





# CDR WEEKLY

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## News

Last updated: 18 November 2004  
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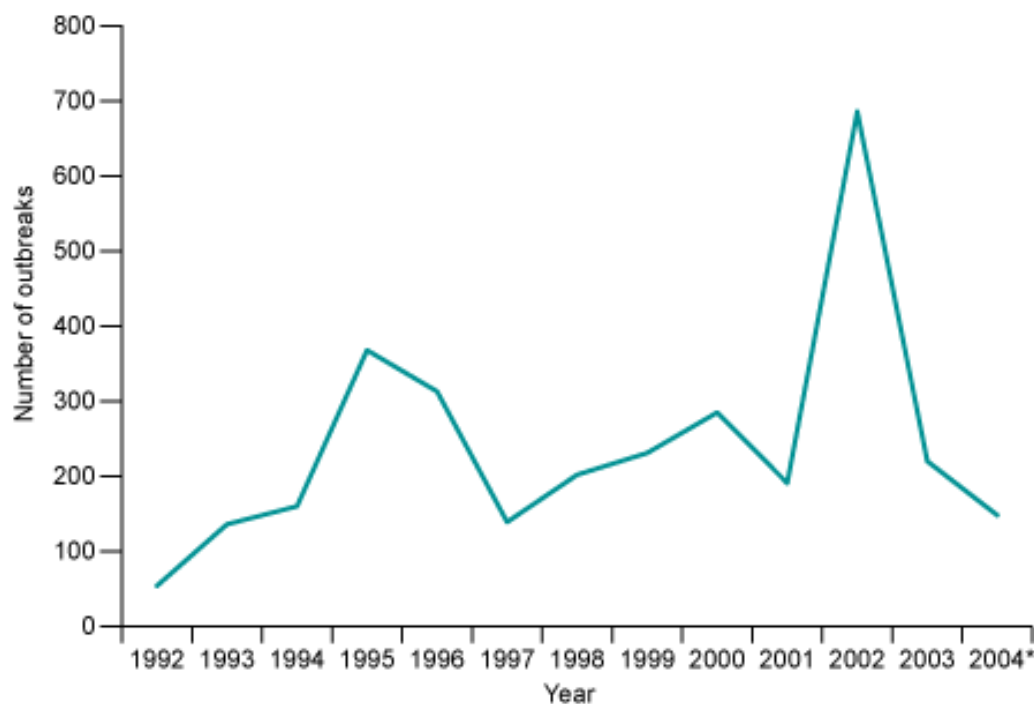
[Norovirus outbreaks in England and Wales : 2003 and 2004](#)

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### Norovirus outbreaks in England and Wales : 2003 and 2004

The Health Protection Agency's Communicable Disease Surveillance Centre (CDSC) has collected standardised data on general outbreaks of infectious intestinal disease (IID) since 1992 (1). Norovirus is the most common cause of IID in England (1,2). The number of outbreaks of IID due to norovirus varies, but is generally between 130 to 250 outbreaks each year. Two distinct peaks of norovirus activity occurred in England and Wales since 1992: one in 1995-96 with 368 outbreaks, and in 2002 there was an unusually high number of outbreaks (686) that coincided with the emergence of a new variant genogroup II 4 (3) (figure 1).

