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Second annual report on healthcare associated infections

The HPA has published its second annual report on healthcare associated infections (HCAIs) [1] The report focuses on those infections subject to mandatory surveillance, but placing them in the context of broader surveillance of bloodstream infections and surgical site infection.

The report covers general trends in bloodstream infections; mandatory surveillance of *Staphylococcus aureus* (*S. aureus*) and glycopeptide-resistant enterococcal (GRE) bloodstream infections and *C. difficile* infection; and general surgical site infection surveillance, as well as mandatory surveillance of orthopaedic surgical site infection. As mandatory surveillance of HCAIs started at different times, this report deals with different periods, covering the latest year of the mandatory surveillance and comparing this with previous years. It therefore reports on the sixth year of *S. aureus* bacteraemia surveillance and the third years of glycopeptide-resistant enterococcal bacteraemia, *C. difficile* infection and orthopaedic surgical site infection. Given different reporting frequencies for the separate elements of mandatory surveillance, some of these data will have been published before, but are brought together for the first time in this report.

The main changes that have occurred include a continuing downward trend in MRSA bloodstream infections and also in rates of surgical site infections. Some NHS Trusts have made a significant impact on their MRSA bloodstream infection rates. This is against a backdrop of changing hospital activity. Rising numbers of blood cultures taken and their positivity rate (all micro-organisms) suggest that not only is there increasing hospital activity, but that this is increasingly focussed on both a more elderly population and in patients with health seriously compromised by underlying disease.

The reduction in the number of MRSA bloodstream infections has not yet translated across to *C. difficile* infections, where numbers are continuing to rise, albeit at a slower rate. Numbers are also rising for glycopeptide-resistant enterococcal bloodstream infections, but are still low in the majority of Trusts. Many Trusts have not yet had experience of these infections, but their numbers are falling since the beginning of the surveillance. The healthcare-associated infections considered in this report are largely conditions affecting the elderly, over three-quarters of MRSA bloodstream, *C. difficile* and surgical site infections occurring in those aged 65 years or over.

The surveillance also highlights some challenges and areas for further consideration: the surveillance system for *C. difficile* is undergoing significant enhancement to better monitor infection against the target. This is likely to have an impact on the data. As ascertainment improves, levels of infections are likely to rise further, before the effect of interventions is seen. General surveillance of bloodstream infections indicates that there are significant increases in infections caused by other micro-organisms where an element of the increase may be healthcare-associated in patients with compromised immune systems – for instance, coagulase-negative staphylococci and *Candida* species. Nationally there is little information on healthcare-associated infections in this very vulnerable group of patients – an area warranting further investigation. The rise in glycopeptide-resistant enterococcal bloodstream infections, albeit from a low base, suggests that there should be a focus of action on affected units in Trusts and consideration of suitable control measures whilst the size of the problem is still small. It is important that measures to prevent SSI caused by MRSA are incorporated into patient care plans. Marked reductions in length of post-operative stay for elective surgery mean that the surveillance data for surgical site infection will become increasingly unreliable. Consequently there is an urgent need to develop systems that capture data on surgical site infections that become apparent after the patient has been discharged from hospital.

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Results from the national confidential study of deaths following meticillin-resistant *Staphylococcus aureus* (MRSA) infection published

The final report detailing results from the *Confidential Study of Deaths Following Meticillin-Resistant Staphylococcus aureus* (MRSA) was published today [1]. The two year study was undertaken by the Health Protection Agency (HPA), in collaboration with the Office for National Statistics (ONS) during 2005-07 with funding from the Department of Health [2].

This qualitative research study provides an in-depth description and evaluation of patient and institutional factors leading to the deaths of a small randomly selected sample of patients who died in NHS hospitals in England who had MRSA mentioned on their death certificate (pilot phase) or who died within 30 days of an MRSA positive blood culture specimen being taken (main phase) [3]. A total of 56 patients from 25 hospitals were reviewed in the study (18 from the pilot phase and 38 from the main phase) in an attempt to identify potentially avoidable or amenable factors that may have been associated with acquisition of, or death from, MRSA infection.

