UK Health Security Agency

Laboratory surveillance of *Acinetobacter* spp. bacteraemia in England 2020

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Contents

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These analyses are based on data relating to diagnosis of *Acinetobacter* spp. bacteraemia between 2009 and 2020 reported by laboratories in England.

Voluntary surveillance data for England was extracted on 18 October 2021 from the UK Health Security Agency's (UKHSA, formerly Public Health England (PHE)) Second Generation Surveillance System (SGSS).

SGSS comprises a communicable disease module (CDR, formerly CoSurv/LabBase2) and a separate comprehensive antimicrobial resistance module (AMR, formerly AmSurv). The majority of analyses presented are based on data from the CDR module of SGSS. The exceptions are the analyses of antibiotic resistance among *Acinetobacter baumannii* and *Acinetobacter lwoffii* from bacteraemia, which 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, this data cannot be used for trend analysis due to the addition of this data collection being relatively recent.

Rates of laboratory reported bacteraemia were calculated using mid-year resident population estimates for the respective year and geography. Geographical analyses were based on the patient's residential postcode. Where this information was unknown, the postcode of the patient's General Practitioner was used or failing that, the postcode of the reporting laboratory was used. Cases were further assigned to 9 regions, formed from the administrative local authority boundaries.

The following report includes analyses on the temporal trends, age and sex distribution, and geographical distribution of *Acinetobacter* spp. bacteraemia cases in England. Single agent antimicrobial susceptibility trends since 2016 are reported for England based on SGSS AMR data, respectively. A web appendix is available featuring the findings of this report including only data submitted to SGSS from laboratories in England.

It should be noted that the data presented here for earlier years may differ from those in previous publications due to the inclusion of late reports

Main points

The principal findings of this report are that:

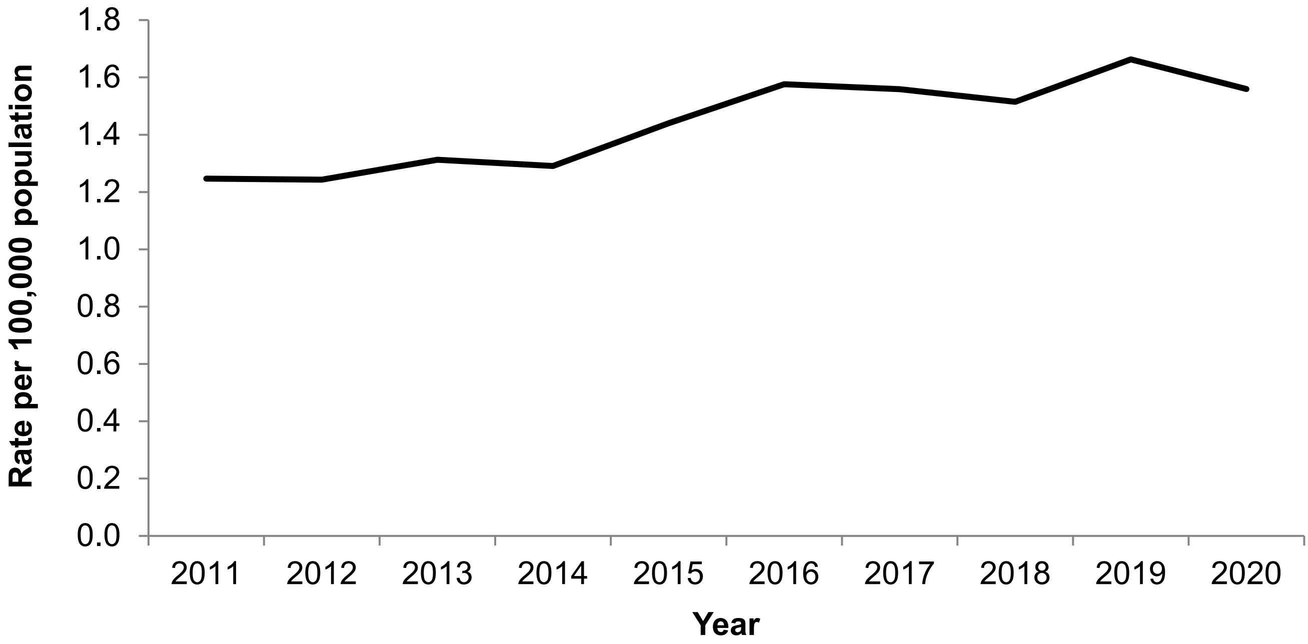
- between 2011 and 2020, the overall incidence rate of *Acinetobacter* spp. bacteraemia in England ranged between 1.25 and 1.66 per 100,000 population, generally rising slightly each year
- from 2019 to 2020, the rate of *Acinetobacter* spp. bacteraemia in England fell slightly from 1.66 per 100,000 population to 1.56 per 100,000 population
- in 2020, the highest rate of *Acinetobacter* spp. bacteraemia was reported in the North West (2.05 out of 100,000 population) and the lowest rate was reported in the North East (0.97 per 100,000 population)
- infants continued to have the highest incidence rate of *Acinetobacter* spp. bacteraemia in 2020 (8.2 out of 100,000 population) followed by adults aged 75 years and older (4.2 out of 100,000)
- in 2020, 82% of *Acinetobacter* spp. isolates were identified to species level, an increase from 79% in 2019
- the 2 most frequently identified *Acinetobacter* species causing bacteraemia in 2020 were *A. lwoffii* (30%) and *A. baumannii* (19.5%)
- for *A. lwoffii*, the resistance percentages were generally low in 2020, ranging between 0 and 8% in 2020

