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News

Increased reporting of Lyme borreliosis in England and Wales

Increased reporting of Lyme borreliosis in England and Wales

Recent media reports have highlighted current interest in the United Kingdom (UK) over ticks and Lyme disease. In particular one recent report describes a case of Lyme disease contracted in the Mendip Hills in Somerset, south west England, although this is an area from which cases have previously been reported. There have also been several articles in both the medical, and the mass media that have raised awareness amongst doctors and their patients.

Anecdotal reports indicate that in the UK, as anticipated, the number of ticks has continued to increase this year following last year's wet summer and mild winter, which has allowed greater numbers of ticks to survive. European colleagues also report that tick numbers have increased throughout northern Europe. In England and Wales, laboratory confirmed case reports are currently running at slightly higher levels than seen at the same time in previous years, these include infections acquired in the UK, from northern European countries, and from the eastern United States. Most of the overseas cases have occurred primarily in holiday-makers. A provisional total of three hundred and fifty-five reports, up to the end of August 2005, have been received, compared with an annual average of 215 reports during the same period from 2001 to 2004. As in previous years over half the reports of indigenously acquired infection have been from patients resident in southern counties of England, especially the south east and south west health regions. The major foci of Lyme borreliosis in England and Wales are around the New Forest, Salisbury Plain, Exmoor, and Thetford Forest. Other endemic areas include the Lake District, the Yorkshire moors, and the Scottish Highlands and Islands, but any area in which ticks are present should be regarded as having a potential risk for infection.

Lyme borreliosis occurs only in people who have been bitten by infected ixodid (hard bodied) ticks, the vector hosts. Infection is caused by the presence of a spiral bacterium, *Borrelia burgdorferi* and cannot be transmitted from person-to-person, or directly from other animals. Peak times for tick blood meals are late spring, early summer, and autumn, although there may also be a low level of tick feeding activity in mild winter periods. This also coincides with peak leisure activity periods when people visit the countryside during the summer months. The main feeding hosts for larval and nymphal ticks are small mammals such as field mice and voles, and birds including blackbirds and pheasants. These hosts may also be reservoirs of *B. burgdorferi*, and the tick feeding patterns ensure the organism's continuing cycle between generations of reservoir and vector hosts. Humans are incidental hosts for tick feeds. Fortunately only a minority of ticks carry borreliae, and borrelial transmission usually occurs late in the feed, after 48 to 72 hours. It is less likely to occur in the first 24 hours of attachment.

As Lyme borreliosis occurs only in people who have been bitten by an infected tick, it is important that a patient's risk of exposure to tick is properly assessed and the clinical history evaluated for features compatible with Lyme borreliosis before diagnostic tests are requested. The most commonly available tests look for the presence of antibodies to *Borrelia burgdorferi* although antibodies may not be detectable in the first few weeks after infection. Specific immunoblot (Western blot) tests should be performed on all specimens reacting in preliminary tests and the significance of the results carefully assessed in the light of the patient's clinical and tick exposure history.

Preventing infection

Risk of human infection can be minimised by:

- Tick-awareness;
- Wearing appropriate clothing in tick-infested areas (long sleeved shirt and long trousers tucked into socks). Light coloured fabrics are useful, as it is easier to see ticks against a light background. Check that unfed ticks are not brought home on clothes;
- Considering use of insect repellents, (eg, N,N-Diethyle-m-toluamide [DEET]-containing preparations;
- Inspecting skin frequently, and removing any attached ticks;
- Checking again for ticks, especially in skin folds, at the end of the day;
- Making sure that children's head and neck areas, including scalps, are properly checked;
- Checking that pets do not bring unfed ticks into the home on their fur.

Remove ticks by gently gripping them as close to the skin as possible, preferably using fine-toothed tweezers or similar implements, and pulling steadily away from the skin. Some veterinary surgeries and pet supply shops sell tick removal devices, which are inexpensive and very useful, especially for people frequently exposed to ticks. Lighted cigarette ends or match heads are not recommended. Some researchers consider that application of creams or volatile oils to cover an attached tick and force it to detach may increase risk of borrelial transmission, as it can stimulate the tick to regurgitate potentially infected material early.

Further information on Lyme disease can be found on the Health Protection Agency website at: http://www.hpa.org.uk/infections/topics_az/zoonoses/lyme_borreliosis/menu.htm.

Bacteraemia

 [Pseudomonas spp and Stenotrophomonas maltophilia bacteraemia: England, Wales, and Northern Ireland: 2004](#)

Published 29 September 2005, Volume 15 Number 39

Pseudomonas spp and Stenotrophomonas maltophilia bacteraemia: England, Wales, and Northern Ireland: 2004

Pseudomonas spp

- There has been little change during 2004 from that reported in the previous year in the proportion of antibiotic resistance reported in *Pseudomonas aeruginosa*, evidenced by no change in the rate of ciprofloxacin resistance in *P. aeruginosa* (12% in both 2003 and 2004, based on 71% and 75% respectively of reports including susceptibility data for this antimicrobial agent).
- Seventy-seven per cent of *Pseudomonas* spp reports for England, Wales, and Northern Ireland in 2004 concerned *Pseudomonas aeruginosa*, with 6% of reports listing other species. Seventeen per cent of reports only identified species to genus level, a similar proportion to 2000 and 2003.
- Four *P. aeruginosa* isolates were reported as resistant to multiple antibiotics: gentamicin, ciprofloxacin, imipenem, ceftazidime, and piperacillin/tazobactam. Of these isolates, one was also reported as resistant to colistin and another to both amikacin and meropenem.