Figure 1 Norovirus outbreaks in England and Wales: 1992 to 2004



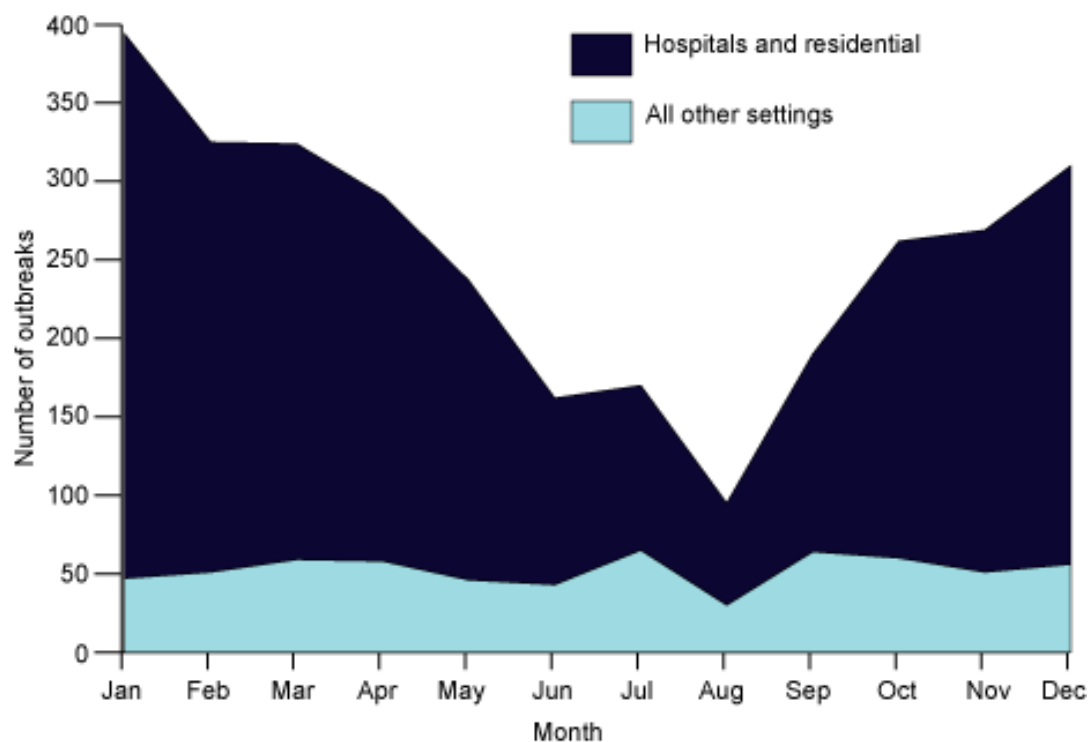
Provisional data\*

Seventy-nine per cent of all outbreaks reported have occurred in healthcare settings, either in hospitals or residential care homes. Hotels (7%) and schools (5%) are the next most frequent settings. Table 1 shows the mode of transmission and setting of norovirus outbreaks in England and Wales between 1992 and 2004.

**Table 1 Mode of transmission for norovirus outbreaks England and Wales : 1992 to 2004**

Outbreak setting	Number of Foodborne outbreaks (%)	Number of person-to-person outbreaks (%)	Number of other/unknown outbreaks (%)	Total
Food outlets	89 (58.2)	38 (24.8)	26 (17.0)	<b>153</b>
Hospitals	12 (0.9)	1222 (93.2)	77 (5.9)	<b>1311</b>
Residential homes	32 (2.7)	1066 (91.0)	74 (6.3)	<b>1172</b>
Schools	4 (2.8)	129 (89.0)	12 (8.3)	<b>145</b>
Hotels	51 (23.8)	140 (65.4)	23 (10.7)	<b>214</b>
Other	39 (28.3)	88 (63.8)	11 (8.0)	<b>138</b>
<b>Total</b>	<b>227 (7.3)</b>	<b>2683 (85.6)</b>	<b>223 (7.1)</b>	<b>3133</b>

Outbreaks in the healthcare sector show a marked seasonality with peak occurrence in the winter months (figure 2), although other settings do not appear to show this seasonal pattern. Outbreaks in healthcare settings are also associated with higher rates of mortality and last longer than outbreaks in other settings, but tend to involve fewer people and are less likely to be foodborne (1). A recent study in the South West of England examining the impact of IID outbreaks in healthcare settings, showed norovirus to be the predominant cause and was identified in 63% of outbreaks. The cost to the health service in England was estimated to be £115 million after extrapolating the cost of bed days lost plus staff absence. Outbreaks were seen to be shorter when control measures were implemented quickly, such as closing wards to new admissions within four days of the beginning of the outbreak (4).

**Figure 2 Seasonality of norovirus outbreaks in England and Wales by outbreak setting: 1992 to 2004**

In 2003 there were 220 outbreaks of IID due to norovirus and by October 2004 148 outbreaks had been reported to CDSC. The regions with the highest number of outbreaks in 2003 are the North West and Yorkshire and Humberside. To date, the North East and Yorkshire and Humberside have the highest number of outbreaks reported in 2004 (table2).

**Table 2 Norovirus outbreaks in England and Wales : 2003 to 2004**

Region	Year	
	2003	2004*
North East	36	37
Yorkshire And Humberside	46	30
East Midlands	2	2
East of England	38	15
London	10	12
South East	10	10
South West	7	13
West Midlands	12	6
North West	52	23
Wales	7	–
<b>Total</b>	<b>220</b>	<b>148</b>

\*Data provisional.

Seventy-eight per cent of norovirus outbreaks identified in 2003 were in the healthcare settings and 74% in 2004 (table2).

The most common mode of spread is person-to-person. Of all outbreaks identified since 1992, 86% occurred via this route of transmission, 4% through contaminated food, and 3% through food followed by person-to-person. Table 3 shows the setting for outbreaks in 2003 and 2004.

**Table 3 Norovirus outbreaks in England and Wales by setting: 2003 to 2004**

Setting	Year	
	2003	2004*
Hospital/residential care home	171	110
Hotel	11	6
School	20	18
Restaurant	4	3
Club/centre	6	3
Other	8	8
<b>Total</b>	<b>220</b>	<b>148</b>

\*Provisional data.

The majority of outbreaks are spread from person-to-person with 88% in 2003 and 87% in 2004 spread in this manner (table 4)

**Table 4 Norovirus outbreaks in England and Wales by mode of spread: 2003 to 2004**

Mode of spread	Year	
	2003	2004
Person-to-person	183	125
Foodborne	5	2
Foodborne then person to person	4	1
Water	–	1
Other	–	2
Unknown	28	17
<b>Total</b>	<b>220</b>	<b>148</b>

\*Provsional data.

From September to mid November 2004 there have been 33 reports of outbreaks of IID due to norovirus, similar number of outbreaks to that seen in the same period in 2003. The number of outbreaks in 2004 will rise as further reports are received and all data for 2004 are provisional at this time.

