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Hospital acquired multi drug resistant tuberculosis

A male in his forties was admitted to a hospital in Kent in February 2002 with a diagnosis of multi drug resistant tuberculosis. He was treated in a negative pressure ventilation room. The man had been taking anti-tuberculosis drugs intermittently and had been admitted to a number of hospitals in the area. Due to his infectious state and refusal to take reasonable precautions to prevent transmission to others, an application was made to detain him under Section 37 and 38 of the *Public Health Act 1984*. This application was upheld and the man was detained on an infectious diseases unit within the hospital.

Subsequently another man who had been a patient on the same unit within the hospital during the time of the detention of the index case was found to have multi drug resistant tuberculosis. Molecular fingerprinting with IS6110 RFLP typing demonstrated the strains to be indistinguishable. As no other link between the two cases had been identified, transmission was most likely to have occurred within the hospital unit.

A local incident control team was established and a look back exercise was initiated to identify potentially exposed staff and patients at risk of infection. The medical notes were reviewed for more than 300 patients who had been on the unit during the detention of the index case, and during the time when the second case was admitted. Of these, 75 were found to be immunocompromised and were invited for screening. In addition, staff who had been in close contact with either of the cases were invited for screening. The investigation is continuing.

This is the first reported instance in Britain of nosocomial tuberculosis transmission involving a patient detained under the *Public Health Act 1984*. The Act allows persons who pose a serious infection risk to others to be removed and detained in a place of safety, most usually a hospital for infectious diseases. Compulsory treatment is not permitted.

There are many practical and ethical difficulties associated with the detention of uncooperative and infectious tuberculosis patients under current public health legislation. Not least is the issue of the availability of an appropriate place of safety in which to care for them. Opportunities to effectively restrict the movement of individuals detained in hospitals for infectious diseases are limited and, as in this case, a high proportion of persons admitted to infectious disease unit's may be immunocompromised and at greater risk of developing active tuberculosis following exposure.

Infection due to multi drug resistant *M. tuberculosis* is generally neither more virulent or more infectious than infection due to drug susceptible strains (1,2). Current guidelines for identification of contacts of infectious cases of tuberculosis in hospital settings (3) state that immunocompetent patients should generally be considered casual contacts and do not require screening. Similarly, immunocompetent staff do not require screening unless they have had prolonged close contact with the patient, or carried out a high-risk procedure.

Immunocompromised patients should be screened and followed up if they had significant exposure to the index case such as eight hours or more within the same room as the infectious case. This principle (3) is similarly applied to immunocompromised staff. Where there is evidence of transmission having occurred, as in this case, then the need for more extensive contact tracing must be considered.

1. British Thoracic Society Guidelines: Chemotherapy and management of tuberculosis in the United Kingdom: recommendations of the Joint Tuberculosis Committee of the British Thoracic Society. *Thorax* 1998; **53**: 536-48.
 2. British Thoracic Society. Control and prevention of tuberculosis in the United Kingdom: code of practice 2000. *Thorax* 2000; **55**: 887-901.
 3. The Interdepartmental Working Group on Tuberculosis. *The prevention and control of tuberculosis in the United Kingdom: UK guidance on the prevention and control of transmission of HIV-related tuberculosis and drug-resistant, including multiple drug resistant tuberculosis*. Department of Health, The Scottish Office, Welsh Office 1998
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Deliberate release of biological – smallpox

Following a recent television interview with the Chief Medical Officer for England which included the issue of vaccination against smallpox, the Department of Health has confirmed that there has been no change in the current assessment of the risk of a bioterrorism attack and that the strategy against a potential attack is also unchanged. This strategy is to contain and ring vaccinate while recognising the need to plan for every eventuality, which would include vaccination of essential workers, and might include the need for mass vaccination after an attack if this was necessary (1).

Following the global eradication of smallpox in 1980, stocks of smallpox were destroyed and now only two World Health Organization reference laboratories legally retain the virus. Unconfirmed details of the Soviet biological weapons programme suggest, however, that the possibility of stocks of smallpox, that could be used for a terrorist attack, existing outside these two centres cannot be excluded (2). This has led a number of governments, including the UK, to start making contingency plans for this event, including ordering stocks of vaccine. Further details of the UK response are available at the Department of Health Emergency Planning and Co-ordination Unit's (EPCU) web pages at <http://www.doh.gov.uk/epcu>.

