



# Health Protection Report

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## Surgical site infection surveillance in NHS hospitals in England, 2010/11

Data collected by 237 NHS trusts in England as part of the surveillance of surgical site infections (SSI) have been published by the HPA [1]. The report details rates of infection in mandatory surgical categories of surveillance and voluntary categories.

The report contains data on SSIs detected during patients' post-operative stay (inpatient SSI) combined with SSIs detected on re-admission after initial discharge (re-admission SSI). NHS Trusts in England performing orthopaedic surgery in one of the four mandatory surveillance categories (hip prosthesis, knee prosthesis, reduction of long bone fracture and repair of neck of femur) are required to undertake SSI surveillance for a minimum of one quarter in any given financial year for a minimum of one category. Trusts also have the option of participating in any of the 13 voluntary categories of surgery.

The report describes, by surgical category, the overall rate of SSI, trends in infection rates, rates by risk group and the most common causative organisms. The report is accompanied by a separate document showing orthopaedic data at Trust level, which will also be available from the NHS Choices and the Care Quality Commission websites in 2012.

### Trust participation

- ▶ Data on 438,679 operations and 6,326 surgical site infections (SSIs) from 17 surgical categories were collected by 237 NHS hospitals and independent sector treatment centres between April 2006 and March 2011. Since 2004, there has been a threefold increase in the number of participating hospitals.
- ▶ For the mandatory surveillance of orthopaedic surgery, 152 NHS Trusts and 11 NHS Treatment centres participated in 2010/11 contributing data on 91,362 procedures.
- ▶ The proportion of hospitals undertaking continuous surveillance in 2010/11 was highest in hip prosthesis, knee prosthesis and coronary artery bypass graft (over 50%) and lowest (less than 25%) in vascular and bowel surgery.

### Key findings

- ▶ The risk of SSI varied according to the likelihood of microbial contamination at the operative site, ranging from 10% in large bowel surgery to <1% in knee prosthesis. The number of patient and operative risk factors influenced the risk of infection. Increasing age significantly increased the risk of infection for 9 of 17 categories, the others showing no significant association.
- ▶ Significant variations in SSI rates between different NHS Trusts were identified, with eight identified as high outliers in the mandatory orthopaedic categories. These Trusts have been informed and asked to undertake further investigations.
- ▶ Longitudinal trends in SSI rates calculated over the three years since readmission surveillance was initiated showed a mixed picture with increases seen in knee prosthesis and cholecystectomy and decreases seen in gastric surgery. Increased participation over time is likely to be influencing these overall trends and masking improvements at individual hospital level.
- ▶ Overall, *Enterobacteriaceae* were the predominant reported causes of SSIs accounting for 31% of all inpatient and readmission cases in 2010/11. *S. aureus* was the most common cause of SSI following orthopaedic surgery (37%). The proportion of all inpatient and readmission SSIs caused by meticillin-resistant *S. aureus* (MRSA) has fallen from 14% in 2008/09 to 6% in 2010/11.

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## A case of toxigenic cutaneous *Corynebacterium ulcerans*

A 67-year old patient presented to hospital on 17 November with pain, swelling and a cutaneous lesion on their right index finger. There were no respiratory or systemic symptoms of note. The initial impression was that of a simple flexor sheath infection. However the infectious diseases team were concerned by necrotic features that were present. The patient was therefore started on a combination of ceftriaxone and clindamycin for suspected necrotising fasciitis and subsequently underwent three wound washouts and debridements.

Tissue taken during surgery did not yield any *Streptococcus* spp. However, three successive tissue samples yielded diphtheroids on routine culture. A one-off isolation of diphtheroids would usually be accepted as a contaminant, though should be viewed in context with the clinical presentation and source of microbiological specimen. The consistent culture of diphtheroids in successive deep surgical samples is unusual and should raise concern [1]. A sample of the isolate was processed through the Matrix-Assisted Laser Desorption/ Ionisation Time-Of-Flight (MALDI-TOF) mass spectrometer and a diagnosis of *Corynebacterium ulcerans* was reached. Samples were sent to the HPA Streptococcus and Diphtheria Reference Unit (SDRU) on 8 December - the isolate was identified as toxigenic by PCR the following day and confirmed by Elek.

The local health protection unit (HPU) convened an urgent incident control meeting on 9 December – including the clinicians, HPA SDRU, and HPA Immunisation and Hepatitis and Blood Safety department – to discuss the ongoing case management, public health management of close contacts and possible sources of the infection, in line with national guidelines [2]. The patient had not had any vaccinations in the previous 12 months and could not recall when their last booster dose of diphtheria vaccine. The HPU arranged for the patient, three household contacts and health care staff who had been involved in treating the patient's wound to have nasopharyngeal swabs taken and to be offered a booster dose of Td/IPV vaccine as appropriate. No further cases linked to this patient have occurred.

Cattle are a known reservoir of *C ulcerans* and human cases traditionally have been associated with the consumption of raw dairy products. However, recent studies have suggested that cats and dogs could also be potential reservoirs for this organism [3]. This patient had no history of contact with raw milk products but had had contact with a number of animals. The HPU contacted the Animal Health and Veterinary Laboratories Agency (AHVLA) to take advice on whether the animals should be swabbed and screened for *C ulcerans*. A decision was made not to sample the animals due to the large number of possible animal contacts and the impracticalities of treating any animals identified as carriers of the organism.

It is uncommon to see diphtheria in the UK due to an effective immunisation programme which can mean that when cases do arise there are delays in diagnosis as this case illustrates, particularly in the context of cutaneous lesions [4]. This is the first case of cutaneous *C ulcerans* seen in the UK since 2001.

A summary of diphtheria cases reported in England and Wales between 2007 and 2010 can be found in the Infection Reports section of this issue.

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## Travel Health

### Travellers preparing for winter sun holidays should think about malaria

Travellers from the United Kingdom visiting friends and family or taking 'winter sun' holidays are reminded that they should take anti-malaria tablets when visiting countries where malaria is prevalent.

Although the majority of malaria cases reported in the UK are diagnosed in the summer months, on average, 17% of malaria cases in travellers arriving in the UK are diagnosed in December and January, in many cases having been contracted during visits to winter sun destinations.

The Gambia (West Africa) is a favourite winter sun destination for UK travellers and the majority of malaria cases associated with travel to The Gambia are typically reported between October and January. Between 1 October and 9 December 2011, the HPA Malaria Reference Laboratory reported 18 cases of malaria associated with travel to The Gambia (compared with 52 between October and December in 2010). All cases were caused by *Plasmodium falciparum*. Of the 13 cases for whom information is available, seven travelled on holiday, four to visit friends and relatives and one for business; there was one case in a new entrant to the UK. Fourteen of 17 travel-associated cases (ie not including the new entrant) had not taken appropriate malaria chemoprophylaxis, with no information available for the other three. One case reported taking a homeopathic remedy; it is important to note that there is no evidence that homeopathic remedies are effective in preventing or treating malaria [1]. Since 2000, more deaths from malaria in the UK have been associated with The Gambia than with any other country, although no deaths were reported in 2010 or so far in 2011.

The Gambia has been regularly highlighted as a risk destination for British holiday makers [2, 3]; however Kenya is another popular year round holiday destination and is also associated with a risk of malaria. As of 9 December, 25 cases of malaria have been reported in the UK in 2011 associated with travel to Kenya (compared with 18 in the whole of 2010); the majority had not taken chemoprophylaxis.

Despite peaks in malaria cases associated with winter holidays, the majority of malaria cases diagnosed in the UK are acquired by those visiting friends and relatives (VFR) in countries of West Africa particularly Nigeria and Ghana [4, 5]. As of 9 December, 348 cases (including two deaths) associated with travel to or arrival from Nigeria and 170 cases associated with travel to or arrival from Ghana, have been reported in 2011 (as compared with 447 cases and two deaths from Nigeria and 224 cases from Ghana in 2010).

Total numbers of malaria cases in the UK increased by 30% between 2008 and 2010. It is therefore encouraging that so far in 2011 there has been a reduction in the number of cases associated with holiday travel to The Gambia, and VFR travel to Nigeria and Ghana, although there is still room for improvement. Malaria is a preventable illness, and the majority of the cases reported in the UK have not taken appropriate chemoprophylaxis.

It has been recently reported by the World Health Organization that some progress has been made in reducing the number of malaria cases and deaths reported globally (including Africa) between 2000 and 2010 [6]. However, despite this reduction, malaria remains a major problem in Africa and travellers to Africa should be aware of the risk and encouraged to take chemoprophylaxis.

### Precautionary measures

The appropriate chemoprophylaxis recommended by the Advisory Committee for Malaria Prevention for the whole of sub-Saharan Africa – from West Africa (eg The Gambia, Ghana, Nigeria, etc) to countries of southern Africa – is atovaquone/proguanil (Malarone®), doxycycline or mefloquine (Lariam®) [7]. Travellers should also avoid mosquito bites between dusk and dawn, but especially at night, by using repellents, wearing clothing that covers the skin as much as feasible, and sleeping under a mosquito net [8].

