Public Health England

Health Protection Report
weekly report

Volume 10 Number 11 Published on: **18 March 2016**

Current News

- **Mandatory HCAI reports quarterly trends: October to December 2015**

Infection reports

Bacteraemia / HCAI

- **Voluntary surveillance of *Acinetobacter* spp. bacteraemia in England, Wales and Northern Ireland: 2015**

News

Volume 10 Number 11 Published on: **18 March 2016**

Mandatory HCAI reports quarterly trends: October to December 2015

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 October-December 2015, has been published on the GOV.UK website [1].

The report includes tabular and graphical information and provides data for the October-December 2015 quarter (updating the previous report published in November 2015). Some key facts are listed below.

MRSA bacteraemia

There has been has been a 13.4% decrease (1.7 to 1.5 reports per 100,000 population) in the rate of all reported MRSA bacteraemia between October-December 2012 and the current quarter (October-December 2015). This is part of an overall decreasing trend beginning from April 2007. Furthermore, between October-December 2014 and October-December 2015 decreases in both the counts and rates of total MRSA bacteraemia have been reported (from 215 to 202 reports, and from 1.6 to 1.5 per 100,000 population, respectively). In addition, this has also been observed for Trust-assigned (from 83 to 71, and from 0.9 to 0.8 per 100,000 bed-days) and CCG-assigned (from 103 to 90, and from 0.8 to 0.7 per 100,000 population), while there has been an increase in Third Party assigned cases (from 29 to 41, and from 0.2 to 0.3 per 100,000 population).

MSSA bacteraemia

The current quarter (October-December 2015) saw the highest rate of total MSSA bacteremia (19.5 reports per 100,000 population) since the reporting of MSSA bacteraemia cases was initiated in January 2011. The count of total MSSA bacteraemia has increased by 3.3% in the current quarter (October-December 2015, n=2,667) when compared to the same quarter in the previous year (October-December 2014, n=2,581). Similarly, in both the counts and rates of Trust-apportioned MSSA bacteraemia reports, there has been a 3.8% increase from 728 to 756 reports and 8.3 to 8.6 per 100,000 bed-days, respectively, over the same time period.

E. coli bacteraemia

A 7.3% increase (from 64.7 to 69.4 reports per 100,000 population) has been observed in the rate of all reported *E. coli* bacteraemias when comparing the current quarter (October-December 2015) with the same quarter of the previous year (October-December 2014). There has been an overall increase of 7.6% in the rate of bacteraemia from 64.5 to 69.4 reports per 100,000 population since July-September 2012.

C. difficile infection (CDI)

Between October-December 2014 and the current quarter (October-December 2015), there has been an increase of 4.9% in both counts and rates of all reported CDI cases (from 3,366 to 3,530 reports and from 24.6 to 25.8 reports per 100,000 population), while the Trust-apportioned CDI counts and rates have both remained steady over the same time period (from 1,306 to 1,305 reports, respectively and 14.9 reports per 100,000 bed-days for both quarters).

Reference

1. PHE (10 March 2015). Quarterly Epidemiological Commentary: Mandatory MRSA, MSSA and *E. coli* bacteraemia, and *C. difficile* infection data (up to October-December 2015).

Public Health England

Health Protection Report
weekly report

Infection report

Volume 10 Number 11 Published on: **18 March 2016**

Voluntary surveillance of *Acinetobacter* spp. bacteraemia in England, Wales and Northern Ireland: 2015

These analyses are based on data extracted from the Public Health England (PHE) voluntary surveillance database, SGSS (Second Generation Surveillance System), extracted on the 1 March 2016. SGSS comprises a communicable disease module (CDR; formerly CoSurv/LabBase2) and an antimicrobial resistance module (AMR; formerly AmSurv). The data presented here may differ in some instances from data in earlier publications due to inclusion of late reports.

The majority of analyses presented are based on data from the CDR module of SGSS. The exceptions are the analyses of resistance to more than one antibiotic among *Acinetobacter baumannii* and *A. lwoffii* bacteraemia, these are based on data from the AMR module. This module captures more comprehensive antibiogram data allowing more robust evaluation of multi-drug resistance rates. However these data cannot be used for trend analysis due to the addition of this data collection being relatively recent.