Although the risk of a deliberate release remains extremely low, the consequences of a release, deliberate or accidental, could be substantial. Smallpox spreads from person to person, although transmission through the population was generally slower than for flu, measles or chicken pox. The observed mortality rate was up to 30%. The incubation period of smallpox was seven to 17 days, average 13 days. The illness starts with a high fever and prostration, but the classical diagnostic rash does not appear until seven to eight days later. The patient is infectious from the onset of symptoms, although most infectious when the rash is present. Early diagnosis is important for containment of disease. Although the disease and its control have been described in detail (3), this was for natural disease and it is not known if exposure to an aerosolised form of smallpox, as in a deliberate release, would result in classical disease. Details of smallpox, including its appearance, are available on the PHLS website at http://www.phls.org.uk/topics_az/deliberate_release/menu.htm, which also contains information on all medical aspects of deliberate release of the biological and chemical agents which pose the highest risk. For further details including plans for responding to the challenge of smallpox will appear through this site, and the EPCU as they are developed and made public.

When natural smallpox outbreaks occurred in the United Kingdom, the usual method of containment was identification, vaccination, and monitoring of close contacts, with isolation should they present with symptoms, along with ring vaccination of contacts and others in the area (4). The incidence of both potentially life threatening and less severe side effects (adverse events) of smallpox vaccination would make large scale vaccination of health care workers, and mass vaccination of the population unacceptable, in the absence of any confirmed cases worldwide. The rates for adverse events following immunisation may be higher than those quoted previously because there may now be more people at risk from immune suppression due to HIV infection, immunosuppressive therapy, organ transplant etc, and from eczema and dermatitis, than when vaccination was common. Should smallpox cases be confirmed, however, this risk balance would change, and immunisation of key groups would be recommended (see Centres for disease Control and Prevention website at <http://www.bt.cdc.gov/>).

1. Emergency Planning Co-ordination Unit. Smallpox – comments on BBC interview with the Chief Medical Officer, 8 October 2002. [online] [cited 15 October 2002]. Available at <http://www.doh.gov.uk/epcu>.
2. Alibek K. *Biohazard*. New York: Random House 1999
3. Fenner F, Henderson DA, Arita I, Jezek Z, Ladnyi ID. *Smallpox and its eradication*. Geneva: World Health Organization, 1988. Available online at <<http://www.who.int/emc/diseases/smallpox/Smallpoxeradication.html>>.
4. Department of Health and Social Security and the Welsh Office. *Memorandum on the control of outbreaks of smallpox*. London: HMSO, 1975.

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Bacteraemia

Last updated: 17 October 2002
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Polymicrobial bacteraemias and candidaemia, England and Wales, 2001

Key points

- There were 1025 reports of *Candida* spp isolated from blood specimens in England and Wales in 2001
- *Candida albicans* was the most common species, accounting for over half of the total number of reports
- In 2001, there were 4212 identified episodes of polymicrobial bacteraemias
- Polymicrobial bacteraemias accounted for 7.2% of all bacteraemia episodes

This article covers laboratory reports of *Candida* spp isolated from blood culture specimens, and polymicrobial bacteraemias (with or without cerebrospinal fluid). All specimens were collected in England and Wales during 2001. Rates were calculated using 2000 resident population denominators for each regional office boundary and age group.

Candidaemia

There were 1025 reports of *Candida* spp isolated from blood specimens in England and Wales in 2001 (table 1). The most commonly reported species was *Candida albicans* with 579 reports, comprising 56% of the total. This was followed by *C. glabrata*, which accounted for 15% of reports, and *C. parapsilosis*, with 10% of reports. Thirteen percent of isolates were not identified further than the genus.

The greatest number of reports of candidaemia was received from London (161 reports, 16% of the total) followed by 140 reports from the South East (table 2). The least reports were received from Wales (61 reports) and the North East (65 reports). The region-specific rates of candidaemia (figure 1) were, however, highest in the North East at 2.5 per 100,000 population, and lowest in the North West at 1.67 /100,000, closely followed by the East Midlands and South West (both 1.69 /100,000).