Three data collection methods were employed by the study – a case-note review, interviews with hospital staff and an organisational questionnaire. Each case was reviewed by an Expert Review Panel specifically convened for the study to reach a consensus opinion on the patient's likelihood of survival based on their condition on admission, the likely source and site of the patient's infection, the investigation and management of the patient's infection and the relative contribution of different factors, including MRSA infection, to the patient's death [4]. The key findings from the Study were:

- ▶ The overriding majority of patients had significant co-morbidities and had short life expectancies irrespective of their infection
- ▶ The expert panel thought that MRSA was the main cause of death in seven and had contributed to another 15 of 38 main phase cases. They thought it had not contributed at all to nine of the 18 pilot cases with MRSA on their certificates
- ▶ This small sample suggests that there is both under reporting in deaths where MRSA played a significant role and over reporting in deaths when it did not

- ▶ The most frequently identified source of MRSA bacteraemia was via invasive devices, particularly peripheral and central venous cannulae
- ▶ Deficiencies in the documentation of insertion, ongoing review and management of invasive devices were found in several cases
- ▶ Only half the Trusts were auditing compliance with policies regarding invasive procedures
- ▶ Shortcomings in the investigation, treatment or management of MRSA infection were identified but were not considered to have affected the outcome in these patients
- ▶ Compliance with screening practices within the Trusts reviewed did not appear to be sufficiently comprehensive

Further analyses of over 5000 linked cases are underway to look at the completeness and determinants of reporting MRSA on death certificates. Guidance on completing death certificates is available at www.gro.gov.uk/medcert [5].

Full results from the study can be found on the HPA website [1]. For further information on the Confidential Study of Deaths following MRSA please contact David Bridger (david.bridger@hpa.org.uk), at the Department of Healthcare Associated Infection and Antimicrobial Resistance, Health Protection Agency Centre for Infections, London .

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The Gonococcal Resistance to Antimicrobials Surveillance Programme (GRASP) annual report

The HPA has recently published *The Gonococcal resistance to antimicrobials surveillance programme – annual report 2006* [1]. The report provides current surveillance information on antibiotic resistant gonorrhoea, in addition to some of the behaviours underlying transmission, and shows the regional distribution of resistance across England and Wales. This annual surveillance report describes, continuing increases in levels of ciprofloxacin resistance particularly among men who have sex with men (MSM), and those of Asian ethnicities, and for the first time a rise in ciprofloxacin prevalence was also seen in black ethnic groups. In contrast, there was a significant decrease in penicillin resistant *Neisseria gonorrhoeae* in 2006.

The report's key findings are:

- ▶ Twenty-six per cent of GRASP isolates were resistant to ciprofloxacin (minimum inhibitory concentration (MIC) =1mg/L) in 2006, an increase from the 22.0% observed in 2005. Significant variation by Government Health Office Regions of England and Wales was also observed ($p<0.005$), ranging from 10.5% in the East Midlands to 48.0% in the North East.
- ▶ The prevalence of ciprofloxacin resistant gonorrhoea increased in all gender/sexual orientation groups but most elevated in MSM, rising to 43.3% in 2006.
- ▶ The prevalence of ciprofloxacin resistant isolates has previously remained much lower in the black ethnic groups. In 2006, however, the prevalence doubled to 27.2% in black Africans and quadrupled to 12.0% in black Caribbeans.
- ▶ There was a significant decline in the prevalence of isolates that demonstrated penicillin resistance (MIC =1mg/L or β -lactamase positive) in 2006, down to 9.5% from 17.9% in 2005 ($p=0.01$). Consequently, decreases were also observed in plasmid-mediated penicillin resistant (PPNG or PP/TRNG) isolates (from 4.3% in 2005 to 3.4% in 2006) and chromosomally-mediated penicillin resistant (CMRNG) isolates (from 11.1% in 2005 to 3.9% in 2006).
- ▶ Reductions in the prevalence of isolates that demonstrated resistance to azithromycin (MIC =1mg/L) (from 2.2% in 2005 to 2.0% in 2006) and tetracycline (=2mg/L) (from 48.0% in 2005 to 36.9% in 2006) were also observed in the report.
- ▶ As seen in previous reports no isolates demonstrated resistance to spectinomycin (MIC=128mg/L) or reduced susceptibility to ceftriaxone (MIC=0.125mg/L) or cefixime (MIC= 0.25mg/L) in 2006.
- ▶ Isolates from non-genitourinary medicine (non-GUM) patients continued to demonstrate lower prevalence of ciprofloxacin resistance (7.4%), penicillin resistance (2.8%) and tetracycline resistance (17.0%). However, there were higher prevalences of azithromycin resistance (2.4%), compared with GUM isolates in 2006.