Rates were calculated using 2014 mid-year resident population estimates based on the 2011 census for England, Wales, and Northern Ireland [1]. Rates of bacteraemia in infants were calculated using 2014 live birth denominators [2]. Geographical analyses were based on the residential location of the patient with reference to 15 local English regions. It should be noted that during 2015 a number of laboratories within Wales were unable to report to SGSS and therefore an underrepresentation of the true incidence rate within Wales may be described within this report.

Key points

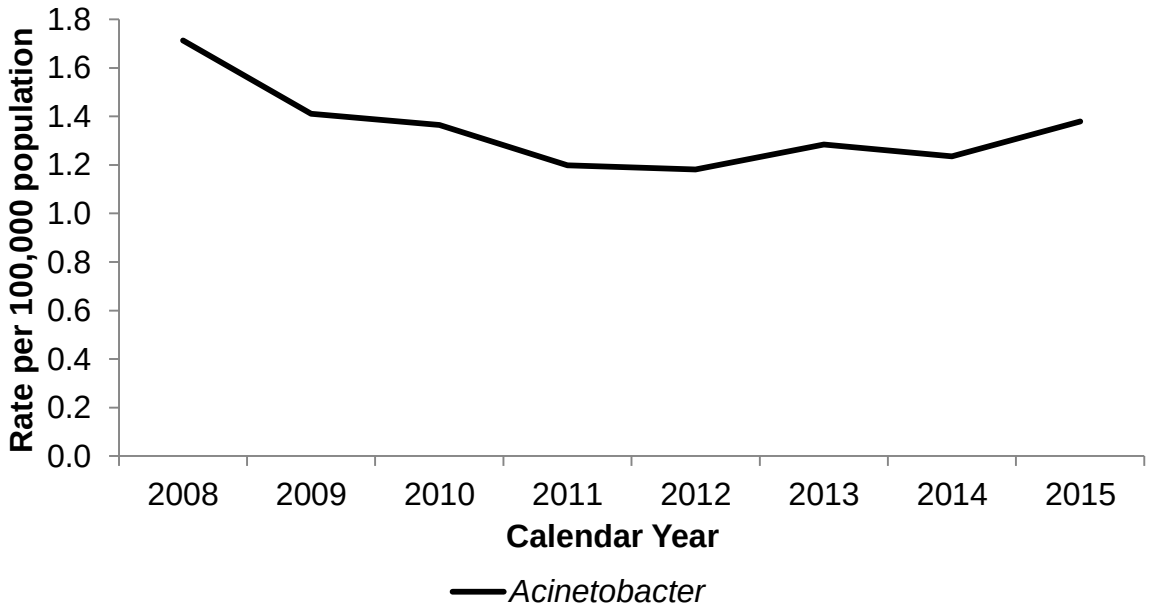
- the incidence rate of *Acinetobacter* spp. bacteraemia has decreased over the eight year period from 2008 to 2015
- the country with the highest incidence rate in 2015 was Northern Ireland (1.6 per 100,000 population)
- within England, the English region with the highest incidence rate was Greater Manchester (1.8 per 100,000 population), while Anglia and Essex had the lowest (1.0/100,000)
- infants have the highest rate of *Acinetobacter* spp. infection (8.2 per 100,000 population) with individuals aged 75 years and over also having a relatively high rate (3.7 per 100,000 population), variation is noted by *Acinetobacter* species
- in 2015, 50% percent of neonatal *Acinetobacter* spp. bloodstream infections occurred in infants less than 7 days old (18/36)
- there were more *Acinetobacter* spp. reports for females than males with rates of 1.4 and 1.3 per 100,000 population respectively (432 and 381 reports respectively)
- *A. lwoffii* and *A. baumannii* continue to be the most common species of Acinetobacter in 2015 from blood isolates (38% and 20% respectively), accounting for over half of all isolates
- the level of resistance to colistin has fallen to a five year low (2%), however the proportion of *Acinetobacter* spp. bacteraemia tested for colistin susceptibility remains below 13% in England, Wales and Northern Ireland in 2015
- resistance to a carbapenem (meropenem and/or imipenem) has decreased over the last 5 years
- a reduction in the proportion of resistant *Acinetobacter* spp bloodstream isolates was noted between 2011 and 2015 for each of the following antimicrobials: gentamicin, ciprofloxacin, tobramycin and amikacin
- of 42 isolates of *A. baumanii* (29) and *A. Iwoffi* (13) tested, there was no (0%) multidrug resistance to gentamicin, ciprofloxacin, carbapenem and colistin.