Trends

The rate of bacteraemia caused by *Acinetobacter* spp. in England increased steadily between 2011 and 2019, from 1.25 per 100,000 population in 2011 to 1.66 per 100,000 population in 2019 (an increase of 32.8%). As shown in Figure 1, a slight drop was noted between 2019 and 2020, with the rate of *Acinetobacter* spp. bacteraemia falling to 1.56 per 100,000 population (a decrease of 6.2%).

The observed increase in *Acinetobacter* spp. bacteraemia since 2014 may partially be due to increased reporting following the launch of UKHSA's Second Generation Surveillance System (SGSS) in 2014. The decreased rates of *Acinetobacter* spp. bacteraemia (and other key organisms, described further in the English Surveillance Programme for Antimicrobial Utilisation and Resistance report 2020 to 2021) seen in 2020 is likely due, at least in part, to the coronavirus (COVID-19) pandemic. This resulted in reduced contact between individuals and overall fewer interactions with the healthcare system, although the underlying causes of reductions in bacteraemia rates are likely to be complex and multifactorial. In 2020, there were significant changes in hospital patient admissions such as the cancellation of elective surgery, which may have resulted in a possible decline in surgical site and other hospital-onset infections.

Figure 1. Rate of *Acinetobacter* spp. bacteraemia per 100,000 population in England: 2011 to 2020



Geographical distribution

In 2020, the rate of *Acinetobacter* spp. bacteraemia across England was 1.56 per 100,000 population, a decrease of 3.3% since 2016 and a decrease of 23.2% from 2019 (Table 1). From a public health perspective, England is split into constituent geographical areas. In 2020, the incidence rate of *Acinetobacter* spp. varied by regional area, ranging from 0.97 per 100,000 population in the North East to 2.05 per 100,000 population in the North West (Figure 2).