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Shooting Up: Infections among Injecting Drug Users in the United Kingdom 2006

The HPA has published the fifth edition of *Shooting Up* [1], the annual report on infections among injecting drugs users (IDUs). IDUs are vulnerable to a wide range of infections, including those caused by viruses such as HIV and hepatitis C, and bacteria such as *Clostridium botulinum* and group A streptococci. Public health surveillance of both the diseases and behaviours associated with injecting drug use is an important tool in developing local and national health policies and services for IDUs. The latest report summarises surveillance data from across the United Kingdom (UK) and presents the findings for 2006 from the Unlinked Anonymous Prevalence Monitoring Programme (UAPMP) survey of IDUs in contact with services. Important findings from the report are described below.

Viral Infections

Hepatitis C is currently the most important infectious disease affecting those who inject drugs. Very high prevalences have been reported among IDUs in many countries. Although the prevalence of hepatitis C is lower in the UK than in some other countries, the prevalence of hepatitis C among current IDUs participating in the UAPMP survey in England, Wales, and Northern Ireland, has increased since the beginning of the decade, up from 33% (791 of 2,364) in 2000, to 42% (838 of 1,981) in 2006. To the end of 2006, laboratories in England

had reported a total of 62,424 diagnoses of hepatitis C infections since reporting began in 1992. The majority of these infections are likely to have been acquired through injecting drug use as over 90% of those diagnoses with risk factor information gave this as the route of infection.

The level of HIV infection among IDUs who took part in the UAPMP survey in England and Wales is higher now than at the start of the decade, with 1.3% (42 of 3,240) of IDUs currently HIV-infected. By the end of 2006 there had been a cumulative total of 4,662 HIV diagnoses reported in the UK where infection was thought to have been acquired through injecting drug use (based on reports received at the Centre for Infections by the end of June 2007). These accounted for 5.4% (4662 of 86,577) of all HIV diagnoses to the end of 2006. So far, 156 HIV diagnoses, where infection was thought to have been acquired through injecting drug use, have been reported in the UK for 2006 (based on reports received at the Centre for Infections by the end of June 2007).

In 2006, the prevalence of HIV was significantly higher among IDUs in London than elsewhere in England (4.0% (24 of 593) and 0.65% (15 of 2300) respectively). Within England and Wales, the largest rise in HIV infection among IDUs occurred outside of London, with the prevalence rising from 0.25% (1 of 400) in 2002, to 0.77% (3 of 388) in 2006.

Despite the availability of an effective vaccine, 21% (677 of 3240) of current and former IDUs who took part in the UAPMP survey had hepatitis B infection. The prevalence of antibodies to the hepatitis B core antigen among recent initiates is an indicator of recent transmission, and has increased from 3.4% (20 of 583) in 1997 to 10% (40 of 388) in 2006, suggesting that hepatitis B transmission continues.

In the UK, the proportion of IDUs who have taken up an offer of hepatitis B vaccination has increased markedly over time, rising from 25% (784 of 3,114) in 1998 to 65% (2,061 of 3,180) in 2006. This increase was also reflected in the proportion of recent initiates reporting hepatitis B vaccine uptake, with 61% (235 of 383) reporting uptake in 2006, up from 46% (179 of 388) in 2005.

Bacterial Infections

Bacterial infections arising from injecting drug use have continued to impact IDUs in recent years. In 2006, 35% (655 of 1,882) of IDUs reported having had an abscess, sore or open wound at an injecting site in the last year, indicating that injecting site infections are common. In addition to localised injection site infection, cases of invasive disease associated with methicillin resistant *Staphylococcus aureus* (MRSA) and severe group A streptococcal infection in IDUs are a continuing public health concern. A number of English and Welsh laboratories reported encountering MRSA as a cause of injecting drug use related sepsis in the community [2,3] with a total of 60 cases reported between April 2003 and March 2007 throughout England and Wales. Cases of wound botulism can also cause significant morbidity among IDUs; however, fewer suspected cases were reported in 2006 (22) than in previous years. To date, 134 suspected cases of wound botulism have been reported since 2000, with 113 (84%) in England, 17 (13%) in Scotland, three in Wales, and one in Northern Ireland.

