

***Proteus* spp., *Morganella morganii*, and *Providencia* spp. bacteraemia reports for England, Wales and Northern Ireland: 2004 to 2008**

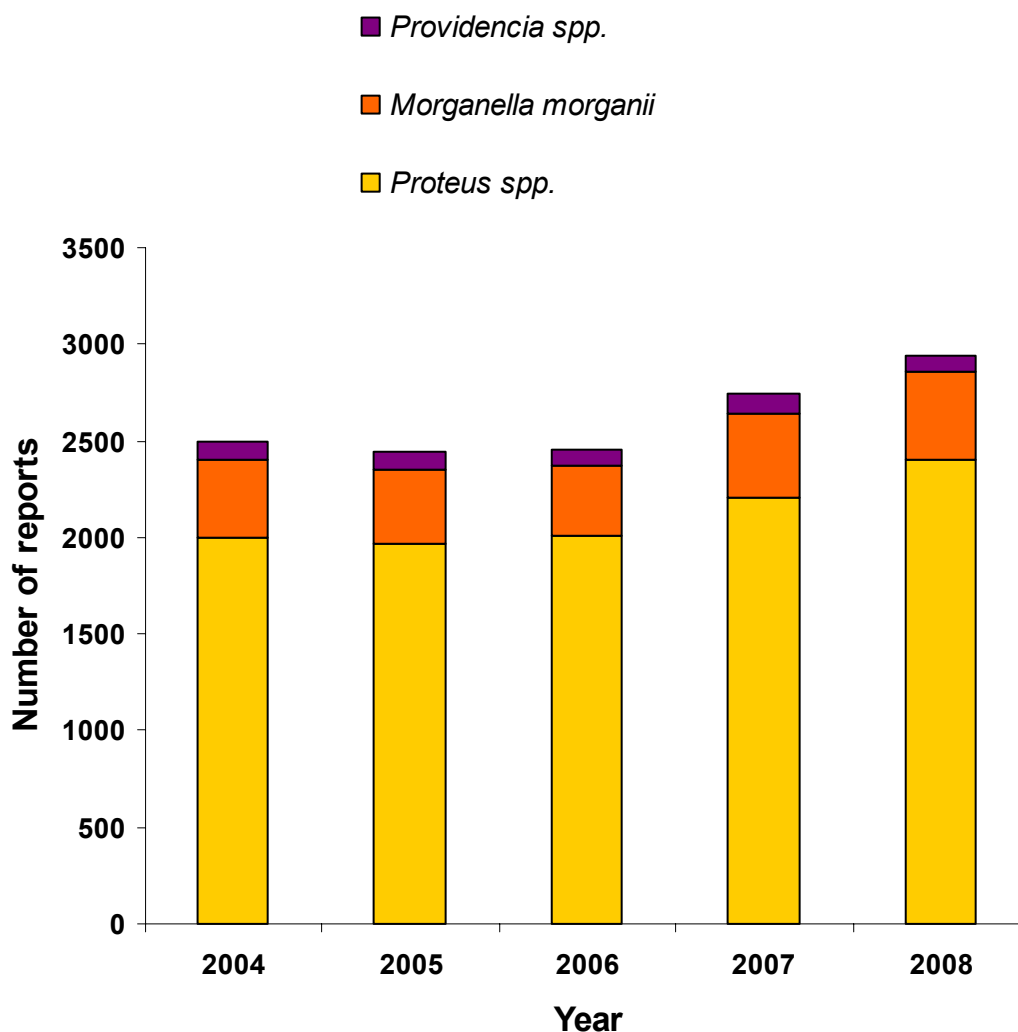
This report contains data voluntarily reported to the Health Protection Agency for *Proteus* spp., *Morganella morganii*, and *Providencia* spp. bacteraemia in England, Wales, and Northern Ireland, from 2004 to 2008; the data were extracted on the 24th February 2009. The data presented here for 2004-7 differ in some instances from those in earlier publications due to the addition of late reports to the database. Similarly the 2008 total may increase in future publications.