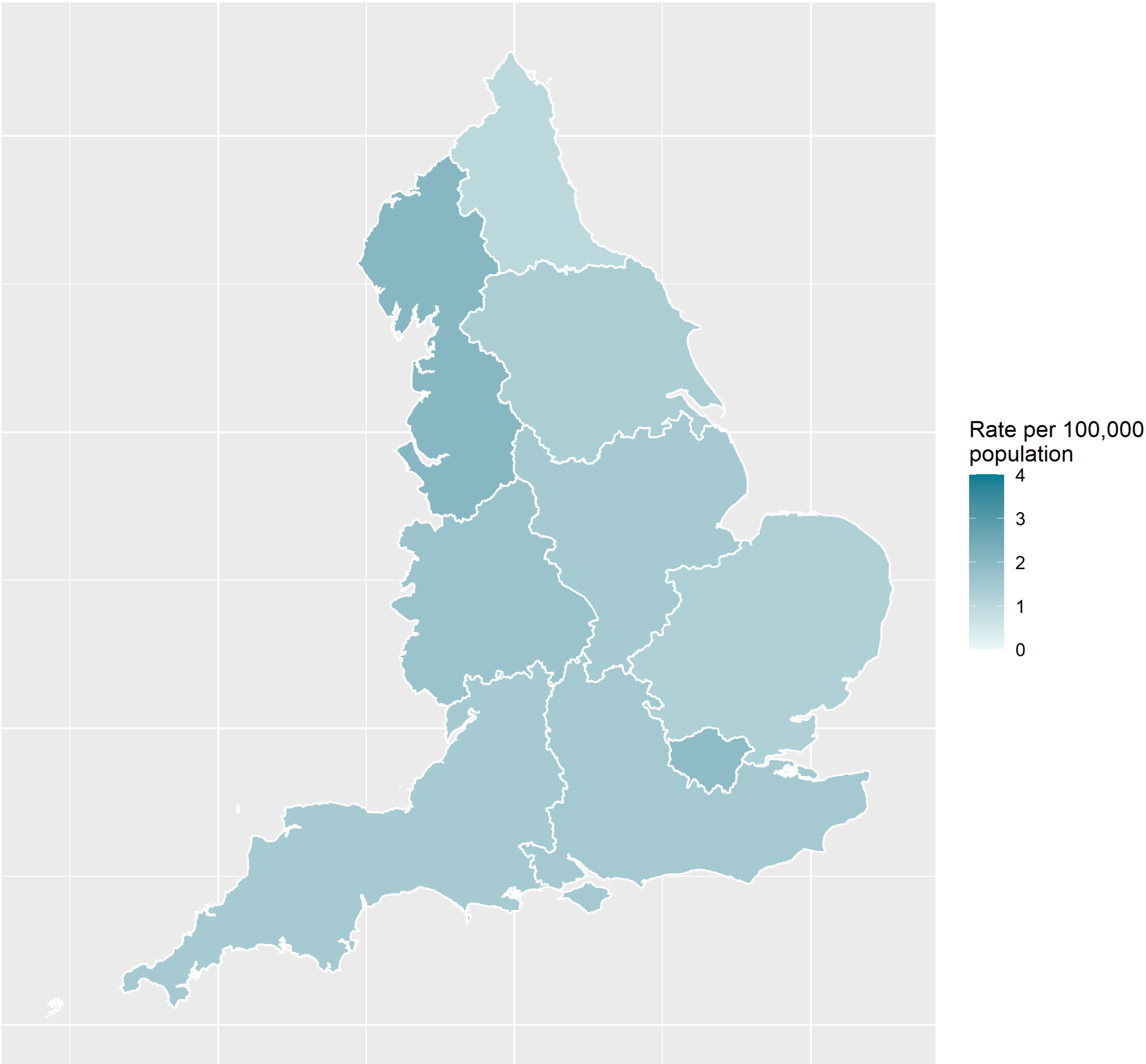
Differences between geographical areas may account for the variation observed. These include completeness of reporting, local outbreaks, as well as differences in the resident populations and distribution of specialist care units.

Table 1. *Acinetobacter* spp. bacteraemia per 100,000 population by region (England): 2016 to 2020

Region	Centre	Rate per 100,000 population				
		2016	2017	2018	2019	2020
North of England	North East	1.52	1.21	1.39	1.39	0.97
	Yorkshire and Humber	1.09	1.47	1.26	1.38	1.30
	North West	1.57	1.28	1.15	1.89	2.05
Midlands and East of England	West Midlands	1.67	1.71	1.42	1.23	1.64
	East Midlands	1.55	1.53	1.44	1.47	1.44
	East of England	1.63	1.51	1.42	1.67	1.25
London	London	1.88	1.72	2.01	2.14	1.91
South of England	South West	1.16	1.53	1.27	1.66	1.44
	South East	1.78	1.76	1.84	1.64	1.45
England		1.58	1.56	1.51	1.66	1.56

The rate of *Acinetobacter* spp. bacteraemia by regional area has fluctuated over the 5-year period 2016 to 2020, with no single geographic region continuously reporting the highest or lowest rates (Table 1). However, the London region has reported either the highest or second highest rate for the last 5 years, ranging from 1.72 to 2.14 per 100,000 population. In addition, a sharp increase was observed in the North West between 2018 and 2019, with the rate of bacteraemia rising from 1.15 per 100,000 population to 1.89 per 100,000 population. This increase continued into 2020, with a rate of 2.05 per 100,000 population. The North West along with the West Midlands were the only 2 regions to have experienced an increase in *Acinetobacter* spp. rates between 2019 and 2020.