Behavioural and Environmental Considerations

Infections among IDUs have been associated with a wide range of behavioural and environmental factors such as needle and syringe sharing, and homelessness. Levels of reported needle and syringe sharing increased in the late 1990s and have remained elevated since then. In 2006, 23% (445 of 1910) of current injectors (those who had injected within the four weeks prior to taking part in the UAPMP survey) from England, Wales and Northern Ireland participating in the UAPMP survey, reported sharing injecting equipment with other injectors in the previous month.

Homelessness levels among IDUs are high and of concern. According to the UAPMP survey, 74% (2200 of 2979) of IDUs report having ever been homeless (defined as someone who has no fixed abode, is living in a hostel, or is living on the street). Of those IDUs who have been

homeless, 49% (1060 of 2153) have been homeless within the last 12 months. Those reporting homelessness also reported higher levels of risk behaviours, with 25% (344 of 1374) of those who had ever been homeless reporting the direct sharing of needles and syringes compared to only 16% (65 of 400) of those who had never been homeless.

For further information please contact Vivian Hope (tel 020 8327 7930; email: vivian.hope@hap.org.uk) or Fortune Ncube (tel: 020 8327 7474; email: fortune.ncube@hpa.org.uk).

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HPV vaccination programme to begin in the UK in Autumn 2008

Recommendations by the Joint Committee on Vaccination and Immunisation (JCVI) to make HPV vaccination available to all 12 to 13 year old girls from Autumn 2008 and to implement catch-up targeting girls up to the age of 18, have been accepted by the UK Departments of Health [1,2]. Infection with one of about a dozen human papillomavirus types is a necessary cause of cervical cancer. Two of these types, HPV 16 and HPV 18, are responsible for about 70% of cervical cancers and have been the main targets for primary prevention via prophylactic vaccination.

Licensure and latest vaccine-efficacy data

GlaxoSmithKline's bivalent HPV vaccine (Cervarix) was licensed by the European Medicines Agency in October 2007 for the prevention of high-grade cervical intraepithelial neoplasia (CIN) grades 2 and 3 and cervical cancer causally related to HPV 16 and 18.[3] This follows the licensure for Gardasil (a quadrivalent HPV 6,11,16 and 18 vaccine from Sanofi Pasteur MSD) in September 2006.[3]

Both vaccines have reported high efficacy in Phase III clinical trials (over 90% in HPV vaccine type naïve women) against high-grade cervical intraepithelial neoplasia, and by implication against cervical cancer caused by the vaccine-type infections.[4,5] The quadrivalent vaccine has shown similar efficacy against anogenital warts (caused by HPV 6 and HPV 11).[6]

JCVI recommendations, accepted for the UK

The Joint Committee on Vaccination and Immunisation's (JCVI) recommendations follow a detailed review of evidence relating to the likely impact of an HPV vaccination programme in the UK. Cost-effectiveness was assessed using a series of models which considered, amongst other things, the cost of the vaccine, the cost to the health service of treating HPV related disease and the effect that cervical cancers and pre-cancers (and genital warts) have on quality of life. Based on these analyses and other data the following was recommended and accepted:

- ▶ Routine vaccination of all girls aged 12-13 years (school year 8)
- ▶ Catch-up vaccination of girls under the age of 18 years (school years 9-12 in Autumn 2008)

The routine vaccination programme aims to protect girls before the onset of sexual activity (and therefore before most exposure to genital HPV infections) to obtain optimum benefit from prophylactic vaccination. Data on HPV infection rates[7] and on sexual activity in the UK suggest around 12 years is likely to be a suitable target age. The cost-effectiveness analyses conducted for the JCVI found that catch-up vaccination for girls up to 18 years was also likely to be an effective use of health care resources. In England and Wales the intention is to conduct the catch-up campaign during the 2nd and 3rd years of vaccination, by offering vaccination to girls aged 16 to 18 years in Autumn 2009, and to girls aged 15 to 17 years in Autumn 2010.[1,2] Details of the exact timing and delivery of the vaccination programme will require planning with all stakeholders over the coming months. The JCVI advised that vaccination would be most effectively delivered through schools.