Trends in total reports

There was an 18% increase (Figure 1) in the total number of reports of *Proteus* spp., *M. morganii*, and *Providencia* spp. bacteraemias in 2008 (2943), compared to 2004 (2500). This increase was similar to the 16% increase in all episodes of bacteraemia (80,890 to 94,093) during the same time period (provisional as of 24th February 2009).

In comparison with 2007, there was a modest increase of 11% (2449 to 2943 reports) in the number of *Proteus* spp., *M. morganii*, and *Providencia* spp. bacteraemia reports in 2008, which contrasts with the 6% decrease seen for all bacteraemias over the same period. The increase in reports of *Proteus* spp., *M. morganii*, and *Providencia* spp. bacteraemia may be due to either increased incidence and/or increased ascertainment.

Figure 1. *Proteus* spp., *Morganella morganii*, and *Providencia* spp. bacteraemia reports (England, Wales and Northern Ireland): 2004 to 2008*



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Completeness of laboratory reports

The number of laboratories voluntarily reporting data for *Proteus* spp., *M. morganii*, and *Providencia* spp. bacteraemia decreased from 186 in 2004 to 172 in 2008 (Table 1), this is probably due to consolidation of laboratories at trust level. The percentage of laboratories identifying *Proteus* spp., *M. morganii*, and *Providencia* spp. isolates to species level increased from 98% in 2004 to 99% in 2008 while the percentage reporting drug susceptibility data increased from 85% in 2004 to 94% in 2008. The percentage of laboratories identifying *Proteus* spp., *M. morganii*, and *Providencia* spp. species and reporting drug susceptibility data increased from 84% in 2004 to 94% in 2008.

Table 1. Proportion of laboratories reporting *Proteus* spp., *Morganella morganii*, and/or *Providencia* spp. bacteraemia (England, Wales and Northern Ireland): 2004 to 2008*

	2004	2005	2006	2007	2008
Number of reporting laboratories	186	186	188	184	172
Laboratories identifying to species level	98%	100%	99%	99%	99%
Laboratories reporting susceptibility data	85%	89%	91%	92%	94%
Laboratories identifying to species level and reporting susceptibility data	84%	89%	90%	91%	94%

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Species-specific data

Table 2 gives a breakdown of reported *Proteus* spp., *M. morganii*, and *Providencia* spp. bacteraemias by species from 2004 to 2008:

- In 2008, as previously most *Proteus* bacteraemias were attributed to *Proteus mirabilis* (86%) and *Proteus vulgaris* (4%) (compared to 81% and 4%, respectively, reported in 2004).
- The majority of *Providencia* isolates determined to species level in 2008 were identified as *Providencia stuartii*, which accounted for 51% of these reports

Table 2. Reports of *Proteus* spp., *Morganella morganii*, and *Providencia* spp. bacteraemia, by species: 2004-2008*

	2004	2005	2006	2007	2008
<i>Proteus mirabilis</i>	1614	1604	1671	1842	2070
<i>Proteus vulgaris</i>	90	96	100	84	99
<i>Proteus</i> spp., other named species	18	8	10	11	9
<i>Proteus</i> spp., species not recorded	281	259	226	264	225
<i>Proteus</i> spp. total	2003	1967	2007	2201	2403
<i>Morganella morganii</i>	401	388	368	438	450
<i>Providencia stuartii</i>	64	61	51	62	46
<i>Providencia rettgeri</i>	17	19	18	28	28
<i>Providencia</i> spp., other named species	5	1	2	3	9
<i>Providencia</i> spp., species not recorded	10	11	3	10	7
<i>Providencia</i> spp. total	96	92	74	103	90

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Antibiotic susceptibility data

Tables 3 to 6 present antibiotic susceptibility data for each of the 4 main species. Trend analysis was carried out using chi-square test for trend in Stata (v8.2).