#### References

1. Lopman BA, Adak GK, Reacher MH, Brown DWG. Two epidemiologic patterns of norovirus outbreaks: surveillance in England and Wales, 1992-2000. *Emerg Infect Dis* 2003; **9**(1): 71-7.
2. Food Standards Agency. *Report of the study of infectious intestinal disease in England*. London: The Stationery Office, 2000.
3. Lopman B, Vennema H, Kohli E, Pothier P, Sanchez A, Negredo A *et al*. Increase in viral gastroenteritis outbreaks in Europe and epidemic spread of new norovirus variant. *The Lancet* 2004; **363**:682-8.
4. Lopman BA, Reacher MH, Vipond IA, Hill D, Perry C, Halliday T *et al*. Epidemiology and cost of nosocomial gastroenteritis, Avon, England, 2002-2003. *Emerg Infect Dis* 2004; **10**(10): 1827-34.

## Increase in RSV activity in England: prophylaxis with palivizumab appropriate for 'at risk' infants

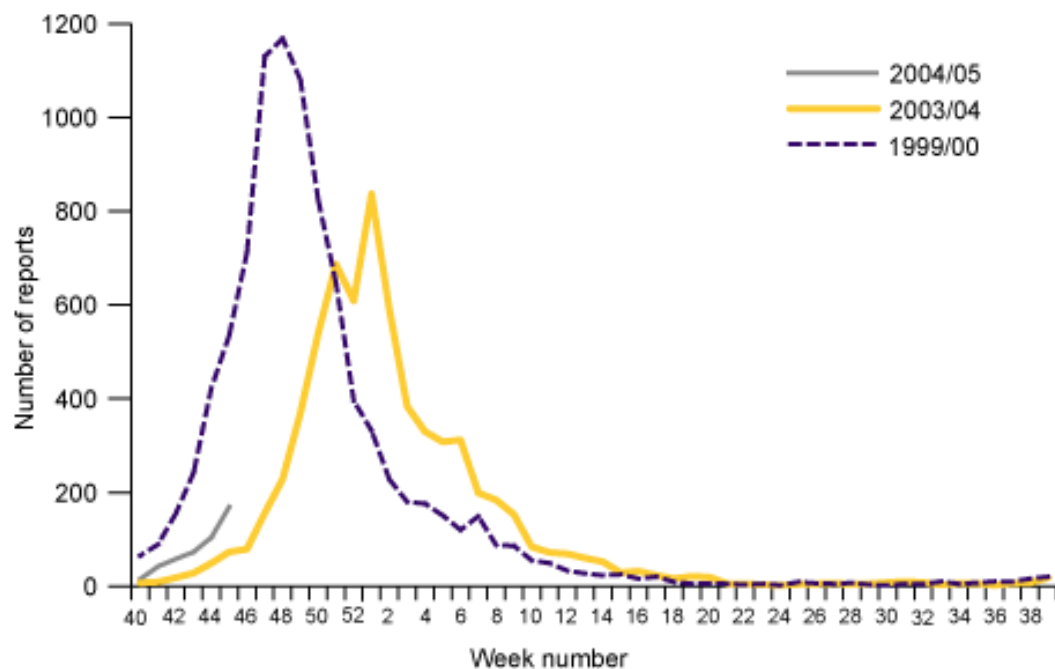


Levels of respiratory syncytial virus (RSV) activity have increased markedly over recent weeks, as expected around late autumn/early winter. The number of laboratory reports made to the Health Protection Agency Centre for Infections are higher than the same time last season (2003/04), but are at a lower level than seen during the last substantial RSV season in 1999/00 (figure).

The largest increase in the number of laboratory reports continues to be among children aged under 1 year, indicating that prophylaxis with palivizumab is now considered appropriate for 'at risk' infants, as outlined on the Health Protection Agency website, available at < <http://www.hpa.org.uk/infections/publications/pdf/RSVpaper.pdf> >

Influenza activity in the United Kingdom, and across Europe continues to remain low. Further information is available at < <http://www.eiss.org/index.cgi> >.

**Figure Laboratory reports of RSV received by HPA Centre for Infections from NHS and HPA microbiology laboratories, by date of specimen: 2004 and recent years**



Please note, reports may not have been received for specimens taken in recent weeks, therefore these data are provisional. Caution should, therefore, be exercised in the interpretation of the trend for the most recent weeks.

## Bacteraemia

Last updated: **21 October 2004**  
Next update due: **18 November 2004**

 [Acinetobacter spp bacteraemia, England, Wales, and Northern Ireland: 2003](#)

 [Enterococcus spp bacteraemia: England, Wales, and Northern Ireland: 2003](#)

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### 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.

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### Enterococcus spp bacteraemia: England, Wales, and Northern Ireland: 2003

#### Key points:

- In 2003 there were 6036 reports of *Enterococcus* spp bacteraemia, a 20% increase on 2002.
- Reporting of antibiotic susceptibility improved in 2003 compared to 2002.
- The percentage of glycopeptide-resistant isolates either remained constant or declined between 2002 and 2003, depending on the species and antibiotic.
- Possible misidentification of enterococci can be detected by examination of reported resistance patterns, particularly ampicillin/amoxycillin and quinupristin/dalfopristin.