Stenotrophomonas maltophilia

- There has been a 3% increase in the number of reports of *Stenotrophomonas maltophilia* from England, Wales, and Northern Ireland in 2004 compared with 2003.
- The proportion of *S. maltophilia* bacteraemia reports from England, Wales, and Northern Ireland submitted with antimicrobial susceptibility data increased by 5% since 2003, reflecting a 24% increase in the provision of this data since 2001.
- The drug of choice for treatment of *S. maltophilia* infections is co-trimoxazole, yet only 2% to 24% of *S. maltophilia* bacteraemia reports (depending on the region) were submitted with an accompanying susceptibility result.
- Similarly, reporting of susceptibility data for ticarcillin/ clavulanate, an alternative to co-trimoxazole, was also low with only 6% of *S. maltophilia* reports including susceptibility data.
- There has been a 5% increase in resistance to ciprofloxacin reported in the proportion of stains identified as *S. maltophilia* during 2004 based on the previous year, with 61% and 65% respectively of reports including susceptibility data for this agent in 2003 and 2004.

• Further information on *Pseudomonas* spp and *S. maltophilia* is available on the Health Protection Agency website at: http://www.hpa.org.uk/srmd/div_nsi_lhcai/factsheet_pseudomonads.htm.

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Diary

- ▣ The sensible use of blood
- ▣ An introductory course Epidemiology and Molecular Epidemiology in Public Health

The sensible use of blood

This one-day conference organised by the Royal Society of Medicine will be held on Tuesday 6 December 2005 at the Postgraduate Medical Centre, Queen Elizabeth Hospital, Birmingham.

There is a variation in practice relating to transfusion practices. It is hoped that this symposium will allow a consensus to develop by sharing evidence where allogeneic transfusion has been safely reduced. The anticipated problems relating to adequate supplies of allogeneic blood, due to changing population demography, and variant CJD, makes this meeting timely.

This meeting is of interest to haematologists, surgeons, anaesthetists, biomedical scientists, hospital liaison staff, specialist nurses and anyone else with an interest in the transfusion or conservation of blood.

Topics include:

- Serious hazards of transfusion
- Transfusion transmitted infection: safety at any price?
- Risk management and vCJD
- Implications of a declining blood donor base
- Plasma substitutes, collard solutions and artificial oxygen carriers
- Lessons from liver surgery
- Critical haematocrits
- Stimulating Erythropoiesis (with quality to life issues in oncology)
- Aspects of haemostasis
- Cell salvage including isovolaemic haemodilution
- Challenges to the blood service

For further information please contact:

Mr Simon Timmis, Academic Conference Department, Royal Society of Medicine, 1 Wimpole Street, London, W1G 0AE (tel: 020 7290 3844 or email: <simon.timmis@rsm.ac.uk>).

Or book online at <http://www.rsm.ac.uk/academ/blood_bham.htm>.

An introductory course Epidemiology and Molecular Epidemiology in Public Health

A course for virologists and microbiologists: An introductory course Epidemiology And Molecular Epidemiology In Public Health will take place on Monday 7 November to Friday 11 November 2005 at Health Protection Agency, Centre for Infections, Colindale, London.

This is an introductory course in communicable disease epidemiology including molecular epidemiology. It is designed for specialist registrars in either virology or microbiology, but would also be suited to other microbiologists, including junior consultants and clinical scientists - particularly those with an interest in public health. It will provide a grounding for interpreting epidemiological literature, for helping with local incidents and outbreaks and for the use of molecular techniques to informing the epidemiology and control of viral diseases.

Topics include:

- General epidemiological concepts
- Concepts in infectious disease epidemiology
- Surveillance: routine data, disease trends
- Study design
- Do my results mean what I think they do?
- Overview of molecular epidemiology
- Bioinformatics tools
- Application of molecular epidemiology to current PH issues

Practicals to include:

- Outbreak investigation
- Norovirus
- Measles
- Hepatitis B

For further information contact Vivienne Fitch 020 8327 7569; email: <vivienne.fitch@hpa.org.uk>. Closing date Friday 21 October 2005.

