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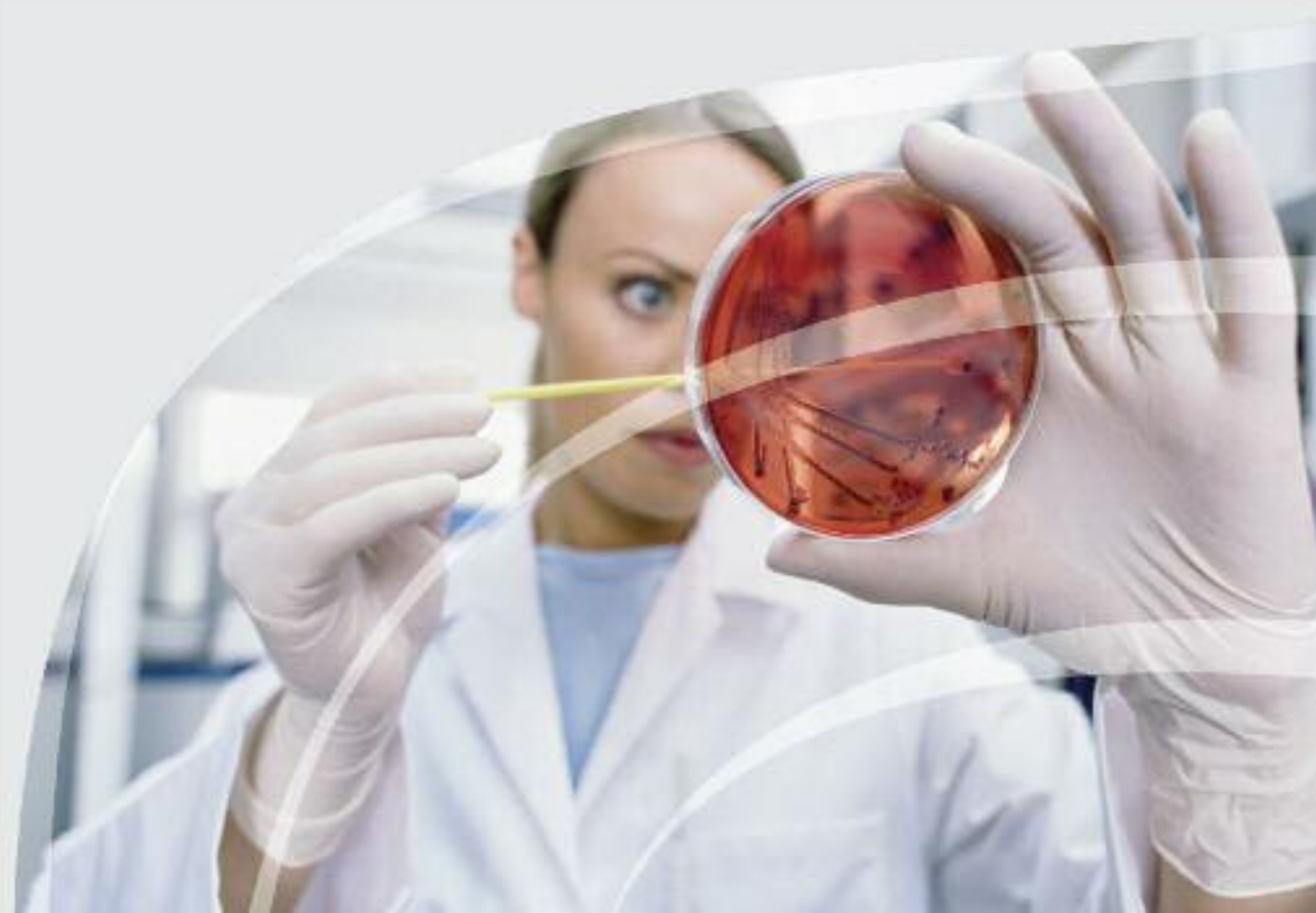
Minimising Healthcare Associated Infections in NHS Trusts in Wales



Minimising Healthcare Associated Infections in NHS Trusts in Wales

I have prepared this report for presentation to the National Assembly under the Government of Wales Acts 1998 and 2006.

The Wales Audit Office study team that assisted me in preparing this report comprised Paul Dimblebee, Stephen Lisle, Elaine Matthews, Rob Powell and Gabrielle Smith.

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Report presented by the Auditor General for Wales to the National Assembly on 8 November 2007

Foreword

Healthcare associated infections are rightly a matter of great concern to patients and the public in Wales. They can have serious adverse effects on those affected including, in a small number of tragic cases, death. Healthcare associated infections can also be very costly for the NHS, and it is widely accepted that many infections can be avoided through the development of robust systems of prevention and control.

The causes, extent and impact of healthcare associated infections are extremely complex. This report sets out the scale of the issue in Wales and examines whether NHS trusts are doing the right things, consistent with a recent Welsh Assembly Government strategy, to minimise the risk of infection.

Although the measurement and reporting of healthcare associated infections is improving, limitations in the available data make it extremely difficult to establish clear trends. Therefore, although this report identifies some trends and provides comparisons within Wales and between Wales and other countries, the data need be interpreted with some caution.

As well as describing the current position in terms of infection rates, my report also identifies the steps trusts have put in place to manage the risk of infection. This part of the report draws on the first series of infection control spot checks undertaken by Healthcare Inspectorate Wales, who visited four of the fifteen Welsh NHS trusts. The Inspectorate's national overview report, published on the same day as this report, can be found on www.hiw.org.uk.

I hope that my report will help the public to understand better the issues relating to infection prevention and control. To help the public to understand the position within their local trust, I have placed detailed infection control performance information relating to each trust in Wales on the Wales Audit Office website (www.wao.gov.uk).

My report also identifies 15 case studies of good practice, which we have also placed on the Wales Audit Office website (www.wao.gov.uk) to facilitate the transfer of such good practice.

Jeremy Colman
Auditor General for Wales

Contents

Summary

1 It is unacceptable to the public that patients should run the risk of acquiring infections as a result of their interaction with the National Health Service (NHS). When some such infections are very hard to treat and can have serious, even fatal, consequences, the need is obvious for all NHS bodies to have effective means of protecting patients from the risk of what are known as Healthcare Associated Infections (HCAIs)[1].

2 In September 2004 the Welsh Assembly Government (the Assembly Government) launched HCAIs – a Strategy for Hospitals in Wales, to support the reduction of HCAIs in Wales. Our scoping work suggested that the strategy has been broadly accepted as the right way forward to reduce the extent and impact of HCAIs. In particular, it highlights the need for all hospital staff to take personal responsibility for infection control. The Assembly Government has also drafted a strategy for HCAIs in the community, on which it consulted during the first quarter of 2007.

3 We examined whether NHS trusts in Wales are doing the right things, consistent with the Assembly Government's 2004 strategy for hospitals, to minimise levels of HCAIs. Overall, we concluded that, although the data showed a mixed picture, trusts are doing many of the right things to minimise HCAIs, but there are things, some straightforward, that all should do to make infection prevention and control everybody's business.

The available data on rates of healthcare associated infections in Wales show a mixed picture

4 Infections are caused by unpredictable and constantly changing micro-organisms. This leads to definition and measurement difficulties that hamper the assessment of the full extent of infections and the impact of interventions to reduce them.

5 The Hospital Infection Society[2] and the Infection Control Nurses Association conducted the Third National Prevalence Survey of all HCAIs between February and May 2006. This showed that 6.4 per cent of patients in Welsh acute hospitals had a HCAI. This prevalence is lower than in England (8.2 per cent) but is higher than in Northern Ireland (5.4 per cent) and the Republic of Ireland (4.9 per cent). A prevalence study carried out in Scotland between October 2005 and October 2006 showed that 9.5 per cent of patients in Scottish acute hospitals had an HCAI.

6 Methicillin-resistant Staphyloccocus aureus (MRSA) infections have tended to dominate media coverage of HCAIs. This is probably because of the potentially severe impact of the organism on patients and its ability to resist treatment with standard antibiotics. However, MRSA is only the sixth most common cause of bacteraemias (bloodstream infections) in Wales. *Escherichia coli* (*E. coli*),

1 HCAIs are infections that occur as a result of contact with the healthcare system in its widest sense – from care provided in one's own home, to primary care, nursing home care and care in acute hospitals. A HCAI is categorised as being a hospital-acquired infection if it develops in a patient 48 hours or more after their admission. If the infection develops less than 48 hours after their admission to hospital, the infection is categorised as having been derived from the community and is hence defined as a community-acquired infection.

2 The Hospital Infection Society is a charity that fosters the advancement of knowledge and education of all those who have an interest in the field of hospital infection.

which can also have very serious consequences for patients but is most commonly brought into hospitals from the community, has by far the highest rate of infection and is more than three times more likely to occur than MRSA.

7 In the year to 31 March 2007, 314 patients contracted MRSA bacteraemias. The number of patients contracting MRSA bacteraemias rose steeply between 1995 and 1997 and continued to rise, though less steeply, up until 2000. Since then the incidence has remained fairly stable until there was a significant reduction between April 2005 and July 2006.

8 Just over 2,500 people contracted *Clostridium difficile* (*C. difficile*) infection in the year leading up to 31 December 2006[3]. Although it is difficult to identify trends from the data that are currently available, there appears to have been a rise in *C. difficile* infection rates between 1993 and 2005 while the last two years have seen stable rates. The third national prevalence survey suggested that the prevalence of *C. difficile* in Wales is half of that in England.

9 The Assembly Government has made the monitoring (surveillance) of the number of infections contracted mandatory for certain relatively common, yet high-risk, surgical procedures where the effects of infections can be particularly devastating. Surgical Site Infections in orthopaedics appear to be relatively high in Wales compared with the rest of the United Kingdom (UK). Surveillance of infections following Caesarean sections in Wales is carried out on a continuous basis, whereas most other countries rely upon snapshot prevalence data taken at a particular point in time. Continuous monitoring enables trusts to identify problems and trends as early as possible. The data suggest that the rate of infection following Caesarean sections is higher in Wales than in many European countries. However, there are some limitations in the current data, which are collected through a relatively new process and are not collected consistently by trusts, and the results may be skewed by the relatively small size of samples. Comparability with other countries is also complicated by different surveillance methods.

10 Welsh hospitals also experience significant problems arising from viruses that cause diarrhoea and vomiting. In 2006, there were 225 outbreaks of infection reported in Welsh hospitals, of which 194 were diarrhoeal illness outbreaks due to norovirus or other viral causes, compared with 18 outbreaks of diarrhoeal illness due to the bacterium *C. difficile*. Viral diarrhoea outbreaks can spread rapidly among patients and staff, and can lead to the closure of wards. Outbreaks are often caused by the admission of patients who are already suffering with diarrhoea and vomiting, or when visitors bring infective organisms into the hospital.

3 NPHS for Wales, All Wales Mandatory *C. difficile* Surveillance, 01/01/2006-31/12/2006, May 2007.

Consistent with the Assembly Government's strategy and other good practice standards, trusts have developed frameworks within which healthcare associated infection can be managed effectively

11 There is evidence that all trust boards are taking infection prevention and control seriously, and trusts have largely put in place the governance structures set out in the national strategy. Although this measure was not included in the national strategy, all trusts now have a non-executive director in place with responsibility for infection control, hygiene and cleanliness. Although this role is relatively new, it appears to have made an impact by raising the profile of infection control within trusts and on trust boards.

12 All trusts have developed action plans and have set local targets to improve infection prevention and control. All trusts have established infection control committees, although their influence varies. Most trust clinical directorates now have a directorate lead for infection control, who works with trusts' specialist infection control teams to address infection control risks within the directorate. We conducted separate surveys of trust infection control teams and directorate leads, which showed that directorate leads had identified priority areas for infection control actions which largely resonated with those identified by specialist infection control teams.

13 The screening of patients for MRSA takes place in all trusts according to local protocols, which generally follow UK-wide guidance published by the Hospital Infection Society in 2006. The protocols vary between trusts, in accordance with their local assessments of risk, but all trusts target some of the high risk patient groups specified in the guidance. However, only six trusts screen patients from residential or nursing homes, even though studies suggest that around 20 per cent of the residents of such homes are colonised with MRSA.

Although we found examples of good practice, there are things, some of which are straightforward, that all trusts should do to reduce the risk of infection

Trusts should take action to embed infection control at all levels to make it everybody's business

14 Performance and financial targets can compromise infection prevention and control. For example, in some trusts bed pressures can lead to patients sometimes being admitted to areas that should be closed after an outbreak of diarrhoea and vomiting. Trusts need to balance the competing risks of not admitting a very sick patient and the risk of infection. Also, the balance between elective waiting time targets and effective infection control needs to be very carefully managed to avoid the problems highlighted in the Healthcare Commission's report[4] on the fatal outbreaks of *C. difficile* in Stoke Mandeville Hospital. There, senior managers were criticised for failing to bring an outbreak in

4 Investigation into outbreaks of *C. difficile* at Stoke Mandeville Hospital, Buckinghamshire Hospitals NHS Trust, Healthcare Commission, July 2006.

2005 quickly under control, because they had prioritised the achievement of performance and financial targets ahead of patient safety.

15 Prudent antibiotic prescribing is an important factor in preventing the continued emergence of micro-organisms, such as MRSA, that are resistant to standard antibiotics. Use of antibiotics can contribute to an environment in which resistant micro-organisms survive, because the sensitive strains are killed leaving only the resistant strains. The National Public Health Service (NPHS) is running an antimicrobial use and resistance programme, which has collected data, promoted best practice on testing and is promoting the prudent use of antimicrobials. NPHS was due to publish the findings of this work in October 2007.

16 There remain concerns about the extent to which all clinicians are engaged in infection prevention and control. Welsh patients provided us with anecdotal evidence of weaknesses in hand washing during clinicians' ward rounds. Such evidence is consistent with international academic research highlighting the poor hand hygiene compliance that exists, particularly amongst clinicians[5]. Furthermore, clinicians rarely attend infection control training, and in five trusts, clinicians never receive information about infection rates. Trusts also need to engage cleaning teams, and domestic and catering staff in infection prevention and control, and some have achieved success by allocating cleaning teams to particular parts of the hospital to increase ownership and commitment to cleanliness. Infection prevention and control is not consistently mentioned in all staff job descriptions.

Trusts should review standards of basic housekeeping and cleanliness to support effective infection prevention and control

17 There are variable standards of basic housekeeping processes to support infection prevention and control. Healthcare Inspectorate Wales (HIW) recently undertook infection control spot checks in four NHS trusts and found some very basic failings of housekeeping, which are outlined in their national overview report, published alongside this report.

18 There continue to be problems with hygiene and cleanliness. Infection control teams and trust directorates identified poor standards of cleanliness as a significant barrier to minimising HCAIs. A lack of storage in some clinical areas has led to problems with cleanliness. Although hand-hygiene facilities have improved in most trusts problems remain, for example in directorates that do not consider this a priority. We also found widespread confusion about cleaning arrangements, with doubts about cleaning responsibility for particular areas or pieces of equipment, problems with the recruitment and retention of cleaning staff and concerns about the quality of cleaning.

19 Laundry facilities for staff uniforms are provided in only two trusts, and there is limited access to changing rooms. To make good use of such facilities staff would be required to arrive earlier and leave later following their shift to allow time for changing in and out of their uniforms, which they might not like.

5 Gould D. Can ward-based learning improve infection control? Nursing Times 1996; 92: 42-43.

Trusts should collect and use information relating to HCAIs more effectively

20 Trusts need reliable information to be able to compare their rates of infection with those of similar trusts. A comprehensive mandatory HCAI surveillance scheme is in place in Wales, which allows Trusts to benchmark against similar Trusts. Whilst data on bacteraemias related to HCAI and *Clostridium difficile* is complete, most trusts have low levels of compliance with the mandatory surveillance schemes that monitor the number of patients becoming infected following high risk surgical procedures. Surveillance information is also less useful than it might be because, at a local level, systems of measurement vary between trusts and the information is often out of date by the time it is reported.

21 Despite the fact that HCAIs are costly for the NHS, most trusts were unable to quantify the relevant costs. We estimate that the annual cost to the NHS of MRSA bacteraemias in Wales is approximately £1.9 million, and the estimated annual cost of *C. difficile* infections in patients aged over 65 is about £10.3 million. Based on a study sponsored by the English Department of Health, the NPHS has estimated the total annual cost of all HCAIs in Wales as £50 million. The lack of reliable trust-level data on the costs of infections makes it difficult for trusts to develop robust business cases to support an increased investment in infection prevention and control. Infection prevention and control experts from all countries in the UK and Ireland are currently considering whether cost data derived from the Scottish prevalence study can be applied to their countries.

22 Infections can damage the reputation of a trust and the wider NHS, as well as cause anxiety for patients who are worried about contracting an infection while in hospital. Most trusts provide general information on HCAIs for the public and an information leaflet produced by the Assembly Government and the Board of Community Health Councils (CHCs) in Wales has been well received and is being widely used. Nine trusts have implemented a protocol for discussing with patients how they can minimise the risks of infection.

Better reporting arrangements and more isolation facilities could help improve the management of infection outbreaks

23 The criteria used by trusts for reporting infection outbreaks to the NPHS vary, and the NPHS is currently working on improving the reliability of reports. Although nearly all trusts have outbreak policies in place, the need to improve communication during outbreaks is an issue for most clinical directorates. Outbreaks could also be managed better through improved access to adequate isolation facilities, the need for which is compounded by the severe bed pressures experienced by many trusts.

Trusts and the Assembly Government should review the capacity and workload of infection control teams

24 Standards developed in the United States suggest that trusts should have one infection control nurse for between 100 and 250 occupied acute beds. The ratio of acute beds to infection control nurses varies widely between trusts and four Welsh trusts have less than one infection control nurse per 250 acute beds. To meet the standard of one

infection control nurse per 100 acute beds, a further 50 infection control nurses would need to be appointed in Wales[6]. Comparing trusts in Wales with the American standards is complicated by the fact that Welsh infection control nurses are responsible for beds in community hospitals in addition to their responsibilities in acute settings, while the standards are based solely on the number of acute beds. As well as ensuring sufficient resources to cover community as well as acute beds, trusts also need to make sure their infection control teams have an appropriate balance of staff and skills to reflect to local circumstances and infection control priorities. Most of the infection control teams that responded to our survey felt that their workload had increased significantly in recent years and that they needed significant additional resources to tackle HCAI.

Trusts need to ensure that the good quality education and training they provide reaches more of their staff

25 Training and education is critical if infection prevention and control is to become everybody's business. While the quality of training provided is generally good, trusts need to ensure that greater numbers of staff, particularly clinicians, receive training. In many areas, operational pressures make it difficult for staff to be released for training, while two trusts do not include infection control in their induction training for medical staff and one trust does not include such training for nursing staff. We found some innovative examples of providing training on wards, through e-learning and through greater investment in induction training, which may provide a model for trusts seeking to improve their infection control training provision. There is also scope for the Assembly Government to use its influence to include greater coverage of basic infection control issues and practice as part of undergraduate training provision.

Systems for the prevention and management of healthcare associated infections will need to adapt to changing circumstances

26 Systems for the prevention and management of HCAI will need to evolve to take account of changing circumstances such as the emergence of new strains of micro-organisms and the changing configuration of health services. Trusts need to maintain and develop systems to identify and disseminate information about new strains of infection. And the reconfiguration of services may alter the balance of HCAI risk in different healthcare settings, as well as presenting opportunities to improve facilities for infection prevention and control:

- **a** systems for the prevention and control of infection will need to change as services are increasingly provided closer to patients' homes;
- **b** changes in patterns of admission to hospital may change infection risks;
- **c** as rates of day surgery improve, post-discharge surveillance may need to improve as more patients are discharged from hospital before the symptoms of their infection emerge; and
- **d** infection control must continue to be a focus in the design of new hospitals.

6 This analysis excludes Velindre NHS Trust and Powys Local Health Board (LHB) because their specialised services or nature makes it difficult to compare with the other acute trusts.

27 New clinical practices provide the opportunity to improve infection prevention and control. Healthcare associated infection risks can be reduced through the development of care bundles. These are the amalgamation of several components of patient management to produce a single checklist of actions that a Healthcare Worker should go through each day to improve clinical outcomes for patients. There is international evidence to suggest that such care bundles can minimise the risks of infection in patients receiving ventilation and in those with central venous catheters. In May 2006 the National Leadership and Innovation Agency for Healthcare (NLIAH) launched the Welsh Critical Care Improvement Programme, with the aim of improving Critical Care Provision by the implementation of care bundles. The programme has shown that the use of care bundles is increasing in Wales and all trusts are achieving high levels of compliance with the care bundles they have in place. However, the care bundle approach is yet to become widespread in Welsh hospitals other than in critical care units.

Recommendations

Trusts should take action to embed infection control at all levels to make it everybody's business

1 Although trusts in Wales have made some progress, more needs to be done to engrain infection prevention and control into the culture of hospitals. **All trusts should introduce good practice in terms of the structures needed to help embed infection control issues within all directorates, by:**

- a **Requiring that, where they do not already, all clinical directorates have infection control priorities or targets within their action plans. While a target to reduce HCAIs will not be appropriate in every case, all clinical directorates should have specific objectives that relate to improved infection prevention and control.**
- b **Introducing named facilitators within the Infection Control Team to help directorates prepare action plans, set targets, co-ordinate training and audit, and provide specific advice on key infection control matters.**
- c **Seconding into their infection control teams directorate staff who could then play a pivotal role in embedding the infection control agenda on their return to their directorates.**

2 The action plans of many trusts include the requirement that infection control responsibilities should be specified in job descriptions, but this has not happened in many directorates. **Where appropriate the Assembly Government should specify responsibility for infection control within all centrally-developed job descriptions, while trusts should include responsibility for infection control in all locally-developed job descriptions. Trusts should assess how adequately responsibilities for infection prevention and control have been discharged during staff appraisals.**

3 Prescribing practice is an important element of infection prevention and control, and there is scope to develop better antimicrobial prescribing policies, improve processes and provide better feedback on antimicrobial prescribing practices. **Trusts should act on a forthcoming NPHS report on the prudent use of antimicrobials to update their guidelines, and use the forthcoming surveillance data to inform improvements in antimicrobial practice.**

Trusts should review standards of basic housekeeping and cleanliness to support effective infection prevention and control

4 The standards of cleaning achieved in some hospitals are not adequate. Trusts have achieved some success where cleaning staff have been allocated on a long-term basis to specific wards or areas of the hospital, so that they are closer to the clinical team. **As far as possible, trusts should make cleaners part of specific ward teams, so that they are more likely to own the standards of cleanliness and to develop closer relationships with members of the clinical team in that part of the hospital. Trusts should also ensure that cleaners have sufficient time and resources to do their job properly.**

Trusts should collect and use information relating to HCAIs more effectively

5 There are low levels of reporting of orthopaedic surveillance, despite it being a mandatory requirement. Clinicians are not engaged because they believe it duplicates information already collected for the National Joint Registry. **The Assembly Government should work with the National Joint Registry to reduce duplication in information collection and encourage increased reporting by trusts.**

6 Trusts do not routinely collect data on the costs and other impacts of HCAIs. **The Assembly Government should require trusts to measure the costs and service delivery impacts of HCAI. Appropriate measures of cost and impact might include the number of:**

- a **ward closures;**
- b **lost bed days, including those lost as a result of patients being admitted with diarrhoea and vomiting from residential homes or from elsewhere in the community; and**
- c **patients readmitted with an infection they acquired during a previous hospital stay.**

7 Most clinicians do not use surveillance data rigorously to inform improvements in clinical practice, and some do not receive or collect data about their own infection rates. **The NPHS should work with trusts and individual clinicians to facilitate the production of surveillance data that better meets clinicians' needs. Trusts should**

provide clinicians with regular information about their own infection rates in high-risk specialties and procedures, ideally using information collected by the clinicians themselves.