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

## Key points:

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- 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

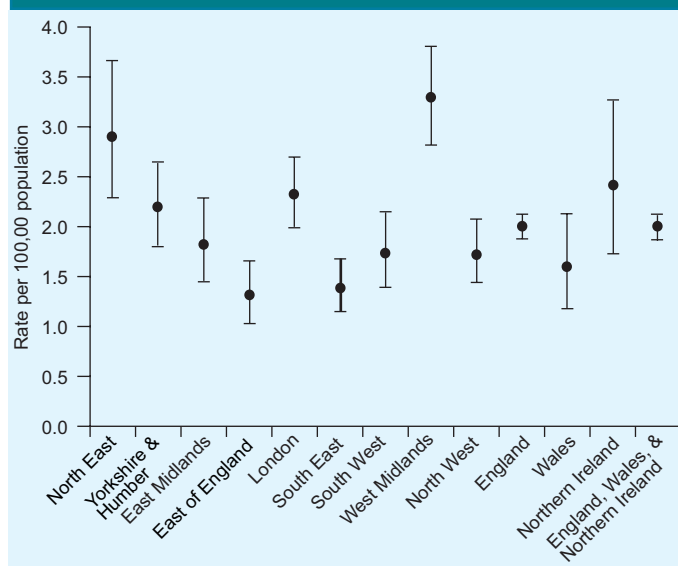
This report describes *Acinetobacter* spp isolated from blood specimens by laboratories in England, Wales, and Northern Ireland and reported via a voluntary surveillance system in 2003. Age and region-specific rates were calculated using 2003 mid-year resident population estimates. STATA\* statistical 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
<b>Acinetobacter spp</b>	<b>1026</b>	<b>1087</b>
<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
<b>England</b>	<b>480 (48)</b>	<b>318 (32)</b>	<b>155 (16)</b>	<b>46 (5)</b>	<b>999</b>
<b>Wales</b>	<b>14 (30)</b>	<b>14 (30)</b>	<b>17 (36)</b>	<b>2 (4)</b>	<b>47</b>
<b>Northern Ireland</b>	<b>21 (51)</b>	<b>14 (34)</b>	<b>5 (12)</b>	<b>1 (2)</b>	<b>41</b>
<b>England, Wales, and Northern Ireland</b>	<b>515 (47)</b>	<b>346 (32)</b>	<b>177 (16)</b>	<b>49 (5)</b>	<b>1087</b>

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 fairly low.

**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)
<b>England</b>	<b>191</b>	<b>149 (78)</b>	<b>124 (83)</b>
<b>Wales</b>	<b>14</b>	<b>11 (79)</b>	<b>5 (45)</b>
<b>Northern Ireland</b>	<b>12</b>	<b>7 (58)</b>	<b>3 (43)</b>

\*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
<b><i>A. baumannii/ A. calcoaceticus</i></b>										
Gentamicin	43 (21)	161	119	(37)	<b>323</b>	53 (23)	182	111	(32)	<b>346</b>
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)	
<b><i>A. Iwoffii</i></b>										
Gentamicin	3 (3)	108	59	(35)	<b>170</b>	2 (2)	129	46	(26)	<b>177</b>
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)	<b>38</b>
Yorkshire & Humber	7 (28)	18	23 (48)	8 (33)	16	24 (50)	7 (44)	9	32 (67)	- (-)	9	39 (81)	<b>48</b>
East Midlands	1 (8)	12	2 (13)	3 (23)	10	2 (13)	6 (50)	6	3 (20)	- (-)	8	7 (47)	<b>15</b>
East of England	3 (18)	14	- (-)	8 (50)	8	1 (6)	6 (40)	9	2 (12)	- (-)	5	12 (71)	<b>17</b>
London	17 (40)	25	14 (25)	16 (40)	24	16 (29)	22 (69)	10	24 (43)	5 (50)	5	46 (82)	<b>56</b>
South East	9 (36)	16	15 (38)	9 (36)	16	15 (38)	10 (45)	12	18 (45)	- (-)	9	31 (78)	<b>40</b>
South West	7 (30)	16	7 (23)	11 (46)	13	6 (20)	11 (50)	11	8 (27)	- (-)	6	24 (80)	<b>30</b>
West Midlands	3 (13)	21	11 (31)	6 (35)	11	18 (51)	5 (56)	4	26 (74)	- (-)	2	33 (94)	<b>35</b>
North West	2 (8)	24	13 (33)	1 (4)	26	12 (31)	4 (67)	2	33 (85)	- (-)	17	22 (56)	<b>39</b>
Wales	1 (14)	6	7 (50)	- (-)	10	4 (29)	9 (100)	-	5 (36)	- (-)	7	7 (50)	<b>14</b>
Northern Ireland	- (-)	3	11 (79)	- (-)	3	11 (79)	- (-)	3	11 (79)	- (-)	3	11 (79)	<b>14</b>
<b>Total</b>	<b>53 (23)</b>	<b>182</b>	<b>111 (32)</b>	<b>69 (30)</b>	<b>160</b>	<b>117 (34)</b>	<b>92 (52)</b>	<b>84</b>	<b>170 (49)</b>	<b>6 (7)</b>	<b>75</b>	<b>265 (77)</b>	<b>346</b>