Figure 2. Geographical distribution of *Acinetobacter* spp. bacteraemia rates per 100,000 population (England) 2020



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Species distribution

In 2020, 82% (725 out of 882) of *Acinetobacter* spp. isolates were identified to species level, an improvement compared to 2019 (when 79% (739 out of 937) of isolates were identified to a species level, see Table 2). Consistent with previous reports, the 2 most frequently identified *Acinetobacter* species causing bacteraemia in 2020 were *A. lwoffii* (30%) and *A. baumannii* (19.5%). Since 2016, the proportion of *Acinetobacter* spp. identified as *A. lwoffii* has decreased in frequency (falling from 35.6%) whereas *A. baumannii* has remained relatively stable (between 17.6% and 19.7%).

In comparison with other organism categories causing bacteraemia, *A. lwoffii* were ranked 51st in the monomicrobial and 50th in the polymicrobial bacteraemia 2020 summary tables. *A. baumannii* were ranked 73rd and 49th, respectively in the monomicrobial and polymicrobial ranking.

There has been a significant rise in the frequency of *A. ursingii* identification in recent years, and this continued in 2019 and 2020, where *A. ursingii* accounted for 9.8% and 11.9% of species, respectively. This rise likely reflects the increased use of MALDI-TOF analysis. Previous routine methods of identification would have been unlikely to identify *A. ursingii* successfully, with isolates likely to have been recorded as '*Acinetobacter* spp., species not recorded'.

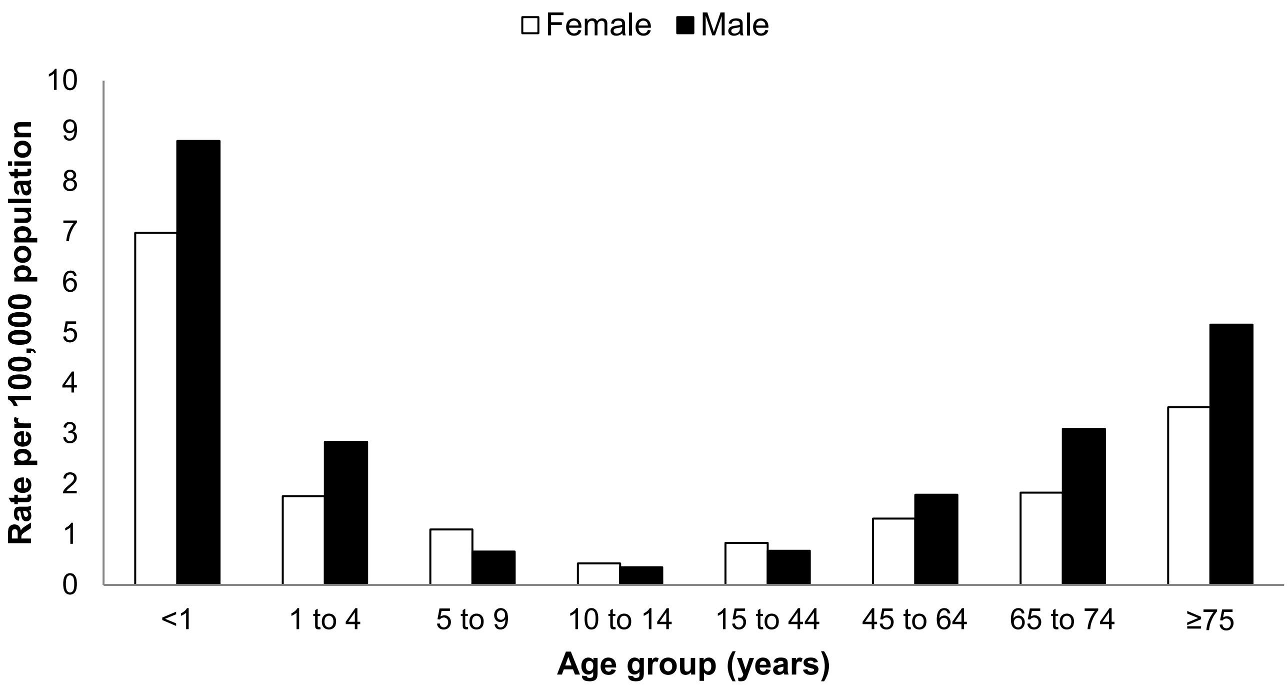
Table 2. Episodes of Acinetobacter spp. bacteraemia by species (England) 2016 to 2020