Better reporting arrangements and more isolation facilities could help improve the management of infection outbreaks

8 There is scope to improve the management of outbreaks, with a particular need to improve communication between central infection control teams and directorates. **Trusts should review their procedures for the management of outbreaks, with a particular focus on the information flows between the central infection control team and directorates.**

9 Infection control teams and directorates stated that the lack of adequate isolation facilities in their trusts was a major constraint on their efforts to minimise HCAIs. A review carried out by Welsh Health Estates in 2005 led to the Assembly Government issuing a Welsh Health Circular (WHC) in 2006[7] aimed at improving the condition of isolation facilities. However, the progress being made by trusts has been patchy. The proposed reconfiguration of health services in Wales presents an opportunity, through the development of new hospitals and facilities, to address some of the existing estates issues that can compromise effective infection prevention and control, in particular the adequacy and extent of isolation facilities. The Assembly Government is developing minimum standards for estates in relation to infection prevention and control. **Working within these new standards, trusts should include proposals for infection prevention and control in any proposed new builds. The Assembly Government should include infection prevention and control criteria in its consideration of capital proposals for new hospitals.**

10 Trusts have duplicated effort in producing policies in dealing with outbreaks of infection which means that staff moving between trusts have to learn new policies. **The Assembly Government should develop all-Wales model policies on key areas of infection control which trusts could adapt to reflect local circumstances. Such model policies would reduce duplication of effort and support common standards of infection control. The Assembly Government should support the model policies by developing a user-friendly guide to policies for staff.**

Trusts should review the workload and capacity of infection control teams

11 Across Wales, four trusts do not meet the 1:250 minimum benchmark of infection control nurses to acute beds and no trust (except Velindre NHS Trust) meets the 1:100 benchmark. **Consistent with the Assembly Government's strategy, which says that Infection Control Team resourcing should be based on local need, trusts should review their infection control capacity and consider whether additional infection control nurses are required to support further improvement in the management of infection risks. Trusts should pay particular attention to the scope for infection control nurses to support the reconfiguration of services and ensure the effective management of infection risks in community-based services.**

7 WHC (2006) 057.

Trusts need to ensure that the good quality of training and education they provide reaches more of their staff

12 Overall, the quality of training on infection control is high, but insufficient staff receive the relevant training. Some trusts have achieved success through training on the ward. **Trusts should apply good practice in developing innovative approaches to training, such as ward-based and hand-hygiene training, with the specific objective of significantly improving participation, especially by clinical staff.**

13 In the longer term, training on infection prevention and control needs to be strengthened at undergraduate level. **The Assembly Government should work with higher and further education providers in Wales to ensure that infection prevention and control are adequately covered within undergraduate education programmes for doctors, nurses and allied health professionals.**

Systems for the prevention and management of healthcare associated infections will need to adapt to changing circumstances

14 There are already significant infection risks at the interface between secondary care, and primary and community settings. Some trusts lose a significant number of bed days as a result of outbreaks arising from the spread of infection from patients who are suffering from diarrhoea and vomiting when they are admitted to hospital. These patients could, in some cases, have been rehydrated in the community rather than requiring a hospital stay. **Local Health Boards should work with trusts to establish community response teams to manage patients with diarrhoea and vomiting in the community, to avoid unnecessary admissions and the risk of infection outbreaks that could lead to bed and ward closures.**

15 Only six trusts routinely screen patients admitted from residential or nursing homes for MRSA, despite the fact that studies suggest that 20 per cent of residents are colonised with MRSA and their high susceptibility to infection. **Where this does not already happen and where local risk assessment suggests it would be beneficial, trusts should introduce the routine screening for MRSA of patients admitted from nursing and residential homes, measure the extent of colonisation of residents from particular homes and develop systems to provide feedback to social services departments and LHBs. This would enable homes to improve their own infection prevention and control procedures, and would provide a basis on which LHBs and local authorities can identify potential service improvements to support such people in the community and avoid unnecessary admissions to hospital. Consistent with the Assembly Government's draft strategy for minimising community-acquired infections, LHBs should work with nursing homes to help embed infection control as a core item of their agenda and in the accountabilities of all staff.**

16 Care bundles are checklists of practice intended to deliver improvements in patient outcomes, one of which is reductions in HCAIs. To date, the development of care bundles has been focused on critical care units. **The Assembly Government should provide national guidance to support the further development of care bundles in a small number of appropriate pilot settings outside critical care. The Assembly Government should monitor performance against set evaluation criteria, including infection rates, with a view to extending their development.**

Part 1 - The available data on rates of healthcare associated infections in Wales show a mixed picture

The prevalence of healthcare associated infections in Welsh acute hospitals is lower than in England and Scotland, but higher than in Northern Ireland and the Republic of Ireland

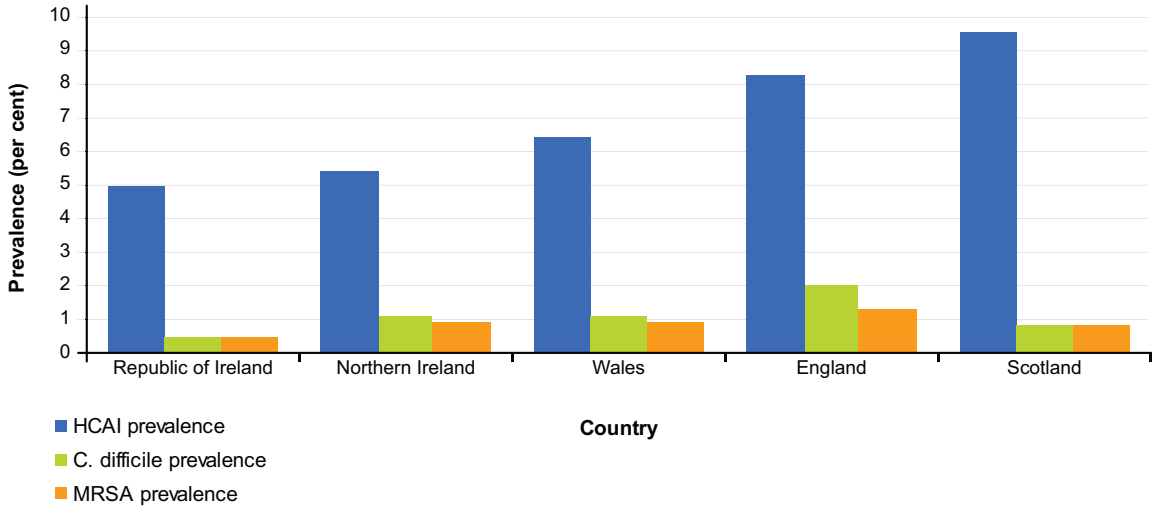
1.1 The Hospital Infection Society and the Infection Control Nurses Association undertook the third national prevalence survey between February and May 2006 to provide a snapshot of the prevalence (Box 1) of HCAIs in acute hospitals across England, Wales, Northern Ireland and the Republic of Ireland[8]. The previous surveys covered England and Wales in 1980, and Great Britain and Northern Ireland in 1993/1994. However, it is not possible to determine trends from the prevalence surveys because their geographical coverage and methodology

Box 1: Meanings of 'incidence' and 'prevalence'

Incidence is the number of new cases of a disease or infection that occur in a particular population over a specific time period. Prevalence is the number of all cases (new and existing) of a disease or infection in a particular population. Prevalence can be measured over a defined period of time (period prevalence) or at a specific point in time (point prevalence).

Source: Wales Audit Office

Figure 1: HCAI prevalence in Wales is lower than in England and Scotland, but higher than in Northern Ireland and the Republic of Ireland



Source: Hospital Infection Society and Infection Control Nurses Association, Third Prevalence Survey of HCAIs in Acute Hospitals, 2006. Scottish data is from the Health Protection Scotland Report, NHS Scotland National HAI Prevalence Survey Final Report 2007.The Scottish study was carried out with a different methodology to the other countries

8 Third Prevalence Survey of HCAIs in Acute Hospitals 2006, Hospital Infection Society and Infection Control Nurses Association.

have changed over time. Health Protection Scotland carried out a separate prevalence survey in Scottish hospitals between October 2005 and October 2006[9].

1.2 The 2006 prevalence survey covered every patient in acute hospitals in Wales, and showed that 6.4 per cent of patients in Wales had an infection. The rate in Wales was lower than in England and Scotland, but higher than in Northern Ireland and the Republic of Ireland (Figure 1). The survey also showed that lower respiratory tract infections were the most common type of infection seen in Wales. Infections at the site of a surgical procedure (Surgical Site Infections) were the second most common type of infection (Figure 2).

Although cases of *Staphylococcus aureus* (including MRSA) and *C. difficile* represent only a small proportion of HCAIs in Wales, they provide the most robust trend data

1.3 When HCAIs are discussed in the media or by the public, it is usually the organism called Methicillin-resistant *Staphylococcus aureus* or MRSA that commands most attention. This is probably because of the potentially severe impact of the organism on patients and its ability to resist treatment with standard antibiotics, which has led to MRSA being labelled a so-called 'superbug'.

Figure 2: Lower respiratory tract infections were the most common type of HCAI seen in Welsh acute hospitals

Infection type	Proportion of all HCAIs caused by specific infection type (%)
Lower respiratory tract (including pneumonia)	24.1
Surgical site	18.0
Urinary tract	15.5
Gastrointestinal system (including *C. difficile*)	15.5
Skin and soft tissue	12.5
Primary bloodstream (including MRSA bloodstream infections)	8.0
Eyes, ear, nose and throat, mouth	3.0
Systemic	1.5
Bone and joint	1.0
Reproductive tract	0.8
Central nervous system	0.8

Note
The National Prevalence Survey considered pneumonia separately from other lower respiratory tract infections but they have been presented together here for ease of reference.

Source: Hospital Infection Society and Infection Control Nurses Association, Third Prevalence Survey of HCAIs in Acute Hospitals, 2006

9 Reilly J, Stewart S, Allardice G, Noone A, Robertson C, Walker A, Coubrough S. NHS Scotland National HAI Prevalence Survey. Final Report 2007, Health Protection Scotland [Report].

Figure 3: MRSA is by no means the most common cause of bacteraemias that Welsh hospitals have to treat

Rank	Organism	Incidence per 100,000 bed days
1	*Escherichia coli* (*E.coli*)	38
2	*Staphylococcus aureus* (MSSA)	17
3	Enterococcus species	13
4	Streptococcus pneumoniae	12
5	Klebsiella species	10
6	*Staphylococcus aureus* (MRSA)	9
7	Coagulase negative staphylococci	8
=8	Serratia species	5
=8	Enterobacter species	5
10	Pseudomonas aeruginosa	4

Source: NPHS for Wales, All Wales Top 10 Bacteraemia for the period 01/01/2006 to 31/12/2006

1.4 Worldwide awareness of MRSA grew substantially during the 1990s, and the 1998 House of Lords Select Committee report, Resistance to Antibiotics and other Antimicrobial Agents, recognised MRSA as one of the biggest challenges facing infection control. However, MRSA and *C. difficile* infections, which have also attracted substantial media coverage in recent years, represent only a small proportion of the HCAIs affecting patients in Wales.
The national prevalence survey showed that HCAIs in Wales due to *C. difficile*, at 1.1 per cent of all hospital in-patients, are more prevalent than those caused by MRSA, at 0.9 per cent (Figure 1).

1.5 In terms of the actual numbers of people affected, reporting from mandatory surveillance schemes in Wales showed that 314 patients suffered MRSA bacteraemia (bloodstream infections) in Welsh hospitals in the year ending 31 March 2007[10], while 2,584 patients over 65 years of age suffered *C. difficile* infection in 2006[11].

1.6 Data collected by the NPHS on the organisms that most commonly cause bacteraemias[12] in Wales show that MRSA is by no means the most frequent cause of bloodstream infections at Welsh hospitals. *E. coli* and Methicillin-sensitive *Staphylococcus aureus* (MSSA), which can also cause severe infection but can be treated more easily with antibiotics, are the most common organisms that cause bacteraemias in Wales (Figure 3).

10 NPHS for Wales, *Staphylococcus aureus* Bloodstream Infection (Bacteraemia) Surveillance, 24th Report, covering data between 1 April 2006 and 31 March 2007. The incidence of MRSA bacteraemia is monitored because when the organism is isolated from blood it almost always is consistent with infection. However, when MRSA is isolated from a skin swab in the laboratory, for example, it is not possible to say whether it represents carriage of the organiusm or true infection. Methicillin-resistant *Staphylococcus aureus* infections, other than those of the bloodstream, generally can only be diagnosed clinically.

11 NPHS for Wales, All Wales Mandatory *C. difficile* Surveillance, 01/01/2006 to 31/12/2006, May 2007.

12 Bacteraemia, as defined by the Health Protection Agency, occurs when bacteria get into the bloodstream. A wide variety of bacteria can cause bacteraemias. Bloodstream infection is also sometimes called septicaemia, which implies greater severity/clinical significance.

1.7 Although the data do not separate out infections caught in hospitals, and those that patients contracted in the community and brought into the hospital, they do show that MRSA is only the sixth most common cause of the bacteraemias treated by Welsh hospitals. The four most common bacteraemias are those caused by bacteria that are part of an individual's normal flora and are brought into hospital with the patient. Many of the infections they cause will occur in the first 48 hours and be considered community acquired. However, *E. coli*, MSSA and Enterococcus species are also associated with healthcare interventions, can occur 48 hours or more after admission and are therefore considered hospital acquired.

1.8 Although the national prevalence survey showed that bacteraemias account for just eight per cent of all HCAIs in Wales (Figure 2), until recent years they have been the primary focus for the surveillance and measurement of HCAIs. The main reasons for this are that:

- bacteraemia reporting is laboratory based and therefore requires minimal input from clinicians;
- infections of the blood are more easily defined than infections of other sites of the body, where the data is complicated by the possible presence of micro-organisms that may not be causing any symptoms; and
- the presence of any micro-organism in the blood represents a potentially serious illness.

1.9 National surveillance schemes use standard methodologies and agreed definitions, and therefore allow for accurate comparisons to be made between individual trusts as well as between Wales and other countries. Mandatory surveillance began in 2001 with the requirement for all trusts in Wales to report *Staphylococcus aureus* bacteraemias. The programme has since been extended to include the 10 most common bacteraemias recorded in each NHS trust, *C. difficile* infections in the over 65s, hospital infection outbreaks, and Surgical Site Infections following Caesarean sections and following specific orthopaedic procedures. We have focused our analysis of data mostly on MRSA bacteraemia and *C. difficile* infections because of their high public profile, and because they are the longest running sources of HCAI data in Wales and hence provide the most robust trend data.

1.10 Since the launch of the national HCAI strategy in Wales, the NPHS has expanded its surveillance programmes and it now has in place a broad monitoring system that has the potential to more accurately measure trends in infection rates over time and improve comparability with other countries. However, these schemes are only in their infancy and, as a result, only limited trend data are currently available in Wales.

On the available data, MRSA bacteraemia and *C. difficile* infection rates appear lower in Wales than in England, but the picture is less clear when compared with other UK countries

1.11 Wales is recognised as having lower rates of MRSA bacteraemias than the rest of the UK. The MRSA bacteraemia rate for the year to 31 March 2007 in Wales was lower than in England, Northern Ireland and Scotland using data covering similar periods of time (Figure 4).

1.12 Although Wales had a lower incidence of MRSA bacteraemias than other parts of the UK, the overall prevalence of all types of MRSA infections in Wales (0.9 per cent) was lower than in England similar to the prevalence in Northern Ireland, but higher than in Scotland and the Republic of Ireland. The national prevalence survey also showed that the prevalence of *C. difficile* infections in Wales was nearly half the prevalence in England, identical to that in Northern Ireland but higher than in Scotland and the Republic of Ireland (Figure 1).

Figure 4: The incidence of MRSA bacteraemias is lower in Wales than in the rest of the UK

Country	MRSA bacteraemias per 100,000 bed days
Wales	8
Northern Ireland	13
England	18
Scotland	18

Data for Northern Ireland are from the Health Protection Agency/Communicable Disease Surveillance Centre Northern Ireland report HCAIs: Northern Ireland 2006 covering the 2006 calendar year. Data for England are from the Health Protection Agency's mandatory surveillance of HCAIs covering April 2005 to March 2006. Data for Scotland are taken from the Health Protection Scotland report Quarterly Report on MRSA Bacteraemias in Scotland. The Scottish data cover 2006 but it is important to note that they consider only acute occupied bed days and not bed days in non-acute settings, and therefore, are probably overstated.

Source: NPHS for Wales, Staphylococcus aureus Bloodstream Infection (Bacteraemia) Surveillance, 24th report, covering 1 April 2006 to 31 March 2007

Despite limitations in the data, there is evidence to suggest that Wales has problems with certain categories of infection

Rates of MRSA bacteraemia have fallen in recent years, although the rates vary between trusts

Box 2: Explanation of incidence of infection per 100,000 occupied bed days

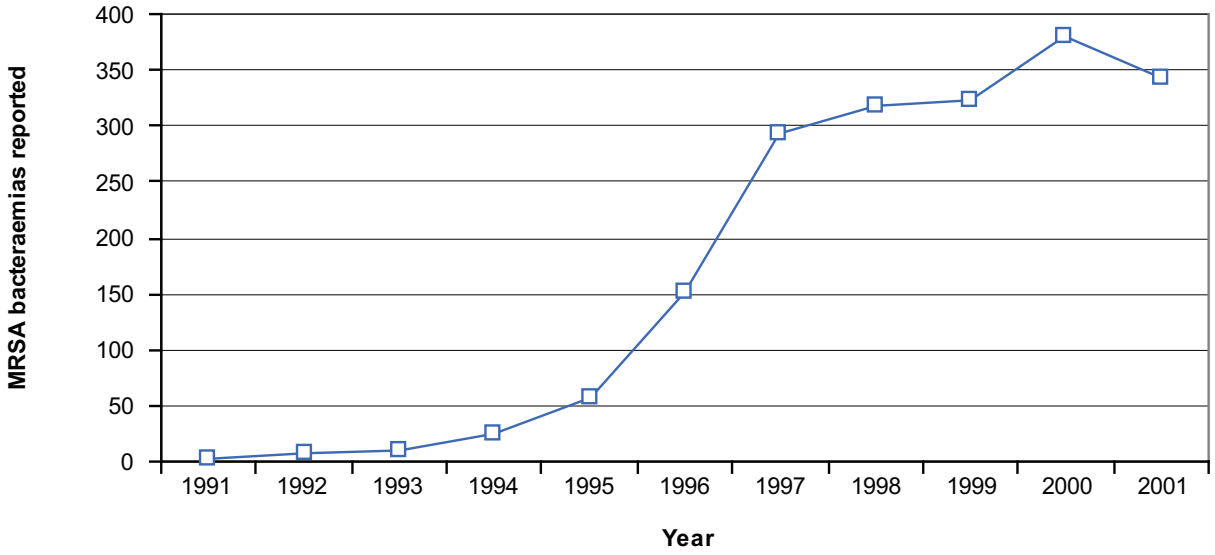
Incidence of infection is often expressed as a rate per 100,000 occupied bed days to allow comparisons between different hospitals or trusts. This is used in order to take hospital activity into consideration and to allow comparisons over time regardless of changes in hospital activity.

This method of standardisation is achieved by dividing the number of new infections in any given period of time by the number of occupied bed days during the same period of time. A multiplication of 100,000 is then applied to produce a rate per 100,000 occupied bed days.

The term 'occupied bed days' is a way of expressing hospital activity levels. One patient in a hospital bed for one night equates to one hospital bed day.