Pseudomonas spp and *Stenotrophomonas maltophilia* bacteraemia: England, Wales, and Northern Ireland: 2004

Key points:

Pseudomonas spp

- There has been little change during 2004 from that reported in the previous year in the proportion of antibiotic resistance reported in *Pseudomonas aeruginosa*, evidenced by no change in the rate of ciprofloxacin resistance in *P. aeruginosa* (12% in both 2003 and 2004, based on 71% and 75% respectively of reports including susceptibility data for this antimicrobial agent).
- Seventy-seven per cent of *Pseudomonas* spp reports for England, Wales, and Northern Ireland in 2004 concerned *Pseudomonas aeruginosa*, with 6% of reports listing other species. Seventeen per cent of reports only identified species to genus level, a similar proportion from 2000 to 2003.
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Stenotrophomonas maltophilia

- There has been a 3% increase in the number of reports of *Stenotrophomonas maltophilia* from England, Wales, and Northern Ireland in 2004 compared with 2003.
- The proportion of *S. maltophilia* bacteraemia reports from England, Wales, and Northern Ireland submitted with antimicrobial susceptibility data increased by 5% since 2003, reflecting a 24% increase in the provision of this data since 2001.
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- Similarly, reporting of susceptibility data for ticarcillin/ clavulanate, an alternative to co-trimoxazole, was also low with only 6% of *S. maltophilia* reports including susceptibility data.
- There has been a 5% increase in resistance to ciprofloxacin reported in the proportion of stains identified as *S. maltophilia* during 2004 based on the previous year, with 61% and 65% respectively of reports including susceptibility data for this agent in 2003 and 2004.
- Further information on *Pseudomonas* spp and *S. maltophilia* is available on the Health Protection Agency website at: <http://www.hpa.org.uk/srmd/div_nsi_lhcai/factsheet_pseudomonads.htm>.

Introduction

This report details bacteraemias due to *Pseudomonas* spp, *Stenotrophomonas maltophilia*, and related species reported to LabBase* during 2004 in England, Wales, and Northern Ireland. Rates were calculated using the Office for National Statistics (ONS) mid-2004 resident population estimates for each region or age group.

The majority of reported bacteraemia due to *Pseudomonas* and related species were due to *Pseudomonas aeruginosa* and *Stenotrophomonas maltophilia* (table 1). Two hundred and nine isolates were reported from species other than *Pseudomonas* spp and *Stenotrophomonas* spp, the majority (47; 22.5%) were due to *Burkholderia* spp and *Sphingomonas paucimobilis* (38; 18%). Due to the small number of such cases, these data are not examined further in this report.

The voluntary surveillance scheme for bacteraemias does not distinguish between healthcare-associated and

community-acquired bacteraemias.

Pseudomonas spp

There were 3136 reports of *Pseudomonas* spp bacteraemia made in 2004 (table 1) of which the majority (2430; 77%) were due to *P. aeruginosa*, a 58% increase since 2000 when 1535 reports were submitted (1).

Regional distribution

Eighty-nine per cent of laboratories in England, 93% of laboratories in Wales, and 92% of laboratories in Northern Ireland reported *Pseudomonas* spp bacteraemias (table 2). The overall reporting rates for *Pseudomonas* spp bacteraemias were 5.75 per 100,000 in England, 5.55/100,000 in Wales, and 5.38/100,000 in Northern Ireland. The region-specific rates within England ranged from 4.04/100,000 in the South East region to 7.90/100,000 in Yorkshire and Humber region (figure 1). Increases were seen in the rates of *Pseudomonas* spp bacteraemia reports within Northern Ireland and Wales, as well as in the East of England, South West, and North West regions despite overall rates for England remaining fairly

*LabBase is the database that is used to collect laboratory reports of all microorganisms isolated from sterile sites at nearly 400 NHS and other laboratories throughout England and Wales. The database is managed and accessed at the HPA Centre for Infections.

Table 1 Bacteraemia laboratory reports of *Pseudomonas*, *Stenotrophomonas* and related species, England, Wales and Northern Ireland: 2003-2004

	Number of reports	
	2003	2004
<i>Pseudomonas</i> spp	3079	3136
<i>Pseudomonas aeruginosa</i>	2364	2430
<i>Pseudomonas alcaligenes</i>	6	9
<i>Pseudomonas fluorescens</i>	54	68
<i>Pseudomonas putida</i>	56	61
<i>Pseudomonas stutzeri</i>	44	50
<i>Pseudomonas</i> spp	555	518
<i>Stenotrophomonas</i> spp	652	674
<i>Stenotrophomonas maltophilia</i>	652	674
Genera closely related to pseudomonas	212	209
<i>Burkholderia cepacia</i>	53	47
<i>Burkholderia pseudomallei</i>	1	-
<i>Brevibacterium</i> spp	15	11
<i>Brevundimonas diminuta</i>	5	6
<i>Brevundimonas vesicularis</i>	15	25
<i>Comamonas acidovorans</i>	24	23
<i>Comamonas testosteroni</i>	3	2
<i>Comamonas</i> spp	2	5
<i>Flavimonas oryzihabitans</i>	41	34
<i>Ralstonia pickettii</i>	10	9
<i>Shewanella putrefaciens</i>	6	4
<i>Sphingomonas paucimobilis</i>	34	38
<i>Sphingomonas</i> spp	3	5

constant compared with 2003 data (2).