Table 1 Laboratory reports of candidaemia, England and Wales, 2001

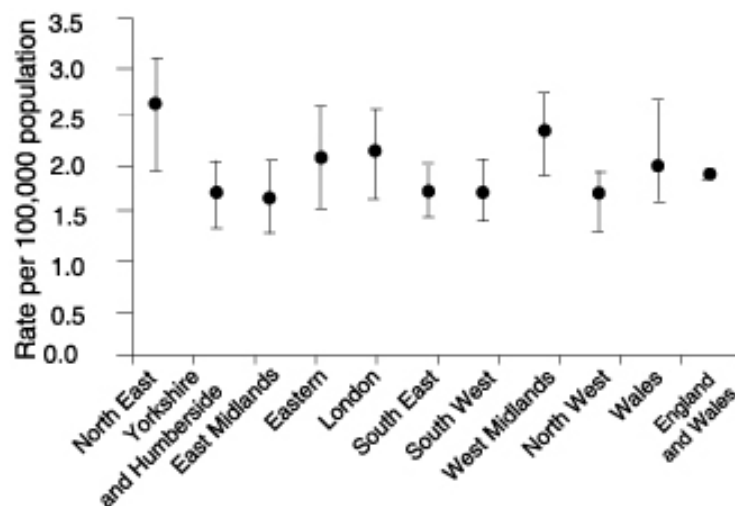
Organism	Number of reports
<i>Candida albicans</i>	579
<i>Candida famata</i>	3
<i>Candida glabrata</i>	149
<i>Candida guilliermondii</i>	3
<i>Candida kefyr</i>	2
<i>Candida krusei</i>	13
<i>Candida lusitanae</i>	5
<i>Candida parapsilosis</i>	104
<i>Candida tropicalis</i>	32
<i>Candida</i> spp - not further identified	115
<i>Candida</i> spp - other named	20
Total	1025

Table 2 Laboratory reports of candidaemia by region, England and Wales, 2001

Region	Number of reports	%*
North East	65	6%
Yorkshire & Humberside	87	8%
East Midlands	71	7%
Eastern	118	12%
London	161	16%
South East	140	14%
South West	84	8%
West Midlands	123	12%
North West	115	11%
Wales	61	6%
England and Wales	1025	100%

* provisional data

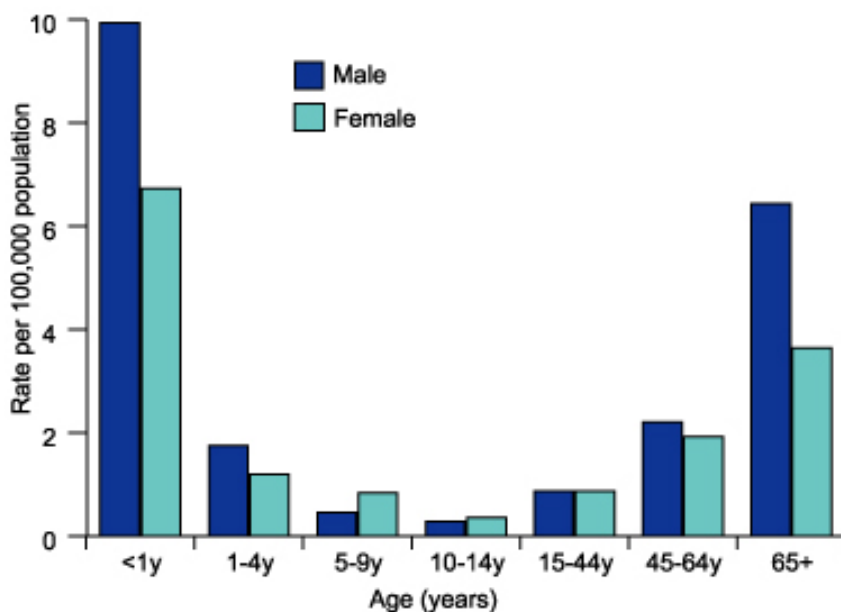
Figure 1 Region-specific rates of laboratory reports of candidaemia, England and Wales, 2001



*rates calculated using 2000 mid-year resident population estimates

Age-specific rates of candidaemia were highest in those under one year for both males and females, followed by those aged over 65 years (figure 2). Rates were higher in males than females in both the young (those under 1 year and aged 1 and 4 years) and the age groups at the other extreme (aged 45 to 64 and those over 65 years). Rates were higher in females in the 5 to 9 and 10 to 14 age group.