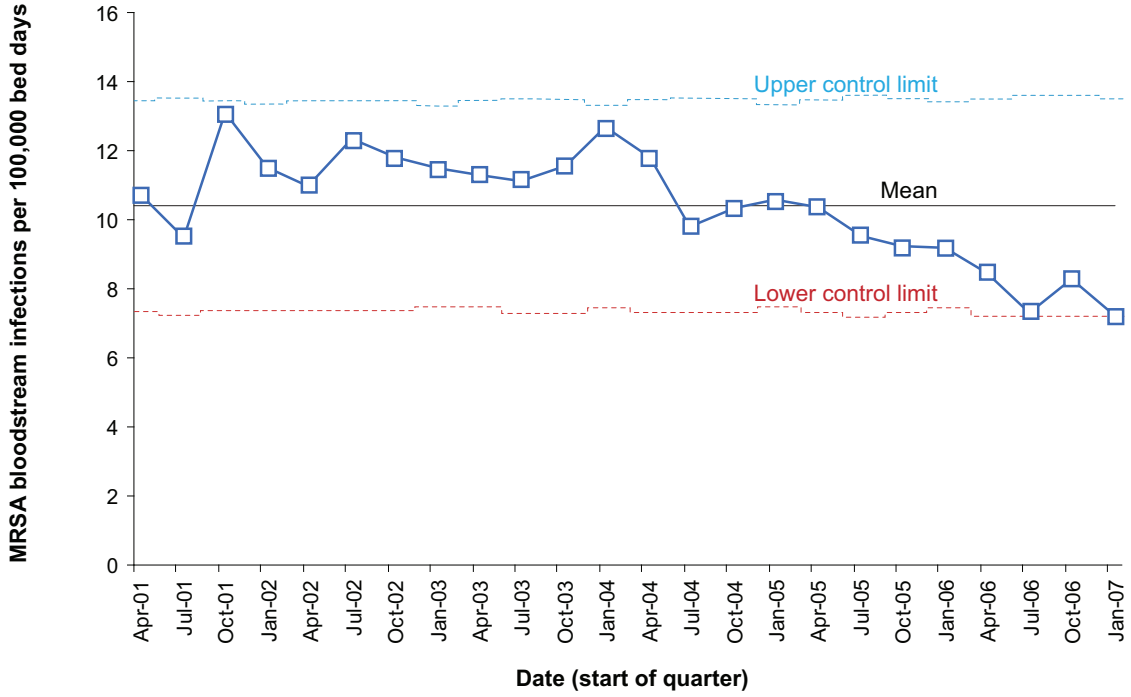
Source: Wales Audit Office

Figure 5: The number of patients suffering MRSA bacteraemias rose steeply between 1995 and 1997 then rose less steeply until 2000



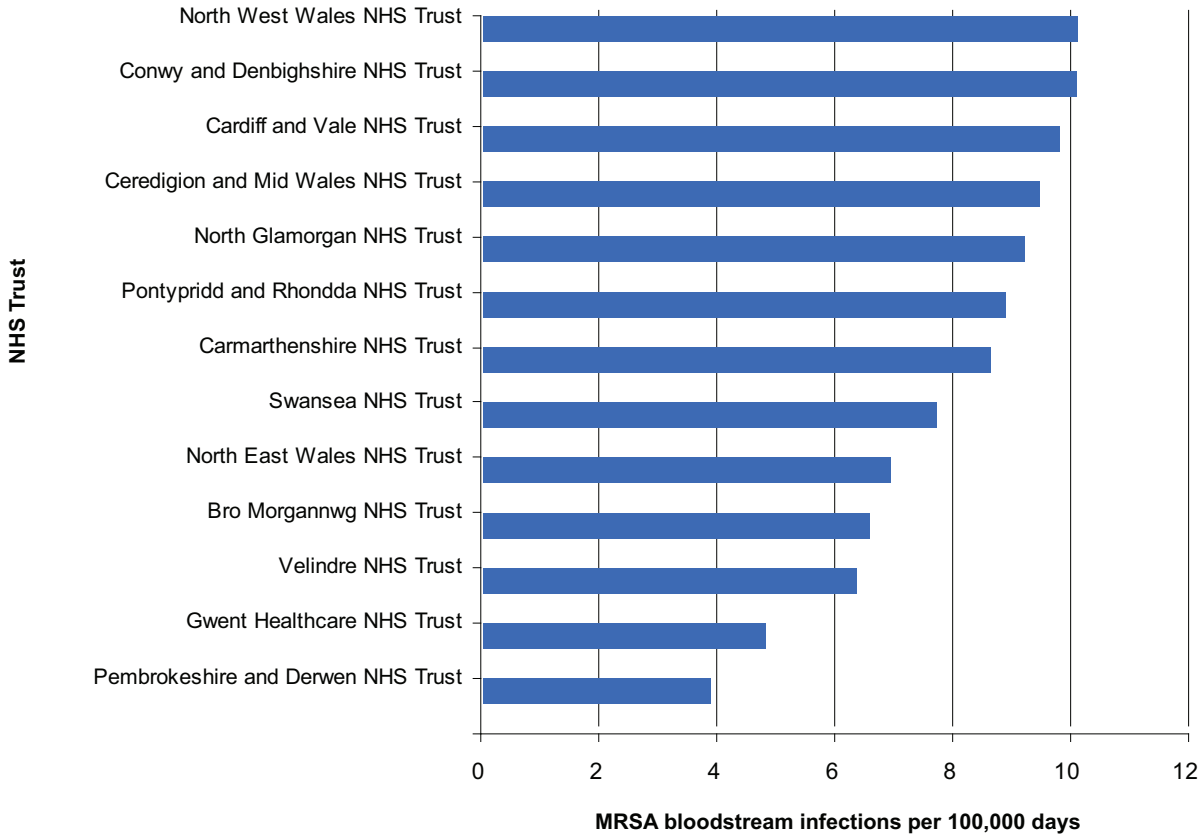
Source: NPHS for Wales

Figure 6: The incidence of MRSA bacteraemia in Wales fell significantly between April 2005 and July 2006



Source: NPHS for Wales, Staphylococcus aureus Bloodstream Infection (Bacteraemia) Surveillance, 24th report

Figure 7: Trusts' MRSA bacteraemia rates varied between trusts in the period between April 2006 and March 2007



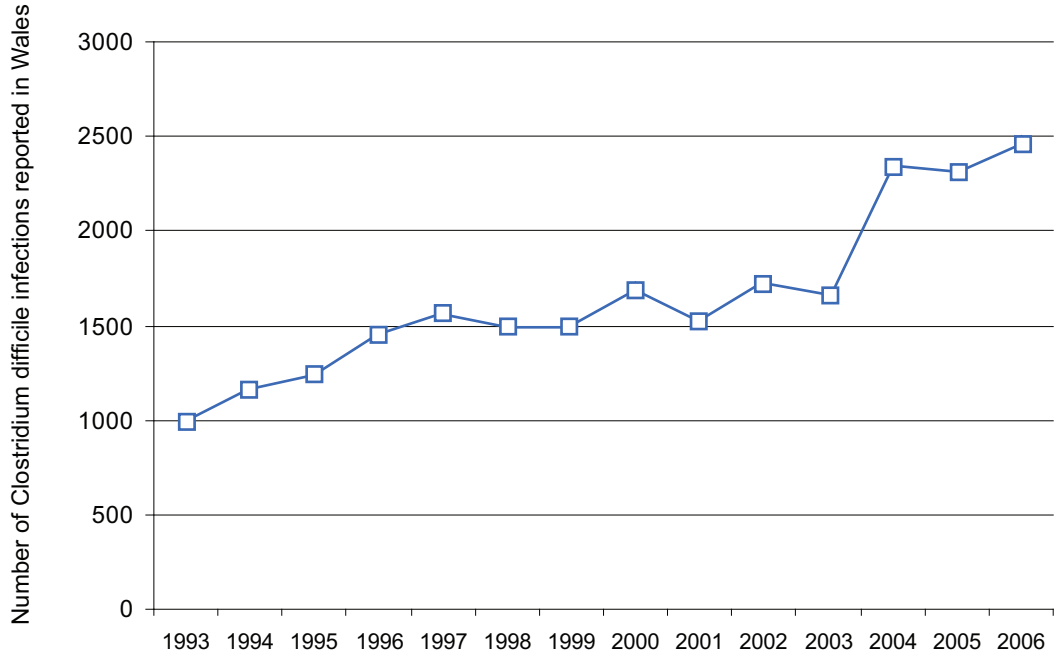
Note
The rate of infection at Velindre NHS Trust needs to be treated with caution. This is because Velindre Hospital has only 65 beds and the Trust sees a high proportion of patients as outpatients for treatments such as chemotherapy. All infections, whether seen in in-patients or outpatients, contribute to reported infection rate whereas the denominator is small due to the relatively small number of bed days. This has the combined effect of disproportionately inflating the infection rate.

Source: NPHS Staphylococcus aureus Bloodstream Infection Surveillance 24th Report, covering 1 April 2006 to 31 March 2007

1.13 There was a steep rise in the number of MRSA bacteraemias in Wales between 1995 and 1997 with a smaller increase between 1997 and 2000 (Figure 5). A different scheme for trusts to report cases of MRSA bacteraemias was introduced in 2001. The NPHS now monitors the incidence of MRSA bacteraemias per 100,000 occupied bed days (Box 2) using statistical process control charts, where incidence falling outside upper and lower control limits is considered to represent a statistically significant trend. Using this approach, the incidence of MRSA bacteraemias per 100,000 occupied bed days remained fairly stable until April 2005, and there was a statistically significant reduction for the first time between April 2005 and July 2006 (Figure 6).

1.14 Despite the downward trend in recent years, there are variations between the incidence of MRSA bacteraemia at different trusts (Figure 7). More detailed information on the extent of HCAIs at each trust are available on the Wales Audit Office website (www.wao.gov.uk).

Figure 8: The number of *C. difficile* infections appears to have increased significantly since 1993 but reporting from trusts has also risen during this period

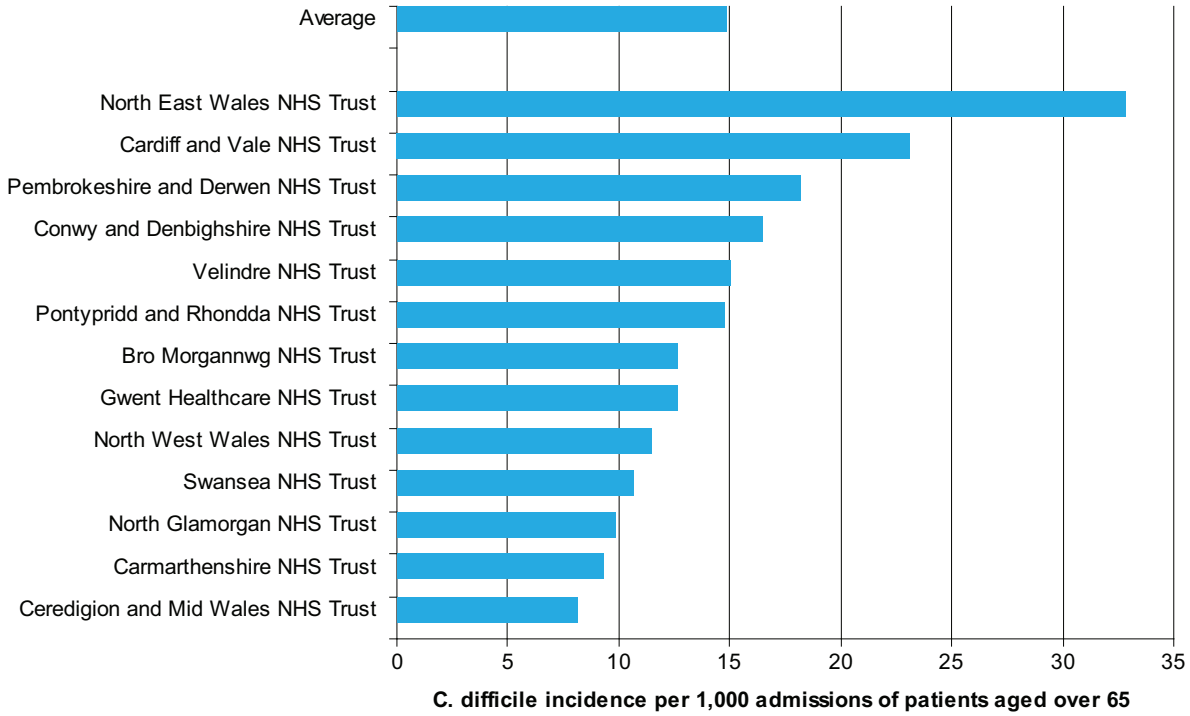


Source: NPHS for Wales, Laboratory-confirmed cases of C. difficile as reported to the Communicable Disease Surveillance Centre using CoSurv

Reported rates of C.difficile infections are rising and vary between trusts

1.15 There is some evidence to suggest that rates of *C. difficile* infections may have risen since the early 1990s. For example, data from a voluntary surveillance scheme, run in parallel to the mandatory *C. difficile* surveillance scheme for the over 65s, show that the number of laboratory-confirmed cases in patients of all ages in Wales rose considerably between 1993 and 2005 (Figure 8). There are, however, limitations to the data. Firstly, they are not wholly representative of *C. difficile* infections contracted in hospitals as they include samples taken from patients in the community setting as well as from hospital patients. Secondly, reporting to this surveillance scheme is voluntary and recent interest in the *C. difficile* organism is thought by the NPHS to have increased the extent of reporting by trusts, thereby giving an apparent increase in incidence. The voluntary nature of the scheme also results in significant under-reporting of cases. This is demonstrated by comparing the 2006 data for the voluntary and mandatory *C. difficile* surveillance schemes. While the mandatory scheme reports 2,584 cases in just the over-65 age group, the Voluntary Scheme reports only 2,473 cases in patients of all ages. Nevertheless, the NPHS believes there has been a rise in the incidence of *C. difficile* infections since 1993, even though the scale of the increase has been exaggerated by the increased extent of reporting.

Figure 9: Incidence of *C. difficile* infection varied between trusts



Source: NPHS mandatory C. difficile surveillance covering 1 January 2006 to 31 December 2006

While this means that mandatory surveillance covers the population that is most commonly affected by *C. difficile* infection, there are cases in younger patients that are not currently identified by mandatory surveillance. The national prevalence survey showed that the prevalence of *C. difficile* in all in-patients varied from zero in Velindre NHS Trust and Pontypridd and Rhondda NHS Trust to 2.5 per cent in North East Wales NHS Trust.

Rates of infection following surgery appear to be higher in Wales than the rest of the UK

1.17 Surgical Site Infections are the second most common site of HCAIs in Wales, accounting for 18 per cent of all HCAIs (Figure 2). This proportion is higher than in England (13.8 per cent), Northern Ireland (13.8 per cent) and Scotland (15.9 per cent), but lower than in the Republic of Ireland (21.5 per cent). The prevalence of Surgical Site Infections in patients who have had a surgical procedure is higher in Wales than in all other UK countries (Figure 10).

1.18 Mandatory surveillance in Wales includes the requirement for all trusts to report on infections following four specific orthopaedic procedures that are frequently carried out, and where infections can be particularly devastating for the patient and costly for NHS Wales.[13] Wales, Scotland and Northern Ireland share data on Surgical Site Infections incidence from these procedures as part of a pan-Celtic collaborative. The most recent

13 A WHC issued on 29 April 2003 (HCAI Surveillance, Surgical Site Infections – Orthopaedics, WHC (2003) 43) made it mandatory for trusts in Wales to report on four orthopaedic procedures which were arthroplasty of the hip, hemiarthroplasty of the hip, open reduction of the trochanteric region of the femur with internal fixation (referred to as # neck of femur) and arthroplasty of the knee. In consultation with orthopaedic surgeons in Wales, the Welsh HCAI Subgroup decided to limit the reporting requirements to just arthroplasty of the hip and arthroplasty of the knee from 2007.

comparative data from the collaborative, covering the three-year period between 2003 and 2005, showed that the incidence of Surgical Site Infections following each of the four procedures was significantly higher in Wales than in the other participating countries (Figure 11). The total incidence of Surgical Site Infections following all four procedures also increased slightly in Wales from 3.1 per cent in 2004 to 3.9 per cent in 2005.

1.19 Surveillance requirements for orthopaedic Surgical Site Infections in England are similar to Wales except that infections are only reported in England if they occur before the patient is discharged from hospital. In Wales these infections are reported even if they do not become apparent until the patient has returned home. The pre-discharge Surgical Site Infections incidence is therefore comparable between the two countries with the Welsh rate between April 2005 and March 2006 being much higher, at 2.6 per cent, than that for England, at 1.1 per cent.[14]

Figure 10: Welsh prevalence of Surgical Site Infections in patients who have had a surgical procedure is higher than the rest of the UK

Country	SSI prevalence (%)
Wales	5.35
England	4.65
Republic of Ireland	4.47
Northern Ireland	3.69

Note
This data was not recorded in the NHS Scotland National HAI Prevalence Survey 2007

Source: Hospital Infection Society and Infection Control Nurses Association, Third Prevalence Survey of HCAIs in Acute Hospitals, 2006

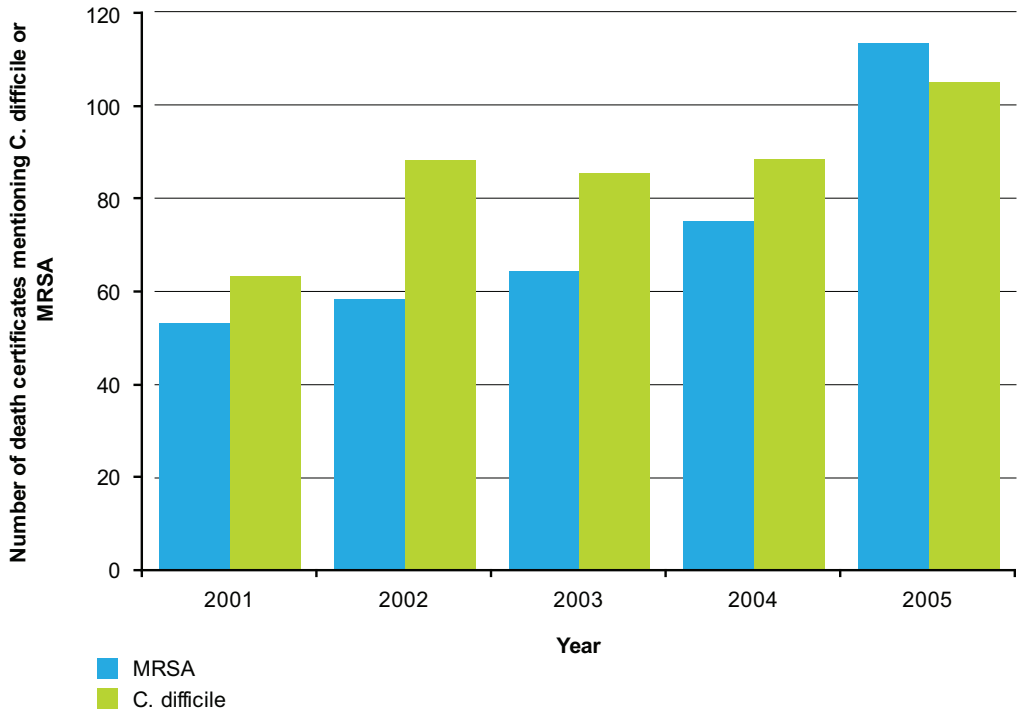
Figure 11: The incidence of Surgical Site Infections following four orthopaedic procedures was significantly higher in Wales between 2003 and 2005 than in Scotland and Northern Ireland

Procedure category	Average for Wales, Scotland and Northern Ireland (%)	Wales (%)	Scotland (%)	Northern Ireland (%)
Arthroplasty of the hip	1.9	3.1	1.9	1.0
Hemiarthoplasty of the hip	3.0	3.6	2.9	3.4
Neck of femur	2.4	3.8	1.8	2.5
Arthroplasty of the knee	2.0	4.2	1.5	1.8
Total	2.1	3.6	1.8	1.8

Source: Pan Celtic Collaborative

14 Health Protection Agency, Second Report of the Mandatory Surveillance of Surgical Site Infections in Orthopaedic Surgery, April 2005 to March 2006.

Figure 12: The number of death certificates mentioning MRSA or *C. difficile* has increased significantly in Wales since 2001



Source: Office for National Statistics

1.20 The reliability of the orthopaedic Surgical Site Infections data from Wales is undermined by trusts' poor compliance with the Assembly Government's reporting requirements. While participation in the surveillance scheme is now mandatory in Wales, many trusts are still failing to carry out surveillance on significant numbers of patients undergoing these procedures. Two trusts failed to report any data in 2005 and overall in Wales only 37 per cent of the procedures that were carried out were reported to the NPHS. This compares with trusts in Northern Ireland that achieved 87 per cent coverage for the same four procedures that are the focus of orthopaedic surveillance in Wales[15]. The Health Protection Agency estimates that in 2005/2006 English trusts reported 33 per cent of procedures classed as arthoplasty of the hip, 25 per cent for hemiarthroplasty of the hip and 38 per cent for arthroplasty of the knee.

1.21 There are similar limitations with the data for Surgical Site Infections following Caesarean sections. Infections following Caesarean sections are relatively common and the consequences can be particularly traumatic for patients. The Assembly Government therefore decided to make reporting of such infections to the NPHS mandatory from January 2006. The data suggest rates of infection are considerably higher than those seen in other European countries. The Surgical Site Infections incidence in Wales during 2006 was 21.5 per cent[16]. This compares with an average incidence rate of

15 The coverage of the Surgical Site Infections surveillance is not routinely monitored in Scotland.

16 National Public Health Service for Wales, Caesarean Section Surgical Site Infection Surveillance, Summary All Wales, draft Annual Report, 2006, due for publication in November 2007.

just 2.7 per cent seen across eight countries that participated in the Hospital in Europe Link for Infection Control through Surveillance (HELICS) report of 2004[17]. It should be noted, however, that direct comparison between the Welsh and European data is problematic. European countries vary in the duration and completeness of post-discharge surveillance and there is therefore under-reporting of Surgical Site Infections when compared with Wales, where post-discharge surveillance is carried out for all patients who have a Caesarean section.

Hospital infection outbreaks can have a considerable impact on the running of Welsh hospitals

1.22 Infections, in particular those arising from viruses that cause diarrhoea and vomiting, can pose significant problems for Welsh hospitals. This is because once introduced into semi-closed environments, such as hospitals, they can spread quickly and cause significant outbreaks.

1.23 In 2006, there were 225 outbreaks of infection reported in Welsh hospitals. Norovirus and other viral causes of diarrhoeal illness accounted for 194 of these outbreaks, compared with 18 outbreaks of diarrhoeal illness due to the bacterium *C. difficile*. More detailed data on the impact of infection outbreaks in hospitals were provided in the 2004 NPHS Outbreak Report[18]. This stated that in 2004 there were 194 outbreaks reported to the NPHS. These affected 2,430 patients, 980 staff and 227 wards, and resulted in five hospital closures.

It is difficult to estimate accurately the number of deaths each year attributable to HCAI

1.24 The Office for National Statistics collects data relating to cases where MRSA or *C. difficile* were mentioned on the death certificate. Between 2001 and 2005 the number of death certificates in Wales mentioning MRSA increased from 53 to 113 and the number mentioning *C. difficile* rose from 63 to 105 (Figure 12). However, the information recorded on death certificates is not a reliable source of a measure of the contribution of HCAIs to mortality in Wales.

1.25 The death certificate is not designed to quantify the number of deaths to which HCAIs have contributed. By definition, patients who contract HCAIs have been receiving health care for another condition, and they often have other potentially fatal medical conditions. It is a matter for clinical judgement whether or not a disease or condition present at, or before, death contributed to the death and therefore should be included on the death certificate. Also, whereas certifiers will often specify the disease or manifestation, such as pneumonia, septicaemia or enterocolitis on the death certificate, they only sometimes specify the micro-organism, such as MRSA or *C. difficile*.

1.26 There is also a risk that the increasing number of recorded deaths arising from HCAIs may reflect an increased willingness on the part of clinicians to record infections arising from HCAIs, rather than an increase in the number of deaths attributable to HCAI. Cause of death information in England and Wales is collected, coded, analysed and published according to internationally agreed

17 HELICS, Surveillance of Surgical Site Infections, Surgical Site Infection Statistical Report, 2004. The eight countries that provided comparative data for Surgical Site Infections following Caesarean sections were Austria, Germany, Spain, France, Lithuania, Holland, Poland and Scotland.

18 NPHS for Wales, Hospital Outbreak Report, January to December 2004.

guidelines and standards, and responsibility for the legislative framework within which clinicians record information on death certificates has not been devolved to the National Assembly for Wales (the National Assembly).