Age distributions

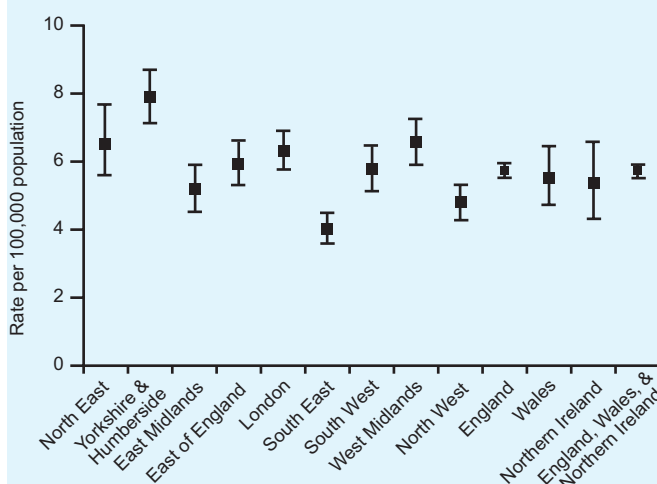
The highest age-specific rate of *Pseudomonas* spp bacteraemia was reported in patients aged 75 years and over (figure 2), followed by those aged between 65 and 74 years, and those aged under one year. The rates were generally higher in males than females in age groups at either end of the age spectrum (ie, those aged under 1 year, and those aged 45 years and over)

Table 2 Laboratory and susceptibility ascertainment data for *Pseudomonas* spp and *Stenotrophomonas maltophilia* bacteraemia reports: England, Wales, Northern Ireland: 2004

Region/Country	Number of laboratories	<i>Pseudomonas</i> spp		<i>S.maltophilia</i>	
		Number (%) of cases reported	Number (%) with susceptibility information*	Number (%) of cases reported	Number (%) with susceptibility information*
North East	11	11 (100%)	10 (91%)	11 (100%)	8 (73%)
Yorkshire & Humberside	21	20 (95%)	16 (80%)	15 (71%)	11 (73%)
East Midlands	11	11 (100%)	9 (82%)	10 (91%)	8 (80%)
East of England	19	19 (100%)	19 (100%)	18 (95%)	17 (94%)
London	32	25 (78%)	17 (68%)	22 (69%)	14 (64%)
South East	29	24 (83%)	15 (63%)	21 (72%)	12 (57%)
South West	18	18 (100%)	14 (78%)	16 (89%)	10 (63%)
West Midlands	20	19 (95%)	17 (89%)	17 (85%)	12 (71%)
North West	31	23 (74%)	19 (83%)	19 (61%)	16 (84%)
England	192	170 (89%)	136 (80%)	149 (78%)	108 (72%)
Wales	14	13 (93%)	11 (85%)	12 (86%)	7 (58%)
Northern Ireland	12	11 (92%)	5 (45%)	9 (75%)	3 (33%)

*As a proportion of those reporting bacteraemias.

Figure 1 Region-specific rates* of *Pseudomonas* spp bacteraemia with 95% confidence intervals: England, Wales, and Northern Ireland: 2004



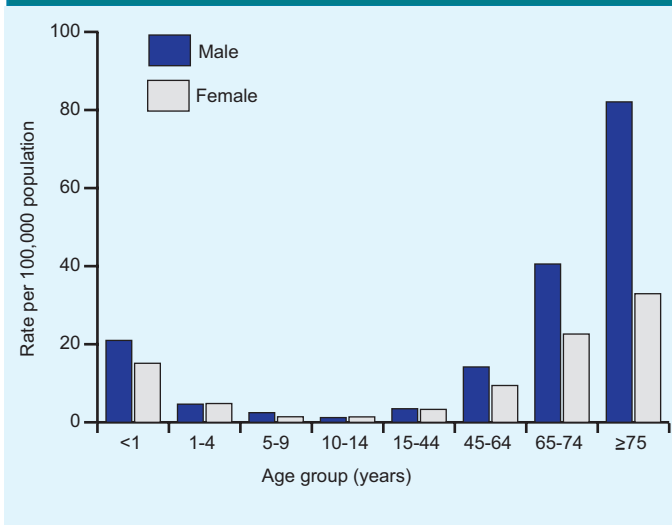
*Based on the Office for National Statistics mid-year 2004 population estimates.

with rates being approximately equal for both sexes in those individuals aged between 1 and 44 years.

Antimicrobial susceptibility

Of those laboratories reporting *Pseudomonas* spp bacteraemias, 80% of laboratories in England, 85% of laboratories in Wales, and 45% of laboratories in Northern Ireland also reported susceptibility results for at least one antimicrobial. Of all *P. aeruginosa* bacteraemia reports, 82% (1989/2430) included susceptibility test results for at least one antimicrobial agent. Of these, 489 (25%) reports included data on susceptibility to all of the key antimicrobial agents: gentamicin, ciprofloxacin, imipenem, ceftazidime, and piperacillin/tazobactam, compared to only 16% in 2003. Three hundred and eighty-one (16%) included susceptibility data on gentamicin, ciprofloxacin, ceftazidime, piperacillin/tazobactam, and

Figure 2 Age-specific rates of *Pseudomonas* spp bacteraemia per 100,000 population*; England, Wales, Northern Ireland: 2004



*Based on the Office for National Statistics mid-year 2004 population estimates.

meropenem. Seventy-five per cent (530/706) of the other *Pseudomonas* species and isolates identified only to genus level were accompanied by susceptibility results, an increase of 52% and 71% on the 2002 and 2003 figures respectively. Isolates which are only identified to species level are likely to include *P. aeruginosa*.

Gentamicin was the antimicrobial for which information on susceptibility was most often given for *P. aeruginosa* (78%), followed by ciprofloxacin (75%), and ceftazidime (66%) (table 3).

