

Acinetobacter spp bacteraemia, England, Wales, and Northern Ireland: 2003

Key points:

- In 2003, 1087 reports of bacteraemia attributed to *Acinetobacter* spp were made in England, Wales, and Northern Ireland, a 6% increase on 2002.
- Almost half (47%) of these isolates were not fully speciated, although this figure varied across regions.
- Ascertainment of antimicrobial susceptibility improved in 2003 for the majority of antibiotics, compared with 2002.
- Resistance among *Acinetobacter* spp isolates varied according to the species, antimicrobial agent, and geographic location.
- Multi-drug resistant (MDR) isolates have been increasingly reported. One measure of this increase is the number of isolates resistant to gentamicin, ciprofloxacin, ceftazidime, and imipenem and/or meropenem. There were 22 MDR isolates in 2003 compared to seven isolates in 2002.

Introduction

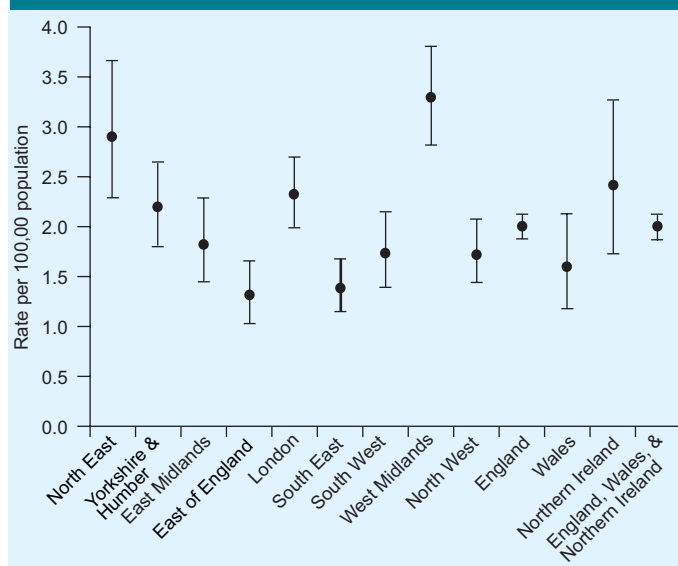
This report describes *Acinetobacter* spp isolated from blood specimens by laboratories in England, Wales, and Northern Ireland and reported via a voluntary surveillance system in 2003. Age and region-specific rates were calculated using 2003 mid-year resident population estimates. STATA* statistical software was used to calculate 95% confidence intervals. Regional analyses were carried out according to the English regional boundaries introduced in April 2002. Where antibiotic resistance is given as a percentage, it is always as a percentage of reports including susceptibility information.

Acinetobacter spp

There were 1087 reports made of *Acinetobacter* spp bacteraemia in England, Wales, and Northern Ireland in 2003 (table 1). Of these, almost half (47%; 515/1087) were not identified to the species level. Full identification needs molecular methods that are not routinely available. Of those that were speciated, 32% of the reports indicated *A. baumannii/calcoaceticus* and 16% *A. lwoffii*. The remainder were *A. haemolyticus*, *A. johnsonii*, and *A. junii*, although the accuracy of these species breakdowns is questionable. There is regional variation in *Acinetobacter* speciation. The percentage of *Acinetobacter* with no indication of species varied from 24% to 62% of total reports across regions (table 2).

Across regions, rates of *Acinetobacter* spp bacteraemia varied between 1.32 and 3.29 per 100,000 population (figure 1). Laboratory ascertainment rates ranged from 58% to 100% across regions (table 3). *A. baumannii/calcoaceticus* is not ubiquitous and would usually be reported by hospitals with specialist burns units and

Figure 1 Region-specific rates* of *Acinetobacter* spp bacteraemia, England, Wales, and Northern Ireland: 2003



*Rates calculated using 2003 mid-year population estimates

Table 1 Laboratory reports of *Acinetobacter* spp bacteraemia, England, Wales, and Northern Ireland: 2002-2003

	Number of reports	
	2002	2003
Acinetobacter spp	1026	1087
<i>Acinetobacter</i> not fully identified	490	515
<i>Acinetobacter baumannii</i>	288	310
<i>Acinetobacter calcoaceticus</i>	35	36
<i>Acinetobacter haemolyticus</i>	17	24
<i>Acinetobacter johnsonii</i>	2	1
<i>Acinetobacter junii</i>	24	24
<i>Acinetobacter lwoffii</i>	170	177

*Stata Statistical software: release 8.2. College Station, Texas, Stata Corporation, 2001.