Part 2 - Consistent with the Assembly Government's strategy and other good practice standards, trusts have developed frameworks within which healthcare associated infection can be managed effectively

There is evidence to suggest that all trusts are taking infection prevention and control seriously at corporate level

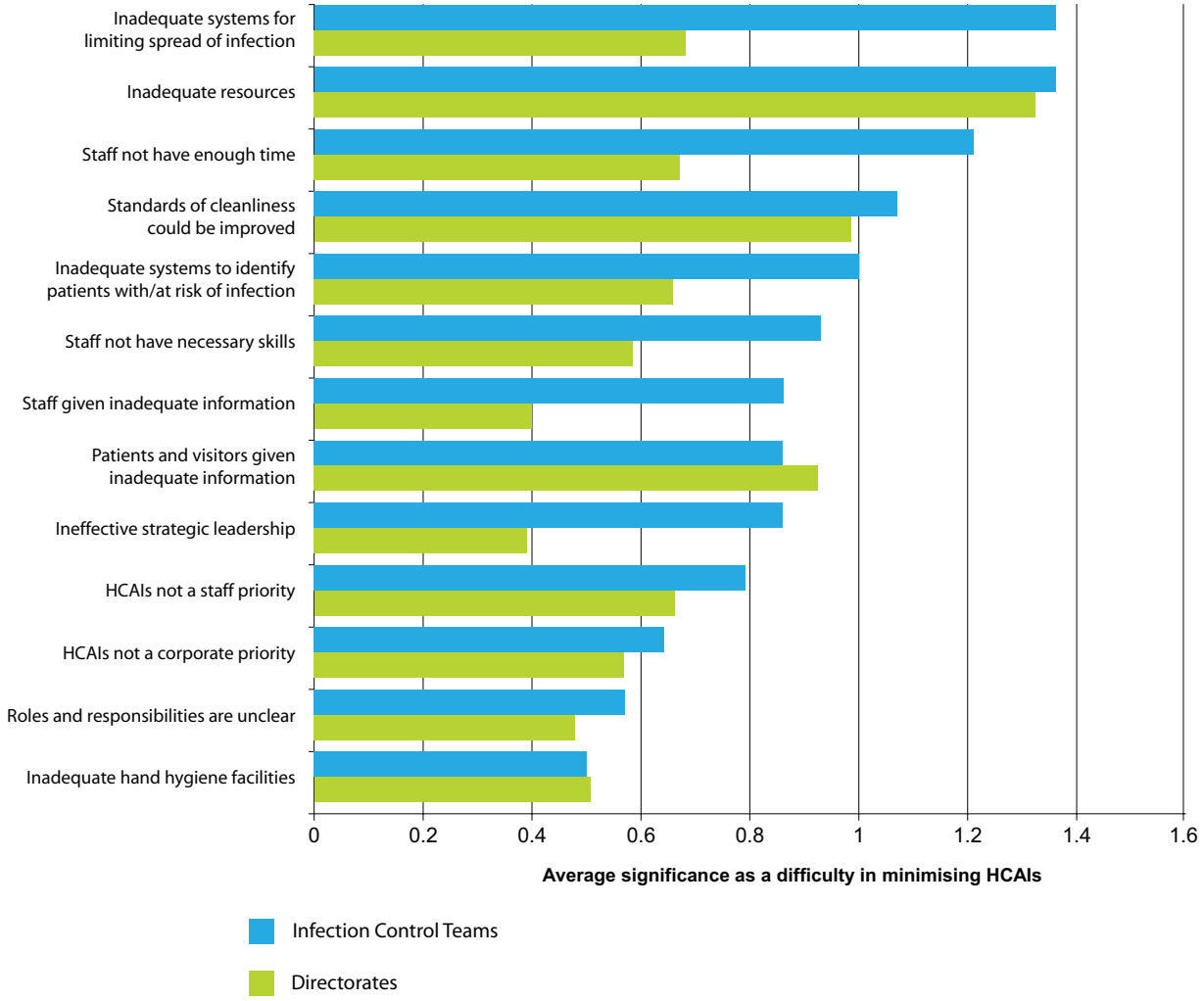
2.1 To be effective, trusts need to take infection prevention and control seriously at corporate level. Our surveys of central specialist infection control teams in trusts, and those leading infection prevention and control in directorates, asked for information about the barriers to minimising HCAIs. Infection control teams rated a lack of corporate priority for reducing HCAI as the third least significant of the 13 potential barriers to minimising HCAI. Directorates rated a lack of corporate priority as the sixth least significant barrier (Figure 13).

2.2 Our survey of trusts showed that chief executives had signed off infection control plans in only two trusts, while HCAIs appeared in only half of trusts' corporate risk registers. However, at the four trusts we visited it was clear that infection prevention and control were being taken seriously at corporate level and had received a higher priority over the last couple of years.

2.3 We also found some evidence of investment in infection control having increased, which may reflect the increasing priority trusts are giving to infection prevention and control. Our survey showed that in the four trusts that could provide comprehensive data, total expenditure on infection control had increased by 52 per cent between 2003/2004 and 2005/2006.

2.4 Infection control is a central element of the clinical governance processes in most trusts. Eight trusts present quarterly or bi-monthly information on mandatory surveillance to their clinical governance committees, while two trusts present such information six-monthly and three annually. Clinical governance committees also receive regular reports from trusts' infection control committees, and there are examples where specific issues are reported to the clinical governance committee. For example, following a gap analysis, Swansea NHS Trust presented a report to the clinical governance committee on the implications of the Healthcare Commission's report on an outbreak of *C. difficile* at Stoke Mandeville Hospital.

Figure 13: Barriers to minimising HCAIs as perceived by infection control teams and directorate leads for infection control



Note
Figure 13 shows the average score that each factor was given, where a score of zero meant that the factor was not a barrier to minimising HCAIs, and a score of three meant the factor was a significant barrier

Source: Wales Audit Office surveys of infection control teams and directorate leads for infection prevention and control

Trusts have put in place many of the structures set out in the national strategy to embed infection prevention and control

2.5 The Assembly Government's strategy required trusts to ensure that each of their directorate management teams appointed a lead to be formally accountable for infection control practice. The strategy highlights the need to develop directorate-based expertise in infection control and for directorates to work with the central infection control team to identify priorities for action and the directorate's contribution to the Trust-wide infection control programme. We found that directorate leads were in place in most trusts: 10 out of 14 trusts have appointed a directorate lead for each of their directorates, while the remaining four have appointed a directorate lead for most directorates. Sixty-three out of the 71 directorates responding to our survey had a designated lead for the prevention and control of HCAIs.

2.6 In December 2005, the Assembly Government issued a WHC[19] requiring each trust to set and register annually, with the NPHS's Welsh HCAI Project Team, local priority targets for infection control. All trusts have developed overall action plans for infection control and local targets to reduce infection. Ten out of 14 trusts had used directorate priorities to inform the Trust's action plan, while 51 out of 71 directorates responding to our survey had identified their own priorities for the prevention and control of infections. Trusts variously told us that the targets had raised the profile of infection control within the Trust, contributed to reductions in rates of infections, and improved collaboration between the infection control team and directorates.

2.7 Our surveys of infection control teams and directorates sought to determine whether trusts' central infection control teams and the directorates that they supported had common views of the priority areas for action within the Trust. In general, our surveys showed that most directorates identified similar priority areas for action as their infection control teams had done. However, our visits to trusts suggested that in some directorates there remains a culture that sees infection control as the responsibility of the central infection control team, rather than of the directorate.

2.8 Welsh Risk Management Standards (WRMSs) state that trusts should have an infection control committee that endorses all infection control policies, procedures and guidance, provides advice and support, and monitors progress with the Trust's infection control programme. All trusts have an infection control committee or, in the case on Pontypridd and Rhondda NHS Trust, an infection prevention and control operational group, which have formal terms of reference. The frequency with which they meet varies from twice a year to five times a year. Sixty-one out of 71 directorates responding to our survey were represented on their Trust's infection control committee, although our visits to trusts suggested that the committees can experience problems in securing the attendance of clinicians and senior managers. Most trusts provide members of their infection control committees with reports of mandatory and voluntary surveillance data on a quarterly basis, which are discussed at committee meetings, and committees are generally involved in signing off and reviewing the Trust's infection control programme.

19 Assembly Government, annual priorities and planning guidance for the Service and Financial Framework 2006/2007, WHC (2005) 088, 16 December 2005.

Case Study A: Divisional infection control facilitators have helped embed infection prevention and control at divisional level in Swansea NHS Trust

Swansea NHS Trust has established a system within the infection control team of having named facilitators for each division. The facilitators have helped divisions in preparing their action plans, setting targets, training, audit and specific advice on key infection control matters. There is clear evidence that this structure has been helpful in embedding the infection control agenda within divisions and the feedback from the divisional lead nurses for infection control was extremely positive.

Source: Wales Audit Office visit to Swansea NHS Trust

2.9 While some infection control committees consider the appropriateness of trust infection control targets, in general it is the infection control team that proposes the initial targets to reduce infection rates, sometimes in liaison with the clinical directorates. Few infection control committees have a significant influence in setting infection control budgets. Some trusts have no allocated infection control budget other than the salaries of the infection control team, while others have infection control budgets that sit within larger budgets that include clinical governance and clinical support services.

2.10 In some trusts, the infection control committee has strengthened its role by requiring all directorate leads to present reports on their infection control progress. This provides a focus for directorates, and the opportunity for robust internal challenge and scrutiny. It also appears to be an effective model for trusts to follow in encouraging ownership of infection control issues in directorates.

2.11 North West Wales NHS Trust's infection control committee has also secured greater involvement from the directorates by requiring directorate leads to give feedback at every meeting regarding their directorate's individual Action Plan. Swansea NHS Trust has increased the engagement of its divisions by strengthening the links between divisions and the infection control team (Case Study A).

Additional structures to those included in the national strategy are now in place in Welsh trusts

2.12 Link practitioners act as a link between clinical areas and the Trust's infection control team. Their role is to raise awareness and encourage improvements in infection control practices. The Welsh Review of Resources for Communicable Disease Control concluded in 2003 that the implementation and success of link practitioner systems had been variable, and such schemes were not included in the Assembly Government's HCAI Strategy.

2.13 Nevertheless, we found that 10 trusts have link practitioner systems in place to some degree, with infection control teams reporting significant benefits including improved dissemination of information, raised awareness of infection control issues, the more successful completion of infection control audits, and assistance in embedding infection control in directorate agendas. Where infection control teams considered the effectiveness of link practitioners to be limited, this was mainly because of issues such as a lack of protected time for the practitioners to carry out their duties. Some infection control teams said the link role should be extended so that practitioners could carry out more audits and more regularly provide infection control training to operational staff.

Case Study B: Reporting by the non-executive director for hygiene, cleanliness and infection in Swansea NHS Trust

The Trust appointed a non-executive director to champion hygiene, cleanliness and infection control before the National Assembly enacted the legislation requiring them to do so. The non-executive director has set up a patient group, sat on relevant Trust groups and received reports from trust staff on issues of hygiene, cleanliness and infection. The non-executive director recently produced her first report on hygiene, cleanliness and infection control, which was presented to the Trust's Clinical Governance Committee. The Trust placed the report on its intranet site, which has generated a substantial number of comments from staff, for example, about areas which were not clean, and about new paper towels introduced which did not fit into the dispenser and so were falling onto bathroom floors.

Source: Wales Audit Office visit to Swansea NHS Trust

2.14 Some trusts have decided not to implement link practitioner schemes. Pontypridd and Rhondda NHS Trust took this decision because it believes the scheme would detract from the idea that infection prevention and control should be the responsibility of all clinical staff.

2.15 In September 2006, the Assembly Government passed legislation which required trusts to appoint a public champion to ensure that the public perspective of cleanliness, hygiene and control of infection is represented at board level[20]. Although this measure was not included in the national strategy, all trusts now have a non-executive director in place with responsibility for cleanliness, hygiene and infection control.

2.16 Even though this role is relatively new, several infection control teams highlighted some early benefits when replying to our survey. In particular, there was a sense that the non-executive champions have increased the awareness and priority of HCAI at trust board level. As part of their role, some non-executive directors have highlighted issues that are of concern to patients and the public, have taken the chair of other relevant groups (such as cleaning strategy groups and infection control committees), and have provided the first of regular quarterly reports to their boards on the issues for which they are responsible (Case Study B). Although the appointment of non-executive directors responsible for cleanliness, hygiene and infection control appears to have had a positive impact, there was a risk of such appointees straying beyond the non-executive role in assurance and governance, and into issues that should be the responsibility of executive directors. In the light of this, the Assembly Government's guidance on the new non-executive role needed further clarification[21].

Screening of patients is carried out in all trusts according to protocols

2.17 Screening is the systematic microbiological testing of patients for the presence of infective organisms. The aim is to identify patients who have been colonised by micro-organisms and therefore are at risk of developing an infection or of transmitting the organism to other patients or staff. Screening can be carried out before a patient is admitted to hospital, upon their admission, or at any time during or after their treatment.

20 National Assembly, Subordinate Legislation, 2006 No. 65, NHS, Wales; Directions to NHS Trusts and Powys LHB 2006, and the Assembly Government, Standing Order 29 Directions to NHS Trust and Powys LHB – Guidance for nominated non-executive directors and non-officer member, WHC (2006) 064, 27 September 2006.

21 National Assembly, HSS(2)-11-06 Paper 03 Annex A, Standing Order 29.3(iii) Explanatory Memorandum in Respect of Directions to NHS Trusts and Powys LHB. 28 June 2006.

Case Study C: Gwent Healthcare NHS Trust has reduced its rates of MRSA infection in orthopaedic patients through a 'search-and-destroy' screening approach

Gwent Healthcare NHS Trust has lowered the rate of MRSA infections on an orthopaedic ward at Nevill Hall Hospital for patients about to undergo joint replacement. A strict protocol is in place to ensure patients are screened before they are admitted. Only patients who are confirmed not to be colonised with MRSA are admitted. Patients who test positive for MRSA are decolonised before being admitted. High-risk patients (during their hospital stay) and staff are also regularly screened for MRSA. If a patient is found to be MRSA positive after they have been admitted, they are moved to another ward. Once a case of MRSA has been detected, surgery is halted until there has been a thorough clean of the ward and all patients are confirmed to be free of MRSA. Also, surgeons try to avoid carrying out elective operations if an emergency patient has been admitted to the ward, as these patients will not have been screened prior to admission.
The protocol was implemented in 2002 and has required full Trust Board support. While there is no orthopaedic ward infection rate data for before 2002, staff claim to have seen a reduction in infection rates to the point where there was only one hospital-acquired MRSA infection per year between 2002 and 2004, and no such infections in 2005 or 2006.

Source: Wales Audit Office surveys of infection control teams and directorate leads for infection prevention and control.

2.18 The Assembly Government has not produced any formal guidance on screening, and it actively decided not to adopt a summary of best practice in screening for MRSA colonisation produced by the Department of Health in England in 2006[22]. This was because it was uncertain about the evidence base for the guidance. The Assembly Government and NPHS told us that most Welsh trusts have therefore based their MRSA screening policies on UK-wide guidance published by the Hospital Infection Society in 2006[23].

2.19 The Hospital Infection Society guidance focuses on a range of interventions for controlling and preventing MRSA. It states that screening for MRSA should be carried out in high-risk groups of patients in certain clinical areas, but that the specifics of these screening protocols should be determined by local risk assessment. The guidance states that high-risk patients include those who have been colonised or infected with MRSA in the past, people frequently admitted to hospital, patients being transferred between hospitals, recent in-patients at hospitals abroad or in the UK that are know to have high MRSA prevalence, and residents from residential care homes that are known or likely to have high MRSA prevalence.

2.20 In addition to routine screening of high-risk patients, the guidance suggests regular screening of all patients in high-risk clinical settings such as intensive care, orthopaedics and burns units. The guidance also states that consideration should be given to the screening of all patients admitted to such units, but that this should be decided locally, based on specific risks. Patients awaiting elective admission who meet locally agreed screening criteria should be screened before their admission by General Practitioners (GPs) or in preadmission clinics.

2.21 All NHS trusts in Wales have formal screening protocols in place, almost exclusively for MRSA although no trust screens all patients for MRSA. The protocols vary between trusts, in accordance with their local assessments of risk but all trusts target some of the high risk patient groups specified in the Hospital Infection Society guidance.

22 Department of Health, Screening for MRSA colonisation: A strategy for NHS trusts: a summary of best practice, 15 November 2006.

23 Guidelines for the control and prevention of MRSA in healthcare facilities, J.E. Coia, G.J. Duckworth, D.I. Edwards, M. Farrington, C. Fry, H. Humphreys, C. Mallaghan, D.R. Tucker, for the Joint

2.22 Using protocols that almost exclusively focus on MRSA, nine trusts screen all patients transferred from other hospitals, six screen patients from residential or nursing homes and six screen elective orthopaedic patients (Case Study C). Screening patients from nursing or residential homes is particularly important as some studies suggest that around 20 per cent of the residents of such homes are colonised with MRSA.

The extent and effectiveness of audits relating to infection prevention and control have increased in most trusts

2.23 Infection control audits usually aim to monitor compliance with relevant infection control policies. They can also examine the performance of staff who are carrying out procedures that could result in exposing patients to higher risks of infection if they are not carried out appropriately. In addition, audits can investigate the possible causes of incidents highlighted through surveillance (Case Studies D and E).

2.24 Our survey suggested that nearly all trusts carry out planned infection control audits as part of their organisation-wide programmes of clinical audit, consistent with the Assembly Government's strategy on HCAI. In addition, all trusts comply with the requirements of the Welsh Risk Management Standards (WRMSs) that they should have a written programme for the audit of infection control policies and procedures (Box 4). Welsh Risk Management Standard 14 requires trusts to produce annual reports on the extent of compliance with infection control procedures. This is in place in all trusts, although two trusts have not yet produced reports covering all of their infection control procedures. The requirement that internal audit departments carry out reviews of infection control systems according to the WRMS 14 was in place in all but two trusts.

2.25 From April 2007, all healthcare organisations in Wales will be required to undertake self-assessments against the Healthcare Standards for Wales[24] and make an annual public declaration of how they have performed. Infection prevention and control are covered by these standards and HIW will be working with the Welsh Risk Pool to ensure that trusts experience no duplication of effort in assessing their progress against the relevant standards[25].

Box 4: The WRMSs cover infection control

Every year NHS trusts carry out a self-assessment against each of the 40 Welsh Risk Management Standards, producing action plans that are reviewed by the Assembly Government. The Welsh Risk Pool (WRP) also carries out assessments at trusts on the first 21 standards plus three others. Welsh Risk Management Standard 14 covers infection control. It requires trusts to have in place specific measures and arrangements for infection prevention and control. These include: written policies and procedures, clear lines of accountability, an infection control team with clear terms of reference, good access to infection control policies, accredited microbiology laboratories, systems for reporting patient-safety incidents regarding HCAIs, a training and education programme, consultation with the Infection Control Team when reviewing domestic or cleaning contracts, information for patients and visitors, and a documented Audit Programme.

Source: WRP

24 The Assembly Government launched a document entitled Healthcare Standards for Wales in May 2005. The document is a common framework of standards to support the NHS and partner organisations in providing effective, timely and quality services across all healthcare settings. The standards came into force in June 2005.

25 Assembly Government. Healthcare Standards for Wales – Next Steps. WHC (2006) 041. 11 August 2006.

Case Study D: Root Cause Analysis carried out in Velindre NHS Trust

Velindre NHS Trust carries out Root Cause Analysis for some of its infection control incidents. Where it is suspected that a patient has acquired an infection during their stay in hospital, the Infection Control Team uses a Root Cause Analysis tool produced by the National Public Safety Agency. The tool entitled Learning Through Action to Reduce Infection guides the Infection Control Team through the patient's care in a chronological way and helps to increase understanding about how an infection might have occurred. The Trust then takes action to try to prevent the same issue arising again. Lessons learnt from using the tool are shared at Senior Nurse meetings, ward meetings, and divisional infection control meetings. While the Infection Control Team have found the tool time-consuming to use, they have found it effective in highlighting problems.

Source: Wales Audit Office

2.26 The Infection Control Nurses Association, in collaboration with the Department of Health, produced a comprehensive set of infection control audit tools in 2004. The audit tools are essentially checklists that are used to ascertain the extent to which a trust is adhering to good practice in infection prevention and control. One trust uses root cause analysis to learn from its infection control incidents (Case Study D). The Assembly Government recommended adoption of the audit tools, following a pilot study carried out in five Welsh trusts. However, our fieldwork identified some concern about the demands placed on infection control teams as a result of using the tools.

2.27 In most trusts, infection control teams oversee the programme of infection control audits while in some trusts they also carry out the audits. Overall, infection control teams consider that their workload regarding infection control audits has increased over the last two years. In response to our survey, 11 teams said they are now spending more time carrying out audits of compliance with infection control procedures compared with two years ago, two teams said the workload has decreased and one said it had stayed the same. Thirteen teams also said that their role in hand-hygiene audits had increased over this period, while one said the workload had stayed the same. In addition, eight teams said their role in monitoring standards of cleanliness in clinical areas had increased, while three said there had been a decrease and two said this had remained constant.

Case Study E: Swansea NHS Trust employs thematic audits of cleanliness and infection issues to drive improvements in practice

Swansea NHS Trust has moved away from undertaking comprehensive infection control and environmental audits of an entire ward, one ward at a time, and has instead introduced trust-wide thematic audits across locations. These are known as 'Back to Basics' audits and are a supplement to the national Infection Control Nurses Association audits which are undertaken by divisional staff. The 'Back to Basics' programme has involved audits of thematic issues such as commodes, beds and handwashing rather than general audits of the ward. At an operational level the 'Back to Basics' programme started in late summer 2006. The Trust considers that the programme has had a significant impact at service delivery level, because the audit work has been targeted on patient-centred basics, such as commodes and ward-level infection control practices. The Infection Control Team works closely with clinical staff during the audit and then follows up to ensure appropriate action has been taken. The process is extremely visible and the Trust considers that it helps to share the corporate vision on infection control.

Source: Wales Audit Office visit to Swansea NHS Trust

2.28 Some trusts have acted to minimise the burden of audit work on their infection control teams by delegating at least some audits to clinical directorates or divisions, while in four trusts link practitioners carry out some infection control audit work.

2.29 We found that some trusts have successfully implemented changes as a direct result of infection prevention and control audits (Case Study E). North East Wales NHS Trust's nursing strategy includes the requirement for ward sisters to carry out hand hygiene audits once every two months. The Trust claims improvements have been made in certain clinical areas where low audit scores resulted in an action plan and follow-up from an infection control nurse. North West Wales NHS Trust considers that it has delivered significant improvements in the patient environment, in use of intravenous cannuale and in intravenous drug administration as a result of deficiencies highlighted by infection control audits. Other impacts include:

- heightened awareness of issues;
- safer practices for disposing of sharps (ie, needles);
- replacement of mattresses and beds;
- replacement of old flooring;
- improvement of action plans;
- inclusion of issues on a risk register; and
- targeted training to address issues identified by audit.