The percentage of 'other' and 'incompletely identified' *Pseudomonas* species isolates reported as antibiotic-resistant remained higher than those identified as *P. aeruginosa*. Figures for 2004 showed that the reported resistance of 'other' and 'incompletely identified' *Pseudomonas* isolates to gentamicin, ciprofloxacin, and ceftazidime to be 12%, 13%, and 8% respectively, compared to 9%, 12%, and 7% for *P. aeruginosa* (table 3). The most common resistance reported for *P. aeruginosa* and isolates of other' and 'incompletely identified' *Pseudomonas* species was to ciprofloxacin (12% and 13% respectively).

Regional breakdowns of antimicrobial susceptibility reporting are shown in tables 4 and 5. The proportion of isolates without information on antimicrobial susceptibility varied by region and across different antimicrobials.

Table 3 Antibiotic susceptibility for *Pseudomonas* spp and *Stenotrophomonas maltophilia* bacteraemia laboratory reports: England, Wales, and Northern Ireland: 2003-2004

	2003				2004			
	Resistant* (%)	Sensitive	No Information† (%)	Total Reports	Resistant* (%)	Sensitive	No Information† (%)	Total Reports
<i>Pseudomonas aeruginosa</i>				2364				2430
Gentamicin	147 (8%)	1593	624 (26%)		164 (9%)	1722	544 (22%)	
Ciprofloxacin	210 (12%)	1479	675 (29%)		226 (12%)	1588	616 (25%)	
Imipenem	60 (9%)	589	1715 (73%)		53 (8%)	612	1765 (73%)	
Meropenem	38 (7%)	513	1813 (77%)		49 (8%)	593	1788 (74%)	
Ceftazidime	68 (5%)	1434	862 (36%)		105 (7%)	1493	832 (34%)	
Piperacillin/tazobactam	38 (4%)	1016	1310 (55%)		68 (5%)	1176	1186 (49%)	
Other <i>Pseudomonas</i> spp				715				706
Gentamicin	63 (13%)	411	241 (34%)		54 (12%)	407	245 (35%)	
Ciprofloxacin	65 (14%)	406	244 (34%)		65 (13%)	426	215 (30%)	
Imipenem	13 (8%)	154	548 (77%)		20 (9%)	197	489 (69%)	
Meropenem	16 (9%)	160	539 (75%)		14 (6%)	209	483 (68%)	
Ceftazidime	44 (11%)	374	297 (42%)		36 (8%)	395	275 (39%)	
Piperacillin/tazobactam	14 (4%)	332	369 (52%)		35 (6%)	584	87 (12%)	
<i>Stenotrophomonas maltophilia</i>				652				674
Gentamicin	248 (62%)	153	251 (38%)		233 (55%)	194	247 (37%)	
Ciprofloxacin	242 (61%)	155	255 (39%)		291 (66%)	150	233 (35%)	
Ceftazidime	66 (19%)	274	312 (48%)		80 (21%)	302	292 (43%)	
Piperacillin/tazobactam	39 (15%)	229	384 (59%)		46 (15%)	270	358 (53%)	
Co-trimoxazole	4 (5%)	84	564 (87%)		4 (4%)	102	568 (84%)	

*As a percentage of reports with susceptibility information.

†As a percentage of total reports.

Resistance of *P. aeruginosa* isolates to ciprofloxacin varied from 7% to 23% across the regions (table 4). Rates of *P. aeruginosa* bacteraemia isolates reported as resistant to piperacillin/tazobactam ranged from 0% to 16% across the regions. Resistance to ceftazidime ranged from 3% to 10% making this agent the most active overall against these isolates. Carbapenem resistance was reported in all regions, with the exception of Northern Ireland, although numbers of reports containing susceptibility information for either imipenem or meropenem were low (table 5).

Four *P. aeruginosa* bacteraemia isolates were reported as resistant to all of gentamicin, ciprofloxacin, imipenem,

ceftazidime, and piperacillin/tazobactam, an increase on 2003 when three similar isolates were reported. Of these four isolates, one was reported as resistant to amikacin and another resistant to colistin. Three of the four isolates had been tested against meropenem and all three were reported as resistant. Five isolates were reported as resistant to all of gentamicin, ciprofloxacin, ceftazidime, piperacillin/tazobactam, and meropenem.

Stenotrophomonas maltophilia

Table 4 Antibiotic susceptibility data for *Pseudomonas aeruginosa* bacteraemias: England, Wales, and Northern Ireland: 2004