Table 3. Antibiotic susceptibility data for reports of *Proteus mirabilis* bacteraemia, England, Wales, and Northern Ireland: 2004 to 2008*

<i>Proteus mirabilis</i>		2004	2005	2006	2007	2008
Total reports:		1614	1604	1671	1842	2070
Amoxicillin	% Non-susceptible	29%	29%	35%	30%	31%
	Reports with susceptibility data	1150	1149	1289	1459	1708
Cefuroxime	% Non-susceptible	2%	2%	5%	2%	2%
	Reports with susceptibility data	1057	1082	1234	1369	1473
Cefotaxime	% Non-susceptible	1%	1%	5%	1%	1%
	Reports with susceptibility data	561	602	743	858	982
Ceftazidime	% Non-susceptible	1%	1%	2%	1%	1%
	Reports with susceptibility data	800	793	916	1190	1353
Ciprofloxacin	% Non-susceptible	6%	7%	7%	7%	6%
	Reports with susceptibility data	1142	1160	1293	1460	1643
Gentamicin	% Non-susceptible	3%	4%	4%	4%	3%
	Reports with susceptibility data	1221	1230	1296	1527	1804

Table 4. Antibiotic susceptibility data for reports of *Proteus vulgaris* bacteraemia, England, Wales, and Northern Ireland: 2004 to 2008*

<i>Proteus vulgaris</i>		2004	2005	2006	2007	2008
Total reports:		90	96	100	84	99
Imipenem	% Non-susceptible	6%	0%	0%	0%	4%
	Reports with susceptibility data	16	20	28	31	28
Cefotaxime	% Non-susceptible	3%	0%	2%	6%	7%
	Reports with susceptibility data	32	40	52	36	46
Ceftazidime	% Non-susceptible	4%	4%	4%	2%	4%
	Reports with susceptibility data	48	51	57	58	72
Ciprofloxacin	% Non-susceptible	0%	4%	1%	1%	2%
	Reports with susceptibility data	68	75	78	69	82
Gentamicin	% Non-susceptible	1%	1%	0%	7%	1%
	Reports with susceptibility data	68	83	72	71	82

Proteus spp., *Morganella morganii*, and *Providencia* spp. bacteraemia reports for England, Wales and Northern Ireland: 2004 to 2008

Antibiotic susceptibility data continued

Table 5. Antibiotic susceptibility data for reports of *Morganella morganii* bacteraemia, England, Wales, and Northern Ireland: 2004 to 2008*

<i>Morganella morganii</i>		2004	2005	2006	2007	2008
Total reports:		401	388	368	438	450
Imipenem	% Non-susceptible	6%	2%	5%	3%	5%
	Reports with susceptibility data	100	102	99	140	153
Cefotaxime	% Non-susceptible	20%	18%	17%	22%	21%
	Reports with susceptibility data	127	147	165	201	195
Ceftazidime	% Non-susceptible	23%	21%	17%	22%	20%
	Reports with susceptibility data	204	190	196	274	294
Ciprofloxacin	% Non-susceptible	11%	8%	11%	10%	13%
	Reports with susceptibility data	282	286	287	373	360
Gentamicin	% Non-susceptible	8%	8%	8%	9%	11%
	Reports with susceptibility data	305	295	297	371	384

Table 6. Antibiotic susceptibility data for reports of *Providencia stuartii* bacteraemia, England, Wales, and Northern Ireland: 2004 to 2008*

<i>Providencia stuartii</i>		2004	2005	2006	2007	2008
Total reports:		64	61	51	62	46
Imipenem	% Non-susceptible	0%	7%	0%	0%	0%
	Reports with susceptibility data	12	14	20	18	16
Cefotaxime	% Non-susceptible	6%	4%	14%	4%	8%
	Reports with susceptibility data	17	28	22	26	26
Ceftazidime	% Non-susceptible	0%	7%	8%	3%	7%
	Reports with susceptibility data	27	29	26	37	29
Ciprofloxacin	% Non-susceptible	2%	9%	10%	14%	0%
	Reports with susceptibility data	44	45	39	49	37
Gentamicin	% Non-susceptible	44%	22%	29%	37%	49%
	Reports with susceptibility data	43	54	42	51	39