Part 3 - Although we found examples of good practice, there are things, some of which are straightforward, that all trusts should do to reduce the risk of infection

Trusts should take action to embed infection control at all levels to make it everybody's business

The pursuit of targets should not compromise patient safety

3.1 One of the key challenges facing senior managers is the need to balance key performance and financial targets with patient safety imperatives, including infection control. The Healthcare Commission's investigation into two outbreaks of *C. difficile* in Stoke Mandeville Hospital between 2003 and 2005 found that senior managers had prioritised the achievement of performance and financial targets, as well as reconfiguration, ahead of patient safety. The consequence was that 334 patients became infected, of whom 33 died. The Healthcare Commission's report was clear that it was not the targets themselves that had caused the problems in Stoke Mandeville Hospital, but management decisions that prioritised performance and financial targets ahead of issues of patient safety (Box 5). Swansea NHS Trust told us that they had conducted a gap analysis to compare their practices with the issues identified at Stoke Mandeville. All trusts should consider the very significant failings identified by the Healthcare Commission's report and, in particular, boards should put in place safeguards to ensure that patient safety is not compromised in the pursuit of targets.

Box 5: Key findings from the Healthcare Commission's investigation into outbreaks of *C. difficile* at Stoke Mandeville Hospital, Buckinghamshire Hospitals NHS Trust

The Healthcare Commission concluded that the first outbreak occurred as a consequence of a poor environment for patient care, poor infection control practices, a lack of facilities to isolate patients, and insufficient priority being given to the control of infection by senior managers. The failure to bring the second outbreak quickly under control occurred because senior managers were too focused on the reconfiguration of services and meeting Government targets, and not sufficiently focused on the management of clinical risk. There was a consensus that the second outbreak should have been brought under control sooner. The failure of the Trust to implement the lessons of the first outbreak, combined with a dysfunctional system for governance which did not incorporate Risk Assessment into decision making, nor made the Board aware of the significance of the outbreaks, meant that it took longer than it should have to control the second outbreak. There was a serious failing at the highest levels of the Trust to give priority to the management of the second major outbreak, and the Trust failed to follow the advice of its own Infection Control Team or that of the Health Protection Agency.
The Healthcare Commission identified a number of issues in the way the Trust's senior managers chose to pursue priorities, which compromised infection control. These included:

- the approach to meeting Government performance targets led to the movement of patients between wards, difficulties in isolating patients with infection and high levels of bed occupancy;
- the lack of suitable isolation facilities in the hospital was exacerbated by changes to wards in order to achieve Government targets;
- the increased frequency of patient movements increased the risk of transmitting infections, while high bed occupancy meant that there was less time available for thorough cleaning; and
- low staffing levels made it difficult for nursing staff to find enough time to comply with good infection control practice.

Source: Wales Audit Office, based on Healthcare Commission, investigation into outbreaks of C. difficile at Stoke Mandeville Hospital, Buckinghamshire Hospitals NHS Trust

3.2 We found evidence that pressures on beds risked compromising good infection control practice in some Welsh trusts. In particular, bed occupancy levels in some of the trusts we visited were very high. For example, in the final quarter of the 2006/2007 financial year a trauma ward in Swansea NHS Trust was redesignated for elective orthopaedic work, with the consequence that some trauma patients were placed on other surgical wards and medical wards. This may potentially increase the risk of cross-infection in this high-risk group of patients.

3.3 When high levels of bed occupancy are combined with severe pressure on Accident and Emergency (A&E) departments, trusts need to assess, for example, the relative risk of not admitting a very sick patient against the risk of infection if admitted to a ward that should technically be closed due to an outbreak of diarrhoea and vomiting. We found examples where national guidelines on the management of hospital outbreaks of viral gastroenteritis had been breached for emergency patients, although elective patients were not admitted to such areas of the hospital.

3.4 High bed occupancy rates in some Welsh trusts can also make it more difficult to isolate patients or group them together, for example, during an outbreak of *C. difficile*. There are also increased risks of less thorough cleaning between patients and of infection arising from a higher number of patient movements.

3.5 The bed pressures being experienced by hospitals in Wales can also result in trusts taking the decision to admit patients to wards that should be closed according to the national guidance on handling infection outbreaks. There were 227 wards in Welsh hospitals affected by hospital outbreaks in 2004. We found evidence that the demand for beds sometimes resulted in trusts failing to comply with national guidance and taking the decision to reopen wards too soon[26]. Three infection control teams told us that bed pressures and the emphasis on trust activity targets can result in wards being reopened too soon, for example, before thorough cleaning has been carried out and before all affected gastroenteritis patients have been asymptomatic for more than 72 hours.

Infection prevention and control is still not always seen as the personal responsibility of all staff

3.6 A central tenet of the Assembly Government's strategy is the need to engage all staff groups in infection prevention and control. Engaging clinicians is particularly important given the extent of their interactions with patients and other staff. Although we found examples of strong leadership for infection prevention and control during the course of our visits to trusts, there were also cases where clinical staff were insufficiently engaged in infection prevention and control. In particular:

- we heard that clinicians' compliance with hand-hygiene requirements was variable, which was also reflected by HIW's findings from their infection control spot checks in four trusts;
- there is scope to improve clinicians' attendance at ongoing training on infection prevention and control, and for the Assembly Government to work with higher education providers to improve the coverage of basic infection prevention and control issues within all healthcare-related undergraduate training in Wales;

26 Management of hospital outbreaks of gastroenteritis due to small Round Structured Viruses (RSVs), report of the Public Health Service Laboratory Service Gastroenteritis Working Group, Journal of Hospital Infection (2000) 45: 1-10.

- according to our survey of trust directorates, infection control is not consistently included in the job descriptions of medical and nusing staff;
- clinicians' attendance at trust infection control committees is generally poor; and
- a lack of clinical engagement is one of the reasons for poor levels of compliance with mandatory Surgical Site Infection surveillance in Wales. In five trusts, clinicians do not receive any reports about mandatory surveilliance rates.

3.7 Effective communication about infection prevention and control issues is important in encouraging all staff to take personal responsibility for infection prevention and control. In Swansea NHS Trust, the development of a simple monthly infection control newsletter had increased the profile of infection control, raised awareness of training and other corporate initiatives, and provided a vehicle for reporting progress (Case Study F).

Trusts need to improve their management of antimicrobial practices to support and further embed effective infection control

3.8 Treating infections with antibiotics or antimicrobials creates conditions favourable to the survival of organisms resistant to standard antibiotics. This is because the drug kills sensitive strains of the micro-organism leaving only the resistant strains. Prudent antibiotic prescribing is therefore a key element of efforts to limit the emergence of infective organisms that are resistant to standard treatment. Eleven trusts have policies that encourage prudent antibiotic prescribing, of which 10 have policies that restrict the use of broad-spectrum antibiotics that are prescribed without attempting to culture or otherwise identify the causative bacteria. The prescription of broad-spectrum antibiotics is widely believed to have contributed to the emergence of more drug-resistant strains of bacteria, whereas identifying the causative agent of an infection and then using an appropriate narrower-spectrum antibiotic is believed to limit the development of antibiotic resistance.

Case Study F: The Infection Control Newsletter at Swansea NHS Trust

Swansea NHS Trust's Infection Control Team has developed a monthly infection control newsletter, 'Focus on Infection', the first edition of which was issued in September 2006. The two-sided bulletin includes:

- a 'focus on divisions' section that looks at actions taken by individual divisions;
- a 'did you know…' section that describes key developments in the field of infection prevention and control;
- 'under the microscope' which usually describes a bug of the month and how the Trust handles outbreaks;
- dates for the diary;
- reports on 'back to basics' thematic audits conducted by members of the Infection Control Team to look at the patient care environment; and
- a request for staff to provide ideas about the future content of the bulletin.

During our visit to the Trust, we found considerable support and praise for the newsletter, which is produced in hard-copy format and placed on the Trust's intranet. It is widely circulated, including to all Board members, and trust staff told us that it has played an important role in supporting the dissemination of key information, good practice and news about infection control within a large Trust operating on split sites

Source: Wales Audit Office visit to Swansea NHS Trust

3.9 Infection control teams responding to our survey believed, on average, that improved monitoring of antibiotic prescribing would have a significant impact on infection rates in their Trust. Recognising this, the NPHS has been running an antimicrobial use and resistance programme over the last two years. This has involved work to promote and co-ordinate optimal practice on testing, surveillance on resistance and usage, and promoting the prudent use of antimicrobials. The programme has collected data on resistance and is preparing a report on the data which it hopes to publish in October. They have also looked at prescribing guidelines and is intending to take forward more detailed work on prudent prescribing.

Trusts should review standards of basic housekeeping and cleanliness to support effective infection prevention and control

Healthcare Inspectorate Wales's infection control spot checks found basic failings of housekeeping

3.10 Healthcare Inspectorate Wales's infection control spot checks in four NHS trusts found problems with basic housekeeping. These included:

- variable standards of cleaning, including examples of cleaning staff also working as hostesses on wards and thereby increasing the risk of cross-infection;
- variable practices in terms of waste disposal, potential risks in respect of compliance with the new recycling laws from 1 April 2007, and non-compliance with requirements for the appropriate disposal of sharp objects, such as syringes;
- problems with the availability and use of storage facilities on wards, including examples where patients needed to store their personal soap and shampoo in bathrooms rather than in their personal lockers;
- limited time available for training; and
- some problems with hygiene practices in ward-based kitchens.

The effectiveness of measures to ensure hygiene and cleanliness varied

3.11 In responding to our survey, infection control teams and trust directorates identified poor standards of cleanliness as a significant barrier to minimising HCAIs. For directorates it was the most significant barrier, while for infection control teams it was the fourth most significant of 13 potential barriers.

A lack of adequate storage is a problem in many hospitals, although some trusts have taken steps to improve the patient environment

3.12 Hospital Patient Environment (HPE) inspections carried out by Community Health Councils have highlighted a lack of storage space as a problem in hospitals across Wales. The 2005 HPE report for all Wales commented on continuous problems involving equipment being stored in corridors, day rooms, treatment rooms and even shower rooms. These findings are consistent with those of HIW and our own fieldwork, where we observed and heard about equipment such as drip stands, wheelchairs, trolleys and boxes of medical supplies being stored in corridors and clinical areas, and causing difficulties for domestic staff trying to clean around them.

Case Study G: Addressing high infection rates through the refurbishment of a vascular ward in North West Wales NHS Trust

North West Wales NHS Trust has comprehensively improved the fabric of a vascular ward after it was found to have high rates of MRSA infections. Together with the Women's Royal Voluntary Service and the hospital's League of Friends, the Trust funded a complete refurbishment of Dulas Ward, with improvements including antimicrobial flooring and paintwork, automatic taps in the sinks and improved storage. Although it is too early to tell if the refurbishment, carried out at Christmas 2005, has had a positive impact on infection rates, audit scores in respect of the patient environment and equipment have improved significantly.

	November 2005	July 2006
Patient equipment (% score for compliance)	77	98
Patient environment (% score for compliance)	56	80

Source: Wales Audit Office visit to North West Wales NHS Trust

3.13 In response to a question in our survey regarding the three main barriers directorates face in minimising HCAIs, eight directorates made reference to estates issues, such as a lack of storage or a lack of ongoing and preventative maintenance resulting in problems with the fabric of hospitals; and, when asked what additional resources were needed to tackle HCAIs, directorates frequently mentioned estates issues, such as needing more space, improved shower facilities and rolling programmes of maintenance. Nevertheless, some trusts have carried out extensive work to address these kinds of issues (Case Study G).

Hand-hygiene facilities have improved at most trusts, although problems remain in some areas

3.14 All trusts have reviewed and improved their hand-hygiene facilities over the last five years. Improvements have included an increased provision of alcohol gel dispensers, the installation of automatic and knee- or elbow-operated taps, the replacement of sinks that did not comply with Department of Health guidelines,[27] the installation of sinks near sluices, and the use of better-quality paper towels and dispensers.

3.15 The 'Clean**your**hands' campaign, launched by the National Patient Safety Agency in 2004, resulted in a significant increase in the availability of hand-hygiene products in Welsh hospitals, although some trusts had made considerable progress in this area before the campaign. For example, Cardiff and Vale NHS Trust had installed alcohol hand rub dispensers at every bed space in 2000. Alcohol gels, or other hand-hygiene products, are now available in all clinical areas of all NHS trusts in Wales. Nine trusts have provided these at all entrances to clinical areas and 12 trusts have them at every bed space. Only three trusts provide such products at some of the entrances to their hospitals, while others decided that this was inappropriate due to health and safety concerns regarding members of the public ingesting the gel because it contains alcohol. Some trusts have developed innovative approaches to making sure hand-hygiene facilities are used as often as they should be (Case Study H).

27 DoH guideline is the Health Building Note 95 – as mentioned in ICNA Audit Tool.

Case Study H: Examples of improving hand-hygiene practice

Carmarthenshire NHS Trust was the first Trust in Wales to adopt the 'Clean**your**hands' campaign, which was launched 2004, appointing hospital champions to act as advocates for the campaign. The Infection Control Team assessed the impact of the campaign and found that compliance with handwashing requirements had doubled in the first year.

Swansea NHS Trust is taking steps to devolve handwashing training to divisions in partnership with a private company that has agreed to provide ultraviolet training boxes and free fluorescent hand cream so that staff can test the cleanliness of their hands. The use of fluorescent hand gel and the ultraviolet boxes will also enable others to identify whether hands have been cleaned effectively. This approach arose in part from concerns about the limited effectiveness of the 'Clean**your**hands' campaign in Swansea and the short-term value of promotional posters. The Trust is considering inviting Swansea University to evaluate the project.

North West Wales NHS Trust has adapted an idea from a television documentary, 'Kim and Aggie go to Hospital', by developing plans to install electronic systems outside high-risk areas to detect when someone is entering and to trigger an audio message reminding them to wash their hands.

Source: Wales Audit Office visits to Carmarthenshire, Swansea and North West Wales NHS trusts

3.16 Infection control teams and directorate leads responding to our survey generally consider that the hand-hygiene facilities available for staff, patients and visitors are adequate. Of a list of 13 potential barriers to effective infection control, infection control teams thought on average that inadequate hand-hygiene facilities was the least significant. Directorate leads for infection prevention and control ranked it the fifth least significant out of a list of 14 potential barriers.

3.17 There is, however, a remaining need to upgrade hand-hygiene facilities in some trusts. Pembrokeshire and Derwen NHS Trust and Velindre NHS Trust said that, where needed, hand-hygiene facilities would be updated during refurbishment work, while Conwy and Denbighshire NHS Trust is improving its hand-decontamination facilities by supplementing its bedside alcohol gel dispensers and installing alcohol gel at the entrance and exits of all clinical areas.

Only two trusts provide laundry facilities for staff uniforms and there is limited access to changing rooms, although there are doubts about the extent to which staff would use such facilities if they were available

3.18 The large amount of contact that healthcare workers have with patients means that their uniforms are at risk of contamination from infective organisms. However, the Department of Health Working Group on Uniforms and Laundry, which included representation from the Assembly Government, concluded in July 2007 that there is no conclusive evidence that uniforms pose a significant hazard in terms of spreading infection[28]. Nevertheless, the working group also concluded that regardless of evidence to the contrary, the public consider there to be a risk of spreading infection through healthcare staff uniforms and that they do not like seeing staff in uniform away from the workplace. Consistent with this, in the public response to our appeal for information, 13 respondents mentioned concerns about staff wearing uniforms outside of the hospital building (Box 6 and Appendix 3).

28 Department of Health, Uniforms and Workwear: An evidence base for developing local policy. 26 July 2007.

3.19 Eleven trusts in Wales have policies in place about staff wearing uniforms. These policies vary in their stringency. For example, in North West Wales and Pontypridd and Rhondda NHS Trusts the policy is that staff should not wear uniforms outside work, but both Trusts acknowledge inadequacies in staff changing facilities and state that if uniforms are worn outside the hospital premises they should be covered up. However, there are also occasions when healthcare staff are required to wear their uniforms outside hospitals, for example, when escorting patients. Other measures covered by trusts' staff uniform policies include: the need for uniforms to be made of material that can be washed at high temperatures to allow intensive cleaning; having an adequate supply so that a clean uniform can be worn every shift; not transporting clean and contaminated uniforms together; and guidance to staff about washing their uniforms, for example, at the right temperatures to maintain effective infection control.

3.20 Only Conwy and Denbighshire NHS Trust and Carmarthenshire NHS Trust provide a laundry for staff uniforms, although Carmarthenshire's Llanelli laundry is not used for uniforms other than theatre scrubs. Pontypridd and Rhondda NHS Trust is currently considering the funding of a central laundry facility for uniforms, while North West Wales NHS Trust makes clean white coats available daily.

3.21 The lack of staff changing facilities is common to many hospitals across the UK. A survey published to coincide with the 'Wipe It Out' campaign[29] led by the Royal College of Nursing, found that in 2005 just a quarter (26 per cent) of all trusts in the UK had adequate on-site staff changing facilities[30].

Box 6: Some members of the public expressed their concern about NHS Wales staff uniforms

'Nurses, doctors and other staff should not wear their uniforms and/or overalls to and from work. All uniforms and protective jackets, scrubs, white coats etc should be laundered in the correct manner at a high temperature in the hospital facilities. Clean uniforms should be worn each shift, and other protective equipment such as plastic aprons should be available and be changed between patients.'

'Do not permit staff, including doctors, to walk round the wards in their outdoor clothing and shoes. During my stay at Bangor Hospital I saw many doctors, but only one was wearing a white coat during ward rounds. Staff should be required to change on entering the hospital. I have seen nurses in uniform in the local shops.'

'The supermarket near the hospital has always got at least one member of staff wearing a uniform walking around.'

'It is disgraceful that healthcare workers should wear their uniforms outside hospitals. '

Source: Information provided to the Wales Audit Office by members of the public using its website

There were inadequate staff changing facilities in two of the trusts we visited. North West Wales NHS Trust has recently carried out an audit of these facilities and is seeking to address this issue, and Carmarthenshire NHS Trust has changing facilities for Intensive Therapy Unit and surgical staff but not for staff working in other services. We also found some concern that if new facilities were provided they would not be used, because to change hospital staff would be required to arrive for shifts earlier and leave later.

3.22 Another area of concern highlighted by the responses we received from the public and NHS staff regarded the laundry of patients' clothes and bedding. Concerns included: a lack of guidance for relatives washing at

29 The 'Wipe It Out' campaign was launched by the Royal College of Nursing in 2005. The campaign aims to provide healthcare staff, employers, patients and visitors with resources to promote better and safer practice around HCAIs.

30 Nye KJ, Leggett VA, Watterson L (2005) Provision and decontamination of uniforms in the NHS. Published in Nursing Standard 19, 33, 41-45.

home the clothes of infected patients; dirty laundry being mixed with clean laundry; a failure to wash dirty laundry at high enough temperatures; and poor compliance with a protocol to segregate the dirty linen of infected patients and non-infected patients. North West Wales NHS Trust has produced a leaflet for relatives laundering patients' clothes which details precautions to be taken, such as wearing rubber gloves, washing patients' clothes separately from other household washing, avoiding rinsing soiled clothes by hand and guidance on the temperature to wash the clothes.

Standards of cleanliness remain an issue of concern in many trusts

3.23 While we did not carry out an extensive examination of hospital cleaning, our fieldwork identified some weaknesses in cleaning arrangements and concerns about the standards of cleanliness in some Welsh hospitals. These varied between trusts and, in some cases, between hospitals within the same trust.

3.24 In response to our surveys, infection control teams, on average, ranked inadequate standards of cleanliness as the fourth most significant barrier they face in minimising HCAIs. Directorate leads for infection prevention and control considered this to be a more serious problem and ranked it the second most significant barrier. Infection control teams and directorate leads for infection also detailed specific problems they experienced with cleaning clinical areas, which included:

- under-resourced cleaning teams;
- a lack of specific teams to carry out deep cleaning, which is the use of particular cleaning agents or techniques to thoroughly clean clinical areas or equipment;
- cleaning impeded by the storage of stock items in clinical areas;
- insufficient time to clean bed areas due to short turnover intervals between patients; and
- a general concern about patchiness in the quality of cleaning.

3.25 Some of the responses we received from the public highlighted issues about the standards of cleanliness observed in hospitals (Box 7). Twenty-two of the responses we received from the public, including some NHS employees, drew attention to cleanliness problems, including dirty floors and furniture.

3.26 Directorate leads for infection prevention and control clearly consider improved cleaning standards to be crucial in minimising HCAIs. When given a list of potential factors that might have a beneficial impact on HCAI rates, directorate leads ranked maintaining better cleaning levels and increasing cleaning schedules as the two highest priorities. Infection control teams were not so concerned about the relevance of cleaning standards when compared with other factors. They ranked maintaining better cleaning levels and increasing cleaning schedules respectively as just the eighth and ninth most significant out of the 12 factors listed.

3.27 We asked infection control teams and directorates what specifically was needed to improve cleanliness. Suggestions included the employment of more cleaning staff, improved communication between domestic and nursing staff, reviews of cleaning contracts, and the introduction of deep cleaning as part of a rolling programme.

Box 7: Some of the concerns raised by members of the public about standards of cleanliness in Welsh hospitals.

'Lifting equipment and other spare items were piled up in a window area of the ward. Zimmer frames were not wiped or cleaned between being used by different patients.'

'I was disgusted at the state of cleanliness of the ward. I moved the table and was amazed at the amount of dirt piled high as if just swept under it.'

'More emphasis on basic hygiene, by ensuring the cleaning of floors and ward furniture is thorough. Corners are missed, and showers and toilets often dirty.'

'Trolleys, commodes, etc do not get washed down between patients whose wounds often leaked. I have seen used equipment from the community brought back to hospitals without being cleaned and left in a day hospital kitchen area.'

Source: Information provided to the Wales Audit Office by members of the public using its website

3.28 We were told that some trusts are unable to carry out deep cleaning as often as they would like because bed pressures mean that beds are rarely empty for sufficient time to allow deep cleaning. On the other hand, Carmarthenshire NHS Trust has spare unstaffed bed capacity which can be used when wards need to close for deep cleaning. This allows for robust management of cleaning schedules and allows continuity of service in the event of an outbreak without compromising patient care.

3.29 Ten trusts told us that there is confusion about which staff members are responsible for cleaning particular areas of the hospital or pieces of equipment. This included confusion between nursing, housekeeping and estates staff about responsibility for cleaning air vents and grills, radiators and radiator covers, beds, mattresses, lockers, tables and care equipment. The consequences of this perceived confusion included patients coming into contact with dirty equipment and delays in admitting patients. We also identified some confusion in Cardiff and Vale NHS Trust about responsibility for cleaning spillages of bodily fluids in communal areas. In Powys LHB, the infection control team expressed frustration at having to define repeatedly what tasks should be carried out by nursing staff and what should be done by domestic staff. Pembrokeshire and Derwen NHS Trust told us they had carried out extensive work in this area, and had secured improvements by implementing a checklist of roles and responsibilities. Swansea NHS Trust is also developing protocols in this area.