Trends

Between 2008 and 2015[1] the incidence rate of *Acinetobacter* spp. fell by 20% from 1.7 to 1.4 per 100,000 population in England, Wales and Northern Ireland (figure 1).

The sharpest decline in the rate (31%) was seen between 2008 and 2012. Since 2012 the rate remained relatively stable until 2015, where a 12% increase, from 1.2 to 1.4 per 100,000 population, in comparison to 2014 has been seen.

Figure 1. *Acinetobacter* spp. bacteraemia rates per 100,000 population (England, Wales and Northern Ireland): 2008-2015



Geographic distribution

Northern Ireland and England had the highest incidence rate (1.6 and 1.4 per 100,000 population respectively), while Wales has the lowest (0.1 per 100,000 population)[2].

From a public health perspective, England is split into four large geographical areas named PHE regions. Each PHE region is made up of smaller constituent geographical areas, called PHE centres. Within England the incidence rate of *Acinetobacter* spp. has

[1] It has been decided for trend data on the overall rate alone, that an eight year period gives a clearer impression of the trend than a five year period.

[2] It should be noted that during 2015 a number of laboratories within Wales were unable to report to SGSS and therefore an underrepresentation of the true incidence rate within Wales may be described within this report.

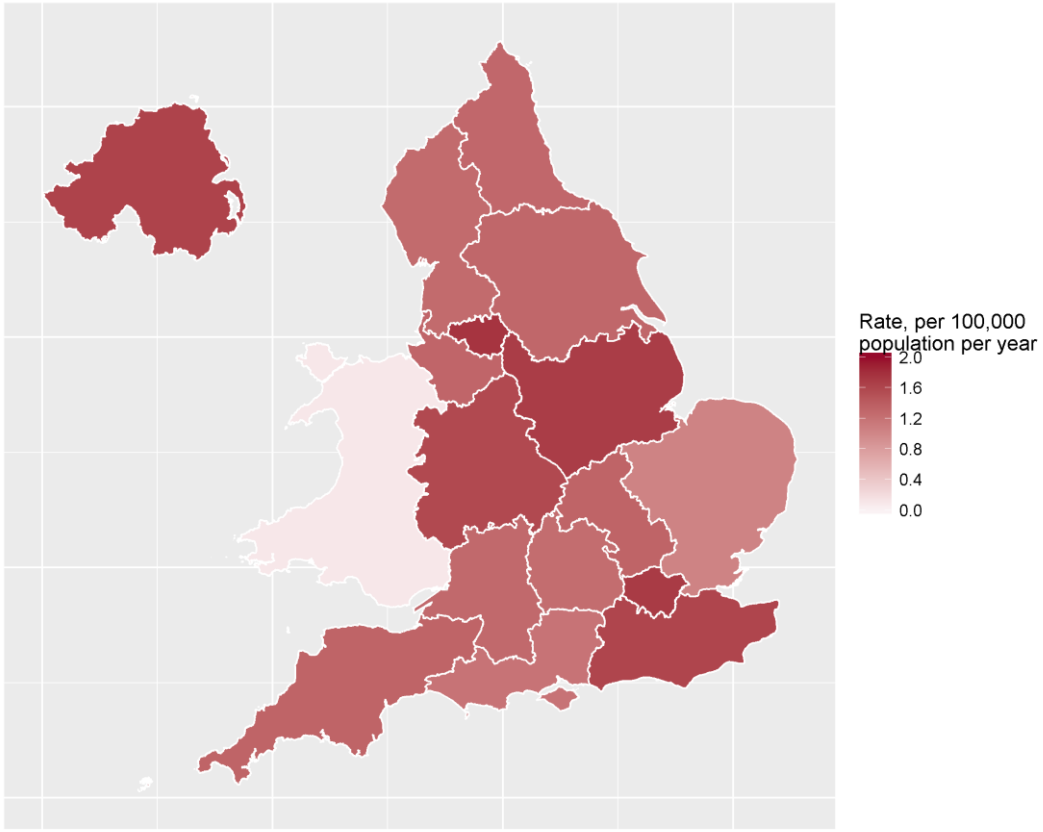
varied by English region over the last five years, although no region has continuously reported the highest (or lowest) rates (table 1).