Region/ Country	Gentamicin			Ciprofloxacin			Ceftazidime			Piperacillin/ Tazobactam			Total reports
	Resistant* (%)	Sensitive	No Information† (%)	Resistant* (%)	Sensitive	No Information† (%)	Resistant* (%)	Sensitive	No Information† (%)	Resistant* (%)	Sensitive	No Information† (%)	
North East	5 (4)	119	15 (11)	12 (9)	120	7 (5)	5 (5)	93	41 (29)	4 (4)	99	36 (26)	139
Yorkshire & Humberside	2 (1)	197	81 (29)	12 (7)	163	105 (38)	9 (7)	117	154 (55)	5 (3)	157	118 (42)	280
East Midlands	5 (3)	158	28 (15)	15 (9)	156	20 (10)	7 (5)	142	42 (22)	5 (4)	131	55 (29)	191
East of England	26 (11)	204	6 (3)	32 (15)	178	26 (11)	12 (6)	195	29 (12)	14 (9)	137	85 (36)	236
London	27 (9)	265	54 (16)	37 (13)	258	51 (15)	25 (10)	225	96 (28)	11 (16)	59	276 (80)	346
South East	10 (6)	162	103 (37)	17 (10)	152	106 (39)	9 (5)	156	110 (40)	12 (9)	127	136 (49)	275
South West	18 (11)	141	81 (34)	17 (15)	96	127 (53)	11 (7)	140	89 (37)	9 (7)	115	116 (48)	240
West Midlands	28 (12)	199	52 (19)	35 (15)	199	45 (16)	12 (6)	206	61 (22)	4 (3)	117	158 (57)	279
North West	24 (12)	170	49 (20)	22 (11)	173	48 (20)	11 (9)	109	123 (51)	2 (1)	153	88 (36)	243
Wales	17 (17)	84	28 (22)	22 (23)	73	34 (26)	3 (3)	93	33 (26)	2 (3)	69	58 (45)	129
Northern Ireland	2 (8)	23	47 (65)	5 (20)	20	47 (65)	1 (6)	17	54 (75)	- (-)	12	60 (83)	72
Total	164 (9)	1722	544 (22)	226 (12)	1588	616 (25)	100 (7)	1400	930 (38)	64 (6)	1077	1289 (53)	2430

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

Table 5 Carbapenem susceptibility data for *Pseudomonas aeruginosa* bacteraemias: England, Wales, and Northern Ireland, 2004

Region/ Country	Imipenem			Meropenem			No information for either		Total reports
	Resistant* (%)	Sensitive	No Information† (%)	Resistant* (%)	Sensitive	No Information† (%)	No Information for either† (%)		
North East	- (-)	15	124 (89)	4 (8)	49	86 (62)	7 (5)	139	
Yorkshire & Humberside	3 (5)	55	222 (79)	3 (5)	60	217 (78)	41 (15)	280	
East Midlands	9 (12)	68	114 (60)	3 (6)	51	137 (72)	18 (9)	191	
East of England	2 (4)	46	188 (80)	12 (9)	127	97 (41)	4 (2)	236	
London	16 (11)	131	199 (58)	8 (8)	98	240 (69)	51 (15)	346	
South East	1 (2)	62	212 (77)	- (-)	56	219 (80)	99 (36)	275	
South West	3 (7)	39	198 (83)	8 (9)	77	155 (65)	70 (29)	240	
West Midlands	4 (6)	66	209 (75)	6 (16)	31	242 (87)	38 (14)	279	
North West	6 (9)	61	176 (72)	3 (13)	21	219 (90)	38 (16)	243	
Wales	9 (12)	66	54 (42)	2 (10)	18	109 (84)	23 (18)	129	
Northern Ireland	- (-)	3	69 (96)	- (-)	5	67 (93)	47 (65)	72	
Total	53 (8)	612	1765 (73)	49 (8)	593	1788 (74)	436 (18)	2430	

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

Regional distribution

There were 674 reports of *Stenotrophomonas maltophilia* bacteraemia in England, Wales, and Northern Ireland in 2004 (table 1), an increase of 3% compared with 2003. Seventy-eight per cent of laboratories in England, 86% of laboratories in Wales and 75% of laboratories in Northern Ireland reported *S. maltophilia* bacteraemias (table 2). The overall reporting rate for England, Wales, and Northern Ireland in 2003 was 1.23 per 100,000 population comprising rates of 1.23/100,000 in England, 1.08 /100,000 in Wales, and 1.46 /100,000 in Northern Ireland (figure 3).

Age distributions

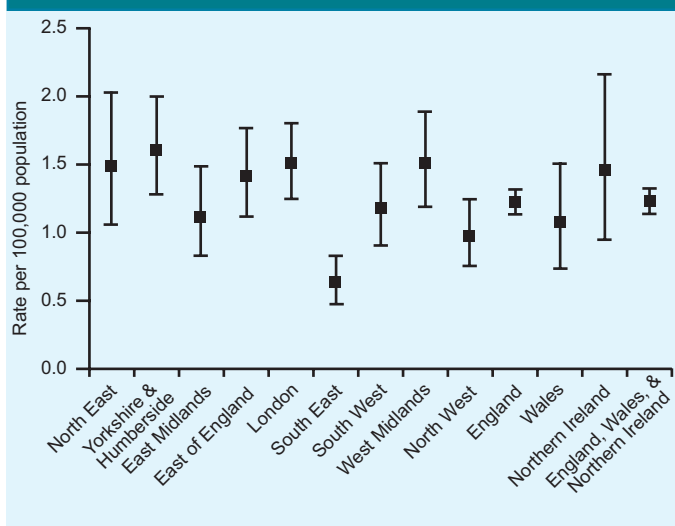
S. maltophilia bacteraemia reporting rates were highest in males aged 65 years and over, 7.24/100,000 in the 65 to 74 years age group, and 6.19/100,000 in the 75 years and over age group,

compared to comparative rates from the female population of 4.07/100,000, and 3.43/100,000 respectively (figure 4). Differences in the reporting of bacteraemias between the genders were not as marked in other age groups. The absolute number of reports, however, was very low and caution should be applied in the interpretation of these data .