The three effective chemoprophylactic options for sub-Saharan Africa are prescription-only medicines. All travellers to malaria risk areas need to be aware of the risk and should seek pre-travel medical advice from their GP or a travel clinic at least six weeks in advance of travel. It is, however, still appropriate for

last minute travellers to receive chemoprophylactic prescriptions and those booking travel to malaria risk areas at short notice should be advised by their travel agents to seek pre-travel health advice as soon as possible. The importance of completing the prescribed course of chemoprophylaxis must also be emphasised to all travellers.

Further information about malaria prevention and other possible health risks of travelling to particular countries is available from the National Travel Health Network and Centre Country Information Pages at [http://www.nathnac.org/ds/map\\_africa.aspx](http://www.nathnac.org/ds/map_africa.aspx).

### Returning travellers

All travellers should seek medical attention promptly if they become unwell and inform their doctor if they have been in a malaria risk area. Clinicians should take a detailed travel history and consider malaria in every ill patient who has recently returned from the tropics. For those with a fever, the illness should be considered to be malaria until proven otherwise; this is especially important during winter months when the UK flu season is underway, when malaria could be misdiagnosed. In these circumstances, blood film examination should be performed without delay.

Clinicians should ensure that any cases of imported malaria, including a full travel history, are reported to the HPA Malaria Reference Laboratory. The standard reporting form can be downloaded from <http://malaria-reference.co.uk/>.

### Note

Data presented above for 2011 are provisional – final data will be published in 2012.

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## Infection reports

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### Immunisation

#### Diphtheria in England and Wales: 2007 – 2010

Diphtheria became rare in England and Wales following the introduction of mass immunisation in 1942, when the average annual number of cases was about 60,000 with 4,000 deaths. Primary vaccine coverage (three doses) in the United Kingdom (UK) for children aged two has been at least 94% since 2001 and is currently 96%, above the World Health Organisation (WHO) target of 95% [1]. Diphtheria vaccine is made from inactivated diphtheria toxin and protects individuals from the effects of toxin-producing corynebacteria. Three *Corynebacterium* spp. can potentially produce toxin; *C. diphtheriae* (associated with epidemic person-to-person spread via respiratory droplets and close contact), *C. ulcerans* and *C. pseudotuberculosis* (both less common globally and traditionally associated with farm animal contact and dairy products) [2]. Classic respiratory diphtheria is characterised by a swollen 'bull neck' and strongly adherent pseudomembrane which obstructs the airways; a milder respiratory form of the disease where patients present with sore throat or pharyngitis is reported in immunised or partially immunised individuals [2]. Cutaneous presentations, characterised by 'rolled edge' ulcers, are usually associated with travel to tropical areas of the world. A recent review of diphtheria in the UK between 1986 and 2008 emphasises the changing epidemiology of the disease with the majority of toxigenic isolates in recent years associated more often with *C. ulcerans* than *C. diphtheriae* [2].

The normal reservoir of *C. ulcerans* is cattle and human cases traditionally have been associated with the consumption of raw dairy products, however, recent studies have suggested that cats and dogs could also be potential reservoirs for this organism [3,4]. Travel and close contact with cattle, other farm animals and horses are other potential risk factors for infection. Although there is no direct evidence of person-to-person transmission of *C. ulcerans* infection there have been incidents that suggest this mode of transmission is possible. The guidelines for consultants in communicable disease control (CCDCs) on the control of diphtheria recommend that anyone who has been in close contact in the previous seven days with a case of infection caused by toxigenic *C. diphtheriae* or *C. ulcerans* should be considered at risk [5].

As a disease becomes rare, the completeness and accuracy of surveillance information become more important and each clinical diagnosis (ie notification) needs to be confirmed by laboratory diagnosis. In addition to notifications, enhanced surveillance for diphtheria incorporates data from reference and NHS laboratories, death registration, and individual case details such as vaccination history, source of infection and severity of disease obtained from hospital records, general practitioners and local incident team reports. Linkage of notified cases of diphtheria and confirmatory laboratory data shows that most notifications are cases of pharyngitis associated with isolation of non-toxigenic strains of *C. diphtheriae*, and therefore interpretation of notification data should be undertaken with caution. This report for the

period 2007 to 2010 updates a previous two-year review of diphtheria cases in England and Wales for 2005-2006 [6].

During the period 2007 to 2010, 15 toxigenic strains of corynebacteria were identified by the HPA Microbiology Services Division (MSD) Streptococcus and Diphtheria Reference Unit (SDRU), WHO Global Collaborating Centre for Diphtheria, all were from patients in England. Of the 34 notified cases of diphtheria reported, 30 were confirmed by SDRU as non-toxigenic *C. diphtheriae* strains, and four as toxigenic strains; one *C. diphtheriae* and three *C. ulcerans*. In the same period, SDRU identified a further eleven toxigenic isolates from samples referred from patients not formally notified as diphtheria; four were *C. diphtheriae*, six *C. ulcerans* and one *C. pseudotuberculosis* (table 1).

**Table 1. Diphtheria notifications and isolates of toxigenic corynebacteria, England and Wales: 2007-2010**

	Year				
	2007	2008	2009	2010	Total
<b>Total notifications</b>	<b>9</b>	<b>6</b>	<b>11</b>	<b>8</b>	<b>34</b>
Number due to non-toxigenic <i>C. diphtheriae</i>	9	6	9	6	<b>30</b>
Number due to toxigenic <i>C. diphtheriae</i>	–	–	–	1	<b>1</b>
Number due to toxigenic <i>C. ulcerans</i>	–	–	2	1	<b>3</b>
<b>All toxigenic corynebacteria isolates</b>	<b>3</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>15</b>
Toxigenic <i>C. diphtheriae</i>	–	2	2	1	<b>5</b>
Toxigenic <i>C. ulcerans</i>	3	3	2	1	<b>9</b>
Toxigenic <i>C. pseudotuberculosis</i>	–	1	–	–	<b>1</b>

### ***C. ulcerans***

Of the nine toxigenic *C. ulcerans* strains isolated in the period 2007 to 2010, seven were from throat swabs of patients presenting with sore throats (mild respiratory diphtheria) (table 2). The patients were aged between 9 and 89 years, four were female, five had received primary diphtheria immunisations and the 89 year old was unimmunised; for one the immunisation status was unknown. None had a history of consuming raw dairy products but all had reported contact with companion animals (cats and dogs), one had also been in contact with farm animals, and one had a recent history of travel to Slovenia. Swabs were taken from some but not all animal contacts (cats and dogs) but *C. ulcerans* was not isolated. All patients were treated with antibiotics and recovered.

In 2007, an unimmunised 54 year old presented to their GP with severe pharyngitis and was treated with antibiotics. However, three days later she attended an accident and emergency department with symptoms of classic respiratory diphtheria including a white pharyngeal membrane. Toxigenic *C. ulcerans* was isolated from a throat swab. All close contacts were identified and pharyngeal swabs taken were negative for *C. ulcerans*. Treatment of the patient was not straightforward as they were resistant to receiving conventional medicine. The patient had no history of travel but had been in contact with a range of domestic animals. Unfortunately it was not possible to take swabs from the animals. In 2009, toxigenic *C. ulcerans* was isolated from the blood of an 82 year old female who had a mastectomy for breast cancer. There was no history of travel and no other risk factors were identified. Her vaccination was not known. The risk of transmission to contacts was low in this instance and control measures were focused primarily around the family. Both patients recovered.

## C. diphtheriae

Five toxigenic isolates of *C. diphtheriae* were identified between 2007 and 2010. An unimmunised school aged child presented with symptoms consistent with laryngeal diphtheria, although this was not recognised at the time of treatment, and was only diagnosed post-mortem [8]. The child had moved to the UK from Europe more than six months prior to the onset of illness but had not travelled since. Family members and close contacts were swabbed but were all negative for *C. diphtheriae*. Molecular typing undertaken on the isolate compared it with other validated ribotypes which revealed a pattern with a 94.7% similarity to the ribotype pattern *Constantine* [9]. The original type strain of ribotype *Constantine* is a toxigenic *mitis* isolated from a case in Algeria in 1994. Ribotype *Constantine* is not similar to any recent circulating strains within Europe and therefore the source of infection for this child remains unclear.

Two mild respiratory infections were reported in adolescents. A 16 year old male immigrant from the Philippines presenting with a sore throat, fever, and muscle ache had *C. diphtheriae* var *mitis* isolated from a throat swab. He was reported as immunised, though no details were available. Close contacts, including family members were swabbed but negative for *C. diphtheriae*. The patient recovered with antibiotic treatment. An immunised 15 year old UK-born girl with no travel history, who presented with severe sore throat, pustular tonsils and abdominal pain, had toxigenic *C. diphtheriae* var *gravis* isolated from a throat swab. All household contacts, hospital staff and patients identified as close contacts were swabbed and started on antibiotics. All swabs were negative and the source of this infection remains unclear [10]. Two imported cutaneous infections due to *C. diphtheriae* var *mitis* were also reported; one in a 72 year old male who had travelled in the Polynesian islands and the other in a 57 year old female who had visited Sierra Leone.

In addition to the *C. diphtheriae* and *C. ulcerans* cases described above, one toxigenic *C. pseudotuberculosis* isolate was reported in 2008. This was the first reported isolation of toxigenic *C. pseudotuberculosis* from a human in the UK since enhanced surveillance started in 1986 [2]. The organism was isolated from the aortic root vegetation of an injecting drug user with endocarditis. *C. pseudotuberculosis* is typically associated with contact with cattle, sheep and goats, however this patient had no history of animal contact and no possible source of infection was identified [2].