3.30 We found that some trusts were experiencing particular difficulties in recruiting and retaining housekeeping staff, who tend to be the lowest-paid employees of a trust. We also identified concerns regarding the contracting out of cleaning services. Some staff told us that cleaners employed on contracts with external companies had problems with ownership, morale and confused line management. One trust claims to have secured improvements in cleaning arrangements by making cleaners part of the ward team (Case Study I). Despite these concerns, only five trusts always consulted their infection control teams when reviewing contracts for domestic or cleaning services. In four trusts, infection control teams are never consulted.

3.31 Following the previous Auditor General's report, 'the Management and Delivery of Hospital Cleaning Services in Wales',[31] the Assembly Government issued the 'National Standards of Cleanliness for NHS Trusts' in Wales in June 2003,[32] which aimed to ensure that trusts maintained consistent standards of

31 The Management and Delivery of Hospital Cleaning Services in Wales, Auditor General. May 2003.

32 Assembly Government. National Standards of Cleanliness for NHS Trusts. WHC (2003) 59. 1 June 2003.

Case Study I: Improving cleaning standards

Swansea NHS Trust claims to have improved significantly its standards of cleaning since this service was brought back in-house at the start of the 2006-2007 financial year. Cleaning specifications have been revised, more cleaners have been employed and the number of complaints regarding cleaning has decreased. The Trust has also increased its audit scores when assessing itself against the National Standards of Cleanliness for NHS Trusts in Wales. One of the most important changes has been to allocate cleaning staff to specific wards or areas of the hospital. Trust officials told us that this alignment has increased the ownership of cleaning staff, generated pride in the physical environment and made cleaning staff a more central component of clinical teams in specific parts of the Trust's hospitals.

Source: Wales Audit Office visit to Swansea NHS Trust.

cleanliness and met the needs of all stakeholders. Trusts use the performance assessment toolkit that was issued alongside the national standards to regularly audit their own performance and submit their scores to Welsh Health Estates. The Assembly Government's HCAI strategy states that opportunities should be explored to build upon these national standards, which include recommendations that trusts should work together to provide an external audit score for cleanliness. Some trusts have sought to achieve this by auditing each other's performance. For example, North West Wales and North East Wales NHS trusts now have a reciprocal arrangement to assess each other's cleaning levels on a regular basis.

3.32 Some trusts told us that they are satisfied with their standards of cleaning, while others appear to be making good progress. For example, Pontypridd and Rhondda NHS Trust invests heavily in cleaning and has been commended by Healthcare Inspectorate Wales for its high standards of cleanliness.

Trusts should collect and use information relating to healthcare associated infections more effectively

Most trusts have difficulties complying with some of the mandatory surveillance requirements, but changes in reporting are helping to improve the position

3.33 The purpose of HCAI surveillance is to collect good-quality information on the extent of, and trends in, infection rates, which can then be used to identify problems, set priorities, plan services and evaluate progress. Most trusts in Wales have local surveillance programmes whereby infection control teams have decided to monitor particular infections based on the specific needs of their trust. These voluntary local surveillance data appear to be widely used and are particularly important for the early identification of infection control outbreaks.

3.34 In addition to voluntary surveillance, the Assembly Government requires trusts to monitor particular infections and report them to the NPHS. Surveillance based on a combination of local need and national requirements was one of six strategic objectives set out in the Assembly Government's strategy.

3.35 National surveillance schemes use standard methodologies and agreed definitions, and therefore allow for accurate comparisons to be made between individual trusts as well as between Wales and other countries. Mandatory surveillance began in 2001 with the requirement for all trusts to report *Staphylococcus aureus* bacteraemias. The programme has since been extended to

include all bacteraemias, *C. difficile* infection in the over 65s, hospital infection outbreaks, and Surgical Site Infections following Caesarean sections and specific orthopaedic procedures. From September 2007, the Assembly Government extended the mandatory surveillance to cover infections contracted in Intensive Therapy Units.

3.36 We found that 12 trusts are experiencing difficulties in complying with the national mandatory surveillance requirements, particularly in relation to orthopaedic Surgical Site Infection surveillance. Surveillance of bacteraemias and of *C. difficile* infections involves the automatic extraction of data from trusts' laboratory computer systems, and the burden on trusts is minimal. Orthopaedic Surgical Site Infection surveillance is more resource-intensive as it requires the manual completion of a form for every single relevant orthopaedic procedure carried out in a trust, regardless of whether or not an infection was contracted.

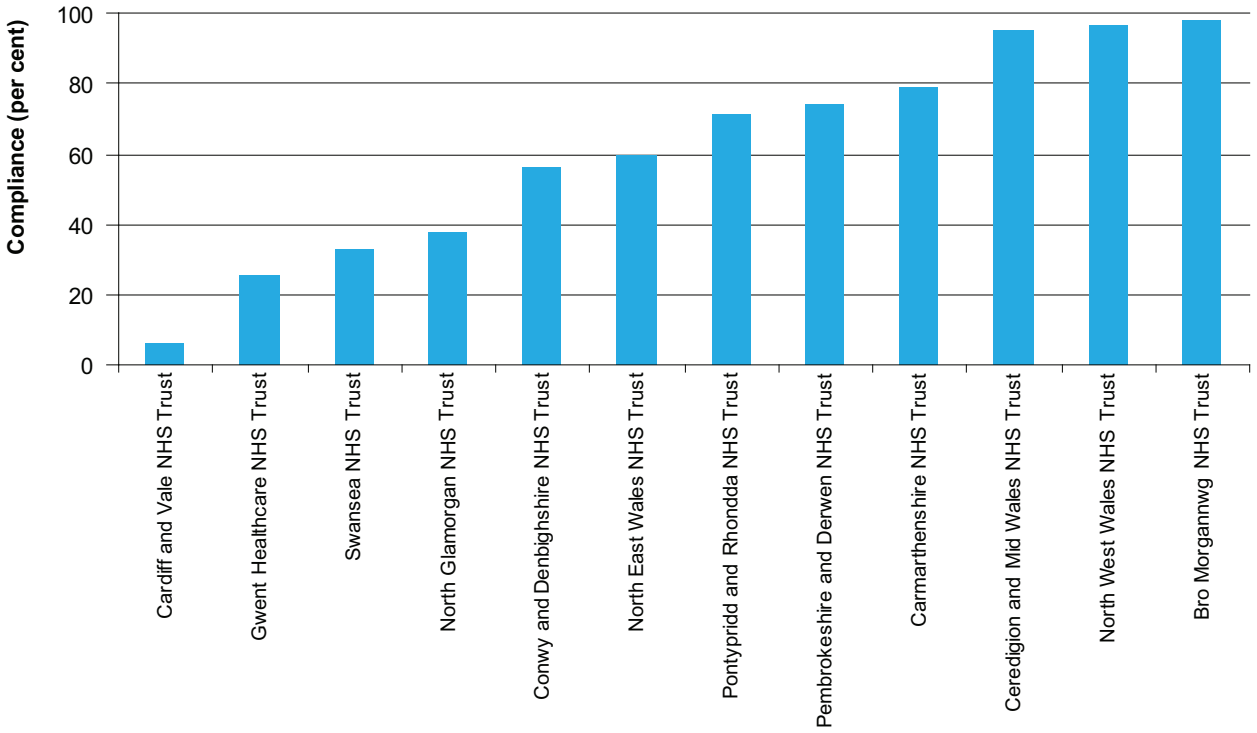
3.37 Infection control teams in seven trusts told us that the major difficulty they face in orthopaedic Surgical Site Infection surveillance is in securing clinician and directorate engagement. Some directorates are reluctant to carry out surveillance without additional funding, and some clinicians are disengaged because they do not receive good-quality feedback. Another reason is that clinicians believe there is a duplication of their effort as they already collect and report some of the data as part of a separate surveillance scheme run by the National Joint Registry. Infection control teams in four trusts told us that they have insufficient resources to fully carry out or co-ordinate orthopaedic Surgical Site Infection surveillance.

3.38 These difficulties have resulted in trusts failing to report a significant number of the relevant orthopaedic procedures to the NPHS. Overall, just 37 per cent of the 9,627 procedures carried out in Wales during 2005 were reported to the NPHS, compared with an Assembly Government target of 95 per cent compliance. Although surveillance of Caesarean section Surgical Site Infections was introduced in Wales after orthopaedic surveillance, the rate of compliance is higher. In 2006, 52 per cent of these procedures were reported to the NPHS. Compliance with regard to Caesarean section (Figure 14) and Orthopaedic Surgical Site Infection surveillance (Figure 15) varied between trusts[33].

3.39 During our fieldwork visits, trust staff told us that it is easier to achieve higher compliance rates for Caesarean section surveillance where trusts have managed to secure strong midwife ownership of the scheme. The continuity of care that arises from the mandatory requirement for community midwives to carry out follow-up appointments with patients once they have been discharged is also a critical factor in securing good compliance with post-discharge surveillance. The NPHS recently amended the reporting arrangements for orthopaedic Surgical Site Infections surveillance and is expecting increased compliance as a result. The form used to report each of the procedures covered by the scheme has been simplified to make it easier to complete.

33 National Public Health Service for Wales, Caesarean Section Surgical Site Infection Surveillance, Summary All Wales, draft Annual Report, 2006, due for publication in November 2007.

Figure 14: In 2006, trust compliance with Surgical Site Infection surveillance for Caesarean sections varied



Source: National Public Health Service for Wales, Caesarean Section Surgical Site Infection Surveillance, Summary All Wales, draft Annual Report 2006, due for publication in November 2007

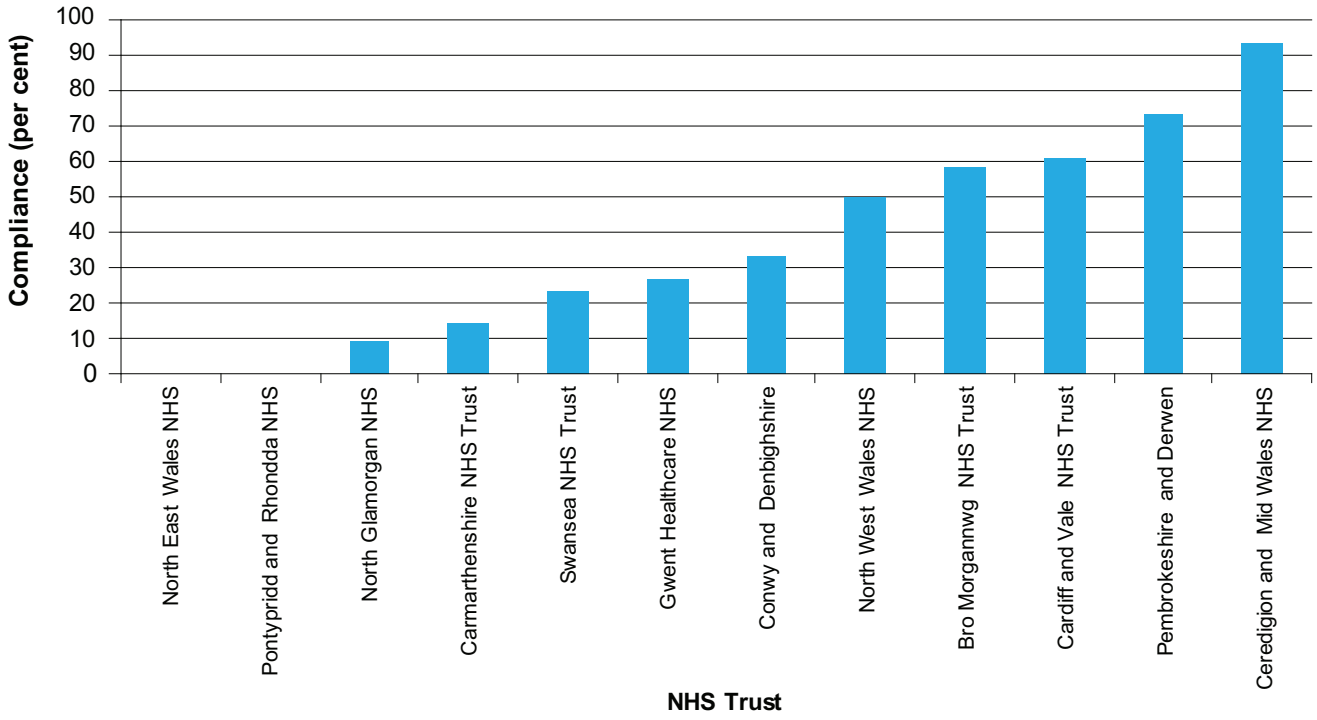
Surveillance data are not always used as effectively as they could be

3.40 It is only worth committing time and resources to the collection of surveillance data if the data are used to improve performance. One reason that the national and local surveillance data are not used optimally in trusts is that they are often significantly out of date by the time they are reported. Trust staff told us that delays in collection, analysis and reporting mean the data are often months out of date by the time reports are produced. Assembly Government Department for Health and Social Services Regional Office staff also told us that the time it takes for data to become available is a problem for their monitoring of trust infection control performance.

3.41 The distribution of surveillance reports varies between trusts. Most trust boards and infection control committees receive updates of the national surveillance data every quarter, but four boards and one infection control committee receive updates only once a year. In contrast, North East Wales NHS Trust provides updates to its infection control committee, its risk management committee, its clinical governance committee and its directorate managers every two months.

3.42 Five out of 58 directorates responding to a particular question in our survey said that they would like to see a more sophisticated analysis of surveillance data, with rates being presented at directorate or ward levels. Some trusts have sought to improve the quality of

Figure 15: In 2005, trust compliance with orthopaedic Surgical Site Infection surveillance varied



Source: NPHS for Wales, Orthopaedic Surgical Site Infection Report January-December 2005, Summary All Wales, Annual Report 2006

their surveillance by funding a surveillance specialist. Four trusts have surveillance co-ordinators in post and four others referred to the need for such staff when asked what additional resources they require to minimise HCAIs. Some trusts used the one-off Assembly Government funding of £20,000 made available to assist with the implementation of the national strategy to fund surveillance co-ordinators, but many decided not to continue with this once the non-recurring money ran out. Carmarthenshire NHS Trust has managed to secure recurring funding for an infection control co-ordinator. Although the co-ordinator's role does not solely encompass surveillance, the Trust is confident the position will release infection control nurses to carry out other work and will assist the Trust in meeting its targets for mandatory surveillance.

The benchmarking and sharing of information on healthcare associated infections could be improved further

3.43 In addition to monitoring trends in their own infection rates, trusts need to be able to compare their performance with that of similar trusts and with wider trends, particularly given the variations in rates between trusts (Figures 6 and 9). However, comparing rates of infection is complicated by factors such as the different levels and types of infection in surrounding communities, and the differing arrangements for recording and reporting data. The patient case mix is also an

important factor, with specialist centres more likely to have high infection rates because they are more likely to treat sicker patients who are particularly susceptible to infection. Nevertheless, the Assembly Government's national HCAI strategy states that the suite of surveillance schemes operating in Wales enables comparisons with other healthcare institutions, both nationally and internationally.

3.44 Nearly all trusts compare themselves only with other trusts in Wales. By also drawing comparisons with trusts in other countries, Welsh trusts should be able to find a greater number of comparators with similar activity levels, specialties and facilities. For example, because a large proportion of HCAIs arise in the Dialysis Unit at Swansea NHS Trust, to better understand its infection control performance in relation to *Staphylococcus aureus* bacteraemias, the Trust has compared itself with a number of English NHS trusts providing similarly high volumes of dialysis.

3.45 Good practice is shared between infection control teams through meetings of the Infection Control Nurse Association and at an annual meeting to discuss progress against trusts' infection reduction targets. Since October 2006 the NPHS has set up an Infection Control Forum, which brings together infection control practitioners, both doctors and nurses, to discuss various HCAI-related issues. This forum meets four times a year.

3.46 The Assembly Government's Healthcare Associated Infection strategy stated that the NPHS's Welsh Healthcare Associated Infection Programme website would be developed as the major vehicle for communication and information exchange for infection control specialists in Wales. The site includes comprehensive surveillance data, general information about HCAIs, access to the e-learning system and links to other relevant sites. There is potential for the site to become a portal for publicising the good practice on infection prevention and control that our examination has identified across Wales.

The nature and quality of the information on healthcare associated infections provided by trusts to patients and the public varied

3.47 In 2005 the Assembly Government commissioned the 'Give Us Useful Information' project, which showed that the public were not satisfied with the information about HCAIs they were receiving from the NHS in Wales. The project suggested that the public wanted more practical advice about how to avoid contracting HCAIs, reassurance that organisations are taking appropriate precautions, general information about HCAIs and how they are transmitted, and information about the extent of the problem in Wales. In March 2007, the Assembly Government, in collaboration with the Board of Community Health Councils (CHCs) in Wales, published a patient information leaflet that addressed these issues.

3.48 We found that all trusts provide at least some general information to patients and the public about HCAIs, but the extent and quality of this information varied widely. Most trusts provide the information through a combination of leaflets and guidance on their websites. In some trusts, the information provided varies between different specialities, and some trusts only provide information leaflets once a patient has contracted an infection. While some trusts are seeking to develop comprehensive information for patients and

the public, both about minimising the risk of infection, and about particular conditions and procedures (Case Study J), other trusts rely on NPHS surveillance reports or provide only very basic information. The Assembly Government told us that the patient information leaflet it had produced with the Board of CHCs in Wales has been well received and is being widely used.

3.49 Nine trusts have a protocol in place for discussing with patients how they can most effectively minimise the risks of HCAIs. The information provided to patients includes guidance on hand hygiene, laundering of patients' own clothes, bringing food into hospital, guidance on flowers and specific information about what visitors should do to minimise the risks of either bringing infections into hospital, spreading infections or contracting infections themselves. During our fieldwork we found anecdotal evidence that, notwithstanding the available guidance, patients and the public often fail to do what they are asked. Staff told us of visitors commonly sitting on, and even lying in, patients' beds, visitors suffering from infections, children rolling around the hospital floors, visitors failing to use hand-hygiene products when instructed and, even patients failing to adhere to clinical advice and interfering with their wound dressings.

3.50 Seven trusts said they use patient representative groups or their local CHC to write, test or edit the information they provide. Some CHCs provide their own information about HCAIs. For example, Clwyd CHC has posted a page on its website that discusses the prevention, treatment and consequences of MRSA infections, while Montgomery CHC's website has information about MRSA and infections due to extended-spectrum beta-lactamase-producing organisms.

3.51 Nearly all trusts said that the 'Clean**your**hands' campaign run by the National Patient Safety Agency has been helpful in drawing attention to HCAIs and had provided posters, badges and leaflets for patient and public information about hand hygiene. The Assembly Government has also attempted to raise awareness about infection control, particularly hand hygiene, through initiatives including roadshow events and the production of the 'Teach Germs a Lesson'

Case Study J: Some trusts are developing comprehensive information for patients and the public, including information on ways to minimise the risks of HCAIs

Carmarthenshire NHS Trust is developing information for patients and the public on how to best minimise the risks of HCAIs, and is considering adapting a list of 10 tips published in November 2006 by the Patients Association, 'Infection Control: Is it only skin deep?' The tips include advice on washing thoroughly before being admitted to hospital, using your own antiseptic hand wipes in hospital, informing staff of dirty areas in the hospital, co-ordinating visits from family and friends so patients have no more than two visitors at any time, asking visitors to use hand-hygiene products, asking visitors not to sit on the patient's bed and asking clinical staff to wash their hands. Advice is also given on preventing children from visiting patients. This is because children are immunologically immature and are more likely to bring infections into hospital.

Carmarthenshire NHS Trust has also invested in an electronic patient information system which allows patients to use the Trust's website to access detailed information about particular medical conditions and surgical procedures. The site aims to improve the information available to patients before they consent to treatment. The information includes the risks of post-treatment problems such as infections.

Source: Wales Audit Office visit to Carmarthenshire NHS Trust.

booklet. This booklet was produced to minimise the risks of gastrointestinal infections spreading in schools, but includes wider lessons for children about hand hygiene. Some trusts have also worked with their communities to promote handwashing (Case Study K).

Case Study K: North West Wales NHS Trust is promoting handwashing in the community

North West Wales NHS Trust is seeking to promote an improved culture of handwashing, targeted at local children. As part of a wider health promotion campaign, the Trust has launched a competition for school children to design a poster around the words 'keep our patients safe – use alcohol gel'.

Source: Wales Audit Office visit to North West Wales NHS Trust

Although healthcare assocated infections carry significant costs for the National Health Service, most trusts cannot quantify these

3.52 Healthcare associated infections result in significant financial costs for the NHS in Wales. A paper to the Health and Social Services Committee in October 2005[34] estimated, based on a study sponsored by the English Department of Health, that the average cost to the NHS for every HCAI in 2000 (including the cost of hospital overheads, capital charges, management time, nursing and medical care, operations, consumables, diagnosis and drug treatment) was £3,154. This equates to an estimated total cost of £50 million across Wales.

3.53 Separate academic studies have calculated the average cost of each *C. difficile* infection and each case of bacteraemia, regardless of the causative organism, to be £4,000[35] and £6,209[36] respectively. Using the number of cases reported to the NPHS in 2006, *C. difficile* infections alone would have cost the NHS in Wales approximately £10.3 million, and between 1 April 2006 and 31 March 2007 MRSA bacteraemias alone would have cost £1.9 million.

3.54 The Scottish prevalence study published in July 2007 produced financial information relating to the estimated total cost of HCAIs. The Assembly Government and NPHS had hoped to be able to use this cost data to apply it to the Welsh prevalence data but this has been problematic because the Scottish study used a different methodology to the prevalence surveys carried out in the rest of Great Britain and Ireland. Infection prevention and control experts from all participating countries are currently working together to see if the Scottish data can be applied more widely.

3.55 National Health Service trusts do not collect and analyse local cost information and, therefore, do not know the financial impacts of HCAIs on their organisation. Our surveys of infection control teams asked for information relating to the costs associated with HCAIs for the year 2005/2006. Ten trusts were unable to provide any data on the number of bed days lost because the beds had been occupied by patients with HCAIs. For the four trusts that were able to provide this information, the number of bed days lost in each in 2005/2006 ranged from 58 to 336. However, two of these trusts said they only collected this information for patients who were affected by infection

34 National Assembly, Health and Social Services Committee, The National Response, HSS(2)-10-05(p.3a), 5 October 2005.

35 Wilcox MH, Cunniffe JG, Trundle C, Redpath C (1996) Financial burden of hospital-acquired *C. difficile* infection. Journal of Hospital Infection 34:23–30.