Antimicrobial susceptibility

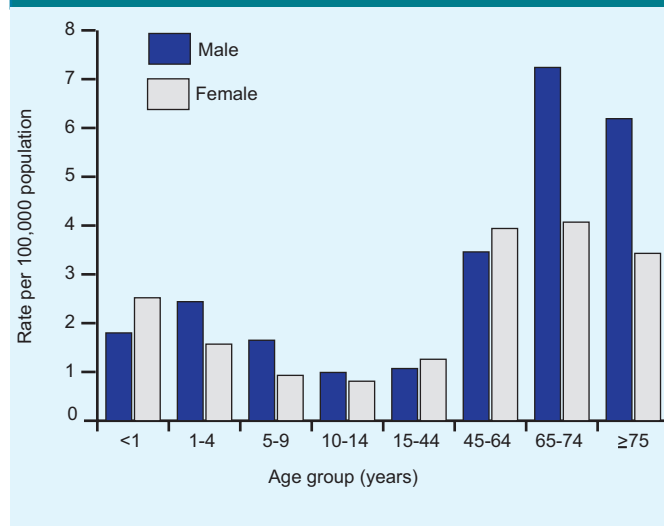
Of those laboratories reporting *S. maltophilia* bacteraemias, 79% of laboratories in England, 56% of laboratories in Wales, and 28% of laboratories in Northern Ireland reported susceptibility results for at least one antimicrobial, the overall rate of such reporting being 76% (512/674). Crucially, only 16% of *S. maltophilia* reports included susceptibility data for co-trimoxazole, the drug of choice for treating *S. maltophilia* infection. Although this was an improvement on the previous

Figure 3 Region-specific rates* of *S. maltophilia* bacteraemia with 95% confidence intervals: England, Wales, and Northern Ireland: 2004



*Based on the Office for National Statistics mid-year 2004 population estimates.

Figure 4 Age-specific rates of *S. maltophilia* bacteraemia per 100,000 population; England, Wales, Northern Ireland: 2004



*Based on the Office for National Statistics mid-year 2004 population estimates.

Table 6 Antibiotic susceptibility data for *S. maltophilia* bacteraemias: England, Wales, and Northern Ireland: 2004

Region/ Country	Gentamicin			Ciprofloxacin			Ceftazidime			Piperacillin/ Tazobactam			Total reports
	Resistant* (%)	Sensitive	No Information† (%)	Resistant* (%)	Sensitive	No Information† (%)	Resistant* (%)	Sensitive	No Information† (%)	Resistant* (%)	Sensitive	No Information† (%)	
North East	20 (59)	14	4 (11)	27 (79)	7	4 (11)	4 (12)	29	5 (13)	5 (17)	25	8 (21)	38
Yorkshire & Humberside	26 (52)	24	31 (38)	27 (49)	28	26 (32)	24 (53)	21	36 (44)	8 (17)	40	33 (41)	81
East Midlands	14 (36)	25	9 (19)	34 (77)	10	4 (8)	8 (19)	35	5 (10)	9 (22)	32	7 (15)	48
East of England	37 (62)	23	18 (23)	34 (60)	23	21 (27)	6 (11)	50	22 (28)	3 (8)	36	39 (50)	78
London	61 (79)	16	35 (31)	60 (76)	19	33 (29)	26 (37)	45	41 (37)	9 (39)	14	89 (79)	112
South East	11 (35)	20	21 (40)	21 (68)	10	21 (40)	3 (10)	27	22 (42)	3 (12)	23	26 (50)	52
South West	26 (70)	11	23 (38)	27 (84)	5	28 (47)	3 (8)	33	24 (40)	2 (6)	32	26 (43)	60
West Midlands	17 (37)	29	35 (43)	27 (59)	19	35 (43)	3 (9)	29	49 (60)	4 (15)	23	54 (67)	81
North West	13 (35)	24	30 (45)	27 (57)	20	20 (30)	1 (4)	27	39 (58)	2 (4)	43	22 (33)	67
Wales	6 (46)	7	19 (59)	6 (46)	7	19 (59)	1 (17)	5	26 (81)	1 (33)	2	29 (91)	32
Northern Ireland	2 (67)	1	22 (88)	1 (33)	2	22 (88)	1 (33)	2	22 (88)	- (-)	-	25 (100)	25
Total	233 (55)	194	247 (37)	291 (66)	150	233 (35)	80 (21)	303	291 (43)	46 (15)	270	358 (53)	674

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

Table 7 Co-trimoxazole susceptibility data for *S. maltophilia* bacteraemias: England, Wales, and Northern Ireland: 2004

Region/ Country	Co-trimoxazole				Total reports
	Resistant* (%)	Sensitive	No Information† (%)		
North East	2 (13)	14	22 (58)		38
Yorkshire & Humberside	– (–)	7	74 (91)		81
East Midlands	– (–)	3	45 (94)		48
East of England	– (–)	12	66 (85)		78
London	2 (7)	25	85 (76)		112
South East	– (–)	1	51 (98)		52
South West	– (–)	7	53 (88)		60
West Midlands	– (–)	17	64 (79)		81
North West	– (–)	11	56 (84)		67
Wales	– (–)	2	30 (94)		32
Northern Ireland	– (–)	3	22 (88)		25
Total	4 (4)	102	568 (84)		674

* As a percentage of reports with susceptibility information.