Species	2016		2017		2018		2019		2020	
	No.	%	No.	%	No.	%	No.	%	No.	%
***Acinetobacter* spp.**	**873**	**100**	**870**	**100**	**849**	**100**	**937**	**100**	**882**	**100**
A. baumannii / calcoaceticus	175	20	170	20	150	18	175	19	188	21
A. haemolyticus	8	1	15	2	10	1	6	1	6	1
A. johnsonii	31	4	29	3	36	4	28	3	31	4
A. junii	30	3	29	3	29	3	23	2	20	2
A. lwoffii	311	36	282	32	279	33	317	34	265	30
A. nosocomialis	1	<1	1	<1	3	<1	7	1	6	1
A. parvus	4	<1	4	<1	6	1	5	1	6	1
A. pittii	10	1	17	2	37	4	18	2	23	3
A. radioresistens	17	2	19	2	16	2	28	3	33	4
A. ursingii	51	6	79	9	81	10	92	10	105	12
Acinetobacter spp., other named*	58	7	26	3	26	3	40	4	41	5
Acinetobacter spp., sp. not recorded	177	20	199	23	176	21	198	21	157	18

* Including A. *beijerinckii, A. bereziniae, A. dijkshoorniae, A. dispersus, A. guillouiae, A. gyllenbergii, A. proteolyticus, A. schindleri, A. towneri, A. variabiliss.*

Age and sex distribution

Figure 3. *Acinetobacter* spp. bacteraemia rates by age and sex (England) 2020



As in previous years, the prevalence of *Acinetobacter* spp. bacteraemia was highest among the youngest and eldest members of the population. Infants under 1 year of age had the highest rate of bacteraemia (7.0, 8.8 and 8.2 per 100,000 population in females, males and overall, respectively) followed by those over 75 years old (3.5, 5.2 and 4.2 per 100,000 population respectively in females, males and overall, respectively, see Figure 3). A similar age pattern was noted for both sexes, although the rate was generally higher among males than females. In those aged between 5 and 44 years old, who had the lowest rates of bacteraemia, females had a slightly higher rate than males.

Antimicrobial resistance

Antimicrobial resistance of *Acinetobacter* spp. to colistin has been identified by the Department of Health and Social Care expert Advisory Committee on Antimicrobial Prescribing, Resistance and Healthcare Associated Infection (APRHAI) as a key drug and bug combination, since colistin is considered a first-line antibiotic for the treatment of multidrug-resistant *Acinetobacter* spp. and features in the English Surveillance Programme for Antimicrobial Utilisation and Resistance (ESPAUR) annual report. In 2020, there were too few colistin susceptibility results for both *A. baumannii/calcoaceticus* (5 tests) and *A. lwoffii* (2 tests) to get a clear understanding of colistin resistance (Table 3). The limited number of tested isolates may be explained as colistin is generally only used for treatment of MDR *Acinetobacter* spp. infections (a last line treatment option) and so is less likely to be considered for routine testing, or may in part be due to the problems associated with accurate detection of resistance in susceptibility tests, unless MICs are determined by broth microdilution [1].

Of the other key antibiotics, the percentage of resistant isolates in *A. baumannii/calcoaceticus* bacteraemia ranged between 9 and 21% in 2020 (meropenem and piperacillin/tazobactam, respectively, see Table 3a). Large changes noted in susceptibility to ciprofloxacin since 2018 are primarily due to changes in the breakpoints classifying susceptible (S) and susceptible increased exposure (S,IE; intermediate susceptibility test results) [2]. Compared to *A. baumannii/calcoaceticus*, the resistance percentages in *A. lwoffii* bacteraemia isolates were comparatively lower, ranging between 0 and 8% in 2020 (Table 3b).

Resistance data for more than a single antimicrobial agent for *A. baumannii/calcoaceticus* and *A. lwoffii* bacteraemia is presented in Tables 4a and 4b. In 2020, 155 pair-wise tests carried out for gentamicin and a carbapenem (imipenem or meropenem) in *A. baumanii/calcoaceticus* showed 7% resistance to both antibiotics, a slight increase from the 5% resistance seen in 2019. Ciprofloxacin and a carbapenem were tested on 146 *A. baumannii/calcoaceticus* isolates, with 8% resistant to both antimicrobials. For *A. lwoffii* bacteraemia isolates tested pairwise for antimicrobial susceptibilities for gentamicin, carbapenem, ciprofloxacin and colistin, there were no isolates recorded as resistant for any pairwise combination in 2020 (Table 4b).

