50.6	55.3	53.3	55.6	62.9
Cheshire and Merseyside	53.8	57.9	62.3	62.9	67.6
Cumbria and Lancashire	43.0	51.8	52.6	55.8	60.5
Greater Manchester	59.5	66.6	62.3	62.7	63.2
North East	51.9	63.6	67.2	65.8	67.8
Yorkshire and Humber	52.3	50.8	49.2	45.2	47.3
Avon Gloucestershire and Wiltshire	27.9	33.7	39.4	35.4	53.0
Devon Cornwall and Somerset	52.3	51.7	49.5	54.9	66.0
Wessex	42.1	45.1	45.1	46.2	52.5
Kent Surrey and Sussex	45.5	48.2	51.6	55.4	53.7
Thames Valley	32.6	36.8	30.4	33.6	36.0
England	**46.5**	**49.9**	**50.4**	**51.3**	**55.3**
Northern Ireland (NI)	**54.6**	**61.9**	**64.9**	**67.8**	**53.3**
Wales	**49.9**	**60.9**	**50.3**	**53.6**	**46.4**
England, Wales & NI	**47.0**	**50.8**	**50.8**	**51.9**	**54.8**

* Data extracted on 14 April 2015

Antimicrobial susceptibility

The antibiotic non-susceptibility of *E. coli* isolates to selected antimicrobials remained broadly stable or increased slightly with the exception of amoxicillin/clavulanate between 2010 and 2014 (table 2).

There was a small increase in the number of isolates non-susceptible to imipenem or meropenem from six out of 18,125 in 2010 to 23 out of 19,759 in 2014, albeit these fluctuated over this period, translating into a rate of 0.1%.

Non-susceptibility to third generation cephalosporins and piperacillin/tazobactam increased by 2.1% (9.7% to 11.8%) and 2.7% (8.1% to 10.8%) between 2010 and 2014, respectively. Ciprofloxacin and gentamicin non-susceptibility remained fairly stable at around 18-19% and 9%, respectively.

The highest increase in non-susceptibility was observed for amoxicillin/clavulanate from 25.2% in 2010 to 40.9% in 2014. Leverstein-van Hall and colleagues reported that switching from a fixed 2:1 ratio of amoxicillin:clavulanate in susceptibility testing to a fixed 2mg/L clavulanate concentration (as stipulated by current EUCAST guidance) causes an increase from 19% to 31% from one year to another [4]. The same shift in MIC breakpoints has been gradually adopted in the UK, doubtless with similar effects.

Data presented here are broadly consistent with those of the Bacteraemia Surveillance Programme of the British Society for Antimicrobial Chemotherapy (BSAC) with the exception of amoxicillin/clavulanate between 2010 and 2013 (BSAC data for 2014 has not been published at the time of publication) [5]. BSAC reported resistance rates for amoxicillin/clavulanate considerably lower than those presented here (26.9% in 2010, 28% in 2011, 29.8% in 2012, and 27.8% in 2013). BSAC used fixed 2:1 ration for amoxicillin:clavulanate testing up to 2013, and this strengthens the hypothesis that the sharp increase observed in SGSS CDR data reflects methodological rather than biological changes. However, Hall et al. found that the new EUCAST method correlated better with clinical efficacy than the ratio based, in-vitro testing, thus even if the increases in non-susceptibility in recent years is in question the resulting prevalence is more likely to represent actual clinical experience.

Table 2. Antibiotic susceptibility for *E. coli* bacteraemia in England, Wales and Northern Ireland: 2010-2014*

		2010	2011	2012	2013	2014
Total reports		26,998	29,477	29,685	30,513	32,196
Meropenem/imipenem	**% non-susceptible**	**0.0**	**0.1**	**0.1**	**0.1**	**0.1**
	Reports with susceptibility data	18,125	20,505	21,208	21,248	19,759
Cefotaxime/ceftazidime	**% non-susceptible**	**9.7**	**10.4**	**10.2**	**10.1**	**11.8**
	Reports with susceptibility data	18,045	20,350	21,147	20,593	18,467
Ciprofloxacin	**% non-susceptible**	**18.1**	**18.7**	**18.5**	**17.9**	**18.7**
	Reports with susceptibility data	20,437	22,997	23,667	23,873	21,220
Gentamicin	**% non-susceptible**	**8.7**	**8.7**	**9.2**	**9.4**	**9.3**
	Reports with susceptibility data	22,055	24,759	25,435	25,359	23,298
Amoxicillin/clavulanate	**% non-susceptible**	**25.2**	**31.0**	**36.6**	**37.9**	**40.9**
	Reports with susceptibility data	20,518	23,343	24,090	24,416	21,905
Piperacillin/tazobactam	**% non-susceptible**	**8.1**	**8.1**	**9.5**	**10.2**	**10.8**
	Reports with susceptibility data	18,713	20,962	22,712	23,396	20,877

* Data extracted on 14 April 2015

Analyses of resistance to more than one antibiotic were based on data extracted from the AMR module of SGSS. The data are limited to isolates from England in 2014.