Table 2 Laboratory reports of *Acinetobacter* spp bacteraemia by region and species, England, Wales, and Northern Ireland: 2003

Region Name	<i>Acinetobacter</i> not fully identified (%)	<i>A. baumannii</i> and <i>A. calcoaceticus</i> (%)	<i>A. lwoffii</i> (%)	<i>A. haemolyticus</i> , <i>A. junii</i> , and <i>A. johnsonii</i> (%)	<i>Acinetobacter</i> spp total
North East	18 (24)	38 (51)	12 (16)	6 (8)	74
Yorkshire & Humber	42 (38)	48 (44)	13 (12)	7 (6)	110
East Midlands	48 (62)	15 (19)	12 (15)	3 (4)	78
East of England	35 (49)	17 (24)	20 (28)	– (–)	72
London	92 (53)	56 (33)	19 (11)	5 (3)	172
South East	47 (42)	40 (35)	22 (19)	4 (4)	113
South West	35 (40)	30 (34)	12 (14)	10 (11)	87
West Midlands	107 (61)	35 (20)	26 (15)	7 (4)	175
North West	56 (47)	39 (33)	19 (16)	4 (3)	118
England	480 (48)	318 (32)	155 (16)	46 (5)	999
Wales	14 (30)	14 (30)	17 (36)	2 (4)	47
Northern Ireland	21 (51)	14 (34)	5 (12)	1 (2)	41
England, Wales, and Northern Ireland	515 (47)	346 (32)	177 (16)	49 (5)	1087

intensive therapy unit (ITUs), which could partially account for the reduced ascertainment in some regions. The full extent of under-reporting is unclear in all regions as these reports are from the voluntary surveillance system.

Antibiotic susceptibility

The number of laboratories that provided antibiotic susceptibility information along with *Acinetobacter* spp bacteraemia reports varied across regions (table 3). Gentamicin was the most commonly reported antibiotic followed by ciprofloxacin for both *A. baumannii*/*A. calcoaceticus*, and *A. lwoffii* isolates (table 4). Testing for all antibiotics increased on 2002 with the exception of imipenem. As laboratories generally report either imipenem or meropenem, antibiotic testing increases from 23%-27% to 50% in *A. baumannii*/*A. calcoaceticus* isolates and from 18%-24% to 41% in

A. lwoffii isolates when reports for imipenem and/or meropenem are combined.

Resistance levels were higher in *A. baumannii*/*A. calcoaceticus* bacteraemia isolates compared with *A. lwoffii* isolates. Resistance to gentamicin was reported in 23% of reports where gentamicin susceptibility information was given for *A. baumannii*/*A. calcoaceticus* isolates compared to a level of 2% in *A. lwoffii* isolates. Higher ciprofloxacin, ceftazidime, cefotaxime, and carbapenem resistance levels were all shown in *A. baumannii*/*A. calcoaceticus* isolates. There were no reports of amikacin, tobramycin, imipenem, and meropenem resistance in *A. lwoffii* isolates, although the number of reports with susceptibility information for these antibiotics was fairly low.

Ascertainment of antimicrobial susceptibilities varied across regions. The number of laboratories not testing/reporting gentamicin in *A. baumannii*/*A. calcoaceticus* isolates was 10 (100%) in the North East, 14 (78%) in Yorkshire & Humber, 7 (88%) in East Midlands, 18 (100%) in East of England, 15 (79%) in London, 15 (75%) in South East, 13 (76%) in South West, 15 (83%) in West Midlands, and 17 (81%) in North West.

Table 3 Laboratory and susceptibility ascertainment data for *Acinetobacter* spp bacteraemia reports, England, Wales, and Northern Ireland: 2003

Region	Number of laboratories*	Number reporting <i>Acinetobacter</i> spp bacteraemias (%)	Number reporting susceptibility information for <i>Acinetobacter</i> spp bacteraemias† (%)
North East	11	10 (91)	10 (100)
Yorkshire & Humber	21	18 (86)	14 (78)
East Midlands	11	8 (73)	7 (88)
East of England	18	18 (100)	18 (100)
London	32	19 (59)	15 (79)
South East	29	20 (69)	15 (75)
South West	18	17 (94)	13 (76)
West Midlands	20	18 (90)	15 (83)
North West	31	21 (68)	17 (81)
England	191	149 (78)	124 (83)
Wales	14	11 (79)	5 (45)
Northern Ireland	12	7 (58)	3 (43)

*Provisional data. †As a percentage of total reports from specified region/

Table 4 Susceptibility reports for *A. baumannii*/*A. calcoaceticus*, and *A. Iwoffii*, England, Wales, and Northern Ireland: 2002-2003