**Table 2. Clinical presentation of diphtheria cases and causative organism, England and Wales: 2007-2010**

Clinical presentation of cases	Causative organism			Total
	Toxigenic <i>C. diphtheriae</i>	Toxigenic <i>C. ulcerans</i>	Toxigenic <i>C. pseudotuberculosis</i>	
Classic respiratory diphtheria (with pseudomembrane)	1	1	–	2
Mild respiratory diphtheria (sore throat/pharyngitis)	2	7	–	9
Cutaneous diphtheria	2	–	–	2
Other	–	1[a]	1[b]	2

a. Blood isolate from mastectomy patient.

b. Blood isolate from IDU with endocarditis.

UK microbiological laboratories are encouraged to submit all suspect isolates of *C. diphtheriae* and other potentially toxigenic corynebacteria to the HPA MSD SDRU. SDRU also provides advice on all aspects of laboratory diagnostics and testing for diphtheria and related infections. Advice on immunisation against diphtheria, provision of vaccine and provision of diphtheria antitoxin for therapeutic use is available from the Immunisation, Hepatitis and Blood Safety Department, HPA. Full details are available on the HPA website at: <http://www.hpa.org.uk/cfi/rsil/corynebacterium.htm>.

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## Immunisation

### Quarterly vaccination coverage statistics for children aged up to five years in the UK (COVER programme): July to September 2011

MMR coverage at 24 months in the United Kingdom (UK) has increased again this quarter by 0.4% to 91.1%, with eight English regions and all devolved administrations achieving at least 90%. Six Scottish Health Boards and 22 English PCTs achieved the WHO target of 95% coverage for this vaccine at 24 months, a further eight PCTs/HB achieved coverage between 94.5% and 94.9%. In London, the only English region with MMR coverage at 24 months below 90%, coverage was 85%, an increase of 0.5% compared to the previous quarter. The English sentinel surveillance data for MMR coverage at 16 months also suggests that the trend for improving routine MMR coverage evaluated at 24 months should continue into 2012.

UK coverage for MMR at 5 years of age also increased this quarter with the proportion of children receiving at least one dose up by 0.5% to 93.3%, and the number completing the two dose schedule up 0.9% to 86.1%. UK DTaP/IPV booster coverage increased by 0.7% to 87.7% with Scotland, Wales, Northern Ireland, and four English regions (North East, Yorkshire and Humber, East Midlands and West Midlands) achieving at least 90%; London is the only region where coverage for DTaP/IPV remains below 85%.

The five-year olds evaluated this report (born between July and September 2006) are the first quarterly cohort to have been offered all their routine immunisations according to the revised schedule introduced on 4 September 2006, including the newly introduced Hib/MenC and PCV booster vaccines [1]. UK coverage of both boosters has increased considerably compared to the previous quarter; PCV is up by 5.7% to 86.4% and Hib/MenC up by 3.9% to 90%. These increases in PCV and Hib/MenC boosters were reported in all English regions and in all devolved administrations.

#### Results for July to September 2011

This report presents quarterly coverage data for children in the UK who reached their first, second, or fifth birthday during the evaluation quarter (July to September 2011).

Children who reached their first birthday in the quarter (born July to September 2010) were the seventeenth quarterly birth cohort to have been scheduled to receive their primary vaccinations according to the schedule introduced on 4 September 2006 [1] (three doses diphtheria, tetanus, acellular pertussis, polio, and *Haemophilus influenzae* type b vaccine (DTaP/IPV/Hib vaccine), two doses each of meningococcal serogroup C conjugate vaccine (MenC vaccine) and pneumococcal conjugate vaccine (PCV).

Children who reached their second birthday in the quarter (born July to September 2009) would have been scheduled to receive their third dose primary vaccinations between November 2009 and January 2010 and first measles, mumps, and rubella (MMR) vaccination between August and October 2010. These children are the sixteenth quarterly birth cohort to be routinely scheduled to receive a booster dose of Hib and MenC vaccine (given as a combined Hib/MenC vaccine) at 12 months, and a PCV vaccine at 13 months of age [1].

Children who reached their fifth birthday in the quarter (born July to September 2006) would have been scheduled to receive their third dose DTaP/IPV/Hib and MenC vaccinations between November 2006 January 2007 and are the first quarterly cohort to have been exclusively offered their primary vaccinations under to the revised schedule introduced on 4th September [1]. They would have been scheduled to receive their first MMR between August and October 2007, their pre-school diphtheria, tetanus, acellular pertussis, inactivated polio booster and second dose MMR from November 2009. Children born between July and September 2006 were the fourth quarterly birth cohort to be scheduled to receive Hib/MenC booster vaccine at 12 months and PCV booster vaccine at 13 months [1].

Methods of data collection for COVER, sentinel MMR coverage and neonatal hepatitis B vaccination coverage are described on the HPA website [2].

## Participation and data quality

Data were received from all Health Boards (HBs) in Scotland, Northern Ireland and Wales, and all but one PCT in England; a London PCT was unable to provide data due to data quality issues. One PCT in South West region, two in London and one in the North West region issued caveats this quarter regarding data completeness/quality.

Individual PCT data for this quarter are published on the HPA website [3].

## Coverage at 12 months

UK coverage at 12 months for DTaP/IPV/Hib3 increased by 0.2% to 94.8% compared to the previous quarter, and both MenC2 and PCV2 increased by 0.1% to 94.3% and 94.5% respectively (table 1) [4]. Country-specific comparisons for minimum coverage levels achieved for all three immunisations evaluated at 12 months show Scotland and Northern Ireland achieved at least 97% coverage, Wales at least 96% and England at least 93%; within England with all regions except London and South East Coast achieved at least 94%. For the fourth successive quarter coverage in London is either above or close to 90% for all three immunisations at 12 months (table 1).

One hundred and six of the 176 participating PCTs/HBs/ARs (60%) achieved at least 95% coverage at 12 months for DTaP/IPV/Hib3, 97 (55%) achieved 95% for two doses of PCV, and 92 (52%) for two doses of MenC vaccine.

**Table 1. Completed primary immunisations (all antigens) by 12 months: July to September 2011**

Strategic Health Authorities (SHAs)/Country	PCT/HB/LHB *† (total)	DTaP/IPV/Hib3 %	MenC2 %	PCV2 %
<b>English SHAs</b>				
North East	12 (12)	96.2	96.0	96.0
North West	24 (24)	95.4	95.3	95.3
Yorkshire and Humber	14 (14)	95.4	94.8	95.0
East Midlands	9 (9)	96.4	95.9	96.0
West Midlands	17 (17)	95.0	94.9	94.9
East of England	13 (13)	95.3	94.8	94.9
London	30 (31)	90.5	89.5	90.0
South Central	9 (9)	95.5	94.7	95.2
South East Coast	8 (8)	92.9	92.8	92.6
South West	14 (14)	95.2	95.0	95.2
<b>England (Total)</b>	<b>150 (151)</b>	<b>94.4</b>	<b>93.9</b>	<b>94.1</b>
<b>Wales</b>	<b>7 (7)</b>	<b>96.5</b>	<b>96.4</b>	<b>96.1</b>
<b>Northern Ireland</b>	<b>4 (4)</b>	<b>97.4</b>	<b>97.4</b>	<b>97.5</b>
<b>Scotland</b>	<b>14 (14)</b>	<b>97.4</b>	<b>97.1</b>	<b>97.7</b>
<b>United Kingdom</b>	<b>175 (176)</b>	<b>94.8</b>	<b>94.3</b>	<b>94.5</b>

\* Primary Care Trusts/health boards/local health boards

† Number of trusts reporting DTaP/IPV/Hib3 coverage.

## Coverage at 24 months

Compared to the previous quarter, UK coverage of DTaP/IPV/Hib3 at 24 months decreased by 0.3% to 96.3%, but still exceeds the WHO target of 95% (for the ninth successive quarter). London remains the only region with coverage significantly below the 95% target (93.1%) (table 2) [4].

MMR coverage in the UK increased 0.4% to 91.1% with all countries and English regions, except London and South East Coast, achieving at least 90% coverage. MMR coverage in London increased by 0.5% and is now the highest level reported since 1998 for this region.

UK Hib/MenC booster remained at 92.6% compared to the previous quarter and PCV booster coverage increased 0.2% to 91.4% (table 2) [4]. Hib/MenC coverage was at least 90% in all countries and English regions except London and for PCV booster coverage, only London and the South East Coast failed to achieve at least 90%.

At least 95% coverage at 24 months was achieved by 140 of the 175 PCTs/HBs (80%) for DTaP/IPV/Hib3, by 112 (64%) for MenC primary, 55 for Hib/MenC booster (31%), 36 (21%) for PCV booster, and 28 (16%) for MMR. An additional 8 PCTs/HBs reported MMR coverage between 94.5% and 94.9%.