In 2015, there remained some variation by PHE centres with Anglia and Essex PHE centre reporting the lowest incidence (1.0 per 100,000 population) and Greater Manchester PHE centre the highest (1.8 per 100,000 population; figure 2).

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

PHE Region	PHE Centre	Rate, per 100,000 population				
		2011	2012	2013	2014	2015
North of England	Cheshire and Merseyside	1.2	1.0	1.2	1.0	1.3
	Cumbria and Lancashire	0.9	0.8	1.4	1.9	1.3
	Greater Manchester	1.7	1.7	1.7	1.3	1.8
	North East	0.9	0.8	1.0	0.8	1.3
Midlands and East of England	Yorkshire and Humber	1.1	0.9	0.7	1.2	1.3
	East Midlands	1.3	1.1	1.6	1.2	1.7
	Anglia and Essex	1.1	1.2	1.3	1.1	1.0
	West Midlands	1.2	1.2	1.3	1.4	1.6
London	London	2.0	2.0	1.9	1.7	1.7
South of England	Avon, Gloucestershire and Wiltshire	1.4	1.1	1.2	1.3	1.3
	Devon, Cornwall and Somerset	1.2	1.1	1.3	0.9	1.3
	Wessex	0.9	0.9	1.1	0.7	1.2
	Kent, Surrey and Sussex	1.0	1.4	1.5	1.6	1.6
	Thames Valley	0.7	0.9	0.4	1.0	1.2
England		**1.2**	**1.2**	**1.3**	**1.3**	**1.4**
Northern Ireland		**1.5**	**1.4**	**1.7**	**1.2**	**1.6**
Wales		**0.3**	**0.3**	**0.6**	**0.5**	**0.1**
England, Wales, Northern Ireland		**1.2**	**1.2**	**1.3**	**1.2**	**1.4**

Figure 2. Geographical distribution of *Acinetobacter* spp. per 100,000 population (England, Wales and Northern Ireland); 2015



Species distribution

In 2015, 81% (662/817) of *Acinetobacter* spp. isolates were identified to species level. This is the highest proportion of species level identification over the five year period. This is almost certainly due to the increasing use of MALDI-ToF analysis in hospitals which allows for better species identification and also a greater reporting of minor species not previously recognised in most clinical laboratories.

In 2015, the two most frequently identified *Acinetobacter* species causing bacteraemia remained *A. lwoffii* [3] (38%) and *A. baumannii* (20%). These proportions remained broadly stable between 2011 and 2015 (table 2).

[3] *A. lwoffii* isolates can be a skin contaminant but also have the capability to cause disease. The CDR module of SGSS captures data on clinically relevant pathogens, however, it is noted that some reports may represent skin contamination rather than bloodstream infection.

Table 2. Distribution of *Acinetobacter* species identified in blood specimens (England, Wales and Northern Ireland); 2011 to 2015

	2011		2012		2013		2014		2015	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
A. baumannii	163	24%	142	21%	143	19%	146	20%	161	20%
A. calcoaceticus	6	1%	3	0%	5	1%	0	0%	1	0%
A. haemolyticus	20	3%	9	1%	15	2%	22	3%	21	3%
A. johnsonii	1	0%	3	0%	6	1%	14	2%	19	2%
A. junii	12	2%	18	3%	16	2%	32	4%	24	3%
A. lwoffii	217	31%	259	38%	283	38%	273	38%	309	38%
A. radioresistens	0	0%	2	0%	1	0%	2	0%	7	1%
A. ursingii	0	0%	0	0%	1	0%	9	1%	46	6%
Acinetobacter spp., other named	50	7%	51	7%	75	10%	69	10%	74	9%
Acinetobacter spp., sp. not recorded	220	32%	198	29%	205	27%	159	22%	155	19%
Acinetobacter spp.	**689**	**100%**	**685**	**100%**	**750**	**100%**	**726**	**100%**	**817**	**100%**

A. ursingii has shown a significant increase over the period, especially in the last three years from <1% (1 isolate, 2013) to 6% (46 isolates, 2015). This increase is almost certainly due to the increased use of MALDI-ToF analysis; previous routine methods of identification would have been unlikely to identify *A. ursingii* successfully. The change in method could give the impression of an artificial increase in the number of reports of this species, when in fact many previous incidences may have been recorded as '*Acinetobacter* spp. not recorded'.