Figure 2 Age-specific rates of candidaemia per 100,000 population, England and Wales: 2001



Polymicrobial bacteraemia

Details of all bacteraemia and candidaemia reports from England and Wales in 2001 (63,130 in total) were extracted from LabBase. Multiple organism isolates from blood culture specimens are not linked on CoSurv/LabBase, so polymicrobial bacteraemias (including bacteraemia/candidaemia combinations) were found by identifying records that matched on specimen date, laboratory, date of birth, sex, and soundex.

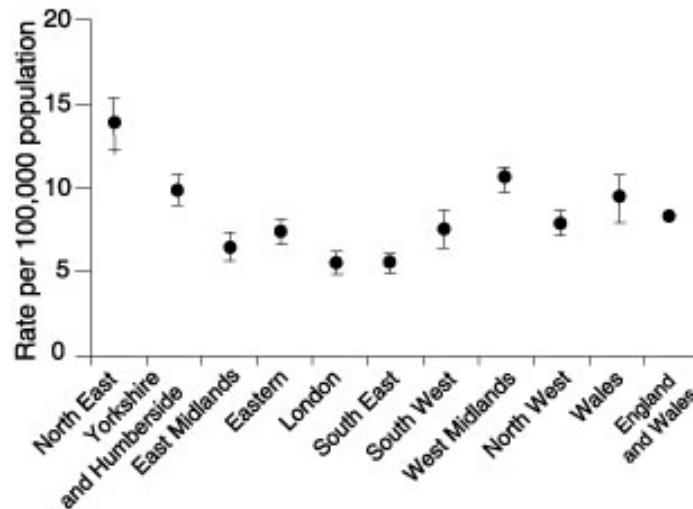
Of 63,130 records, 7792 were identified as matching at least one other report on all these identifiers. Four-hundred and six reports matched at least one other for all these identifiers excluding soundex, which was not always included in every report. There were 706 reports that matched on specimen date, laboratory, soundex, and sex (*ie* excluding date of birth, which was also not included in some reports). Finally, there were 22 reports that matched on all identifiers excluding sex. Therefore, a total of 8926 records were considered to be linked to at least one other report. These were analysed to identify the number of patient episodes of polymicrobial bacteraemias. A total of 4212 patient episodes were identified. The other 54,204 reports were taken to be monomicrobial bacteraemias.

In England and Wales, 7.2% of bacteraemia episodes were polymicrobial (table 3). Nearly one in ten bacteraemia episodes (9.8%) in the North East region were polymicrobial, compared to only 5.6% in London. The North East also had the highest polymicrobial bacteraemia rate by regional population at 13.6/100,000 population (figure 3). The lowest rate was found in the South East region, at 5.6/100,000. The overall rate for England and Wales was 7.9/100,000.

Table 3 Mono- and polymicrobial bacteraemia episodes: England and Wales, 2001

	Monomicrobial	Polymicrobial		Total number of bacteraemia episodes
	Number	Number	(% bacteraemias)	
North East	3222	352	(9.8%)	3574
Yorkshire & Humberside	5890	506	(7.9%)	6396
East Midlands	3992	278	(6.5%)	4270
Eastern	5928	408	(6.4%)	6336
London	7112	423	(5.6%)	7535
South East	7068	462	(6.1%)	7530
South West	5161	384	(6.9%)	5545
West Midlands	7164	556	(7.2%)	7720
North West	5263	557	(9.6%)	5820
Wales	3404	286	(7.7%)	3690
England and Wales	54,204	4212	(7.2%)	58,416

Figure 3 Polymicrobial bacteraemia reporting rate (95% confidence intervals) England and Wales; 2001



*rates calculated using 2000 mid-year resident population estimates

Ninety per cent of episodes of polymicrobial bacteraemia involved two organisms (figure 4). Three organisms were involved in 8.4% of episodes, and 1.4% of episodes involved four. Only a few polymicrobial bacteraemia episodes involved more than four organisms; the maximum number involved in a polymicrobial bacteraemia episode was seven.

Ninety-eight different genera were named in bacteraemia reports (table 4) and consequently many organism combinations were identified in polymicrobial bacteraemias. Rather than attempting to describe all these combinations, table 4 enables comparison of all genera across both monomicrobial and polymicrobial bacteraemias. *Staphylococcus* spp were the most common genera in both monomicrobial and polymicrobial reports, although they were less common in the polymicrobial reports than the monomicrobial reports. *S. aureus* was less prevalent among the polymicrobial bacteraemias (accounting for 12.7% of polymicrobial reports, compared to 22.1% of monomicrobial reports), coagulase-negative staphylococci were more common in polymicrobial reports (10.9%) than monomicrobial reports (8.9%).