	2002					2003				
	Resistant* (%)	Sensitive	No Information†	(%)	Total reports	Resistant* (%)	Sensitive	No Information†	(%)	Total reports
<i>A. baumannii/ A. calcoaceticus</i>										
Gentamicin	43 (21)	161	119	(37)	323	53 (23)	182	111	(32)	346
Amikacin	5 (19)	22	296	(92)		9 (11)	75	262	(76)	
Tobramycin	2 (29)	5	316	(98)		6 (12)	45	295	(85)	
Ciprofloxacin	65 (36)	116	142	(44)		69 (30)	160	117	(34)	
Imipenem	7 (7)	96	220	(68)		6 (7)	75	265	(77)	
Meropenem	3 (5)	54	266	(82)		3 (3)	92	251	(73)	
Ceftazidime	68 (48)	74	181	(56)		92 (52)	84	170	(49)	
Cefotaxime	41 (66)	21	261	(81)		96 (80)	24	226	(65)	
<i>A. Iwoffii</i>										
Gentamicin	3 (3)	108	59	(35)	170	2 (2)	129	46	(26)	177
Amikacin	1 (8)	11	158	(93)		- (-)	39	138	(78)	
Tobramycin	- (-)	5	165	(97)		- (-)	11	166	(94)	
Ciprofloxacin	4 (4)	96	70	(41)		5 (4)	111	61	(34)	
Imipenem	1 (2)	47	122	(72)		- (-)	43	134	(76)	
Meropenem	- (-)	21	149	(88)		- (-)	32	145	(82)	
Ceftazidime	13 (19)	55	102	(60)		17 (23)	56	104	(59)	
Cefotaxime	12 (25)	36	122	(72)		16 (26)	46	115	(65)	

*As a percentage of reports with susceptibility information. †As a percentage of total reports.

Table 5 Antibiotic susceptibility data for *A. baumannii* and *A. calcoaceticus* bacteraemias, England, Wales, and Northern Ireland: 2003

Region/ Country	Gentamicin			Ciprofloxacin			Ceftazidime			Imipenem			Total reports
	Resistant* (%)	Sensitive	No Information† (%)	Resistant* (%)	Sensitive	No Information† (%)	Resistant* (%)	Sensitive	No Information† (%)	Resistant* (%)	Sensitive	No Information† (%)	
North East	3 (10)	27	8 (21)	7 (23)	23	8 (21)	12 (40)	18	8 (21)	1 (20)	4	33 (87)	38
Yorkshire & Humber	7 (28)	18	23 (48)	8 (33)	16	24 (50)	7 (44)	9	32 (67)	- (-)	9	39 (81)	48
East Midlands	1 (8)	12	2 (13)	3 (23)	10	2 (13)	6 (50)	6	3 (20)	- (-)	8	7 (47)	15
East of England	3 (18)	14	- (-)	8 (50)	8	1 (6)	6 (40)	9	2 (12)	- (-)	5	12 (71)	17
London	17 (40)	25	14 (25)	16 (40)	24	16 (29)	22 (69)	10	24 (43)	5 (50)	5	46 (82)	56
South East	9 (36)	16	15 (38)	9 (36)	16	15 (38)	10 (45)	12	18 (45)	- (-)	9	31 (78)	40
South West	7 (30)	16	7 (23)	11 (46)	13	6 (20)	11 (50)	11	8 (27)	- (-)	6	24 (80)	30
West Midlands	3 (13)	21	11 (31)	6 (35)	11	18 (51)	5 (56)	4	26 (74)	- (-)	2	33 (94)	35
North West	2 (8)	24	13 (33)	1 (4)	26	12 (31)	4 (67)	2	33 (85)	- (-)	17	22 (56)	39
Wales	1 (14)	6	7 (50)	- (-)	10	4 (29)	9 (100)	-	5 (36)	- (-)	7	7 (50)	14
Northern Ireland	- (-)	3	11 (79)	- (-)	3	11 (79)	- (-)	3	11 (79)	- (-)	3	11 (79)	14
Total	53 (23)	182	111 (32)	69 (30)	160	117 (34)	92 (52)	84	170 (49)	6 (7)	75	265 (77)	346

*As a percentage of reports with susceptibility information. †As a percentage of total reports.

A. calcoaceticus isolates varied between 0% and 48% across regions in England (table 5). Gentamicin resistance levels varied between 8% and 40% across regions in England. Ciprofloxacin susceptibility ascertainment ranged from 6% to 51% in English

regions with resistance levels varying from 4% to 50%. Ceftazidime susceptibility ascertainment ranged from 12% to 85% in English regions with resistance levels varying from 40% to 69%.