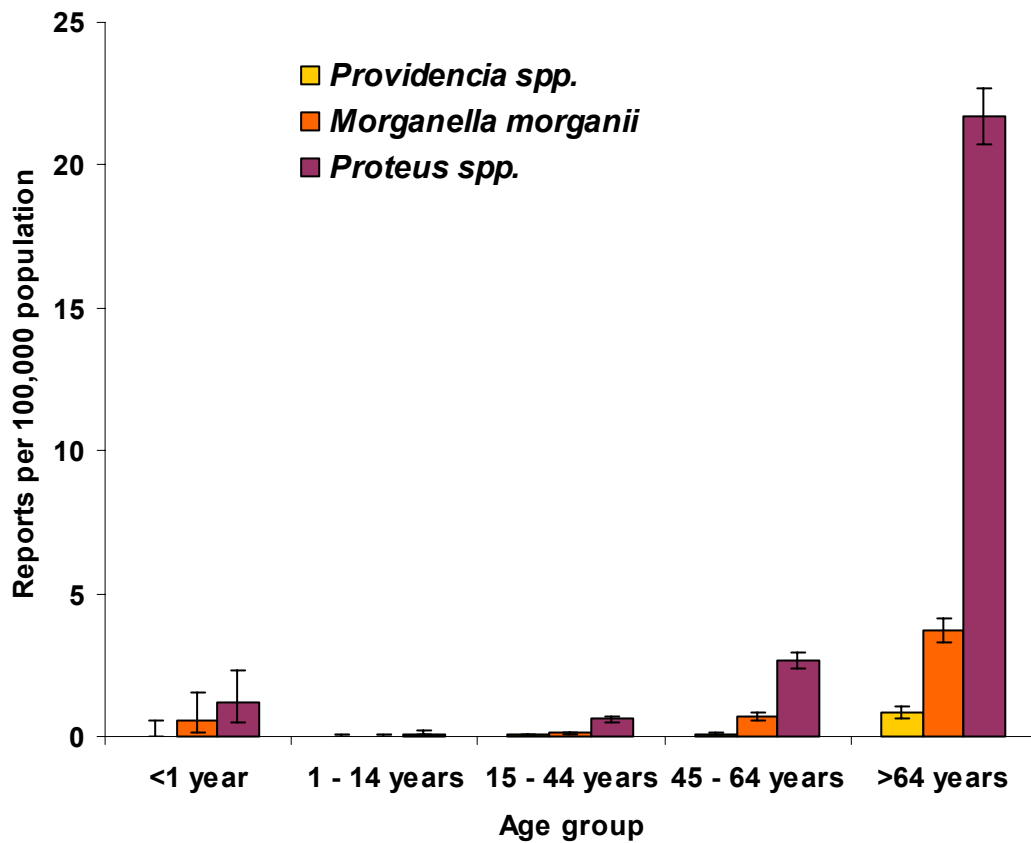
- Over 80% of reports in 2008 included susceptibility data for ciprofloxacin and gentamicin
- There were no statistically significant resistance trends for *Proteus mirabilis*, *Proteus vulgaris*, *Providencia stuartii* or *M. morganii*

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Age distribution by species

Figure 2 shows the age and sex distribution for cases of bacteraemia due to *Proteus* spp., *M. morganii*, and *Providencia* spp. in 2008. The huge majority of infections were in those aged greater than 64 years of age and *Proteus* spp. dominated each age group.

Figure 2. *Proteus* spp., *Morganella morganii*, and *Providencia* spp. bacteraemia reports in 2008 by age*