Table 4 Organisms reported in mono- and polymicrobial bacteraemia reports: England and Wales, 2001

Genus	Monomicrobial bacteraemias			polymicrobial bacteraemias		
	number of reports	(%)	Rank	Number of reports*	(%)	rank
<i>Abiotrophia</i>	4	(0.0%)	64	1	(0.0%)	57
<i>Achromobacter</i>	3	(0.0%)	67	0	(0.0%)	67
<i>Acinetobacter</i>	686	(1.3%)	14	225	(2.5%)	11
<i>Actinomyces</i>	1	(0.0%)	85	0	(0.0%)	67
<i>Aerococcus</i>	57	(0.1%)	33	27	(0.3%)	23
<i>Aeromonas</i>	69	(0.1%)	30	27	(0.3%)	23
<i>Agrobacterium</i>	39	(0.1%)	39	13	(0.1%)	31
<i>Alcaligenes</i>	54	(0.1%)	34	17	(0.2%)	28
<i>Anaerobiospirillum</i>	0	(0.0%)	100	1	(0.0%)	57

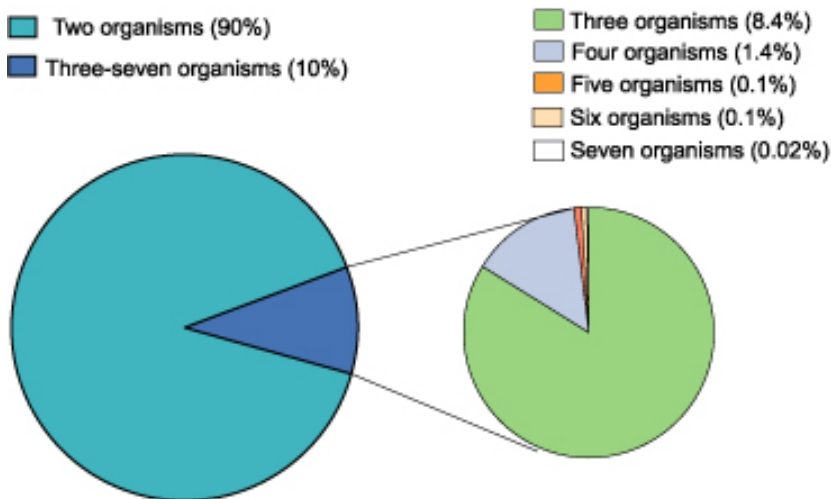
<i>Arcanobacterium</i>	2	(0.0%)	74	0	(0.0%)	67
<i>Bacillus</i>	136	(0.3%)	25	33	(0.4%)	20
<i>Bacteroides</i>	744	(1.4%)	12	143	(1.6%)	12
<i>Bifidobacterium</i>	1	(0.0%)	85	0	(0.0%)	67
<i>Bordetella</i>	2	(0.0%)	74	0	(0.0%)	67
<i>Borrelia</i>	10	(0.0%)	54	0	(0.0%)	67
<i>Branhamella</i>	1	(0.0%)	85	0	(0.0%)	67
<i>Brevibacterium</i>	5	(0.0%)	61	2	(0.0%)	54
<i>Brevundimonas</i>	12	(0.0%)	52	4	(0.0%)	48
<i>Brucella</i>	2	(0.0%)	74	1	(0.0%)	57
<i>Burkholderia</i>	11	(0.0%)	53	4	(0.0%)	48
<i>Campylobacter</i>	81	(0.1%)	28	4	(0.0%)	48
<i>Candida</i>	910	(1.7%)	11	115	(1.3%)	16
<i>Capnocytophaga</i>	7	(0.0%)	57	1	(0.0%)	57
<i>Cardiobacterium</i>	1	(0.0%)	85	0	(0.0%)	67
<i>Chromobacterium</i>	4	(0.0%)	64	0	(0.0%)	67
<i>Chryseobacterium</i>	20	(0.0%)	45	10	(0.1%)	37
<i>Citrobacter</i>	334	(0.6%)	20	126	(1.4%)	15
<i>Clostridium</i>	272	(0.5%)	21	89	(1.0%)	18
<i>Comamonas</i>	69	(0.1%)	30	15	(0.2%)	29
<i>Corynebacterium</i>	453	(0.8%)	16	135	(1.5%)	14
<i>Dermabacter</i>	1	(0.0%)	85	0	(0.0%)	67
<i>Edwardsiella</i>	1	(0.0%)	85	0	(0.0%)	67
<i>Eikenella</i>	2	(0.0%)	74	0	(0.0%)	67
<i>Empedobacter</i>	1	(0.0%)	85	0	(0.0%)	67
<i>Enterobacter</i>	1403	(2.6%)	9	343	(3.8%)	9
<i>Enterococcus</i>	2627	(4.8%)	6	1110	(12.4%)	4
<i>Erwinia</i>	1	(0.0%)	85	0	(0.0%)	67
<i>Erysipelothrix</i>	3	(0.0%)	67	0	(0.0%)	67
<i>Escherichia</i>	11083	(20.4%)	3	1153	(12.9%)	2
<i>Eubacterium</i>	7	(0.0%)	57	3	(0.0%)	51
<i>Flavimonas</i>	13	(0.0%)	51	3	(0.0%)	51
<i>Flavobacterium</i>	7	(0.0%)	57	6	(0.1%)	40
<i>Fusobacterium</i>	62	(0.1%)	32	13	(0.1%)	31
<i>Gardnerella</i>	2	(0.0%)	74	0	(0.0%)	67
<i>Gemella</i>	43	(0.1%)	38	11	(0.1%)	36
<i>Haemophilus</i>	410	(0.8%)	18	32	(0.4%)	21
<i>Hafnia</i>	29	(0.1%)	43	13	(0.1%)	31
<i>Helicobacter</i>	3	(0.0%)	67	0	(0.0%)	67
<i>Kingella</i>	3	(0.0%)	67	0	(0.0%)	67
<i>Klebsiella</i>	2587	(4.8%)	7	656	(7.3%)	7
<i>Kluyvera</i>	15	(0.0%)	48	5	(0.1%)	43
<i>Lactobacillus</i>	17	(0.0%)	46	8	(0.1%)	39
<i>Lactococcus</i>	16	(0.0%)	47	6	(0.1%)	40
<i>Leclercia</i>	1	(0.0%)	85	0	(0.0%)	67
<i>Legionella</i>	2	(0.0%)	74	0	(0.0%)	67