Two issues are still under consideration: which of the two licensed vaccines should be offered in the national programme, and how best to achieve the potential benefits of making vaccination available to some women aged 18 years and over. Cervical screening remains important in reducing the risk of cervical cancer in unvaccinated women and due to HPV infections that are not prevented by vaccination.

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Respiratory virus activity

Influenza activity in Australia has now declined to low levels after a particularly severe season in several states. The predominant virus circulating in Australia in 2007 was A(H3N2) with A(H1N1) circulating to a lesser extent. The exception to this was in Queensland where these viruses co-circulated. There were low levels of influenza B activity reported. In contrast, the 2007 season in New Zealand has been relatively mild, with a mix of A(H1N1), A(H3N2) and some influenza B viruses circulating. No deaths from influenza were reported in children in New Zealand and six deaths from influenza were reported in children in Australia .

This increased activity in Australia will not necessarily be reflected in the UK during the 2007/08 season. Influenza activity in the UK currently remains at low levels. The respiratory syncytial virus season has begun and, in line with published guidelines [1], it is now appropriate to prescribe paluvizumab prophylactically.

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The National Travel Health Network and Centre launch new web resources for health professionals and travellers

On 1 November 2007, the National Travel Health Network and Centre (NaTHNaC) officially launched their new website resources: the Country Information Pages and Outbreak Surveillance Database.

The Country Information Pages provide specific information about protection against vaccine-preventable illness, malaria, and selected other hazards associated with travel to any country in the world, based on the most up-to-date evidence from national and international sources. The information on these diseases is presented in a unique fashion: risk assessment and risk management. The risk assessment details the pattern of the disease in each country and how it is transmitted; the risk management details the ways in which a traveller may avoid or reduce exposure to the disease such as food and water hygiene, insect bite avoidance, and/or vaccination. The user is therefore provided with details of the disease and the important prevention measures to allow a fully informed assessment of risk, rather than simply a list of vaccine recommendations.

Directly linked to the Country Information Pages, is the Outbreak Surveillance Database, which provides a summary of global health events searchable by country, disease, and date, and is updated daily. Further links are provided to other useful sources of information such as the NaTHNaC Clinical Updates, which are extended reports on global health outbreaks with advice for travellers, the NaTHNaC Health Information Sheets, which give in-depth descriptions of tropical and vaccine-preventable diseases, and the Foreign and Commonwealth Office country pages, which provide safety information and a description of services for United Kingdom residents.

The Country Information Pages and Outbreak Surveillance database are designed to be used as a resource to conduct a detailed risk assessment that includes the traveller's itinerary, planned activities, and health status to assess which prevention measures, vaccines, and malaria prevention tablets are appropriate for the individual traveller; they are not a substitute for a comprehensive pre-travel health consultation.

The NaTHNaC website information is freely available for use by both health professionals and the travelling public and is available at http://www.nathnac.org/ds/map_world.aspx; it will also be linked from the travel health advice page on the Health Protection Agency website at http://www.hpa.org.uk/infections/topics_az/travel/travel_advice.htm.

Respiratory

Laboratory reports of respiratory infections made to CfI from HPA and NHS laboratories in England and Wales: weeks 40-43/2007

Data are recorded by week of report, but include only specimens taken in the last eight weeks (i.e. recent specimens)

Table 1 Reports of influenza infection made to CfI, by week of report: weeks 40-43/2007

Week	Week 40	Week 41	Week 42	Week 43	Total
Week ending	07/10/07	14/10/07	21/10/07	28/10/07	
Influenza A	4	1	–	1	6
Isolation	2	–	–	–	2
DIF	–	–	–	–	–
Four-fold rise in paired sera	–	–	–	–	–
PCR	–	–	–	–	–
Other	2	1	–	1	4
Influenza B	4	–	2	–	6
Isolation	–	–	–	–	–
DIF	–	–	–	–	–
Four-fold rise in paired sera	–	–	–	–	–
PCR	–	–	–	–	–
Other	4	–	2	–	6
Influenza (untyped)	–	–	–	–	–
Isolation	–	–	–	–	–
DIF	–	–	–	–	–
Four-fold rise in paired sera	–	–	–	–	–
PCR	–	–	–	–	–
Other	–	–	–	–	–

*DIF = Direct Immunofluorescence.