There were 20,560 isolates of *E. coli* causing bacteraemia tested for susceptibility to ciprofloxacin, imipenem or meropenem, cefotaxime or ceftazidime, gentamicin, piperacillin/tazobactam, and amoxicillin/clavulanate extracted from the AMR module of SGSS. Forty-seven percent (9,622) of these were non-susceptible to at least one antibiotic. Non-susceptibility to the combination of any two antibiotics was observed in 21% (4,373) of cases. Two isolates tested were non-susceptible 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 [6]. Table 3 shows that 8.2% of *E. coli* from bacteraemias tested non-susceptible to both cefotaxime or ceftazidime and ciprofloxacin, while 4.6% isolates were non-susceptible to cefotaxime or ceftazidime and gentamicin. This is most likely due to isolates with CTX-M-group 1 ESBLs (the commonest type now in the UK) that also often carry an inhibitor-resistant penicillinase OXA-1 and the AAC(6')-1b-cr aminoglycoside acetyltransferase enzyme, which also augments ciprofloxacin resistance [7]. Note, fluoroquinolone resistance has been on increase even in isolates lacking ESBLs [8], a point exemplified by co-non-susceptibility to ciprofloxacin and amoxicillin/clavulanate (13.4%) being higher than that seen for third generation cephalosporin and fluoroquinolone non-susceptibility (8.2%).

Some CTX-M ESBLs producing *E. coli* strains contain plasmids carrying genes that code for resistance to aminoglycosides and fluoroquinolones [7], and 4.2% (650/15650) of isolates exhibited this pattern of non-susceptibility.

Non-susceptibility of isolates to carbapenems and other antibiotics remained low at less than 1%.

Table 3. Pair-wise comparison of antimicrobial resistance among E. coli isolates causing bacteraemia in England: 2014*

	Cefotaxime/ ceftazidime		Ciprofloxacin		Gentamicin		Imipenem/ meropenem		Piperacillin/ tazobactam		Amoxicillin/ clavulanate	
	tested	% resistant	tested	% resistant	tested	% resistant	tested	% resistant	tested	% resistant	tested	% resistant
Cefotaxime/ ceftazidime												
Ciprofloxacin	15,851	8.2										
Gentamicin	16,051	4.6	17,994	7.0								
Imipenem/ meropenem	15,586	0.1	17,200	0.1	17,485	<0.1						
Piperacillin/ tazobactam	15,449	4.2	17,211	5.2	17,728	2.9	16,801	0.1				
Amoxicillin/ clavulanate	15,848	9.3	17,694	13.4	18,118	7.8	17,172	0.0	17,344	11.3		

*Data extracted on 14 April 2015

Ascertainment: Comparison of *E. coli* positive specimens from the voluntary laboratory reporting scheme versus E. coli infections from the mandatory surveillance scheme in England

The following data compare *E. coli* bacteraemias reported to the voluntary laboratory surveillance scheme with *E. coli* bacteraemia reports 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 and June 2011 onwards.

Between 2013 and 2014, the number of *E. coli* reports made to the voluntary surveillance increased by 7.9% (27,621 to 29,791, respectively) in comparison to a 6.2% (33,497 to 35,589, respectively) increase in the number of reports made to the mandatory surveillance (table 4). Percentage increases in *E. coli* bacteraemia reports for the voluntary and mandatory schemes from 2012 to 2014 were 10.5% and 9.8%, respectively; comparison to 2011 is not included because testing did not include the full calendar year. The case ascertainment of *E. coli* reported to the voluntary scheme has fluctuated between 2011 (84.1%) and 2014 (83.7%), with the highest ascertainment obtained in 2011 (84.1%).

Table 4. Ascertainment of E. coli data for the mandatory and voluntary reporting schemes in England: 2011- 2014*

Year	Voluntary reports	Mandatory reports	% Ascertainment
2011†	16,000	19,019	84.1
2012	26,954	32,405	83.2
2013	27,621	33,497	82.5
2014	29,791	35,589	83.7

* Data extracted on 14 April 2015

† Data from June to December only

Concluding remarks

The data presented here indicate year-on-year increase in the number of laboratory reports of *E. coli* bacteraemia with 27% increase since 2008 and 3% increase from 2013 to 2014, correlating with the increase in total number of bacteraemia reports [3].

The rate of *E. coli* bacteraemia per 100,000 population in England, Wales and Northern Ireland increased by 5.5% between 2013 and 2014.

Trends in non-susceptibility to key antibiotics (3rd generation cephalosporins, quinolones and gentamicin) indicated an increase in resistance to cefotaxime or ceftazidime (9.7% in 2010 to 11.8% in 2014), while resistance to ciprofloxacin and gentamicin remained stable (18.1% and 8.7% in 2010, and 18.7% and 9.3% in 2014, respectively).

The increase in the number of laboratory reports across England, Wales and Northern Ireland in conjunction with the public health impact of *E. coli* confirms that it should remain a priority. There is also a need for continued surveillance and interventions to prevent the spread of *E. coli* producing ESBLs, in particular CTX-M types and emergent carbapenem-resistant strains, such as those producing NDM-1, VIM, OXA-48, and KPC enzymes, which are frequently associated with multiple antibiotic resistance.

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