\*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

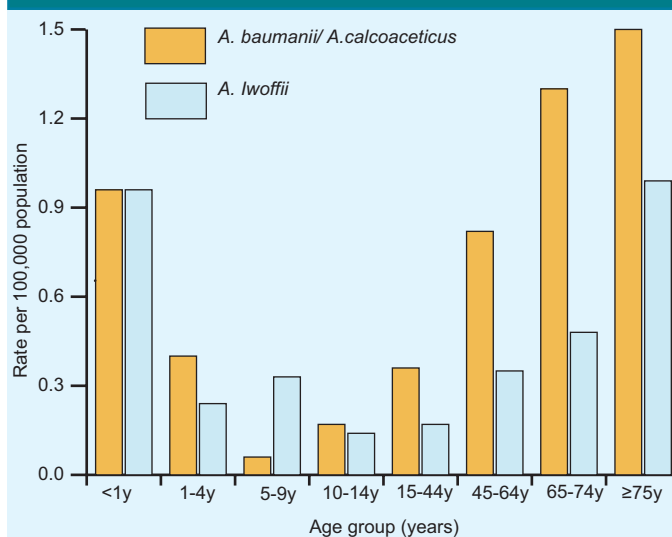
Rates of *Acinetobacter* spp bacteraemia were highest in those aged under one year and those aged 45 years and over (figure 2). *A. baumannii/A. calcoaceticus* predominated as the causative agent in the older age groups, being highest in those from the 15 to 44 years age group and over. Rates of *A.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

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# Enterococcus spp bacteraemia: England, Wales, and Northern Ireland: 2003

## Key points:

- In 2003 there were 6036 reports of *Enterococcus* spp bacteraemia, a 20% increase on 2002.
- Reporting of antibiotic susceptibility improved in 2003 compared to 2002.
- The percentage of glycopeptide-resistant isolates either remained constant or declined between 2002 and 2003, depending on the species and antibiotic.
- Possible misidentification of enterococci can be detected by examination of reported resistance patterns, particularly ampicillin/amoxycillin and quinupristin/dalfopristin.

## Introduction

This report describes *Enterococcus* spp (including Group D streptococci) isolated from specimens in 2003 by laboratories in England, Wales, and Northern Ireland and voluntarily reported to the Health Protection Agency's Centre for Infections via CoSurv (1). Age- and region-specific rates were calculated using 2003 mid-year population estimates. Where the percentage resistance to a specific antibiotic is given, the denominator excludes those reports without susceptibility information for that antibiotic. Confidence intervals were calculated using STATA†.

In 2003 there were 6036 reports (table 1) of *Enterococcus* spp bacteraemia (including Group D streptococci). Of these, 2647 reports indicated *E. faecalis* (44%) and 1011 reports indicated *E. faecium* (17% of the total). Thirty-two per cent of the isolates reported were not identified beyond the genus. Four per cent (216 reports) indicated Group D streptococci. *E. faecalis* accounted for 65% and *E. faecium* 25% of the reports that included the species name. Of the 217 laboratories in England, Wales, and Northern Ireland, 182 (84%) reported at least one *Enterococcus* spp bacteraemia in 2003 (table 2). Of these 182 laboratories, 164 (90%) included susceptibility information for enterococci.

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

<i>Enterococcus</i> spp	Number of reports
<i>Enterococcus</i> not fully identified	1955
<i>Enterococcus avium</i>	36
<i>Enterococcus casseliflavus</i>	21
<i>Enterococcus durans</i>	49
<i>Enterococcus faecalis</i>	2647
<i>Enterococcus faecium</i>	1011
<i>Enterococcus gallinarum</i>	92
<i>Enterococcus hirae</i>	4
<i>Enterococcus raffinosus</i>	5
Streptococci group D	216
<b>Total</b>	<b>6036</b>

The reporting rate for *Enterococcus* spp bacteraemia for England, Wales, and Northern Ireland combined was 11.9 per 100,000 population (figure 1). Region-specific rates ranged from 15.3/100,000 in Yorkshire and Humberside, to 8.2/100,000 in the South East.

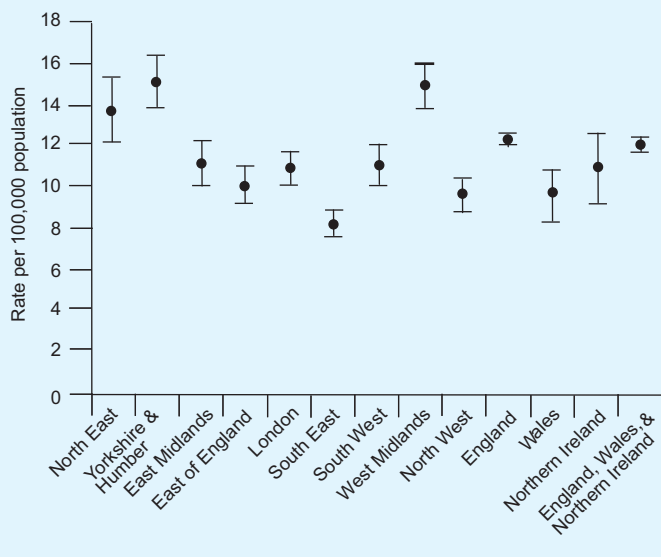
†Stata Statistical software: release 8.2. College Station, Texas, Stata Corporation, 2001.