† As a percentage of total reports.

year, when only thirteen per cent of reports included this information, the rate of reporting of susceptibility data for co-trimoxazole is disappointingly low. Reporting of susceptibility data for ticarcillin/clavulanate, a widely used alternative if an isolate is resistant to, or a patient intolerant of co-trimoxazole, was also extremely low. Only six per cent of *S. maltophilia* reports included susceptibility data for ticarcillin/clavulanate with 4/40 (10%) of these reports indicating resistance to this agent.

Antimicrobial susceptibility information was given most commonly for gentamicin and ciprofloxacin (63% and 65% of reports contained this information respectively), followed by ceftazidime (57%) and piperacillin/tazobactam (47%) (table 3). Although relatively high levels of gentamicin susceptibility data were reported, susceptibility testing for this agent can be problematic as results are influenced by temperature, with isolates appearing resistant when tested at a reduced temperature. A high percentage (90%) of *S. maltophilia* bacteraemia isolates were reported as resistant to imipenem, which is not unexpected, as *S. maltophilia* has a carbapenemase enzyme rendering it inherently resistant to imipenem.

Regional data for antimicrobial susceptibility reporting are shown in tables 6 and 7. The proportion of isolates without information on antimicrobial susceptibility varied by region and across different antimicrobials.

Discussion

The reported rates of bacteraemia due to *P. aeruginosa* and *S. maltophilia* increased 58% and 69% respectively between 2000 and 2004 (1). It is likely, however, that this may reflect in large part improved levels of reporting.

The number of reports identifying *P. aeruginosa* as the causative agent of bacteraemia increased by 3% between 2003 and 2004. The proportion of *Pseudomonas* spp that were identified as *P. aeruginosa* remained constant between 2003 to 2004 (77%), reflecting both an increase in the identification

of other *Pseudomonas* spp and a decrease in the proportion of incompletely identified *Pseudomonas* spp, from 18% to 7% between 2003 and 2004. The number of *S. maltophilia* reports also increased by 3% in England, Wales, and Northern Ireland compared with 2003.

Although the proportion of *P. aeruginosa* reports with antimicrobial susceptibility information increased slightly between 2003 and 2004 (78% and 82% respectively), almost 20% of *P. aeruginosa* isolates still did not include information on susceptibility to any antimicrobial. The percentage of *S. maltophilia* isolates reported with antimicrobial susceptibility data for at least one antimicrobial agent has also increased during 2004 (from 71% in 2003 to 76% in 2004).

All regions had low levels of reporting co-trimoxazole susceptibility results for *S. maltophilia* isolates, with most regions submitting between 76% and 98% of *S. maltophilia* bacteraemia reports without an accompanying co-trimoxazole susceptibility result. The exception was the North East region, which reported co-trimoxazole susceptibility results with 42% of its *S. maltophilia* bacteraemia reports. This is both surprising and disappointing considering it is the drug of choice for treatment of infections with these organisms. Although the rate of co-trimoxazole susceptibility reporting has increased from 13% in 2003 to 16% in 2004, there is still considerable scope for improvement in the reporting of this antimicrobial agent.

Four *P. aeruginosa* isolates were reported as resistant to all of gentamicin, ciprofloxacin, imipenem, ceftazidime, and piperacillin/tazobactam in 2004, which is unsurprising given its resistance to many drug classes and ability to acquire resistance through mutation (3). The small number of isolates observed with this resistance pattern may be due to the small number of isolates that were tested against all five antibiotics. In contrast, the Health Protection Agency (HPA) Antibiotic Resistance Monitoring and Reference Laboratory (ARMRL) regularly receives multiply-resistant *P. aeruginosa* isolates. These are mostly from cystic fibrosis patients, although a few are from burns and other sources, occasionally including bacteraemias.

When compared to the data from the British Society for Antimicrobial Chemotherapy (BSAC) Bacteraemia Resistance Surveillance Programme, the routine laboratory reporting data demonstrates similar levels of resistance in the 2003 *P. aeruginosa* isolates (4). Comparison of data from the two sources is limited, as both are based on a small number of isolates.

S. maltophilia is inherently resistant to imipenem, so the 20 reports of isolates susceptible to this antimicrobial are unlikely. In fact, BSAC guidelines recommend that *S. maltophilia* isolates should be reported as resistant to carbapenems irrespective of results obtained by disc testing (5).

As previously reported, co-trimoxazole is the drug of choice for the treatment of *S. maltophilia* infections. Three per cent of isolates included susceptibility results for co-trimoxazole in 2001, 8% in 2002, 13% in 2003, and 16% in 2004 were reported with susceptibility results for this antimicrobial. Although this is an improvement, it compares poorly with the reporting of other less relevant antimicrobials.

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