Table 3a. Antimicrobial susceptibility for *Acinetobacter baumannii/calcoaceticus* bacteraemia (England) 2016 to 2020

Antimicrobial agent	2016			2017			2018			2019			2020		
	S (%)	S, IE (%)	R (%)	S (%)	S, IE (%)	R (%)	S (%)	S, IE (%)	R (%)	S (%)	S, IE (%)	R (%)	S (%)	S, IE (%)	R (%)
gentamicin	91	0	9	86	0	14	86	0	14	88	0	12	90	0	10
ciprofloxacin	85	2	14	84	3	13	88	0	12	74	12	14	50	35	15
imipenem	81	0	19	82	0	18	85	0	15	85	2	12	88	0	13
meropenem	90	2	7	87	2	11	89	1	9	90	2	8	89	2	9
colistin	100	0	0	100	0	0	94	0	6	90	0	10	80	0	20
piperacillin/tazobactam	77	7	16	73	12	15	78	1	21	70	5	25	76	3	21

S = susceptible; S, IE = susceptible (susceptible, increased exposure); R = resistant

Table 3b. Antimicrobial susceptibility for *Acinetobacter lwoffii* bacteraemia (England) 2016 to 2020

Antimicrobial agent	2016			2017			2018			2019			2020		
	S (%)	S, IE (%)	R (%)	S (%)	S, IE (%)	R (%)	S (%)	S, IE (%)	R (%)	S (%)	S, IE (%)	R (%)	S (%)	S, IE (%)	R (%)
gentamicin	100	0	0	99	0	1	100	0	0	98	0	2	100	0	0
ciprofloxacin	98	0	2	97	0	3	99	0	1	78	17	5	65	30	4
imipenem	100	0	0	100	0	0	100	0	0	100	0	0	100	0	0
meropenem	100	0	0	99	1	1	99	0	1	98	1	2	99	0	1
colistin	100	0	0	100	0	0	83	0	17	100	0	0	100	0	0
piperacillin/tazobactam	96	0	4	95	2	3	97	0	3	92	1	7	92	0	8

S = susceptible; S, IE = intermediate (susceptible, increased exposure); R = resistant.

Table 4a. Multi-drug antimicrobial testing and resistance summary for A. baumannii/calcoaceticus bacteraemia (England) 2016 to 2020

Antimicrobial agent	2016		2017		2018		2019		2020	
	No. tested	R (%)	No. tested	R (%)	No. tested	R (%)	No. tested	R (%)	No. tested	R (%)
gentamicin and ciprofloxacin	166	9	176	11	142	8	154	8	146	10
gentamicin and carbapenems*	166	6	176	11	146	6	157	5	155	7
gentamicin and colistin	32	0	32	0	16	6	10	0	6	17
ciprofloxacin and carbapenems*	163	7	178	10	141	9	153	8	146	8
ciprofloxacin and colistin	32	0	33	0	15	7	11	9	6	17
carbapenems* and colistin	32	0	33	0	14	7	11	9	6	17

*meropenem or imipenem

Table 4b. Multi-drug antimicrobial testing and resistance summary for A. lwoffii bacteraemia (England) 2016 to 2018

Antimicrobial agent	2016		2017		2018		2019		2020	
	No. tested	R (%)	No. tested	R (%)	No. tested	R (%)	No. tested	R (%)	No. tested	R (%)
gentamicin and ciprofloxacin	304	0	273	0	279	0	289	1	203	0
gentamicin and carbapenems*	294	0	271	0	288	0	311	1	219	0
gentamicin and colistin	39	0	18	0	6	0	6	0	2	0
ciprofloxacin and carbapenems*	294	0	272	0	282	0	293	1	200	0
ciprofloxacin and colistin	37	0	19	0	5	0	7	0	1	0
carbapenems* and colistin	39	0	19	0	6	17	7	0	2	0

*meropenem or imipenem

Microbiology services

For reference services, including species identification and confirmation of susceptibility testing results, laboratories should contact UKHSA's Antimicrobial Resistance and Healthcare Associated Infections (AMRHAI) Reference Unit in London.

Acknowledgements

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2. European Committee on Antimicrobial Susceptibility Testing. 'Clinical breakpoints - breakpoints and guidance'

About the UK Health Security Agency

The UK Health Security Agency is an executive agency, sponsored by the Department of Health and Social Care.

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