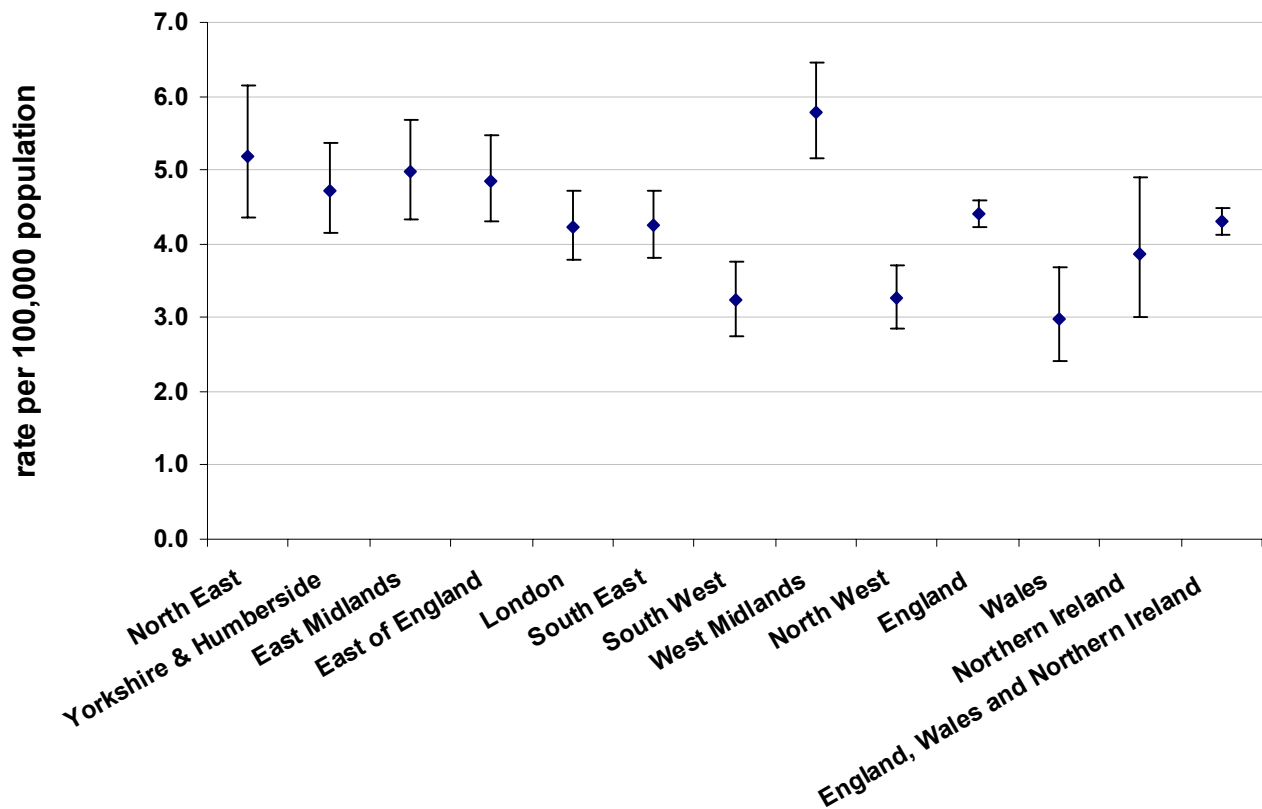


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Distribution by region

Figures 3 and 4 show regional distribution of *Proteus* spp. and *M. morganii* bacteraemia in 2008.

Figure 3. Region-specific rates[†] of *Proteus* spp. bacteraemia: England, Wales, and Northern Ireland, 2008



The regions with the highest incidence of *Proteus* spp. bacteraemia included the West Midlands (5.78 per 100,000 population) and the North East (5.19/100,000). Regions/countries with low incidence include Wales (2.99/100,000) and the South West (3.23/100,000). The overall reported incidence for England, Wales, and Northern Ireland is 4.30 per 100,000 population. It is important to note that regional incidence rates are affected by completeness of regional reporting as well as the regional distribution of specialist care units.