**Table 2. Completed primary immunisations (all antigens) by 24 months: July to September 2011**

SHA/Country	PCT/HB * (total)	DTaP/IPV /Hib3 %	MenC2 %	PCV booster%	Hib/MenC%	MMR1%
<b>English SHAs</b>						
North East	12 (12)	97.3	96.5	93.3	95.6	92.4
North West	24 (24)	96.8	95.2	93.1	93.5	93.3
Yorkshire and Humber	14 (14)	97.2	96.8	93.3	95.0	92.8
East Midlands	9 (9)	97.6	97.3	93.3	94.9	92.6
West Midlands	17 (17)	96.9	96.6	92.4	92.7	91.9
East of England	13 (13)	96.1	96.7	92.2	94.3	91.3
London	30 (31)	93.1	90.1	84.5	86.0	85.0
South Central	9 (9)	96.9	96.0	92.4	92.9	92.8
South East Coast	8 (8)	94.9	93.8	89.5	91.4	89.7
South West	14 (14)	96.8	96.1	91.8	92.4	91.2
<b>England (total)</b>	<b>150 (151)</b>	<b>96.0</b>	<b>95.0</b>	<b>91.0</b>	<b>92.2</b>	<b>90.7</b>
<b>Wales</b>	<b>7 (7)</b>	<b>97.4</b>	<b>96.0</b>	<b>93.1</b>	<b>94.0</b>	<b>92.2</b>
<b>Northern Ireland</b>	<b>4 (4)</b>	<b>98.5</b>	<b>96.8</b>	<b>93.5</b>	<b>95.4</b>	<b>92.8</b>
<b>Scotland</b>	<b>14 (14)</b>	<b>98.0</b>	<b>96.2</b>	<b>94.4</b>	<b>95.7 †</b>	<b>94.0</b>
<b>United Kingdom</b>	<b>175 (176)</b>	<b>96.3</b>	<b>95.2</b>	<b>91.4</b>	<b>92.6</b>	<b>91.1</b>

\* Primary Care Trusts/health boards.

† Includes Hib/MenC given from 11 months

### Coverage at 5 years

All countries and three English regions (North East, East Midlands, East of England) achieved at least 95% coverage for primary courses of DTP/Pol3, Hib3 and MenC (table 3). UK coverage of MMR1 at five years increased by 0.5% to 93.3%, and all countries and all English regions except London achieved at least 90% (London 89.4%). For the fourth successive quarter Scotland, Northern Ireland, and two English regions (North East and North West) achieved at least 95%.

UK coverage for MMR2 increased by 0.9% to 86.1% compared to the previous quarter with Northern Ireland and Scotland achieving at least 90% (table 3). Coverage of UK DTaP/IPV booster coverage increased by 0.7% to 87.7% with Scotland, Wales, Northern Ireland, and four English regions (North East, Yorkshire and Humber, East Midlands and West Midlands) achieving at least 90%; London is the only region where coverage for DTaP/IPV remains below 85%.

The five-year birth cohort evaluated this quarter (born between July and September 2006) were the first to have had all their primary immunisations scheduled according to the revised schedule introduced on 4th September 2006 [1]. UK coverage of both PCV and Hib/MenC boosters increased considerably compared to the previous quarter; PCV was up by 5.7% to 86.4% and Hib/MenC increased by 3.9% to 90%. These increases for both antigens were reported in all English regions and in all devolved administrations [4] (table 3).

**Table 3. Completed primary immunisations and boosters (all antigens) by 5 years: July to September 2011**

SHA/ country	PCT/HB/AR* † (total)	Primary				Booster			
		DTP/Pol3 %	Hib3 %	MenC %	MMR1 %	MMR2 %	DTaP/IPV %	Hib/MenC %	DTaP/IPV %
<b>English SHAs</b>									
North East	12 (12)	97.6	97.2	95.2	95.7	89.0	90.6	89.7	89.7
North West	24 (24)	96.6	95.3	92.6	95.2	88.0	89.1	90.0	86.6
Yorkshire & Humber	14 (14)	96.8	96.2	94.8	94.7	88.7	90.0	92.6	87.0
East Midlands	9 (9)	96.9	96.3	95.5	94.1	88.4	90.3	91.7	89.7
West Midlands	17 (17)	96.9	96.3	94.5	94.6	87.6	90.0	93.0	90.8
East of England	13 (13)	95.3	95.1	95.3	90.5	86.3	88.6	92.0	87.3
London	30 (31)	91.8	91.3	84.9	89.4	77.9	77.1	80.7	73.5
South Central	9 (9)	95.6	95.5	93.4	93.0	87.6	89.5	91.6	88.3
Sth. East Coast	8 (8)	93.1	93.1	90.5	90.4	84.0	86.2	85.8	83.5
South West	14 (14)	96.6	96.7	93.5	93.6	83.6	87.0	92.5	89.1
<b>England (total)</b>	<b>150 (151)</b>	<b>95.4</b>	<b>94.9</b>	<b>92.3</b>	<b>92.8</b>	<b>85.4</b>	<b>86.9</b>	<b>89.3</b>	<b>85.4</b>
<b>Wales</b>	<b>7 (7)</b>	<b>97.1</b>	<b>96.6</b>	<b>94.0</b>	<b>94.6</b>	<b>87.5</b>	<b>90.0</b>	<b>92.7</b>	<b>88.4</b>
<b>Northern Ireland</b>	<b>4 (4)</b>	<b>98.2</b>	<b>95.5</b>	<b>94.2</b>	<b>96.9</b>	<b>90.7</b>	<b>92.2</b>	<b>90.0</b>	<b>90.9</b>
<b>Scotland \$</b>	<b>14 (14)</b>	<b>98.7</b>	<b>98.2</b>	<b>94.5</b>	<b>96.9</b>	<b>90.5</b>	<b>92.5</b>	<b>95.9</b>	<b>94.5</b>
<b>United Kingdom</b>	<b>175 (176)</b>	<b>95.8</b>	<b>95.3</b>	<b>92.6</b>	<b>93.3</b>	<b>86.1</b>	<b>87.7</b>	<b>90.0</b>	<b>86.4</b>

\* Primary Care Trusts/health boards/administrative regions

† Number of trusts reporting DTP/Pol3 coverage

### Neonatal hepatitis B vaccine coverage data in England

The data in table 4 represents coverage for three doses of hepatitis B vaccine in those infants born to hepatitis B surface antigen (HBsAg) positive mothers who reached the age of one year in this quarter (i.e. those born between July to September 2010), and coverage of four doses of vaccine in infants who reached two years of age (ie those born between July to September 2009).

**Table 4. Neonatal hepatitis B coverage in England: July to September 2011**

Region	Returns with 12 month data	12 month denominator	Coverage at 12 months %	Returns with 24 month data	24 month denominator	Coverage at 24 months %
North East	7 (12)	10	100	6 (12)	2	100
North West	23 (24)	60	72	23 (24)	73	69
Yorkshire and Humber	14 (14)	31	94	14 (14)	37	95
East Midlands	7 (9)	26	73	7 (9)	59	31
West Midlands	13 (17)	45	73	13 (17)	57	67
East of England	12 (13)	58	66	11(13)	48	67
London	27 (31)	194	90	26 (31)	192	59
South Central	8 (9)	23	100	8 (9)	34	94
South East Coast	8 (8)	22	77	8 (8)	22	50
South West	13(14)	9	89	13 (14)	27	33
<b>Total</b>	<b>132 (151)</b>	<b>478</b>	<b>82</b>	<b>129 (151)</b>	<b>551</b>	<b>62</b>

The quality of these data are variable; some PCT returns may relate to only part of the trust due to mergers and two PCTs only provided the numerator (not included in the coverage estimate calculations). 132 PCTs provided both numerator and denominator 12 month data of which 47 were zero returns. 129 PCTs provided similar 24 month data; 49 were zero returns. The proportion of complete returns varied between SHA regions. Compared to the last quarter 12 month coverage of three doses of Hep B in England decreased by 4% to 82%, and coverage of four doses at 24 months increased 4% to 62% [8] (table 4). Only Yorkshire and the Humber, and South East Coast SHAs reported data from all PCTs.

### MMR sentinel surveillance scheme coverage in England

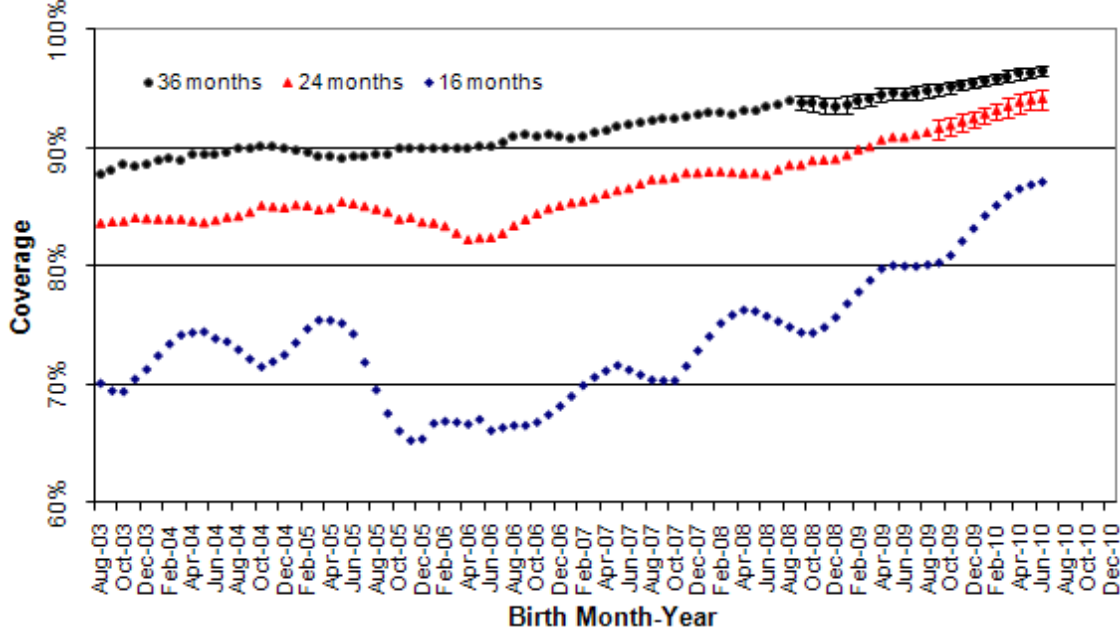
Data collected from September to November 2011 for children in the four age cohorts are summarised in table 5. Data ranged from 86.6 to 87.7% at 16 months, 90.0 to 91.0% at 20 months, 91.0 to 91.9% at 24 months, and remained at 94.1% for each evaluation at 36 months.