36 Plowman R, et al (1999) the socio-economic burden of hospital-acquired infection. London: Public Health Laboratory Service (now part of the Health Protection Agency).

outbreaks. Lost bed days and ward closures also prevent other patients from being admitted for the treatment they need.

3.56 In 2000, a Department of Health sponsored study[37] showed that patients who contract an HCAI stay in hospital for an average of 11 extra days. The national surveillance survey in Wales puts this figure at 13 days for orthopaedic patients developing Surgical Site Infections[38]. However, no individual Welsh trust was able to provide us with this information.

3.57 Only six trusts were able to provide information on the number of cases of litigation they faced in relation to HCAIs during 2005/2006 which varied from one to six. No trust was able to specify the financial costs of these cases.

3.58 While patients who litigate after contracting HCAIs very rarely win a settlement, a 2005 case in Wales demonstrates that the financial impact of successful legal action can be considerable. Bro Morgannwg NHS Trust paid substantial, but undisclosed, damages to an 87-year-old patient who contracted MRSA following a hip replacement at the Princess of Wales Hospital in Bridgend. The case was settled out of court after the Trust accepted that it had not followed its own infection control guidelines.

3.59 During our visits to trusts and background research we were told about concerns that there could be a substantial rise in the number of cases brought against trusts as patients increasingly use workplace safety legislation to pursue infection control complaints. Assembly Government officials and risk management staff in some trusts told us that they also expect the costs of legal settlements relating to HCAI to increase as a result of recent legal successes using the Control of Substances Hazardous to Health legislation. These cases have sought compensation because of exposure to biological agents such as infection-causing organisms.

3.60 The inability of trusts to quantify the costs associated with HCAI has compromised their ability to produce robust business plans for infection control. Infection control teams told us they are unable to quantify some of the benefits (those relating to reduced costs) that might be realised through investing in infection prevention and control, and hence they struggle to succeed with business cases for extra resources.

3.61 In addition to the financial costs, HCAIs can damage trusts' reputations as healthcare providers. The public response to 'Give Us Useful Information' showed that patients are clearly anxious about HCAIs in Welsh hospitals, and some said they were so worried that they would do all they could to avoid hospital admission. In response to our appeal for public opinions, more than 40 members of the public and NHS staff raised concerns about perceived increases in infection rates, poor standards of cleanliness and hygiene, and poor clinical practice (Box 8). We were also told about the devastating consequences for some patients who contract HCAIs.

37 Plowman R, et al (1999) the socio-economic burden of hospital-acquired infection. London: Public HealthLaboratory Service (now part of the Health Protection Agency).

38 NPHS for Wales, Orthopaedic Surgical Site Surveillance Report, January-December 2005.

Box 8: Some members of the public are extremely concerned about HCAIs and the devastating impacts infections can have on people

'Whilst in hospital for nine days I saw staff only wash their hands a total of seven times and use the alcohol hand rub only twice…Is it any surprise antibiotic-resistant infections are picked up in hospital if this is the example we set?'
One person told us she had contracted an MRSA infection during surgery. She suffered severe itching before having to be isolated and undergo a further two operations.
Another patient told us about contracting an MRSA infection following a gall bladder operation. She experienced terrible pain, bleeding and oozing from the wound, and required several additional procedures.
One patient told us of their great concerns about HCAIs and that they were partly due to excessive visiting hours on wards.

Source: Information provided to the Wales Audit Office by members of the public using its website

Better reporting arrangements and more isolation facilities could help improve the management of infection outbreaks

Although the definitions used for infection outbreaks are similar across Wales, the criteria used for reporting outbreaks to the National Public Health Service vary

3.62 Trusts have been required to report outbreaks of infection to the NPHS since 2003. However, classifying an infection-control incident as an outbreak is not straightforward (Box 9).

Box 9: Outbreak definitions used by the NPHS

1 Enteric outbreaks:
- a viral gastronenteritis:
  - virological confirmation in two or more cases; or
  - clinical diagnosis meeting the criteria of Chadwick et al (vomiting in over 50 per cent of cases, duration of illness 12-60 hours, incubation period 15-48 hours, staff and patients affected).
- b *C. difficile*-associated diarrhoea –'occurrence of two or more related cases over a defined period, agreed locally taking account of the background rate'; and
- c bacterial gastroenteritis – eg, salmonellosis, 'occurrence of two or more cases over a defined period agreed locally to be related'.

2 Other outbreaks:
- a anything deemed an outbreak by the Infection Control Team;
- b any incident leading to the establishment of a formal outbreak control team;
- c any incident leading to ward closure/admission restriction;
- d any incident leading to a patient notification exercise; and
- e multiple cases associated with a common source (patient, staff, food/water or environment).

Source: NPHS

3.63 Although most trusts appear to have in place a formal definition of outbreaks that largely matches the national definition, there is a wide variation between trusts in how outbreaks are reported to the NPHS. This is largely because the definition allows for local interpretation. For example, the national definition states that background rates of infection should be considered when defining outbreaks of *C. difficile* infection. This suggests that trusts with endemic or frequent cases of this disease will have to experience a larger number of cases over a set period of time before they report an outbreak to the NPHS.

3.64 The national definition also requires the reporting of anything deemed to be an outbreak by a trust's infection control team. This can result in further variations between trusts as different infection control teams can have differing professional opinions on what constitutes an outbreak.

3.65 The 2006 NPHS report on outbreaks of infection stated that there were 225 outbreaks of infection in Welsh hospitals, with 194 being due to diarrhoeal illnesses. Only one outbreak of MRSA was reported. The 2004 NPHS outbreak report included more detailed data on the impacts of the hospital outbreaks (Box 10).

3.66 Because of the large variations in how trusts report infection outbreaks, the information is of only limited reliability and value. Although the NPHS proposed a refined definition in 2004, this was not adopted, and the Assembly Government and the NPHS are currently working on improved arrangements for reporting outbreaks of infection.

Nearly all trusts have outbreak policies and specific arrangements for particular infections in place

3.67 Outbreak policies set out the procedures that trust staff should follow once an infection outbreak has been declared. The aim is to limit the spread of infection and bring the outbreak under control quickly. All trusts except one have generic policies in place that broadly cover all infection outbreaks, while all trusts have specific arrangements for the management of particular infectious diseases, such as *C. difficile* and MRSA. However, in most cases policies have been developed locally by trusts, in isolation from each other, probably resulting in duplicated effort.

Box 10: Nearly 2,500 patients were affected by hospital outbreaks of infection in 2004

According to the 2004 NPHS outbreak report:

- **a** Trusts reported 194 hospital outbreaks of infection.
- **b** 2,430 patients and 980 staff were infected.
- **c** These outbreaks resulted in five hospital closures and affected 227 wards.
- **d** The rate of patients infected by hospital outbreaks per 1,000 in-patient deaths and discharges varied from 0.7 in North Glamorgan NHS Trust to 11.1 in Pembrokeshire and Derwen NHS Trust. Velindre NHS Trust's rate of 11.6 patients infected by hospital outbreaks per 1,000 in-patient deaths and discharges was affected in part by its untypical casemix.

Source: NPHSs for Wales, Hospital Outbreak Report, January-December 2004.

3.68 All trusts except one establish an outbreak committee to deal with individual outbreaks. Three trusts do this for every outbreak while 10 trusts establish committees for only some outbreaks. The membership of the committees varies, but most trusts include infection control staff and clinicians and managers from the affected area. Some outbreak committees also involve bed managers, executives, hotel services staff, occupational health staff, pharmacists, radiographers and others. Communicable disease control consultants from the NPHS are also invited on some committees during more severe outbreaks.

3.69 Once an outbreak has been brought under control it is important that the trust learns from the incident. Some trusts do this by holding a debrief meeting or a 'look-back' exercise at either a corporate or a directorate level. However, only one trust holds a corporate-level debrief for every outbreak of infection and only three trusts hold a directorate-level debrief for every outbreak. In seven trusts,

debriefings result in a formal outbreak report that is presented to the infection control committee, Trust board or executive management team.

3.70 Our survey of directorate leads suggested that improved communication is needed to better contain infection outbreaks. The need for improved communication was referred to 11 times by directorates, and involved the need for improved communication about outbreaks between acute and community settings, as well as the need to rapidly notify all staff about the nature and location of an outbreak.

Inadequate isolation facilities increase the risk of healthcare associated infections

3.71 Infection control teams told us that outbreaks could be managed better through improved access to adequate isolation facilities. All trusts have policies that require patients to be isolated in order to prevent or contain outbreaks of infection. However, there is a lack of adequate isolation facilities across Wales. Infection control teams and directorates told us that the lack of adequate isolation facilities in their trusts was a major constraint on their efforts to minimise HCAIs. When asked about the three main difficulties they face, infection control teams most commonly mentioned problems with isolation facilities and the same issue was the second most commonly mentioned by directorate leads for infection prevention and control.

3.72 A review of isolation facilities carried out by Welsh Health Estates in 2005 found two-thirds of all single rooms that were supposed to have negative air pressure to contain airborne organisms were not fit for purpose. Contributing factors were a lack of national standards with which isolation rooms have to comply, poor levels of maintenance and air leakage through open doors and windows, suspended ceilings and door frames.

3.73 The recommendations from the Welsh Health Estates report formed the basis of a Welsh Health Circular[39] issued in August 2006. This stated that trusts should resolve leakage and maintenance issues, educate clinical and maintenance staff about the requirement of the rooms, install warning sensors that detect when the pressure is inadequate, and instigate a regime to validate regularly the pressure in isolation rooms.

3.74 Ten infection control teams and 40 directorates out of the 66 that replied to this question said they were either dissatisfied or very dissatisfied with the availability of isolation facilities. This was generally because of the limited number of isolation rooms within trusts, and because of competing priorities for their use. Single rooms are often used for patients who are dying or who are mentally or physically disturbed. As a result, trusts are often unable to isolate all infected patients and instead have to resort to other infection control measures, such as carrying out risk assessments to allocate scarce single rooms to isolate the highest-risk patients and operating cohort nursing of groups of infected patients on the same ward.

3.75 The progress being made by trusts in improving their isolation facilities is patchy (Box 11), and the Assembly Government and NPHS are developing further guidance in this regard.

39 Assembly Government, Hospital Isolation Facilities, WHC (2006) 057, 21 August 2006.

Box 11: Trusts are trying to improve their isolation facilities but progress is patchy

Pembrokeshire and Derwen and Swansea NHS Trusts now consider the need for improved isolation facilities during all refurbishments and new builds.

North West Wales and Pontypridd and Rhondda NHS Trusts have ongoing reviews of their isolation facilities.
Cardiff and Vale and Bro Morgannwg NHS Trusts have long-term plans to consider isolation facilities during specific hospital developments.

Velindre NHS Trust is planning to increase isolation facilities during the refurbishment of a ward.

Conwy and Denbighshire NHS Trust has installed two negative pressure rooms since the Welsh Health Estates review.

North Glamorgan NHS Trust has a business case for improved facilities that is being considered by the Assembly Government.

Carmarthenshire NHS Trust has carried out minimal adjustments to improve the functionality of its existing isolation rooms.

Ceredigion and Mid Wales NHS Trust and Powys LHB have taken no action to improve their isolation facilities.

North East Wales NHS Trust has a dedicated isolation unit for nursing patients with infections, but the number of single rooms on the majority of wards is on average between three and four, which the Trust does not consider sufficient, not only for the purpose of infection control but also to provide accommodation for dying or confused patients.

Gwent Healthcare NHS Trust said its efforts to carry out remedial work have been of limited success, due to what it perceived as the total inadequacy of existing facilities. However, the Trust is in the process of developing two new hospitals which will provide all overnight accommodation in single rooms.

Source: Wales Audit Office

Trusts and the Welsh Assembly Government should review the capacity and workload of infection control teams

The number of beds covered by each infection control nurse varies from 246 to 475, and some trusts required more consultant microbiological input into infection control

3.76 Across Wales, the average number of beds covered by each infection control nurse is 332 and the average number of acute beds covered is 223[40]. In 2004, the National Audit Office reported that, on average, there was one infection control nurse in England for every 347 acute beds[41]. There are also wide variations between trusts. Discounting Powys LHB (which does not have any acute beds) and Velindre NHS Trust (which provides very specialised services), the average number of acute beds covered by each infection control nurse ranged from 122 in Pembrokeshire and Derwen NHS Trust to 363 in Swansea NHS Trust (Figure 16).

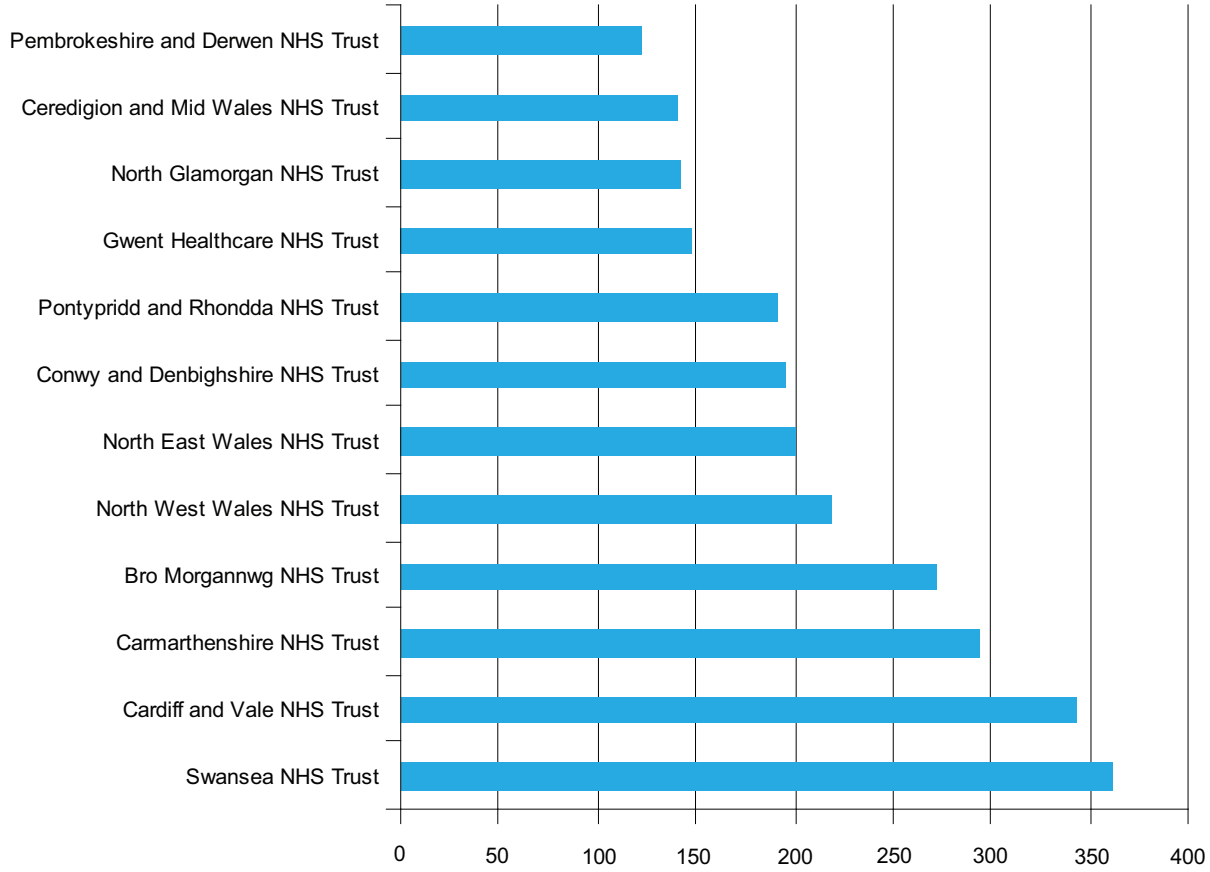
3.77 Many countries use an American benchmark which suggests that each infection control nurse should cover 250 occupied acute care beds. Four Welsh trusts did not meet this benchmark[42]. A more recent American

40 Velindre NHS Trust is excluded from the calculations due to the unique nature of the services it provides in Wales. Powys LHB is excluded from the calculation relating to acute beds as it does not have any acute beds.

41 National Audit Office, Improving Patient Care by Reducing the Risk of Hospital-Acquired Infection: A Progress Report, Report by the Comptroller and Auditor General, HC 876 Session 2003-2004, 14 July 2004.

42 O'Boyle C, Jackson M and Hanly SJ (2002) staffing requirements for infection control programmes in US healthcare facilities: Delphi Project, American Journal of Infection Control, October 2002 Vol 30, No. 6 321-33.

Figure 16: The number of acute beds covered by each Infection Control Nurse ranges from 122 to 363



Note
The number of beds has changed at some trusts since the NPHS reviewed Infection Control Nurse staffing levels between December 2005 and January 2006.

Source: Wales Audit Office survey of Infection Control Teams, January 2007

benchmark suggests that each infection control nurse should cover 100 acute beds, because of increasing workloads and the complexity of activities undertaken by infection control nurses, but no Welsh trust met this benchmark (Figure 16). Across Wales, excluding Velindre NHS Trust and Powys LHB, an additional 50 infection control nurses would be required to comply (Figure 17). Comparing trusts in Wales with the American standards is complicated by the fact that Welsh infection control nurses are responsible for beds in community hospitals in addition to their responsibilities in acute settings, while the standards are based solely on the number of acute beds. Because community hospital beds tend to be dispersed across a large number of relatively small hospitals, trusts are likely to require resources in addition to the number needed to comply with the American benchmarks, in order to maintain effective infection control arrangements in their community beds as well as their acute beds.

Figure 17: Most Welsh trusts would need additional infection control nurses to comply with benchmarks of the number of nurses required per bed

NHS trust	Number of additional infection control nurses required to meet 1:250 nurse-to-acute bed ratio	Number of additional infection control nurses required to meet 1:100 nurse-to-acute bed ratio
Cardiff and Vale NHS Trust	2	12.6
Swansea NHS Trust	2	10.5
Bro Morgannwg NHS Trust	0.3	5.2
Gwent Healthcare NHS Trust	Exceed ratio	4.37
Carmarthenshire NHS Trust	0.3	3.9
North West Wales NHS Trust	Exceed ratio	3.6
North East Wales NHS Trust	Exceed ratio	3
Conwy and Denbighshire NHS Trust	Exceed ratio	2.8
Pontypridd and Rhondda NHS Trust	Exceed ratio	2.4
North Glamorgan NHS Trust	Exceed ratio	1.3
Ceredigion and Mid Wales NHS Trust	Exceed ratio	0.41
Pembrokeshire and Derwen NHS Trust	Exceed ratio	0.4

Note
We have excluded Velindre NHS Trust and Powys LHB because their unique range of services and nature makes it difficult to compare with the other acute trusts.

Source: Wales Audit Office survey of trust Infection Control Teams

3.78 Resourcing infection control teams simply on the basis of nurse-to-bed ratios is inadequate. There will be a minimum staffing requirement regardless of the size of a trust, and the number of infection control staff and the appropriate skills mix needed in each trust should also reflect local factors. This is because in addition to providing specialist infection control support to wards, infection control teams also provide advice, support and monitoring in respect of, for example, outpatients, operating theatres and pathology. Seven trusts have increased the staffing of their infection control teams since the launch of the national strategy in September 2004, although the largest increase was by just one whole time equivalent. However, in four trusts the infection control teams have no clerical support, which can lead to infection control specialists undertaking routine clerical duties.

3.79 Infection control is one of a number of roles performed by consultant microbiologists in Welsh trusts and the amount of time they dedicate to infection control is difficult to quantify. This difficulty arises because the amount of time spent on infection control activities is often demand-driven and will therefore increase in certain circumstances, such as outbreaks of infection. Out of the 11 trusts that responded to a question in our survey about the amount of time consultant microbiologists were able to dedicate to infection control duties, the answers ranged from less than half a session in Pontypridd and Rhondda NHS Trust to 5.5 sessions at Cardiff and Vale NHS Trust. Three trusts had a vacancy for consultant microbiologist positions. When we asked infection control teams what additional resources they required to minimise HCAIs, four – Swansea, North West Wales and Pontypridd and Rhondda NHS Trusts and Powys LHB - stated they required more consultant microbiologist time.

The Welsh Assembly Government has not conducted its intended review of the staffing resources required for effective infection control

3.80 In its strategy, the Assembly Government undertook to review the resources available for the control of communicable diseases in Wales, and to provide updated recommendations to trusts on staffing and resourcing for trust chief executives to consider. However, the review has not yet taken place, even though the need for it has probably increased in the three years since the Assembly Government's strategy was published.

3.81 Infection control teams told us that their workload has increased in all key areas of infection control – surveillance, audit, monitoring cleaning, monitoring hand hygiene and staff training. Furthermore, 11 out of the 14 infection control teams responding to our survey considered that they needed significant additional resources to tackle HCAIs, while the other three felt they needed a small amount of additional resources. In addition, four infection control teams expected their future workload to increase. The others expected a changing (though not necessarily increased) workload. For example, some teams expected their roles to move to providing more support for increasingly self-sufficient directorates who would manage their own infection prevention and control priorities. We also heard concerns that trusts do not always consider the infection control resource implications of setting up new clinical services.

Trusts need to ensure that the good-quality education and training they provide reaches more of their staff

Action has been taken to improve the quality of training on infection control provided nationally and through local innovative good practice

3.82 One of the seven objectives set out in the Assembly Government's strategy relates to education and training. The Assembly Government launched its HCAI Champion e-learning scheme on 20 June 2006. This is an electronic self-learning package that requires the support of relevant mentors from across a trust's workforce. The scheme is recognised across Wales, although as at 20 September 2006 only seven trusts had signed

up to use the scheme. Having a Wales-wide scheme should reduce the requirement for trusts to retrain the staff they employ from other Welsh trusts.

3.83 England and Scotland have similar e-learning schemes, tailored to their specific circumstances. The primary difference between the English and Welsh schemes is the target audience: while the English programme is aimed at all healthcare staff, both clinical and non-clinical, the Welsh programme is more detailed and time-consuming, and is primarily targeted at workers who have direct contact with patients. While the English scheme uses online multichoice questions to formally assess the learning outcomes at the end of each module, participants in the Welsh programme are assessed offline. This requires a nominated mentor to confirm the achievement of the required competencies and that workplace activities have been completed.