Acinetobacter spp bacteraemia isolates showing

Table 6 Multidrug resistant isolates in all *Acinetobacter* spp, England, Wales, and Northern Ireland: 2003-2003

Isolate type	2002	2003	% increase
Isolates resistant to all 3 of Gentamicin, Ciprofloxacin, & Ceftazidime	42	75	(79)
Isolates resistant to all 4 of Gentamicin, Ciprofloxacin, Ceftazidime, & Imipenem/ Meropenem	7	22	(214)

multi-drug resistance patterns are shown in table 6. In 2003 there were 22 isolates resistant to all four of gentamicin, ciprofloxacin, ceftazidime, and imipenem and/or meropenem. Eight of these isolates were identified as *A. baumannii* with the remaining isolates not identified to species level. This is a 214% increase on 2002 when only seven isolates were reported resistant to all four antibiotics. As a proportion of total *Acinetobacter* spp bacteraemia isolates reported, these multi-drug resistant isolates accounted for 0.68% in 2002 and 2% in 2003. There is also a 79% increase in the number of isolates resistant to all three of gentamicin, ciprofloxacin, and ceftazidime (75 in 2003 compared to 42 in 2002). These multi-drug resistant isolates accounted for 4% of total *Acinetobacter* spp bacteraemia reports in 2002 and 7% in 2003.

Age distributions

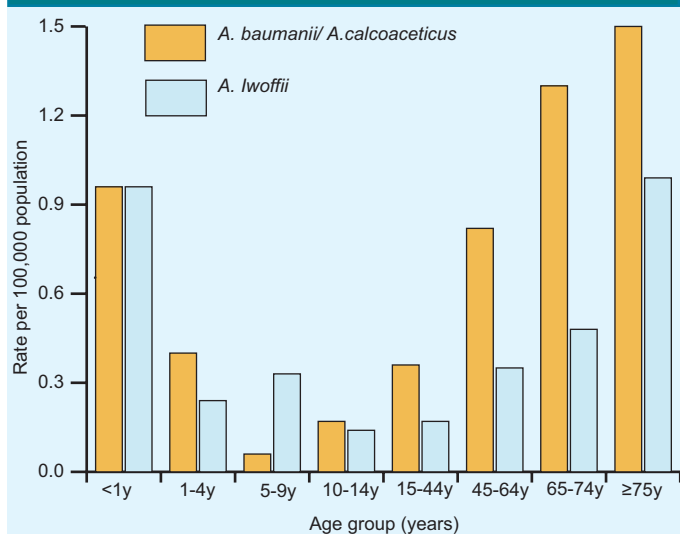
Rates of *Acinetobacter* spp bacteraemia were highest in those aged under one year and those aged 45 years and over (figure 2). *A. baumannii/A. calcoaceticus* predominated as the causative agent in the older age groups, being highest in those from the 15 to 44 years age group and over. Rates of *A. lwoffii* bacteraemia are similar to those of *A. baumannii/A. calcoaceticus* bacteraemia in the 10 to 14 years age group.

Discussion

The number of reports of *Acinetobacter* spp bacteraemia increased by 6% between 2002 and 2003, a smaller rate of increase than between 2001 and 2002, which saw an 8% increase (1) and between 2000 and 2001 (23% increase excluding Northern Ireland) (2). Between 2002 and 2003 the rate of *Acinetobacter* spp bacteraemia in England, Wales, and Northern Ireland increased insignificantly from 1.91 to 1.99 per 100,000 population. Within regions, rates fluctuated from 2002 to 2003. The increase in the *Acinetobacter* spp rate in the West Midlands is due to a 287% increase in number of reports from one laboratory between 2002 and 2003. In 2002, the laboratory accounted for 12% of the total reports from the West Midlands, whereas in 2003 it accounted for 33% of the total reports. Within the English regions, four other regions have rate increases and four have rate decreases between 2002 and 2003. This highlights how outbreaks in hospitals can skew the overall rates for an entire region.