In 2010 *A. ursingii* species was noted as being a clinically relevant species [3]. Following this notice there has been no corresponding change in incidence among referrals to the reference laboratory, which has used methods that identify to species level accurately throughout the period.

Age and Sex distribution

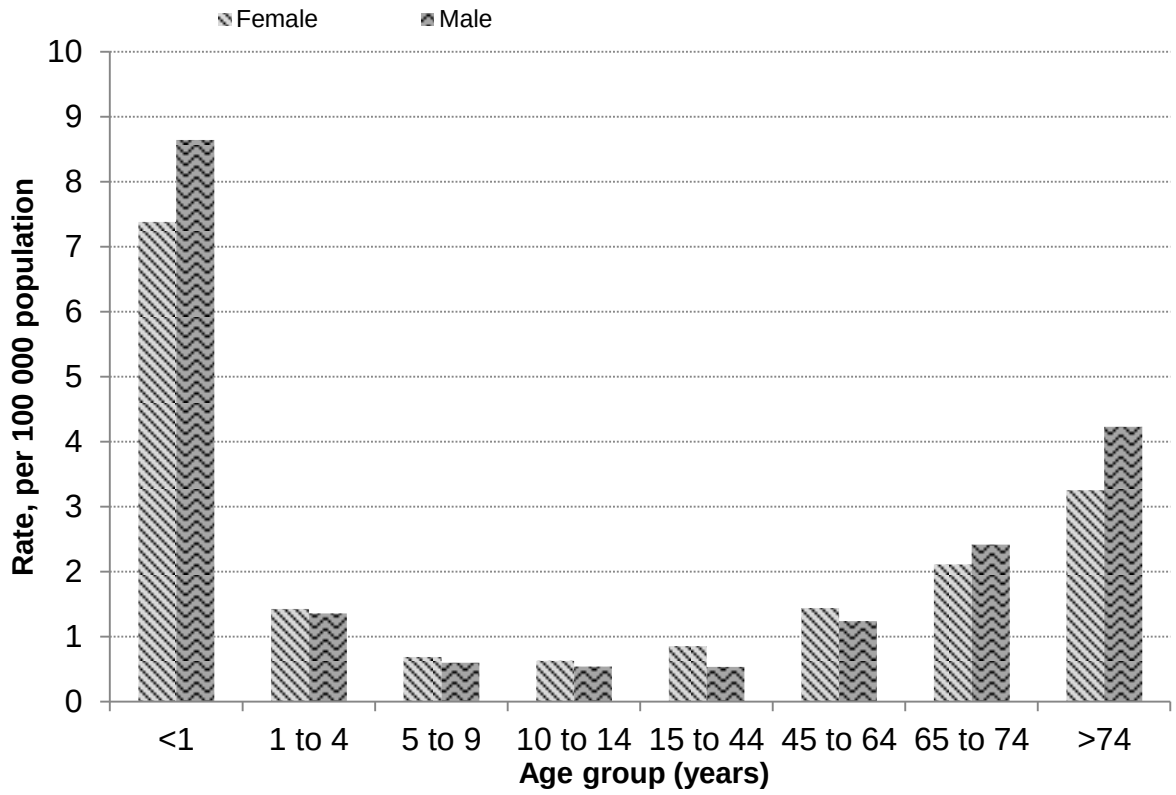
Looking at *Acinetobacter spp*. during 2015, infants continued to have the highest incidence rates (8.1 per 100,000 population) followed by adults aged 75 years and older (3.7/100,000; figure 3). While this is consistent with previous years, both of these rates have increased from those reported in 2014, most notably in infants [4]. These findings need to be interpreted with caution as the incidence in this group was low and so any variation between years may produce seemingly large changes in the incidence rate. These rates account for all infections of *Acinetobacter spp*. reported and these trends may not be reflected when *Acinetobacter spp*. is broken down by species and age.