**Table 5. Monthly sentinel estimates of measles, mumps rubella (MMR) coverage at 16, 20, 24 and 36 months: July to September 2011**

Evaluation month	Proportion of children vaccinated at each age				
	Number of PCT/trusts	16 months	20 months	24 months	36 months
March 2010	34	86.6	90.0	91.0	94.1
April 2010	34	87.2	90.2	91.9	94.1
May 2010	34	87.7	91.0	91.7	94.1

The figure below shows observed and projected MMR coverage at 16, 24 and 36 months in England for birth cohorts from August 2003 to June 2010. Projections of coverage at 24 and 36 months were made using the most recent coverage data for the same birth cohort and an estimate of the proportion,  $p$ , of those unvaccinated at each earlier age who were subsequently vaccinated by the later age. The proportion was estimated using the most recent 18 months data where final coverage was known. 95% confidence intervals were calculated based on the variability of  $p$  in the past data. The estimates of  $p$  were as follows: 54.2% for 16 to 24 months, 72.6% for 16 to 36 months, 23.7% for 20 to 24 months, 54.6% for 20 to 36 months and 40.2% for 24 to 36 months. Projections make the assumption that  $p$  remains constant over the period of the projection. Data at 20 months is not shown to simplify the graph as the line is close to that plotted for the 24 month data.

### Observed and projected MMR coverage at 16,24 and 36 months by birth year and month in England



Data shown are 5 month moving averages  
Projections are shown with 95% confidence intervals

## Relevant links for country-specific coverage data are as follows:

### England

<http://www.ic.nhs.uk/statistics-and-data-collections/health-and-lifestyles/immunisation>.

### Northern Ireland

<http://www.publichealthagency.org/directorate-public-health/health-protection/vaccination-coverage>.

### Scotland

<http://www.isdscotland.org/Health-Topics/Child-Health/Immunisation/>.

### Wales

<http://www.wales.nhs.uk/sitesplus/888/page/43510>.

### Other relevant links

[http://www.hpa.org.uk/infections/topics\\_az/cover/default.htm](http://www.hpa.org.uk/infections/topics_az/cover/default.htm)

<http://www.dh.gov.uk/en/Publichealth/Immunisation/index.htm>.

## References

1. Department of Health. Important changes to the childhood immunisation programme. PL CMO (2006)  
1. Available online at:  
[http://www.dh.gov.uk/en/Publicationsandstatistics/Lettersandcirculars/Professionalletters/Chiefmedicalofficerletters/DH\\_4137171](http://www.dh.gov.uk/en/Publicationsandstatistics/Lettersandcirculars/Professionalletters/Chiefmedicalofficerletters/DH_4137171).
  2. Methods of collection and publication of data for the COVER programme. HPA website, Home › Topics › Infectious Diseases › Infections A-Z › Vaccine coverage and COVER (Cover of Vaccination Evaluated Rapidly) › COVER Methods.
  3. Vaccine coverage and COVER (Cover of Vaccination Evaluated Rapidly). HPA website, Home › Topics › Infectious Diseases › Infections A-Z › Vaccine coverage and COVER Vaccine coverage and COVER (Cover of Vaccination Evaluated Rapidly).
  4. HPA. Vaccination coverage statistics for children up to the age of five years in the United Kingdom, April to June 2011. *Health Protection Report* 2010; **5**(38): immunisation. Available online at:  
<http://www.hpa.org.uk/hpr/archives/2011/hpr3811.pdf>.
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## Bacteraemia/HCAIs

- ▶ Trends in MRSA bacteraemia and *Clostridium difficile* infection data, and the first nine months of mandatory MSSA bacteraemia data, for England, up to July - Sept 2011
  - ▶ Uncommon pathogens involved in bacteraemia: England, Wales and Northern Ireland, 2005-2009
- 

### Trends in MRSA bacteraemia and *Clostridium difficile* infection data, and the first nine months of mandatory MSSA bacteraemia data, for England, up to July-Sept 2011

This ninth publication of the quarterly epidemiological commentary contains trend analyses for mandatory surveillance of meticillin-resistant *Staphylococcus aureus* (MRSA) bacteraemia and *Clostridium difficile* infections (CDI) reported by NHS acute Trust hospitals in England up to September 2011 [1,2]. A summary of meticillin-sensitive *Staphylococcus aureus* (MSSA) bacteraemia data collected to date is also provided. This is the third quarterly epidemiological commentary to include mandatory surveillance data on MSSA bacteraemia; collection of MSSA bacteraemia data became mandatory in January 2011 [3].

The complete epidemiological commentary with additional information on the rates of MRSA bacteraemia and CDI and MSSA bacteraemia data for the first three quarters of 2011 is available on the HPA website [4]. Methodological information including details of the Trust apportioning process can be found below.

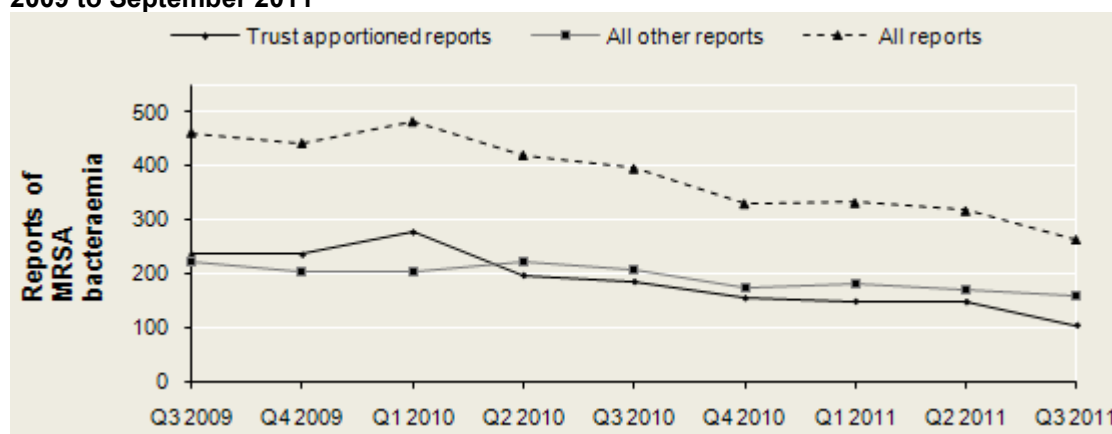
The next commentary will be published in March 2012.

Note: All references to quarterly data are based on calendar year definitions, and NOT financial year definitions (eg Q1 2009 refers to January-March 2009 and NOT to April-June 2009).

#### MRSA bacteraemia

- ▶ The quarterly average of MRSA bacteraemia reports for the financial year 2003/04 of 1,925 reports is used to calculate a baseline against which future data can be compared.
- ▶ In the most recent quarter (July-September 2011) there was an 86.2% decrease in reports relative to the baseline.
- ▶ There has been a 42.6% decrease in total reports (462 to 265) from July-September 2009 to July-September 2011 (figure 1).
- ▶ Compared to the previous quarter (April-June 2011) there has been a 16.7% decrease (from 318 to 265 reports).

**Figure 1. Quarterly counts of Trust apportioned and all other reports of MRSA bacteraemia: July 2009 to September 2011**



## MSSA bacteraemia

The data included in this quarterly report represents early analysis of the first three quarters of MSSA bacteraemia surveillance (January-September 2011) collected from English NHS acute Trusts.

- ▶ There were a total of 6,573 reports between January and September 2011; 2,148 of these reports were Trust apportioned and 4,425 were non-Trust apportioned.
- ▶ A summary of reports by month is presented in table 1. Details of both Trust apportioned and non-Trust apportioned MSSA bacteraemia reports are provided.
- ▶ A summary of patient demographics and admission status is presented in table 2. Reports are split into Trust apportioned and non-Trust apportioned MSSA bacteraemia reports.