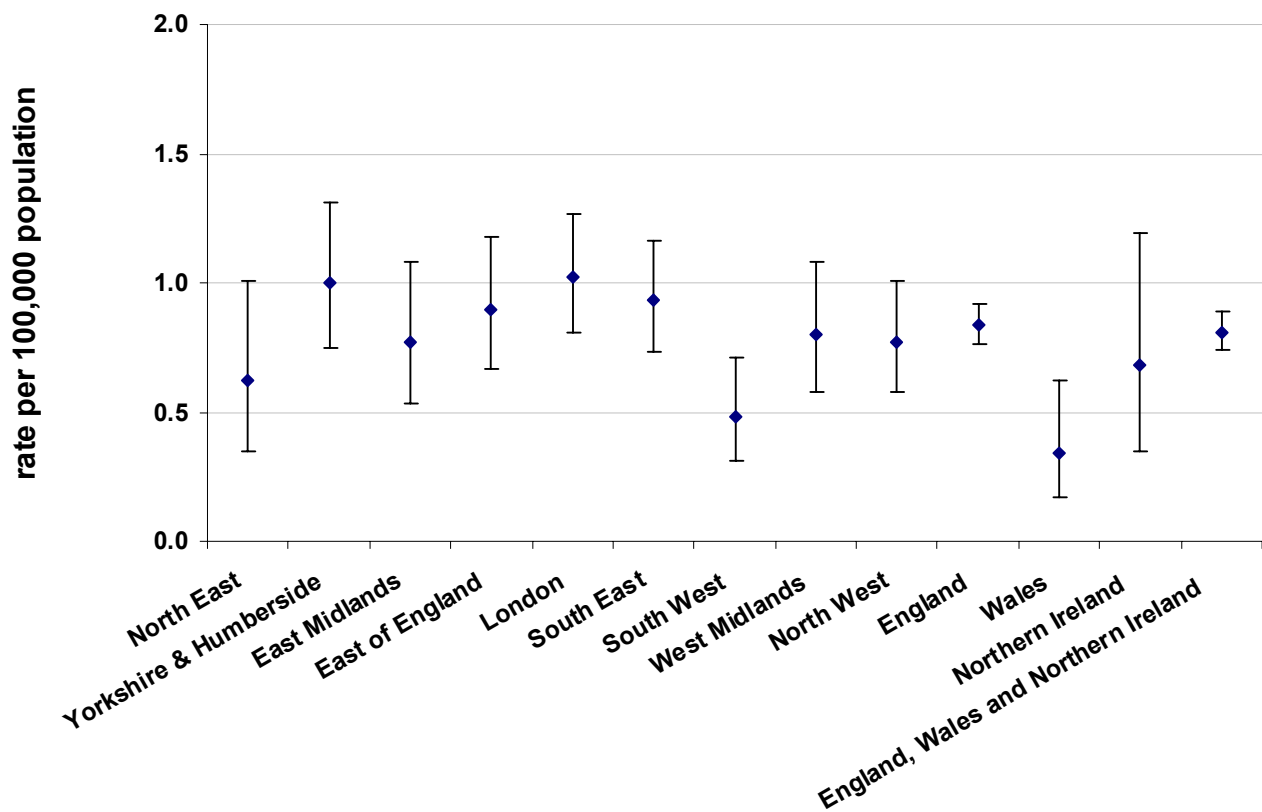
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Distribution by region continued

Regions with a high incidence of *M. morganii* bacteraemia included London (1.02/100,000) and Yorkshire and Humberside (1.00/100,000). Regions/countries with low incidence include Wales (0.34/100,000) and the South West (0.48/100,000). The overall reported incidence for England, Wales, and Northern Ireland is 0.81 per 100,000 population. It is important to note that regional incidence rates are affected by completeness of regional reporting as well as the regional distribution of specialist care units.

Comparison of voluntary and mandatory surveillance schemes for MRSA bacteraemia in England shows that voluntary reports account for 70-75% of all mandatory reports (2004-2008) with considerable variation in relative reporting levels between regions. Similar trends may apply to the *Proteus* spp. and *M. morganii* bacteraemia data for 2008.

Figure 4. Region-specific rates[†] of *M. morganii* bacteraemia: England, Wales, and Northern Ireland, 2008*



* Data were extracted on the 24th February 2009

† Regional rates were calculated using mid-year 2007 resident population estimates published by the Office for National Statistics (ONS) (<http://www.statistics.gov.uk>).