<i>Leptospira</i>	3	(0.0%)	67	0	(0.0%)	67
<i>Leptotrichia</i>	2	(0.0%)	74	0	(0.0%)	67
<i>Leuconostoc</i>	15	(0.0%)	48	5	(0.1%)	43
<i>Listeria</i>	80	(0.1%)	29	5	(0.1%)	43
<i>Micrococcus</i>	138	(0.3%)	24	20	(0.2%)	26
<i>Moraxella</i>	85	(0.2%)	27	13	(0.1%)	31
<i>Morganella</i>	195	(0.4%)	22	84	(0.9%)	19
<i>Mycobacterium</i>	37	(0.1%)	40	3	(0.0%)	51
<i>Neisseria</i>	691	(1.3%)	13	31	(0.3%)	22
<i>Nocardia</i>	2	(0.0%)	74	0	(0.0%)	67
<i>Ochrobactrum</i>	35	(0.1%)	41	5	(0.1%)	43
<i>Oerskovia</i>	1	(0.0%)	85	0	(0.0%)	67
<i>Oligella</i>	1	(0.0%)	85	0	(0.0%)	67
<i>Pantoea</i>	54	(0.1%)	34	21	(0.2%)	25
<i>Pasteurella</i>	44	(0.1%)	37	5	(0.1%)	43
<i>Pediococcus</i>	1	(0.0%)	85	0	(0.0%)	67
<i>Peptococcus</i>	15	(0.0%)	48	2	(0.0%)	54
<i>Peptostreptococcus</i>	92	(0.2%)	26	9	(0.1%)	38
<i>Porphyromonas</i>	2	(0.0%)	74	0	(0.0%)	67
<i>Prevotella</i>	34	(0.1%)	42	12	(0.1%)	35
<i>Propionibacterium</i>	153	(0.3%)	23	15	(0.2%)	29
<i>Proteus</i>	1304	(2.4%)	10	320	(3.6%)	10
<i>Providencia</i>	48	(0.1%)	36	20	(0.2%)	26
<i>Pseudomonas</i>	1924	(3.5%)	8	408	(4.6%)	8
<i>Rahnella</i>	3	(0.0%)	67	0	(0.0%)	67
<i>Ralstonia</i>	7	(0.0%)	57	0	(0.0%)	67
<i>Rhodococcus</i>	5	(0.0%)	61	1	(0.0%)	57
<i>Salmonella</i>	451	(0.8%)	17	6	(0.1%)	40
<i>Serratia</i>	543	(1.0%)	15	107	(1.2%)	17
<i>Shewanella</i>	3	(0.0%)	67	0	(0.0%)	67
<i>Shigella</i>	5	(0.0%)	61	0	(0.0%)	67
<i>Sphingobacterium</i>	2	(0.0%)	74	0	(0.0%)	67
<i>Sphingomonas</i>	24	(0.0%)	44	2	(0.0%)	54
<i>Staphylococcus</i>	16820	(31.0%)	1	2110	(23.6%)	1
– <i>Staphylococcus aureus</i>	11968	(22.1%)	–	1135	(12.7%)	–
– <i>Coagulase-negative staphylococci</i>	4852	(8.9%)	–	975	(10.9%)	–
<i>Stenotrophomonas</i>	377	(0.7%)	19	137	(1.5%)	13
<i>Streptobacillus</i>	1	(0.0%)	85	1	(0.0%)	57
<i>Streptococcus</i>	8337	(15.4%)	4	1092	(12.2%)	5
<i>Tropheryma</i>	1	(0.0%)	85	0	(0.0%)	67
<i>Veillonella</i>	8	(0.0%)	55	1	(0.0%)	57
<i>Vibrio</i>	2	(0.0%)	74	1	(0.0%)	57
<i>Weeksella</i>	1	(0.0%)	85	0	(0.0%)	67
<i>Yersinia</i>	8	(0.0%)	55	1	(0.0%)	57
Other:	321	(0.6%)		134	(1.5%)	