The incidence rate of *Acinetobacter spp.* bacteraemia was higher in females (1.4 per 100,000 population) compared with males (1.3/100,000) in 2015. However, this varies by age group, with higher rates in males in the extreme age groups of the age spectrum (<1 years and ≥65y groups).

Neonates (0-90 days) accounted for 61% of infant (<1 year) *Acinetobacter* bacteraemia reports in England and Northern Ireland in 2015[4]. The incidence rate in this age group is 0.05 per 1000 live births in England and Northern Ireland. Fifty percent of neonatal *Acinetobacter* bacteraemia reports (18 reports) are for infants aged less than 7 days (table 3).

[4] There were no neonate reports received from Wales in 2015

Figure 3. *Acinetobacter* spp. bacteraemia rates per 100,000 population by age and sex (England, Wales and Northern Ireland); 2015



Antimicrobial Resistance

Antimicrobial resistance of *Acinetobacter* spp. to colistin has been identified by the Department of Health expert advisory committee for antimicrobial resistance and healthcare associated infections (ARHAI) as a key drug-bug combination and features in the English Surveillance Programme for Antimicrobial Utilisation and Resistance (ESPAUR) annual report [5][6]. The resistance rate to colistin among *Acinetobacter* spp. from bloodstream infections was in the range of 4−5% each year with the exception of 2012 when 10% of isolates were reported as resistant. The proportion of resistant isolates decreased in 2015 to 2%. While this is encouraging, caution is needed in the interpretation of colistin resistance due to the low proportion of isolates tested (13% in 2015), giving greater uncertainty to the population value reported (table 4).

Table 3. Number and rate per 1000 live births of *Acinetobacter* spp. bacteraemia in infants 0-90 days old, England and Northern Ireland; 2015

	All cases (0-90 days old)			Early onset (0-6 days old)			Late onset (7-90 days old)		
	No.	**rate**	**95% CI**	**No.**	**rate**	**95% CI**	**No.**	**rate**	**95% CI**
England	35	0.05	(0.04 - 0.07)	17	0.03	(0.01 - 0.04)	18	0.03	(0.02 - 0.04)
Northern Ireland (NI)	1	0.04	(0.00 - 0.23)	1	0.04	(0.00 - 0.23)	0	0.00	(0.00 - 0.15)
England & NI*	36	0.05	(0.04 - 0.07)	18	0.03	(0.01 - 0.04)	18	0.03	(0.01 - 0.04)

*There were no reports from Wales

Table 4. Antimicrobial susceptibility for *Acinetobacter* spp. bacteraemia (England, Wales and Northern Ireland); 2011 to 2015

	2011		**2012**		**2013**		**2014**		**2015**	
	No. Tested	**% Resistant**	**No. Tested**	**% Resistant**	**No. Tested**	**% Resistant**	**No. Tested**	**% Resistant**	**No. Tested**	**% Resistant**
Gentamicin	561	8%	546	3%	618	4%	580	7%	689	4%
Ciprofloxacin	504	11%	504	8%	570	8%	539	7%	641	5%
Imipenem	102	13%	92	4%	104	5%	99	7%	114	5%
Meropenem	401	9%	413	4%	494	5%	478	5%	604	3%
Tobramycin	128	15%	112	8%	134	6%	132	10%	156	5%
Amikacin	250	8%	255	4%	311	3%	287	6%	327	2%
Colistin	120	3%	91	10%	102	5%	86	5%	105	2%
Total Reports*	**689**		**685**		**750**		**726**		**817**	

*An isolate can be tested against multiple treatments

The proportion of *Acinetobacter* spp. bacteraemia isolates that were resistant to ciprofloxacin decreased by 6% between 2011 and 2015 (11% to 5%; table 4). Similarly, the proportion of resistant isolates has fallen in other reported antibiotics; meropenem (6% decrease), imipenem (8% decrease), gentamicin (4% decrease), amikacin (6% decrease) and tobramycin (10% decrease) between 2011 and 2015. A further point of note, 2015 marks the lowest levels of resistance recorded for all of antibiotics tested with the exception of gentamicin.