**Table 1. Monthly counts of Trust apportioned and all other reports of MSSA bacteraemia, January-September 2011**

	January-September 2011		
	Trust Apportioned	Non-Trust apportioned	Total
<b>January</b>	239	506	745
<b>February</b>	237	452	689
<b>March</b>	258	503	761
<b>April</b>	238	465	703
<b>May</b>	236	526	762
<b>June</b>	222	492	714
<b>July</b>	218	500	718
<b>August</b>	232	479	711
<b>September</b>	268	502	770
<b>Total</b>	<b>2,148</b>	<b>4,425</b>	<b>6,573</b>

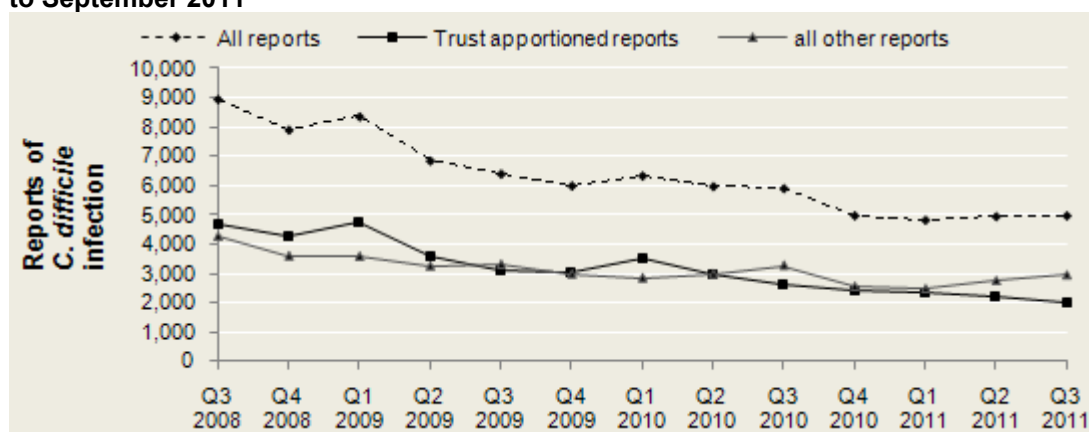
**Table 2. Summary of MSSA bacteraemia patient demographics and admission status, January-September 2011**

	January-September 2011					
	Trust apportioned (%)		Non-Trust apportioned (%)		Total (%)	
<b>Gender</b>						
Females	826	(40.0)	1,602	(37.5)	2,428	(38.3)
Males	1,238	(60.0)	2,680	(62.5)	3,918	(61.7)
Not known/unspecified	84	(-)	143	(-)	227	(-)
<b>Age at diagnosis</b>						
<1	225	(10.5)	135	(3.1)	360	(5.5)
1-14	56	(2.6)	305	(6.9)	361	(5.5)
15-44	255	(11.9)	792	(17.9)	1,047	(15.9)
45-54	225	(10.5)	501	(11.3)	726	(11.0)
55-64	274	(12.8)	664	(15.0)	938	(14.3)
65-74	372	(17.3)	758	(17.1)	1,130	(17.2)
≥75	741	(34.5)	1,270	(28.7)	2,011	(30.6)
<b>Admission Method</b>						
Emergency	1,450	(78.0)	3,645	(93.8)	5,095	(88.7)
Elective	215	(11.6)	127	(3.3)	342	(6.0)
Other	195	(10.5)	115	(3.0)	310	(5.4)
Not known/unspecified	288	(-)	538	(-)	826	(-)
<b>Admission source</b>						
Home	1,638	(84.3)	3,584	(92.2)	5,222	(88.7)
Nursing/residential home	60	(3.1)	194	(4.6)	254	(4.3)
Other hospital	160	(8.2)	89	(1.8)	249	(4.2)
Other	84	(4.3)	77	(1.4)	161	(2.7)
Not known/unspecified	206	(-)	481	(-)	687	(-)

### ***Clostridium difficile* infection**

- ▶ The quarterly average of CDI reports for the financial year 2007/08 of 13,875 reports is used as the baseline against which future data comparisons can be made.
- ▶ Data for the most recent quarter (July-September 2011) showed a total of 4,981 reports, which corresponds to a 64.1% reduction relative to the baseline.
- ▶ This is a 15.7% decrease on the same quarter in 2010 (July-September 2010) when the total number of reports was 5,909 (Figure 2).
- ▶ There has been a 44.3% decrease in total reports (8,948 to 4,981) from July-September 2008 to July-September 2011. Compared to the previous quarter (April-June 2011) there has been a minimal increase (from 4,955 to 4,981 reports).
- ▶ There has been a 56.5% decrease in Trust apportioned reports (4,687 to 2,040) from July-September 2008 to July-September 2011. Compared to the previous quarter (April-June 2011) there has been a decrease of 7.6% (2,207 to 2,040) in Trust apportioned reports.
- ▶ The number of all other reports (non-Trust apportioned reports) has decreased by 31.0% (4,261 to 2,941) from July-September 2008 to July-September 2011. Compared to the previous quarter (April-June 2011) there has been a 6.9% increase (2,750 to 2,941) in all other reports.

**Figure 2. Quarterly counts of all CDI reports and Trust apportioned and all other reports: July 2008 to September 2011**



## Notes

**MRSA bacteraemia Trust apportioned episodes:** The analysis of Trust apportioned and all other reports is based on the model outlined by the National Quality Board ([http://www.dh.gov.uk/en/Consultations/Closedconsultations/DH\\_100641](http://www.dh.gov.uk/en/Consultations/Closedconsultations/DH_100641)).

This includes patients who are (i) in-patients, day-patients, emergency assessment patients or not known; AND (ii) have had a specimen taken at an acute trust; AND (iii) specimen is **3 or more days** after date of admission (admission date is considered day '1').

**MSSA bacteraemia Trust apportioned reports:** The analysis of Trust apportioned and all other reports is based on the criteria applied to MRSA bacteraemia.

**CDI Trust apportioned episodes:** include patients who are (i) in-patients, day-patients, emergency assessment patients; AND (ii) have had a specimen taken at an acute Trust or not known; AND (iii) specimen is **4 or more** days after date of admission (admission date is considered day '1').

**Non-Trust apportioned reports ('all other reports'):** These include all reports that are NOT apportioned to an acute Trust. The two categories are mutually exclusive.

## References

1. Mandatory *Staphylococcus aureus* bacteraemia surveillance scheme.
2. Mandatory *Clostridium difficile* infection surveillance scheme.
3. HPA. Healthcare-associated infections: changes to reporting for MSSA bacteraemia. *Health Protection Report* 2011; **5**(2): news.
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## Uncommon pathogens involved in bacteraemia: England, Wales and Northern Ireland, 2006-2010

This analysis is based on bacteraemia reports made by laboratories in England, Wales and Northern Ireland between 2006 and 2010. The reports were made to the HPA as part of the voluntary reporting scheme and provide data on both community- and hospital-acquired bacteraemia. This report describes uncommon pathogens (genera with fewer than 50 reports in 2010) identified from blood cultures or blood specimens where the diagnostic method was not stated. The majority of such reports are likely to represent bacteraemic infection. Due to late reporting, the data in this report may vary from that in previous reports.

A total of 99,159 bacterial isolates using either blood culture or unknown methods were reported by laboratories in England, Wales and Northern Ireland in 2010. Sixty-five uncommon genera causing bacteraemia were reported in 2010, comprising a total of 667 bacteraemic episodes. Gram-negative organisms comprised 66% of episodes caused by uncommon pathogens in 2010. By definition of inclusion in this report, small numbers of reports preclude robust or meaningful analysis of trends but of note are the general decreases in *Alcaligenes* and *Ochrobactrum* and an increase in *Actinomyces* (see table 1/appendix – see following pages).

### Discussion

The purpose of this review is to describe the unusual bacterial genera not included in the monthly bacteraemia reports published in the *Health Protection Report*. Although these bacteria only account for a very low proportion of total bacteraemia reports between 2006 and 2010, they can be associated with important clinical consequences. For example, some genera, such as *Cardiobacterium* spp., *Eikenella* spp. and *Kingella* spp. are associated with endocarditis [1]. Infections imported from endemic regions – eg *Brucella* sp, *Burkholderia pseudomallei* – although rarely diagnosed in this country, can cause severe illness in those affected. Others, eg *Nocardia*, are well recognised causes of infection in immunocompromised patients. Some, although pathogens indigenous to the UK – eg *Yersinia* spp, *Vibrio* spp – are simply uncommon and generally associated with specific exposures. The bulk of them, however, are likely to be opportunistic pathogens. Examining trends in these unusual pathogens can also provide a means for identifying emerging or re-emerging infections, providing opportunities for preventive measures or education of frontline clinical staff.

The fall in numbers of reports of *Agrobacterium*, *Alcaligenes* and certain other environmental bacteria capable of causing line-related sepsis since 2006, is of interest and may well reflect widespread improvements in line management in the NHS [2].

Reports of bacteraemia caused by members of the *Actinomyces* genus have increased between 2006 and 2010 accounted for by increased reports of unnamed *Actinomyces* species. Reports of *Veillonella* have also increased over the same time period. Members of both genera form part of the normal microbial flora of the mouth but are capable of causing serious disease [3,4].