**Table 2** Laboratory and susceptibility ascertainment data for *Enterococcus* spp bacteraemia reports: England, Wales, and Northern Ireland: 2003

Region	Number of laboratories*	Number reporting <i>Enterococcus</i> spp bacteraemias (%)	Number reporting susceptibility information for <i>Enterococcus</i> spp bacteraemias† (%)
North East	11	10 (91)	10 (100)
Yorkshire & Humber	21	20 (95)	18 (90)
East Midlands	11	10 (91)	8 (80)
East of England	18	18 (100)	18 (100)
London	32	20 (63)	15 (75)
South East	29	22 (76)	21 (95)
South West	18	18 (100)	18 (100)
West Midlands	20	20 (100)	19 (95)
North West	31	22 (71)	21 (95)
<b>England</b>	<b>191</b>	<b>160 (84)</b>	<b>148 (93)</b>
<b>Wales</b>	<b>14</b>	<b>12 (86)</b>	<b>10 (83)</b>
<b>Northern Ireland</b>	<b>12</b>	<b>10 (83)</b>	<b>6 (60)</b>

\*Provisional data. †As a proportion of those reporting bacteraemias.

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



\*Rates calculated using 2003 mid-year population estimates

### Antibiotic susceptibility

Due to the low numbers of reports of the minor *Enterococcus* species, antibiotic susceptibilities were only analysed for the two most common species, *E. faecalis* and *E. faecium*.

For both *E. faecalis* and *E. faecium*, 21% of reports did not contain information on susceptibility to ampicillin/amoxycillin. There were 101 reports of *E. faecalis* isolates resistant to ampicillin/amoxycillin in 2003 (table 3), representing 5% of the total number of reports with susceptibility information. The proportion of resistant *E. faecalis* isolates varied geographically, from 10% in the London and Yorkshire and Humberside regions, to none in Northern Ireland. *E. faecium*, by contrast, is typically resistant to ampicillin/amoxycillin, although 16% (124 isolates) were reported as sensitive. The South East region had the lowest proportion of *E. faecium* isolates reported resistant to ampicillin/amoxycillin at 67%. All reports of *E. faecium* from Northern Ireland (that contained susceptibility results) indicated resistance.

Eighty-six per cent of reports of both *E. faecalis* and *E. faecium* did not include information on susceptibility to high-level gentamicin (resistance is indicated by a MIC >128 mg/L). Of the reports that did include this information, 38% of *E. faecalis* and 36% of *E. faecium* had high-level resistance to gentamicin (table 3). A further 20% *E. faecalis* and 24% *E. faecium* reports (521 and 24 respectively) indicated either resistance or sensitivity to gentamicin, but without specifying whether this was at high or low concentrations. Routine testing and reporting of high-level gentamicin susceptibility is encouraged, as enterococci have inherent low-level resistance to gentamicin. Nevertheless, serious enterococcal infections may be treated with combinations of cell wall active agents (ampicillin/amoxycillin or glycopeptides) and gentamicin, which show synergy in that the combination is bactericidal. High-level resistance to gentamicin, however, abolishes

**Table 3** *Enterococcus* spp bacteraemia laboratory reports, England, Wales, and Northern Ireland: 2003

	Resistant (%) <sup>*</sup>	Sensitive	No Information (%) <sup>†</sup>
<b><i>E. faecalis</i> (n=2647)</b>			
Ampicillin/amoxycillin	101 (5)	1984	562 (21)
Vancomycin	44 (2)	1815	788 (30)
Teicoplanin	38 (4)	999	1610 (61)
High level gentamicin	143 (38)	236	2268 (86)
Quinupristin/dalfopristin	173 (90)	19	2455 (93)
<b><i>E. faecium</i> (n=1011)</b>			
Ampicillin/amoxycillin	675 (84)	124	212 (21)
Vancomycin	118 (16)	624	269 (27)
Teicoplanin	60 (14)	384	567 (56)
High level gentamicin	50 (36)	87	874 (86)
Quinupristin/dalfopristin	9 (8)	103	899 (89)

\*As a percentage of reports with susceptibility information.

†As a percentage of all reports.

this synergy.

*E. faecalis* is inherently resistant to quinupristin/dalfopristin, and this may account for why 93% of reports of this species did not include susceptibility information for this antibiotic. Of the few reports that did include this information, 90% indicated resistance (table 3). A slightly higher proportion (11%) of *E. faecium* isolates contained susceptibility information for quinupristin/dalfopristin, of which 8% were resistant to this antibiotic.