Total number of reports	54,204	100%	-	8,926	100%	-
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*does not correspond to patient episodes as each organism constitutes a separate report.

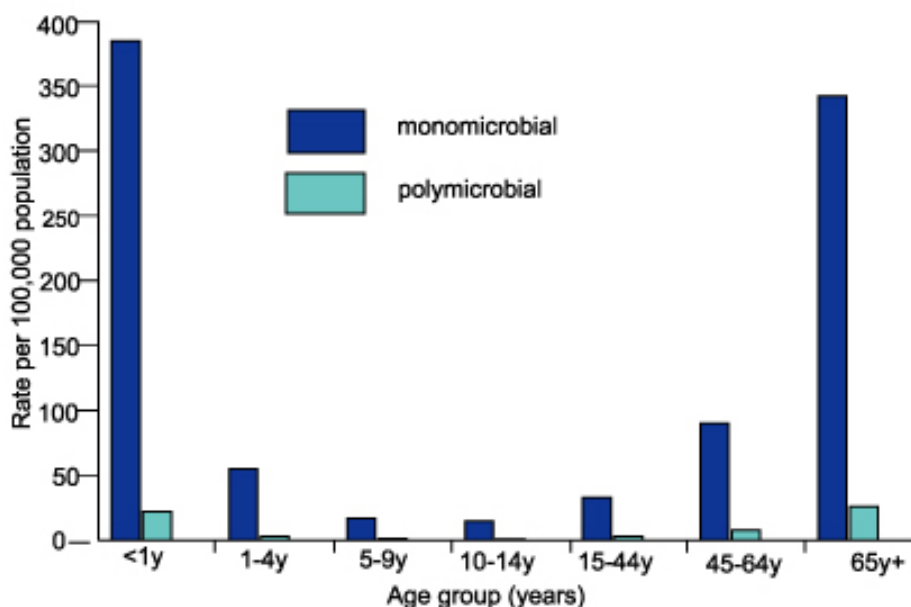
Figure 4 Number of organisms involved in polymicrobial bacteraemia episodes England and Wales, 2001



Some species (eg, *Acinetobacter* spp, *Bacteroides* spp, *Citrobacter* spp, *Clostridium* spp, *Corynebacterium* spp, *Enterobacter* spp, *Enterococcus* spp, *Klebsiella* spp, *Morganella* spp, *Proteus* spp, *Pseudomonas* spp, *Serratia* spp, and *Stenotrophomonas* spp) featured more commonly in polymicrobial bacteraemias. Conversely, *Candida* spp, *Escherichia* spp, *Haemophilus* spp, *Micrococcus* spp, *Neisseria* spp, *Propionibacterium* spp, *Salmonella* spp, and *Streptococcus* spp (of the more common genera) were less commonly reported in polymicrobial bacteraemias than monomicrobial bacteraemias.