Whilst the bacteraemia reported to this voluntary surveillance system should, according to national reporting guidelines, reflect clinically significant disease, it should be borne in mind that some of these reports may reflect contaminants. Reports of pseudobacteraemia (bacteria being present in blood cultures but without clinical evidence of blood stream infection) caused by *Ochrobactrum* have been identified in the past, resulting from poor sampling technique or through contamination of laboratory reagents [5,6]. Inclusion of reports with unknown diagnostic methods should also be taken into account in interpreting these data as some of these reports may not represent isolation from blood culture but microbiological diagnoses by other unspecified means. Improvements in laboratory reporting of diagnostic methods would allow the exclusion of these reports without artificially decreasing the number of genuine bacteraemic infections.

There has been a general improvement in the identification of cultured organisms to the species level by the increased use of automated biochemical identification systems, molecular techniques such as 16S ribosomal RNA and, most recently, by the introduction of MALDI-TOF mass spectrometry in some laboratories. This should increase the accuracy of species identified and permit robust trend analysis of

hitherto difficult to identify species. If confirmation of unusual bacterial pathogens is required, isolates can be sent to the relevant laboratory within the [Specialist and Reference Microbiology Division](#) of the HPA.

## Acknowledgements

These reports would not be possible without the enduring weekly contributions from microbiology colleagues in laboratories across England, Wales and Northern Ireland, without which there would be no surveillance data. The valuable support of colleagues within HPA Colindale in the preparation of the reports is also gratefully acknowledged. Comments/feedback may be sent to: [hcai.amrdivision@hpa.org.uk](mailto:hcai.amrdivision@hpa.org.uk).

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Table 1: Uncommon organisms associated with bacteraemia, England, Wales and Northern Ireland: 2006-2010\*

Genus	Species	Number of bacteraemia reports				
		2006	2007	2008	2009	2010
<b>Gram positive bacteria</b>						
<i>Abiotrophia</i> spp		34	28	25	17	16
	<i>Abiotrophia adjacens</i>	19	11	8	5	7
	<i>Abiotrophia defectiva</i>	11	11	12	7	5
	<i>Abiotrophia</i> other named	0	0	1	1	0
	<i>Abiotrophia</i> sp	4	6	4	4	4
<i>Actinomyces</i> spp		8	9	19	15	32
	<i>Actinomyces meyeri</i>	0	0	2	1	4
	<i>Actinomyces naeslundii</i>	3	4	2	3	3
	<i>Actinomyces odontolyticus</i>	0	1	4	1	4
	<i>Actinomyces</i> other named	1	1	2	2	5
	<i>Actinomyces</i> sp	4	3	8	8	16
	<i>Actinomyces viscosus</i>	0	0	1	0	0
<i>Aggergatibacter</i> spp		7	6	4	2	1
	<i>Aggergatibacter (haemophilus) actinomycetemcomitans</i>	6	6	4	2	1
	<i>Aggergatibacter (haemophilus) segnis</i>	1	0	0	0	0
<i>Arachnia</i> spp		0	1	0	0	0
	<i>Arachnia</i> named	0	1	0	0	0
<i>Arcanobacterium</i> spp		10	5	26	12	18
	<i>Arcanobacterium haemolyticum</i>	10	5	26	12	18
<i>Arthrobacter</i> spp		3	5	2	2	4
	<i>Arthrobacter</i> sp	3	5	2	2	4
<i>Bifidobacterium</i> spp		3	7	7	10	4
	<i>Bifidobacterium</i> named	0	0	3	0	0
	<i>Bifidobacterium</i> sp	3	7	4	10	4
<i>Brevibacterium</i> spp		14	15	16	15	21
	<i>Brevibacterium</i> other named	1	1	2	1	6
	<i>Brevibacterium</i> sp	13	14	14	14	15
<i>Delftia</i> spp		18	9	15	10	9
	<i>Delftia acidovorans</i>	18	9	15	10	9
<i>Dermabacter</i> spp		1	4	8	2	2
	<i>Dermabacter hominis</i>	1	4	8	2	2
<i>Erysipelothrix</i> spp		1	4	4	4	7
	<i>Erysipelothrix rhusiopathiae (insidiosa)</i>	1	4	4	4	7
<i>Eubacterium</i> spp		24	19	23	19	12
	<i>Eubacterium lentum</i>	15	9	16	12	7
	<i>Eubacterium</i> other named	4	3	2	5	2
	<i>Eubacterium</i> sp	5	7	5	2	3
<i>Faenia</i> spp		0	0	1	0	0
	<i>Faenia rectivergula</i>	0	0	1	0	0
<i>Globicatella</i> spp		2	3	0	2	4
	<i>Globicatella sanguis</i>	2	3	0	2	4
<i>Koserella</i> spp		0	0	0	0	1
	<i>Koserella trabulsii</i>	0	0	0	0	1

Genus	Species	Number of bacteraemia reports				
		2006	2007	2008	2009	2010
<i>Kurthia</i> spp		0	0	1	1	1
	<i>Kurthia</i> other named	0	0	1	1	1
<i>Leuconostoc</i> spp		43	39	38	38	34
	<i>Leuconostoc</i> sp	43	39	38	38	34
<i>Mobiluncus</i> spp		0	0	1	0	2
	<i>Mobiluncus curtisii</i>	0	0	0	0	1
	<i>Mobiluncus</i> sp	0	0	1	0	1
<i>Nocardia</i> spp		4	2	7	8	5
	<i>Nocardia asteroides</i>	0	0	0	0	1
	<i>Nocardia</i> other named	1	1	2	3	2
	<i>Nocardia</i> sp	3	1	5	5	2
<i>Oerskovia</i> spp		0	1	0	1	0
	<i>Oerskovia</i> other named	0	1	0	0	0
	<i>Oerskovia</i> sp	0	0	0	1	0
<i>Pediococcus</i> spp		3	5	6	1	6
	<i>Pediococcus</i> other named	2	4	2	0	2
	<i>Pediococcus</i> sp	1	1	4	1	4
<i>Peptococcus</i> spp		12	17	23	15	14
	<i>Peptococcus</i> named	5	1	6	0	5
	<i>Peptococcus</i> sp	7	16	17	15	9
<i>Rhodococcus</i> spp		17	23	18	10	10
	<i>Rhodococcus equi</i> ( <i>Corynebacterium equi</i> )	0	0	2	1	0
	<i>Rhodococcus</i> other named	0	2	4	1	0
	<i>Rhodococcus</i> sp	17	21	12	8	10
<i>Rothia</i> spp		12	13	9	7	17
	<i>Rothia dentocariosia</i>	6	5	2	3	4
	<i>Rothia</i> sp	6	8	7	4	13
<i>Stomatococcus</i> spp		7	4	9	3	6
	<i>Stomatococcus mucilaginosus</i>	7	3	7	3	4
	<i>Stomatococcus</i> sp	0	1	2	0	2
<i>Streptomyces</i> spp		0	1	0	0	1
	<i>Streptomyces</i> sp	0	1	0	0	1
Total - Gram positive bacteria		223	220	262	194	227
Gram negative bacteria						
<i>Actinobacillus</i> spp		1	1	3	0	3
	<i>Actinobacillus</i> other named	0	1	1	0	3
	<i>Actinobacillus</i> sp	0	0	2	0	0
	<i>Actinobacillus ureae</i>	1	0	0	0	0
<i>Agrobacterium</i> spp		47	40	30	26	34
	<i>Agrobacterium</i> other named	0	1	0	0	2
	<i>Agrobacterium radiobacter</i> ( <i>Agrobacterium tumefaciens</i> )	43	35	29	24	30
	<i>Agrobacterium</i> sp	4	4	1	2	2
<i>Alcaligenes</i> spp		41	36	26	25	20
	<i>Alcaligenes faecalis</i>	16	24	14	18	13
	<i>Alcaligenes</i> other named	5	2	4	0	1
	<i>Alcaligenes</i> sp	20	10	8	7	6

Genus	Species	Number of bacteraemia reports				
		2006	2007	2008	2009	2010
<i>Anaerobiospirillum</i> spp		4	6	9	9	4
	<i>Anaerobiospirillum</i> other named	1	1	1	0	3
	<i>Anaerobiospirillum</i> sp	3	5	8	9	1
<i>Arcobacter</i> spp		0	1	1	0	0
	<i>Arcobacter butzleri</i>	0	1	0	0	0
	<i>Arcobacter</i> sp	0	0	1	0	0
<i>Bergeyella</i> spp		1	0	0	0	0
	<i>Bergeyella zoohelcum</i>	1	0	0	0	0
<i>Bordetella</i> spp		4	6	5	4	6
	<i>Bordetella bronchiseptica</i>	3	6	2	2	1
	<i>Bordetella</i> other named	1	0	0	0	1
	<i>Bordetella</i> sp	0	0	3	2	4
<i>Borrelia</i> spp		0	2	2	7	2
	<i>Borrelia</i> sp	0	2	2	7	2
<i>Branhamella</i> spp		3	3	0	2	2
	<i>Branhamella</i> sp	3	3	0	2	2
<i>Brevundimonas</i> spp		29	47	45	25	28
	<i>Brevundimonas diminuta</i>	8	14	10	5	8
	<i>Brevundimonas</i> sp	1	4	7	6	3
	<i>Brevundimonas vesicularis</i>	20	29	28	14	17
<i>Brucella</i> spp		11	7	3	8	4
	<i>Brucella abortus</i>	1	0	0	0	0
	<i>Brucella melitensis</i>	4	5	3	7	3
	<i>Brucella</i> sp	6	2	0	1	1
<i>Burkholderia</i> spp		34	46	29	35	45
	<i>Burkholderia cenocepacia</i>	0	0	1	1	4
	<i>Burkholderia cepacia</i>	31	46	27	31	37
	<i>Burkholderia multivorans</i>	0	0	0	2	1
	<i>Burkholderia pseudomallei</i>	3	0	1	1	2
	<i>Burkholderia</i> sp	0	0	0	0	1
<i>Buttiauxella</i> spp		0	1	1	0	0
	<i>Buttiauxella agrestis</i>	0	1	0	0	0
	<i>Buttiauxella</i> sp	0	0	1	0	0
<i>Capnocytophaga</i> spp		9	13	21	14	12
	<i>Capnocytophaga ochracea</i>	0	0	0	0	1
	<i>Capnocytophaga</i> other named	3	2	10	1	7
	<i>Capnocytophaga</i> sp	6	11	11	13	4
<i>Cardiobacterium</i> spp		1	3	6	1	4
	<i>Cardiobacterium hominis</i>	1	1	4	1	2
	<i>Cardiobacterium</i> other named	0	2	0	0	1
	<i>Cardiobacterium</i> sp	0	0	2	0	1
<i>Cedecea</i> spp		2	2	0	2	2
	<i>Cedecea davisae</i>	1	0	0	1	0
	<i>Cedecea lapagei</i>	0	0	0	1	0
	<i>Cedecea neteri</i>	1	1	0	0	0
	<i>Cedecea</i> sp	0	1	0	0	2