Between 2002 and 2003, the proportion of *Acinetobacter* spp reports without information on

Figure 2 Age-specific rates* of *Acinetobacter* spp bacteraemia per 100,000 population, England, Wales, and Northern Ireland: 2003



*Rates calculated using 2003 mid-year resident population estimates

antimicrobial susceptibility fell for all antibiotics reviewed here. The proportion of *A. baumannii/A. calcoaceticus* reports without information on susceptibility to gentamicin fell from 37% to 32%. The proportion of resistant isolates increased by 2%. For ciprofloxacin, the proportion of *A. baumannii/A. calcoaceticus* reports without susceptibility information fell from 44% to 34%, and the level of resistance fell from 36% to 30%. This highlights that information received on antibiotic susceptibilities is vital to establish accurate resistant rates. As carbapenems are one of the treatment drugs of choice for *Acinetobacter* spp, it is imperative that the susceptibility reporting rate for imipenem and/or meropenem improves from 50% of total reports containing no information.

The increase in multi-drug resistant isolates from 2002 to 2003 is likely to be linked to an epidemic strain of *A. baumannii* identified by the Health Protection Agency's Laboratory of Healthcare Associated Infection (LHCAI) in 2003 (3). Of the 22 isolates showing multi-drug resistance to gentamicin, ciprofloxacin, ceftazidime, and imipenem and/or meropenem, 17 of them were found in five London hospitals, a result that reflects recent literature (4,5). The voluntary bacteraemia reporting system is failing to capture the full extent of highly multi-drug resistant strains circulating around London and the South East. The mainstay of treatment of serious infection with these multi-resistant strains of *A. baumannii* is polymyxin. There were, however, no susceptibility reports of polymyxin through the voluntary surveillance system. Other antibiotics showing good *in vitro* activity against *A. baumannii* include tigecycline (6) and sulbactam (tigecycline is presently in Phase III clinical trials and available for named patient records). Neither of these antibiotics are active against the main London and South East outbreak strain. A *CDR Weekly* news story on 5 January 2004 highlighted actions being taken by

the HPA in view of the increasing problem of multi-resistant *Acinetobacter* in the United Kingdom and the rest of Europe (5,7,8).

Acknowledgements

These reports would not be possible without the enduring weekly contributions from microbiology colleagues in laboratories across England, Wales, and Northern Ireland, without which there would be no surveillance data. Please send any comments/feedback to Andrew Pearson, email: Andrew.pearson@hpa.org or Amy Glasswell, email: amy.glasswell@hpa.org. In addition, the support from colleagues within the Health Protection Agency, Specialist and Reference Microbiology Division in particular, is valued in the preparation of the reports. These contributions are greatly appreciated.

Reference List

1. HPA. *Acinetobacter* spp and *Enterococcus* spp bacteraemia: England, Wales, and Northern Ireland, 2002. *Commun Dis Rep CDR Wkly* [serial online] 2003 [cited 17 November 2004]; **13**(29): Bacteraemia. Available at <<http://www.hpa.org.uk/cdr/PDFfiles/2003/cdr2903.pdf>>.
2. PHLS. *Acinetobacter* spp and *Enterococcus* spp bacteraemia: England and Wales, 2001. *Commun Dis Rep CDR Wkly* [serial online] 2002 [cited 17 November 2004]; **12**(29):Bacteraemia. Available at <<http://www.hpa.org.uk/cdr/PDFfiles/2002/cdr2902.pdf>>.
3. HPA. A prevalent strain of *Acinetobacter baumannii*. *Commun Dis Rep CDR Wkly* [serial online] 2003 [cited 17 November 2004]; **13**(29): News. Available at <<http://www.hpa.org.uk/cdr/PDFfiles/2003/cdr2903.pdf>>.
4. Turton JF, Kaufmann ME, Warner M, Coelho J, Dijkshoorn L, Van Der RT, *et al*. A prevalent, multiresistant clone of *Acinetobacter baumannii* in Southeast England. *J Hosp Infect* 2004; **58**:170-9.
5. Coelho J, Woodford N, Turton J, Livermore DM. Multiresistant *acinetobacter* in the UK: how big a threat? *J Hosp Infect* 2004; **58**:167-9.
6. Pachon-Ibanez ME, Jimenez-Mejias ME, Pichardo C, Llanos AC, Pachon J. Activity of Tigecycline (GAR-936) against *Acinetobacter baumannii* Strains, Including Those Resistant to Imipenem. *Antimicrob Agents Chemother* 2004; **48**:4479-81.
7. HPA. Multi-resistant *Acinetobacter baumannii*: update. *Commun Dis Rep CDR Wkly* [serial online] 2004 [cited 17 November 2004]; **14**(1): News. Available at <<http://www.hpa.org.uk/cdr/PDFfiles/2004/cdr0104.pdf>>.
8. Van Looveren M, Goossens H. Antimicrobial resistance of *Acinetobacter* spp in Europe. *Clin Microbiol Infect* 2004; **10**:684-704.