### GRE (Glycopeptide-resistant enterococci)

Seventy per cent of *E. faecalis* reports included information on susceptibility to vancomycin, and 73% of *E. faecium* reports contained this information (table 3). Fewer than half the reports for both *E. faecalis* and *E. faecium* contained data for teicoplanin (39% and 44% respectively). Seventy-four per cent of *E. faecalis* reports included susceptibility information for any glycopeptide, compared to 77% of reports of *E. faecium*.

Twenty-six per cent (698) of *E. faecalis*, did not contain information on the susceptibility of the isolate to either vancomycin or teicoplanin, and 36% (947) had information on susceptibility of the isolate to both glycopeptides (table 4). Thirty-four per cent of reports only included information on susceptibility to vancomycin, and 3% only contained information on teicoplanin.

The susceptibility reporting was similar for *E. faecium*; of the total number of reports, 40% included results for both glycopeptides, and 23% included results for neither (table 4). Thirty-three per cent of reports only had results for vancomycin, and 3% only contained results for teicoplanin.

Of the two main enterococcal species, higher proportions of glycopeptide resistance were seen among *E. faecium*, with 16% of reports indicating that the isolate was resistant to vancomycin, and 14%

**Table 4** Glycopeptide susceptibility reporting for *E. faecalis* and *E. faecium* bacteraemia: England, Wales, and Northern Ireland: 2003

Susceptibility reported	<i>E. faecalis</i> (%)	<i>E. faecium</i> (%)
Vancomycin & teicoplanin	947 (36)	409 (40)
Neither vancomycin nor teicoplanin	698 (26)	234 (23)
Vancomycin only	912 (34)	333 (33)
Teicoplanin only	90 (3)	35 (3)

\*Percentages do not add up to 100% due to rounding errors.

indicating resistance to teicoplanin (table 3). By comparison, 2% and 4% of *E. faecalis* reports indicated resistance to vancomycin and teicoplanin respectively.

The North East, and Yorkshire and Humberside regions did not report any *E. faecalis* isolates resistant to vancomycin, whereas the South West, and Wales both reported the highest percentage of vancomycin-resistant isolates (5%). Variation among the English regions in reported vancomycin resistance for *E. faecium* ranged from 0% in the North East to 27% in the East of England. Northern Ireland did not report any glycopeptide resistance in either *E. faecalis* or *E. faecium* in 2003, although at least half of the reports did not contain any information on glycopeptide susceptibility.

### Age distribution

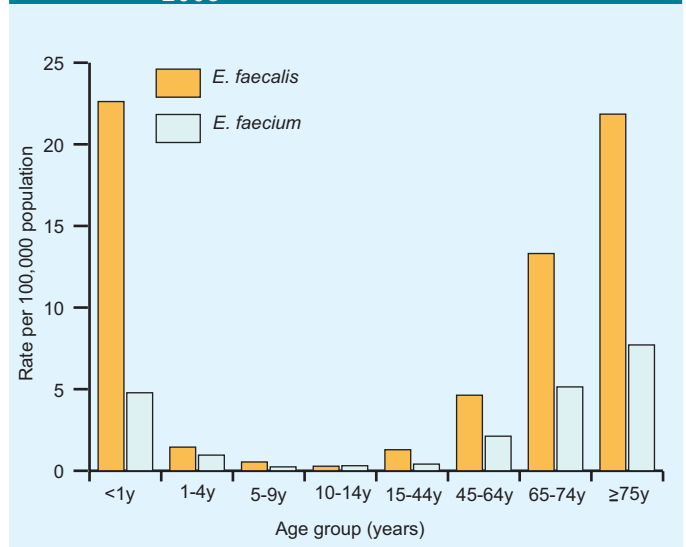
Patients with bacteraemia due to either *E. faecium* or *E. faecalis* show similar age distributions (figure 2), with the highest rates being in the very young (*ie*, those aged under one year) and the elderly (*ie*, those aged over 75 years and over).

### Discussion

There was a 20% increase in the total number of enterococci reported in 2003 compared to 2002 (2). The number of reports of the two commonest species, *E. faecalis* and *E. faecium* increased by 25% and 24% respectively. There was a 17% decrease in the number of isolates reported as Group D streptococci. It is unlikely that speciation of group D streptococci accounts for much of the increase in the other enterococci, as *E. faecalis* increased from 2126 reports in 2002 to 2647 in 2003, and *E. faecium* from 816 to 1011, compared to a decrease from 259 to 216 reports of group D streptococci. It is more likely that this fall indicates the decline of disused nomenclature. The rate of enterococcal bacteraemia in England, Wales, and Northern Ireland increased from 9.4 per 100,000 population in 2002 to 11.9/100,000 in 2003.

An important issue with the enterococci is the technical problems associated with accurately identifying the species. The proportion of *Enterococcus* spp not identified further than the genus decreased marginally from 33% in 2002 to 32% in 2003. The recent report of the national glycopeptide-resistant enterococci (GRE) bacteraemia surveillance working group (3) recommended that all enterococci should be identified to species level. The recommendation was that identification should be based on the use of

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



\* Based on mid-year 2003 population estimates.

commercial kits, while acknowledging that these are not always accurate, particularly for rarer species. Molecular techniques are more accurate, but are impractical and expensive for use in routine testing and are mostly used for reference purposes. As a result of this, misidentification occurs – some of which can be seen when examining the isolate’s antibiotic susceptibilities.