Genus	Species	Number of bacteraemia reports				
		2006	2007	2008	2009	2010
<i>Chromobacterium</i> spp		2	1	4	0	1
	<i>Chromobacterium</i> sp	0	0	1	0	0
	<i>Chromobacterium violaceum</i>	2	1	3	0	1
<i>Chryseobacterium</i> spp		49	47	20	29	21
	<i>Chryseobacterium indologenes</i>	37	30	16	20	14
	<i>Chryseobacterium meningosepticum</i>	9	16	3	6	5
	<i>Chryseobacterium</i> sp	3	1	1	3	2
<i>Comamonas</i> spp		13	10	10	9	10
	<i>Comamonas</i> other named	1	2	3	1	1
	<i>Comamonas</i> sp	6	3	1	3	2
	<i>Comamonas testosteroni</i>	6	5	6	5	7
<i>Dialister</i> spp		0	1	2	1	1
	<i>Dialister pneumosintes</i>	0	1	2	1	1
<i>Edwardsiella</i> spp		3	1	2	0	2
	<i>Edwardsiella</i> other named	0	0	1	0	2
	<i>Edwardsiella</i> sp	3	0	0	0	0
	<i>Edwardsiella tarda</i>	0	1	1	0	0
<i>Eikenella</i> spp		7	9	4	13	8
	<i>Eikenella corrodens</i>	7	8	3	13	8
	<i>Eikenella</i> sp	0	1	1	0	0
<i>Empedobacter</i> spp		0	1	3	1	2
	<i>Empedobacter brevis</i>	0	1	3	1	2
<i>Erwinia</i> spp		2	0	0	0	2
	<i>Erwinia</i> other named	0	0	0	0	1
	<i>Erwinia</i> sp	2	0	0	0	1
<i>Ewingella</i> spp		1	0	0	1	1
	<i>Ewingella americana</i>	1	0	0	1	1
<i>Flavobacterium</i> spp		4	4	10	8	4
	<i>Flavobacterium</i> other named	0	1	4	3	2
	<i>Flavobacterium</i> sp	4	3	6	5	2
<i>Gardnerella</i> spp		2	3	6	7	10
	<i>Gardnerella</i> other named	0	0	1	2	1
	<i>Gardnerella</i> sp	0	0	1	0	0
	<i>Gardnerella vaginalis</i>	2	3	4	5	9
<i>Hafnia</i> spp		31	41	44	32	38
	<i>Hafnia alvei</i>	31	39	43	31	38
	<i>Hafnia</i> sp	0	2	1	1	0
<i>Helicobacter</i> spp		0	1	0	18	0
	<i>Helicobacter cinaedi</i>	0	1	0	0	0
	<i>Helicobacter pylori</i>	0	0	0	18	0
<i>Kingella</i> spp		2	6	5	11	6
	<i>Kingella denitrificans</i>	1	0	0	0	0
	<i>Kingella kingae</i>	1	4	4	10	5
	<i>Kingella</i> sp	0	2	1	1	1
<i>Kluyvera</i> spp		24	37	18	20	21
	<i>Kluyvera ascorbata</i>	1	0	2	0	1
	<i>Kluyvera</i> sp	23	37	16	20	20

Genus	Species	Number of bacteraemia reports				
		2006	2007	2008	2009	2010
<i>Leclercia</i> spp		2	6	6	5	12
	<i>Leclercia adecarboxylata</i>	2	6	6	5	12
<i>Legionella</i> spp		1	4	6	3	0
	<i>Legionella pneumophila</i>	0	0	0	1	0
	<i>Legionella</i> sp	1	4	6	2	0
<i>Leptospira</i> spp		1	6	5	4	3
	<i>Leptospira</i> other named	0	0	1	1	1
	<i>Leptospira</i> sp	1	6	4	3	2
<i>Leptotrichia</i> spp		2	0	1	4	3
	<i>Leptotrichia buccalis</i>	1	0	0	2	1
	<i>Leptotrichia</i> sp	1	0	1	2	2
<i>Myroides</i> spp		0	5	3	0	2
	<i>Myroides odoratus</i>	0	5	3	0	0
	<i>Myroides</i> sp	0	0	0	0	2
<i>Ochrobactrum</i> spp		61	63	42	35	26
	<i>Ochrobactrum anthropi</i>	59	59	41	34	26
	<i>Ochrobactrum</i> sp	2	4	1	1	0
<i>Oligella</i> spp		3	3	3	2	2
	<i>Oligella</i> sp	1	0	0	0	0
	<i>Oligella ureolytica</i>	2	1	3	1	2
	<i>Oligella urethralis</i>	0	2	0	1	0
<i>Plesiomonas</i> spp		2	1	1	0	0
	<i>Plesiomonas shigelloides</i>	2	1	1	0	0
<i>Porphyromonas</i> spp		5	0	1	6	4
	<i>Porphyromonas asaccharolytica</i>	3	0	0	3	0
	<i>Porphyromonas</i> sp	2	0	1	3	4
<i>Rahnella</i> spp		3	4	2	4	4
	<i>Rahnella</i> named	2	4	2	4	3
	<i>Rahnella</i> sp	1	0	0	0	1
<i>Ralstonia</i> spp		14	16	15	8	17
	<i>Ralstonia pickettii</i>	14	16	15	8	17
<i>Roseomonas</i> spp		5	6	4	4	3
	<i>Roseomonas gilardii</i>	1	1	1	2	2
	<i>Roseomonas</i> sp	4	5	3	2	1
<i>Shewanella</i> spp		7	4	6	5	2
	<i>Shewanella putrefaciens (pseudomonas putrefaciens)</i>	6	4	6	5	2
	<i>Shewanella</i> sp	1	0	0	0	0
<i>Shigella</i> spp		4	6	9	3	7
	<i>Shigella boydii</i>	1	1	0	0	0
	<i>Shigella flexneri</i>	3	3	7	3	3
	<i>Shigella sonnei</i>	0	1	2	0	2
	<i>Shigella</i> sp	0	1	0	0	2
<i>Sphingobacterium</i> spp		1	8	9	8	4
	<i>Sphingobacterium multivorum</i>	1	2	3	4	2
	<i>Sphingobacterium</i> sp	0	3	5	1	1
	<i>Sphingobacterium spiritivorum</i>	0	2	1	2	0
	<i>Sphingobacterium thalpophilum</i>	0	1	0	1	1

Genus	Species	Number of bacteraemia reports				
		2006	2007	2008	2009	2010
<i>Streptobacillus</i> spp		0	0	1	2	0
	<i>Streptobacillus</i> sp	0	0	1	2	0
<i>Veillonella</i> spp		19	39	28	42	45
	<i>Veillonella</i> named	0	6	6	1	4
	<i>Veillonella</i> sp	19	33	22	41	41
<i>Vibrio</i> spp		0	4	0	1	0
	<i>Vibrio fluvialis</i>	0	2	0	1	0
	<i>Vibrio vulnificus</i>	0	2	0	0	0
<i>Weeksella</i> spp		2	2	1	0	0
	<i>Weeksella virosa</i>	2	2	1	0	0
<i>Wolinella</i> spp		0	0	1	0	0
	<i>Wolinella</i> sp	0	0	1	0	0
<i>Yersinia</i> spp		17	7	11	10	13
	<i>Yersinia enterocolitica</i>	15	6	9	8	9
	<i>Yersinia pseudotuberculosis</i>	2	0	1	2	4
	<i>Yersinia</i> sp	0	1	1	0	0
Total - Gram negative bacteria		476	560	464	454	440
Total - Gram positive and Gram negative bacteria		699	780	726	648	667

\*Uncommon genera are identified on the basis of less than 50 reports from blood samples and diagnosed by culture or unknown methods per year in 2009. *Treponema* species are also excluded due to the low likelihood of culture as a method of diagnosis for *Treponemal* infections.