The age-specific rates of both monomicrobial and polymicrobial bacteraemia episodes were considerably higher in babies under one year and adults over 65 years compared to all other age groups (figure 5). The rate of monomicrobial bacteraemias was highest in the under ones, whereas polymicrobial episodes had the highest rate among those aged over sixty-five years.

Figure 5 Age distribution of mono and polymicrobial episodes: England and Wales, 2001



Discussion

Of the 1025 reports of *Candida* spp isolated from blood culture specimens in England and Wales in 2001, the majority concerned *C. albicans*. Other common *Candida* spp included *C. glabrata* and *C. parapsilosis*. There were several uncommon *Candida* species that together comprised 6% of the total number of reports. Thirteen per cent of candidaemia reports did not indicate the species. As with most bacteraemia reports, rates of candidaemia were highest in the youngest and oldest age groups. In contrast to many of these reports (1,2,3) rates were highest in those under one year for both males and females. (A notable exception is Group B and certain non-pyogenic streptococcal bacteraemias (4), where rates were also highest in the under ones for both sexes.)

This is the first time that *Candida* spp have been considered in a routine report to the *CDR Weekly*, and therefore we cannot compare these findings to data for 2000. Data is available for invasive mycoses reported to CDSC between 1990 and 1999 (5). In this article, all cases of invasive mycoses were considered, not just blood culture specimens. For *Candida* spp however, 98% of reports of systemic candidosis were due to candidaemia. From 1990 to 1998 increasing numbers of reports of invasive candidosis were received, to a maximum of 804 reports (13/million population) in 1998. In 1999 the total number of reports fell slightly to 722 (13.7/million population). The 1025 cases of candidaemia reported for 2001 (1.94/ 100,000 population or 19.4/million population) therefore represent a notable continuation of the trend of an increasing number of reports of serious *Candida* spp infection.

The proportions of the major *Candida* spp between 1990 and 1999 were given as 60% *C. albicans*, 11% *C. parapsilosis*, and 9% *C. glabrata*. This is similar to the data presented here, although in the 2001 data the proportion of *C. albicans* is slightly lower (56%) and *C. glabrata* higher (15%). Others have also noted a significant increase in the incidence of *C. glabrata* bloodstream infection and concomitant decrease in the incidence of *C. albicans* over the same time period (6). Age and sex distributions for the 1990 and 1999 data show very similar patterns to those reported here.

These rates are much lower than those identified in a recent study (*C Kibbler, personal communication*), which are similar to rates found in the United States (7). It is as yet unclear whether this reflects under-reporting by laboratories to CDSC or whether different populations are being assessed.

In England and Wales in 2001 4212 episodes of polymicrobial bacteraemia were identified, representing 7.2% of all bacteraemia episodes. The process of identifying these polymicrobial episodes relied heavily on matching patient identifiers. This means that incomplete or incorrectly inputted data may not be matched to other reports from the same patient. It is therefore possible that the values presented here are an underestimate. Data from 71 English hospitals participating in hospital-acquired bacteraemia surveillance between 1997 and 2000 (8) indicated that 10% of all hospital-acquired bacteraemias were caused by more than one organism.

There was a notable increase in the number and proportion of polymicrobial bacteraemias in 2001 compared to 2000. For example, 2730 episodes of polymicrobial bacteraemia were identified in 2000 (9) compared to 4212 in 2001, and the number of monomicrobial bacteraemias also increased from 50,266 to 54,263. Polymicrobial episodes accounted for 5.2% of all bacteraemias in 2000, which increased to 7.2% in 2001. It is difficult to tell if this indicates an increase in polymicrobial bacteraemias or improved reporting. The 2001 data includes candidaemia, which was not included in the calculations for 2000, but this only accounts for a small part of the difference between the two years.

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