Currently in the United Kingdom, the vast majority of *E. faecalis* isolates are susceptible to ampicillin/amoxycillin, whereas *E. faecium* isolates are usually resistant. A crude analysis assuming that all *E. faecalis* are susceptible and all *E. faecium* are resistant, and based on the figures given above, would indicate that 5% of reported *E. faecalis* did not belong to that species, and 16% of *E. faecium* were also incorrectly identified. This represents a slight improvement in 2003 compared to 2002. The results of the 2001-2002 British Society for Antimicrobial Chemotherapy (BSAC) Bacteraemia Resistance Surveillance Programme (4), in which species identification was checked using reference techniques, found ampicillin resistance among *E. faecalis* isolates was 0.3%, and among *E. faecium* isolates was 86.2%. Comparing the BSAC results to those presented here, there is a suggestion that more *E. faecium* are being misidentified as *E. faecalis* than vice versa.

In contrast to the situation with ampicillin/amoxycillin, *E. faecalis* is inherently resistant to quinupristin/dalfopristin (although occasional susceptible isolates have been discovered and have been attributed to mutations knocking out a putative efflux pump) whereas *E. faecium* is inherently susceptible, although resistance can emerge. In 2003, 90% of *E. faecalis* and 8% of *E. faecium* were reported as resistant to this antibiotic, although the number of reports with information for this antibiotic is considerably lower than for ampicillin/amoxycillin. The report of the national working group(2) recommended that any apparent ampicillin/amoxycillin-resistant and/or

quinupristin/dalfopristin-sensitive *E. faecalis*, or ampicillin/amoxicillin-sensitive, and/or quinupristin/dalfopristin-resistant *E. faecium* should be sent to a reference laboratory for checking.

Between 2002 and 2003, the reporting of glycopeptide susceptibility improved slightly for both vancomycin and teicoplanin, and for both main enterococcal species. The proportion of reports identifying GRE has either remained stable or declined between the two years. For *E. faecalis* the percentage of isolates reported as resistant to vancomycin fell from 4% in 2002 to 2% in 2003, and teicoplanin resistance remained at 4%. Among *E. faecium* isolates, vancomycin resistance fell from 19% of isolates in 2002 to 16% in 2003, and the proportion reported as resistant to teicoplanin fell slightly from 14% to 13%.

The higher proportion of *E. faecalis* isolates resistant to teicoplanin compared to vancomycin is likely to be an artefact, possibly related to the high proportion of reports without information on teicoplanin susceptibility (61%), as there is no known genotype that confers resistance to teicoplanin, but not vancomycin. The two main genotypes conferring resistance to glycopeptides in *E. faecalis* and *E. faecium* are *vanA* (which confers resistance to both vancomycin and teicoplanin), and *vanB*, which confers resistance to vancomycin, but not teicoplanin. It is, therefore, expected that reported resistance to vancomycin should be slightly higher than resistance to teicoplanin in these two species, as seen for *E. faecium*. For the same reason, it is recommended that all laboratories should test vancomycin against enterococci, and that teicoplanin susceptibility, if tested, should only be tested in addition to vancomycin, even if it is the hospital's preferred glycopeptide for therapeutic purposes (3). Three per cent of reports of both *E. faecalis* and *E. faecium* in 2003 only contained information on teicoplanin susceptibility.

This pattern of slightly higher reported resistance to vancomycin compared to teicoplanin, and similar resistance rates to those reported here, were also seen in the BSAC Bacteraemia Resistance Surveillance Programme (4). For 2001-2002, the proportion of *E. faecalis* isolates reported as resistant to vancomycin and teicoplanin were 3.0% and 2.7% respectively. For *E. faecium*, the proportions resistant were 19.6% for vancomycin and 15.2% for teicoplanin. The 95% confidence intervals for these percentages overlap the percentage resistances reported through the Health Protection Agency's voluntary reporting system. This

suggests that despite the known problems associated with species identification, this system provides a reasonably accurate estimate of the proportion of enterococcal bacteraemias that are resistant to the glycopeptides.

Mandatory surveillance of GRE (5) along the lines of that already in place for methicillin-resistant *Staphylococcus aureus* (MRSA), commenced in October 2003 and it is expected that the first results will be published in 2005. It will be interesting to discover the extent to which the voluntary reporting scheme underestimates the level of GRE in England and whether, allowing for this, it still provides a reasonably accurate estimate of the proportion of antibiotic-resistant pathogens, as has been seen for *S. aureus*/MRSA.

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Please send any comments/feedback to Andrew Pearson, email [andrew.pearson@hpa.org.uk](mailto:andrew.pearson@hpa.org.uk) or Louise Bishop, email [louise.bishop@hpa.org.uk](mailto:louise.bishop@hpa.org.uk). In addition, the support from colleagues within the Health Protection Agency is valued in the preparation of this report. These contributions are greatly appreciated.

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