3.84 Infection control staff told us that they welcomed the e-learning package and a NPHS review found widespread recognition of its benefits, including its standardised tuition, out-of-hours availability and accessibility. However, there was some concern about the resources required to co-ordinate the e-learning programme within Welsh trusts. While it is members of infection control teams who have generally been involved in mentoring as the scheme has been implemented in trusts, it is intended that mentors should be drawn from across the trust workforce as participation in the scheme

Case Study L: Good practice in providing infection prevention and control training and education for staff

Pontypridd and Rhondda NHS Trust has given a high priority to training on infection prevention and control, which forms a key element of staff induction programmes. The Trust provides all staff with a two-day induction, which covers infection control, and an additional three days' induction training for nursing staff, which also covers infection control issues but in greater detail. The Trust is investing in infection control training during induction as it has found it more straightforward to train staff before they go out onto the wards than subsequently trying to release them from operational duties. However, staff are still released from operational duties to take part in infection control training through mandatory study days.

Swansea NHS Trust has developed a number of innovative approaches to training. The Trust has developed a core education programme led by its Infection Control Team which has been very well received. The full programme consists of eight modules but individual modules are also delivered at ward level as appropriate. The programme has also been tailored to the needs of community-based staff.

Swansea NHS Trust has also developed a number of ward-based training initiatives, designed to tackle the problem of getting staff released from their operational duties to attend training. These include a recently-established 'back to the floor' programme, through which senior nursing staff undertake two sessions on the wards each month, through which there is the opportunity to spread key corporate messages about infection prevention and control.

North West Wales NHS Trust ran a training day for all staff on infection prevention and control called 'Bugs R Us'. The day was run by infection control team staff who gave presentations on the latest research and policy issues. It was attended by more than 100 staff and, while nurses were the main participants, several doctors and Board members also attended.

Source: Wales Audit Office visits to NHS trusts

increases. Also, some staff raised concerns about the estimated 16 to 20 hours required to complete the programme, the release of staff to complete the course and the overall time it will take to train all relevant staff.

3.85 Several trusts have developed innovative local approaches to infection control training, which might be of interest and relevance to other trusts, and have improved participation in training and education as well as its impact (Case Study L).

Training is poorly attended, especially by clinicians

3.86 In responding to our survey, infection control teams and directorates highlighted the difficulties associated with training and educating staff on HCAIs. One of the major challenges is to find the time to release staff, especially ward-based staff, as well as attracting clinicians to participate in training. Consequently, while there is evidence that the quality of training provision has improved, the number of people participating is low. For example, by July 2007, excluding students at the University of Glamorgan, across the whole of Wales just 200 healthcare workers have begun using the e-learning package launched in June 2006 and only 40 have completed the course[43].

3.87 The participation of clinical staff in training on infection prevention and control training is a particular concern. Medical staff in all but two trusts and nursing staff in all but one trust receive induction training that covers infection prevention and control. However, no mandatory ongoing training is provided for medical staff at nine trusts or for nursing staff at four. The availability of protected time for staff to undertake ongoing training on infection control was also an issue in some trusts: 27 out of 71 directorates that responded to our survey had protected time for all staff undergoing ongoing training in infection control, 26 had protected time for some staff, while at 18 no staff had protected time.

3.88 It is essential that training on infection prevention and control is also provided to the relevant non-clinical staff. Cleaners, domestic staff, porters and catering staff all need to understand infection prevention and control issues, and good practice. All trusts except one include infection prevention and control as part of induction training for domestic, cleaning and portering staff. However, ongoing training is mandatory for these staff at only eight trusts.

3.89 In the longer term, the Assembly Government told us that it is trying to encourage higher education institutions in Wales to include increased coverage of basic infection prevention and control issues within relevant undergraduate training programmes, possibly through the use of its e-learning package. This would help ensure that newly trained undergraduates come to work in a trust with a basic Welsh qualification in infection control. The University of Glamorgan has now built the e-learning package into all preregistration courses, Swansea University has decided not to do so and the University of Wales, Bangor, is considering this approach.

43 As at 13 August 2007, 395 nursing students from the University of Glamorgan had also begun the course and 90 had completed it.

Box 12: The Assembly Government has consulted on a strategy for HCAIs in community settings

The strategy includes the following six objectives for NHS organisations working in primary care and community settings:

a All staff will understand the impact of infection and infection control practices to enable them to discharge their personal responsibilities to patients, other staff, visitors and themselves.

b Patients will be treated in physical environments that minimise the risk of infection.

c Organisations will develop an infection control programme that includes audit and surveillance. Programmes will be based on local need but will adopt national programmes as they are developed and agreed. Specialist epidemiological support will be available to support organisations' infection control processes as required and to support their infection control Programmes.

d The aim of minimising HCAIs will form part of commissioner programmes and strategies. This will be embedded within overall management schemes and will have links to clinical governance, risk management and performance management.

e Organisations will develop systems to ensure rigorous recording, analysis, sharing and access to their own data, and access to information sources appropriate to their needs for managing infection within their own organisation.

f All community-based healthcare providers must have access to an occupational health service. This should provide appropriate health screening (and immunisation) at the commencement of employment and should manage incidents in the workplace where exposure to blood-borne viruses or other infectious reagents may have occurred.

The consultation strategy indicates that these objectives will be achieved through:

g national standards to ensure consistent and effective infection control and prevention;

h infection control being embedded within organisations' agenda and accountabilities of all staff and managers;

i infection control processes being supported by appropriate specialist infection control staff; and

j basic infection control to be included in the training of all community healthcare staff.

Source: The Assembly Government. HCAIs, A Community Strategy for Wales, a consultation document, January 2007

Systems for the prevention and management of healthcare associated infections will need to adapt to changing circumstances

Case Study M: Audit of avoidable admissions

In Swansea NHS Trust, the A&E Department instigated an audit of the extent to which admissions for diarrhoea and vomiting could have been avoided. The Trust conducted a two-week audit of patients attending A&E which showed that of the 29 people who attended suffering with diarrhoea and vomiting, of whom 18 were admitted to a hospital bed, 15 could have been managed more appropriately in a primary care setting. The audit recommended that the Trust should set up a specialist team in the community to provide rehydration.

Source: Wales Audit Office visit to Swansea NHS Trust.

Changes in the configuration of health services may change the nature of infection control risks

3.90 As well as the emergence of new types of infection, the nature of infection control risks may change as the configuration of healthcare services in Wales changes. The Assembly Government's strategy to deliver a world-class health service in Wales by 2015, 'Designed for Life', anticipates significant changes in the nature of services and in service configuration, with services increasingly being delivered in the community. This may shift the balance of infection control risk toward community services and settings, and reinforces the need to ensure that systems are in place for engaging staff across all healthcare settings in infection prevention and control.

3.91 There are already significant infection prevention and control risks at the interface between secondary care, and primary and community settings. For example, during our fieldwork we found that patients are frequently admitted to hospital, often directly from nursing homes or referred by a GP, suffering from diarrhoea and vomiting. Some infection control staff we spoke to told us that some of these patients could have been rehydrated in the community without the need for admission to hospital and the consequent increased risk of an infection spreading, an outbreak emerging and wards being closed (Case Study M).

3.92 To reduce avoidable admissions to specialist acute hospitals, commissioners will need to consider the development and availability of community-based services to sustain patients with diarrhoea and vomiting in the community. More broadly, commissioners and providers will need to consider the infection control implications of any increased provision in community settings resulting from service reconfiguration. The Assembly Government has developed a strategy for HCAIs in the community, on which it consulted during the first quarter of 2007 (Box 12).

3.93 Service reconfiguration is likely to involve the development of new hospitals and services, and the redesignation or closure of some existing facilities. Such developments can provide significant opportunities to improve infection prevention and control. For example, given the lack of suitable isolation facilities in Welsh hospitals, trusts have an opportunity to build appropriate isolation facilities into the specification and design of any new hospital. Research completed for NHS Estates in 2005[44] showed that hospitals with a higher proportion of single rooms not only have improved bed occupancy rates and shortened patient recovery times, but are also more effective in minimising cross-infections.

Case Study O: Conwy and Denbighshire NHS Trust has significantly reduced ventilator-associated pneumonia through the use of care bundles

Since 2004 Conwy and Denbighshire NHS Trust has been working with experts at the US-based Institute for Healthcare Improvement, as part of the Health Foundation's Safer Patients Initiative.

By introducing a 'bundle' of measures to make care for ventilated patients safer in the Intensive Care Unit at Ysbyty Glan Clwyd the Trust reduced rates of ventilator-associated pneumonia from 30 per cent to 9.4 per cent in the first year. The measures include ensuring the patient's head is elevated at 30 degrees, the provision of particular preventative medication and intervals when sedation is reduced. Such measures are included on daily goal sheets that have to be completed daily.

As well as reducing the infection rate, the bundle has contributed to an reduction of 2.1 days in the average length of stay.

Source: Safer Patients Initiative

New clinical practices provide the opportunity to improve infection prevention and control

3.94 Infection risks can be reduced through the implementation of care bundles. These are the amalgamation of several components of patient management to produce a single checklist of actions that a healthcare worker should go through each day to improve clinical outcomes for patients. There is international evidence to suggest that the development of such care bundles is effective in reducing infections. For example, the risk of pneumonia in patients receiving ventilation is reduced where the care bundle involves measures such as ensuring the patient's head

44 Department of Health, NHS Estates, ward layouts with single rooms and space for flexibility, 1 May 2005.

is correctly elevated and that they receive the appropriate antimicrobial drugs. Care bundles for patients with central venous catheters minimise HCAIs through measures such as ensuring hand hygiene of staff and specific antisepsis of the catheter site.

3.95 Work carried out by the NLIAH-funded Welsh Critical Care Programme[45] has ensured that all Welsh trusts with intensive care units are now implementing care bundles focusing on ventilated patients and central venous catheters. All trusts are achieving high levels of compliance with these care bundles and one Trust – Conwy and Denbighshire NHS Trust – has been extremely successful in lowering rates of ventilator-associated pneumonia using the care bundle approach (Case Study O). However, care bundles are not yet well established outside of the Welsh critical care environment and there is the potential to apply the approach to other areas of clinical practice.

45 NLIAH, Critical Care Collaborative, Interim Report, http://www.wales.nhs.uk/sites3/Documents/484/WCCIPInterimReport.pdf.

Appendix 1 – Methodology

1 The focus of this study was on all HCAIs (including those acquired in community settings, primary care and residential/nursing homes, as well as in hospitals) that affect patients who are treated in hospital. As the Assembly Government has recently developed and consulted on a strategy for the control of infections in community settings, we excluded the management of HCAIs in community settings from the scope of this project. We also excluded the Welsh Ambulance Services NHS Trust from the scope of this project because infection control issues were covered by the Special Assurance Review of the Trust, conducted by Healthcare Inspectorate Wales (HIW) and published in January 2007.

2 The study fieldwork was carried out between November 2006 and March 2007. Our methodology involved the following main activities:

Document review

3 This considered key documents relevant to infection prevention and control, and HCAI in Wales. In particular, we considered:

- Trusts' action plans;
- the NPHS's Service Review;
- the Assembly Government's review of isolation facilities;
- correspondence on HCAI received by the Auditor General;
- Trust, NPHS and Assembly Government documentation on training and education in respect of HCAI;
- Trusts' outbreak plans; and
- Welsh Health Circulars and strategies issued by the Assembly Government.

Data analysis

4 We conducted a detailed analysis of data on the incidence and prevalence of HCAI, including trends. We compared the performance of trusts, specialties and the different parts of the UK. We also considered performance against the relevant Welsh Risk Management Standards (infection control, medical equipment and devices, nutrition and catering), and we conducted desk research on the position in English providers treating significant volumes of Welsh patients.

Surveys

5 We designed detailed surveys which we sent to infection control teams in the 14 acute trusts. All 14 infection control teams provided a detailed response to the survey.

6 We also designed a shorter survey which we sent to all the directorate leads identified by trust infection control teams. The purpose of the survey was to assess the issues that affected directorates and to compare their views of infection control issues with those of the specialist infection control teams. We received 74 responses from directorate leads.

7 We also developed a survey of Community Health Council lead officers. Only four of the 15 Community Health Councils in Wales responded.

Semi-structured interviews

8 We conducted semi-structured interviews with key stakeholders including Assembly Government and NPHS officials, the Director of Nursing of each of the Assembly Government Department for Health and Social Services' Regional Offices, the National Patient Safety Agency, the Health and Safety Executive, the Welsh Risk Pool, Welsh Health Estates, and Welsh Health Legal Services.

Trust visits

9 We carried out detailed visits to four NHS trusts – Carmarthenshire NHS Trust, North West Wales NHS Trust, Pontypridd and Rhondda NHS Trust, and Swansea NHS Trust. The purpose of the visits was to follow up the themes emerging from our surveys, and identify the barriers to improving infection prevention and control, and potential solutions that might apply across Wales. All four trusts adopted an extremely positive and co-operative approach to the visits. We selected the four trusts using the following criteria:

- region;
- infection rates and trends, both up and down;
- comprehensiveness of infection control action plan;
- Welsh Risk Management Standards scores;
- location of infection control spot checks planned by HIW; and
- known good practice in infection prevention and control.

Views of the public, patients and staff

10 We issued a press release inviting the public to share their views and experiences of HCAIs in Wales, and any ideas about how infection prevention and control might be improved. Respondents could contact the Wales Audit Office by telephone, using a freepost address or by using a simple form placed on the Wales Audit Office website. We received 43 responses.

Good practice

11 We sought to identify good practice in infection prevention and control. We have included a number of good practice case studies within the report. Additional good practice case studies can be found on the Wales Audit Office Good Practice Exchange website http://www.wao.gov.uk/goodpracticeexchange.asp.

Work with Healthcare Inspectorate Wales

12 In the spirit of the 'Concordat Between Bodies Inspecting, Regulating and Auditing Health and Social Care in Wales', we have worked very closely throughout the examination with our colleagues from HIW. Healthcare Inspectorate Wales carried out the first of a series of unannounced infection control spot checks in four NHS Trusts – Swansea, Cardiff and Vale, Ceredigion and Mid Wales, and North East Wales, and four independent healthcare providers during the last quarter of 2006. Healthcare Inspectorate Wales have also published their overview report today, and we have referred to some of their main findings within this report. Healthcare Inspectorate Wales intend to continue with their annual infection control spot checks, which provides an excellent opportunity to monitor the

progress made by trusts in implementing the recommendations of this and Healthcare Inspectorate Wales' report.

Expert Panel

13 We established a panel of experts to advise us during key stages of the project. The Expert Panel met twice, once to advise on the scope and methodology of the project, and once to discuss our emerging findings and recommendations. We also invited panel members to provide their comments on an early draft of this report. Members of our Expert Panel are listed below. We are extremely grateful to them for their time, commitment, support and helpful insights.

Name	Title
Ms Mandy Collins	Director of Investigation and Development, HIW
Dr Eleri Davies	Director of the Welsh HCAI Programme, NPHS for Wales
Ms Delyth Davies	Lead Nurse Infection Control, Swansea NHS Trust
Ms Sharon Evans	Directorate Nurse/Lead Infection Control Nurse, Carmarthenshire NHS Trust
Dr Tony Howard	Former Director of the Infection and Communicable Disease Service, NPHS for Wales (retired in March 2007)
Mrs Enfys Mercieca	Head of Infection Prevention and Control and Deputy Director of Infection Prevention and Control, Bro Morgannwg NHS Trust
Professor Robert Pratt	Richard Wells Research Centre, Institute of Health and Human Science Research
Dr Kunnathur Rajan	Member of Cardiff Community Health Council
Mr Steve Scott	Principal Inspector, Services Group, Health and Safety Executive Wales
Ms Karen Taylor	Director of health value for money studies at the National Audit Office

Appendix 2 - Glossary

Abbreviation	Description
Acute beds	Includes beds on the following wards: intensive care, terminally ill/palliative care, all surgical, medical and paediatric, acute maternity, and acute elderly and young physically disabled.
Acute Hospital Portfolio	A UK-wide Benchmarking Tool run by the Healthcare Commission for key areas of Acute Hospital Provision to facilitate comparison between trusts and parts of the UK. The Wales Audit Office collects data for Welsh trusts.
Antibiotic	A substance that destroys or inhibits the growth of bacteria. Action may be selective against certain bacteria.
Antimicrobial/antibiotic resistance	Resistance to antimicrobial agents that is either naturally occurring or develops in a micro-organism over time.
Audit	Organised review of staff of current practices and comparisons with predetermined standards. Action is then taken to rectify any deficiencies that have been identified in current practices. The review is repeated to see if the predetermined standards are being met.
Bacteraemia	Presence of bacteria in the bloodstream.
Bacterium (bacteria)	A simple microscopic single-celled organism(s) that lacks a true nucleus.
Catheter/cannula	A tubular flexible instrument passed through body channels for withdrawal or introduction of fluids.
Clinical governance	A framework through which NHS organisations are accountable for continuously improving the quality of their services and safeguarding high standards of care by creating an environment in which excellence in clinical care will flourish.
C. difficile	A toxin-producing bacterium which can cause severe diarrhoea or enterocolitis. This most commonly occurs following a course of antibiotics which has disturbed the normal bacterial flora of the patient's gut
Colonised patients	Patients that have acquired micro-organisms but have not developed any symptoms of disease.
Communicable disease	A disease that can be transmitted from a person, animal or the environment to another susceptible individual.
Endemic	A disease or infection constantly present in the community.
Enterococcus	A bacterium which normally colonises the human bowel, and is associated with bladder and wound infections.

Abbreviation	Description
HCAI	An infection acquired via the provision of healthcare in either a hospital or community setting.
Hospital-acquired infection	An infection that was neither present nor incubating at the time of a patient's admission which normally manifests itself more than 48 hours after the patient's admission to hospital.
Hospital Infection Control Committee	The main forum for routine consultation between the Infection Control Team and the rest of the NHS trust. It is required to approve and lend support to the Infection Control Teams Programme.
Immune	Being resistant to a disease due to the formation of antibodies and/or the development of immunologically competent cells.
Incidence	The number of new events/episodes of a disease that occur in a population in a given time period.
Infection	Invasion and multiplication of harmful micro-organisms in body tissues.
Infection Control Nurse	A registered General Nurse, normally with higher specialist training in infection control. The Infection Control Nurse is usually the only full-time member of the Infection Control Team.
Infection Control Team	A team within an NHS trust which has prime responsibility for, and reports to the Chief Executive on, all aspects of surveillance prevention and control of infection. The members of the team include an Infection Control Doctor and Infection Control Nurse(s) and may include surveillance nurses and clerical support staff.
Infectious	Caused by or capable of being communicated by infection.
Inspection	A visit carried out as part of a review, investigation or study to inspect premises or documents, or to require explanation.
Isolation	To remove a patient from the General Ward setting to a place where contact with other people can be controlled.
Link practitioners	Healthcare workers who receive regular and appropriate training in infection control, which they then apply in the healthcare setting where they work. In some cases, they are also trained to collect surveillance data for the Infection Control Team.
Medical Microbiologist	A Doctor who studies the science of the isolation, identification and infectivity of micro-organisms that cause diseases in humans and applies this knowledge to treat, control and prevent infections.
Microbiology	The science of the isolation, identification and mode of infectivity of micro-organisms. Medical microbiology is concerned with those micro-organisms which cause diseases in humans.
Micro-organism	An organism too small to be seen with the naked eye. The term includes bacteria, fungi, protozoa and viruses.
MRSA	A strain of *Staphylococcus aureus* that is resistant to methicillin, and other penicillin and cephalosporin antibiotics.

Abbreviation	Description
MSSA	A strain of *Staphylococcus aureus* that is sensitive to methicillin.
National Joint Registry	A central database launched on 1 April 2003 which stores information on hip and knee replacement procedures across England and Wales.
Normal flora	The micro-organisms that normally live in or, on the body, and contribute to normal health. When antimicrobial agents are used to treat infectious disease, changes affecting the normal flora may reduce their ability to protect against infection.
Norovirus	The term used for a group of viruses including Norwalk-like virus and small RSV that cause infections gastroenteritis.
Outbreak	An incident in which two or more people have the same infectious disease or similar symptoms, and in which there is a time/place/person association. Also a situation where the observed number of cases unaccountably exceeds the expected number.
Prevalence	The total number of cases of a specific disease in existence in a given population at a certain time.
Screening	Involves taking specimens from patients and staff which are then subject to microbiology testing to determine whether that individual is colonised by specific micro-organisms eg, MRSA.
Standard	A deserved and achievable level of performance against which actual performance can be measured.
Staphylococcus	A group of bacteria which cause a wide variety of infections especially of skin and wounds. More serious infections include bacteraemia and pneumonia as well as heart valve, bone and joint infections.
Surveillance	Systematic collection of data from the population at risk, identification of infections using consistent definitions, analysis of these data, and dissemination of the results to those responsible for the care of the patients and to those responsible for implementation of prevention and central measures.
Virus	A very small micro-organism of simple structure, only capable of surviving within a living host cell.

Source: Adapted from the National Audit Office, Improving Patient Care by Reducing the Risk of Hospital-Acquired Infection: A Progress Report, Report by the Comptroller and Auditor General, HC 876 Session 2003-2004, 14 July 2004

Appendix 3 - Summary of responses to our appeal for information about healthcare associated infections from patients, the public and National Health Service Wales staff

We appealed for patients, the public and NHS Wales staff to share with us their experiences and views on HCAIs. The appeal was made through the Wales Audit Office website, press releases and posters sent to healthcare organisations across Wales, including NHS trusts and CHCs. In total we received 43 responses and a summary of the themes covered in these responses is given below. Many respondents discussed more than one theme.

Theme	Number of times mentioned in comments
Standards of cleanliness of hospitals	20
Poor hand hygiene of staff and visitors	14
Wearing of staff uniforms outside of clinical areas	13
Respondent gave details of significant health problems following an infection	6
Problems with visiting hours or visitor behaviour	5
Problems with the laundry of items from infected patients	5
Positive comments about infection control	4
Need for more specialist infection control resources in hospitals and in the community	4
Poor use of personal protective equipment (eg, gloves, aprons)	3
Problems with hospital ventilation systems	2
Problems with staff informing patients and relatives when a patient has contracted an infection	2
Contaminated medical equipment (eg, oxygen masks)	2
Disagreements about the recording of HCAIs on death certificates	2
Cleaning staff not being members of the ward teams	2
Clinical areas cluttered with medical equipment therby preventing cleaning	2
Poor communication about barrier nursing or isolation precautions	2
Failure to communicate to catering staff that patients are isolated	1
Lack of isolation facilities	1

Theme	Number of times mentioned in comments
Need for improved staff education about infection control	1
Concerns about cleanliness of drinking water	1
Need for an Executive Director accountable for infection control	1
Need for more preoperative screening	1
Infection Control Doctor expressing frustration at time wasted taking part in Wales Audit Office study	1
Problems with patients' personal hygiene	1
Low staffing levels across the Trust	1
High throughput of patients	1
Staff being moved to different wards and thereby spreading infections	1
Rigorous enforcement of staff Sickness Policy therby encouraging infected staff to attend work	1
Poor compliance with decolonisation policies	1
Poor technique when administering intra venous drugs	1
Excessive antiobiotic prescribing	1