Analyses on resistance to more than one antimicrobial were based on data extracted from the AMR module of SGSS. Single year pair-wise antimicrobial testing analysis revealed that 94% of *Acinetobacter baumanii/calcoaceticus* bloodstream isolates reported in England (148/157) had susceptibility results reported for both gentamicin and ciprofloxacin in 2015; 15% of which were resistant to both drugs (table 5a). Pair-wise tests carried out for gentamicin and a carbapenem[5] showed 43% (22/51) resistant to both antibiotics, although a lower proportion had susceptibility results for both antibiotics (32%). Ciprofloxacin and carbapenem were tested on 50 isolates, 48% were resistant to both, although approximately a third (32%) had susceptibility results for both antibiotics.

Twenty-nine (18%) *A. baumanii/calcoaceticus* bacteraemia isolates were tested for susceptibility to gentamicin, ciprofloxacin, a carbapenem and colistin; of those tested there were no incidences of multi-drug resistance to all four antibiotics (0%).

Pair-wise antimicrobial testing of *A. lwoffi* bacteraemia isolates found 94% (279/296) of isolates had susceptibility results reported for both gentamicin and ciprofloxacin and no cases of resistance were reported (0%; table 5b). Similarly, pair-wise testing for both gentamicin and a carbapenem found no cases of resistance to both antimicrobials (0%), although fewer isolates were tested (40/296; 14%). Of the *A. lwoffii* bacteraemia isolates tested for both ciprofloxacin and a carbapenem (40/296; 14%), one instance of resistance was reported (2.5%).

Four percent of *A. lwoffii* bacteraemia reports included susceptibility test results for each of gentamicin, ciprofloxacin, carbapenem and colistin; of those tested for all four, no reports of multi-drug resistance were reported (0%).

[5] Meropenem or imipenem

Table 5a. Pair-wise antimicrobial testing and resistance summary *A. baumanii/calcoaceticus* (England); 2015

Organism	Antimicrobial combinations	No. tested	% Resistant
A. baumanii/calcoaceticus	gentamicin and ciprofloxacin	148	15
A. baumanii/calcoaceticus	gentamicin and carbapenems*	51	43
A. baumanii/calcoaceticus	ciprofloxacin and carbapenems*	50	48

*imipenem or meropenem

Table 5b. Pair-wise antimicrobial testing and resistance summary *A. lwoffi* (England); 2015

Organism	Antimicrobial combinations	No. tested	% Resistant
A. lwoffi	gentamicin and ciprofloxacin	279	0
A. lwoffi	gentamicin and carbapenems*	40	0
A. lwoffi	ciprofloxacin and carbapenems*	40	1

*imipenem or meropenem

Microbiology services

For advice on treatment of antibiotic-resistant infections due to these opportunistic pathogens or for reference services including species identification and confirmation of sensitivity testing results, laboratories should contact the Medical Microbiologists at PHE's Bacteriology Reference Department at Colindale on colindalemedmicro@phe.gov.uk and PHE's Antimicrobial Resistance and Healthcare Associated Infections (AMRHAI) Reference Unit in London [7].

Acknowledgements

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. The support from colleagues within Public Health England, and the PHE ARMHAI Reference Unit, in particular, is valued in the preparation of the report. Feedback and specific queries about this report are welcome and can be sent to hcai.amrdepartment@phe.gov.uk.

References

1. Office for National Statistics (ONS) mid-year population estimates for England, Wales and Northern Ireland
2. ONS. Births in England and Wales, 2014. Statistical Bulletin. Published July 2015
3. Turton *et al..* Genes Encoding OXA-134-Like Enzymes Are Found in *Acinetobacter lwoffii* and *A. schindleri* and Can Be Used for Identification. *J Clin Microbiol* 48:1445-1449)
4. PHE. Voluntary surveillance of *Acinetobacter* spp. bacteraemia in England, Wales and Northern Ireland: 2014. *Health Protection Report* 2015; 9(10): infection report.
5. PHE. English surveillance programme for antimicrobial utilisation and resistance (ESPAUR) Report 2015.
6. Department of Health. UK 5-year Antimicrobial Resistance (AMR) Strategy 2013-2018
7. Antimicrobial Resistance and Healthcare Associated Infections Reference Unit (AMRHAI), https://www.gov.uk/amrhai-reference-unit-reference-and-diagnostic-services.