†'Other' = 'Antibody detection - Single high titre' or 'method not specified'.

Table 2 Respiratory viral detections by any method (culture, direct immunofluorescence, PCR, four-fold rise in paired sera, single high serology titre), by week of report: weeks 40-43/2007

Week	Week 40	Week 41	Week 42	Week 43	Total
Week ending	07/10/07	14/10/07	21/10/07	28/10/07	
Adenovirus*	12	14	19	12	57
Coronavirus	–	–	1	2	3
Parainfluenza †	13	15	14	17	59
Rhinovirus	31	3	27	24	85
Respiratory Syncytial Virus (RSV)	22	37	69	77	205

*Respiratory samples only. Excludes diagnoses made by electron microscopy (EM)

†includes parainfluenza types 1, 2, 3, 4 and untyped.

Table 3 Respiratory viral detections by age group: weeks 40-43/2007

Age group (years)	<1 year	1-4 years	5-14 years	15-44 years	45-64 years	≥65 years	Unknown	Total
Adenovirus*	9	17	–	22	8	1	–	57
Coronavirus	2	–	–	–	1	–	–	3
Influenza A	1	1	1	3	–	–	–	6
Influenza B	–	–	1	3	–	2	–	6
Parainfluenza†	33	16	4	5	1	–	–	59
Rhinovirus	50	14	4	10	4	3	–	85
Respiratory Syncytial Virus (RSV)	149	35	1	9	3	8	–	205

*Respiratory samples only.

†includes parainfluenza types 1, 2, 3, 4, and untyped.

Table 4 Laboratory reports of infections associated with atypical pneumonia, by week of report: weeks 40-43/2007

Week	Week 40	Week 41	Week 42	Week 43	Total
Week ending	07/10/07	14/10/07	21/10/07	28/10/07	
<i>Coxiella burnetii</i>	3	1	–	–	4
respiratory Chlamydia sp.	1	3	1	2	7
<i>Mycoplasma pneumoniae</i>	14	11	13	13	51
Legionella sp.	15	16	11	13	55

*Includes *Chlamydia psittaci*, *Chlamydia pneumoniae*, and *Chlamydia* sp detected from blood, serum, and respiratory specimens.

Table 5a Reports of legionnaires' disease cases in England and Wales, by week of report: weeks 40-43/2007

Week	Week 40	Week 41	Week 42	Week 43	Total
Week ending	07/10/07	14/10/07	21/10/07	28/10/07	
Nosocomial	1	1	–	1	3
Community	3	5	4	5	17
Travel Abroad	11	7	6	6	30
Travel UK	–	3	1	1	5
Total	15	16	11	13	55
Male	11	14	9	7	41
Female	4	2	2	6	14

Fifty-five cases of legionnaires' disease with pneumonia were reported; 41 males aged from 28 to -89 years and 14 females aged from 40 to 74 years. Seventeen cases had community acquired infection and 3 cases had hospital acquired infection. Four deaths were reported in three males aged between 36 and -62 years and a female aged 47years.

Thirty-five cases were travel associated: six from Spain, five from the United Kingdom, four from Italy, three from each of Greece, and United States, two from Turkey, and one from each of Canada, Cruise/Spain, Dominican Republic, France, Hong Kong/Taiwan, India, Italy/Switzerland, Italy/United Kingdom, Malta, Poland, Thailand, and Tunisia.

Table 5b Reports of legionnaires' disease cases by region of report in England and Wales: weeks 40-43/2007

REGION	Nosocomial	Community	Travel Abroad	Travel UK	Total
North East	–	–	–	–	–
Yorkshire & Humber	–	–	5	–	5
East Midlands	–	2	1	–	3
East of England	–	1	–	1	2
London	1	2	3	1	7
South East	1	9	8	1	19
South West	–	–	2	1	3
West Midlands	1	2	3	–	6
North West	–	1	7	1	9
Wales	–	–	1	–	1
Unknown	–	–	–	–	–
Total	3	17	30	5	55