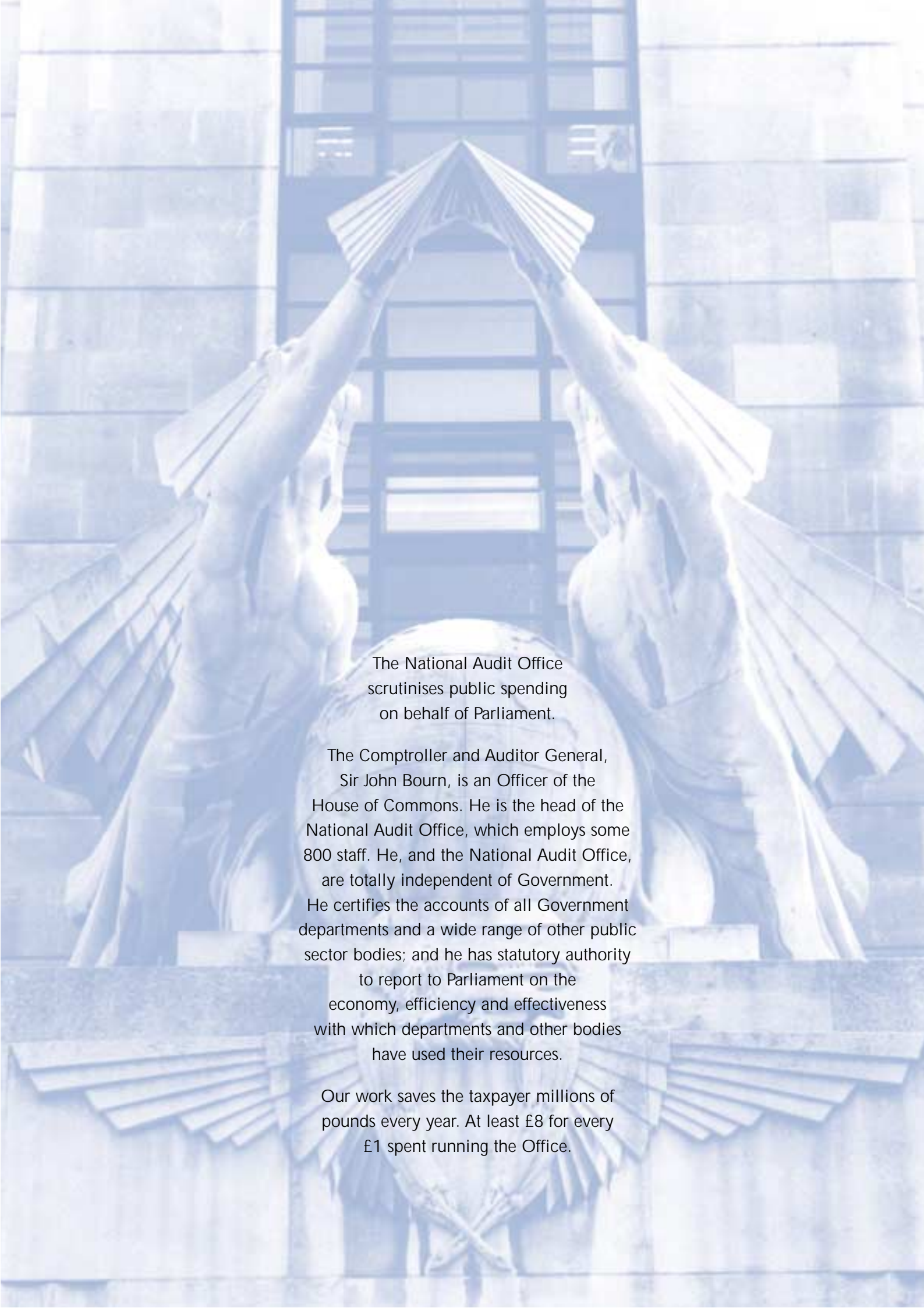


# Improving patient care by reducing the risk of hospital acquired infection: A progress report

REPORT BY THE COMPTROLLER AND AUDITOR GENERAL  
HC 876 Session 2003-2004: 14 July 2004





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HC 876 Session 2003-2004: 14 July 2004

This report has been prepared under Section 6 of the National Audit Act 1983 for presentation to the House of Commons in accordance with Section 9 of the Act.

*John Bourn*  
Comptroller and Auditor General

National Audit Office  
12 July 2004

The National Audit Office study team consisted of:

Sonia Ashby, Judith Sedgwick and  
Dr. Andrew Pearson (on secondment from  
the Public Health Laboratory Service/Health  
Protection Agency) under the direction  
of Karen Taylor.

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**For further information about the National Audit Office  
please contact:**

National Audit Office  
Press Office  
157-197 Buckingham Palace Road  
Victoria  
London  
SW1W 9SP

Tel: 020 7798 7400

Email: [enquiries@nao.gsi.gov.uk](mailto:enquiries@nao.gsi.gov.uk)

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### Quote from The Florence Nightingale Museum

“As we approach the 150th anniversary of Florence Nightingale’s rise to fame as the ‘Lady with the Lamp’ of the Crimean War, it is worth reflecting that her lasting legacy was as a ‘Passionate Statistician.’ Upon her return from the war she embarked on a painstakingly meticulous analysis of the mortality data which enabled her to identify the underlying cause: poor sanitation. She created new statistical diagrams to persuade the government to carry out fundamental health reforms. Florence Nightingale applied her methods to civil hospitals in Britain, tackling the problems of overcrowding, poor ventilation and lack of cleanliness with similar rigour and influence. Her Notes on Hospitals of 1863, though less widely known than Notes on Nursing, had a profound impact on the design and management of hospitals in Britain and throughout the world. Through the use of carefully collected and accurate data she was able to build her case to improve the quality of people’s lives. Today her recommendations for creating comparative hospital statistics are startlingly relevant.”

**Alex Attewell**  
Director  
Florence Nightingale Museum

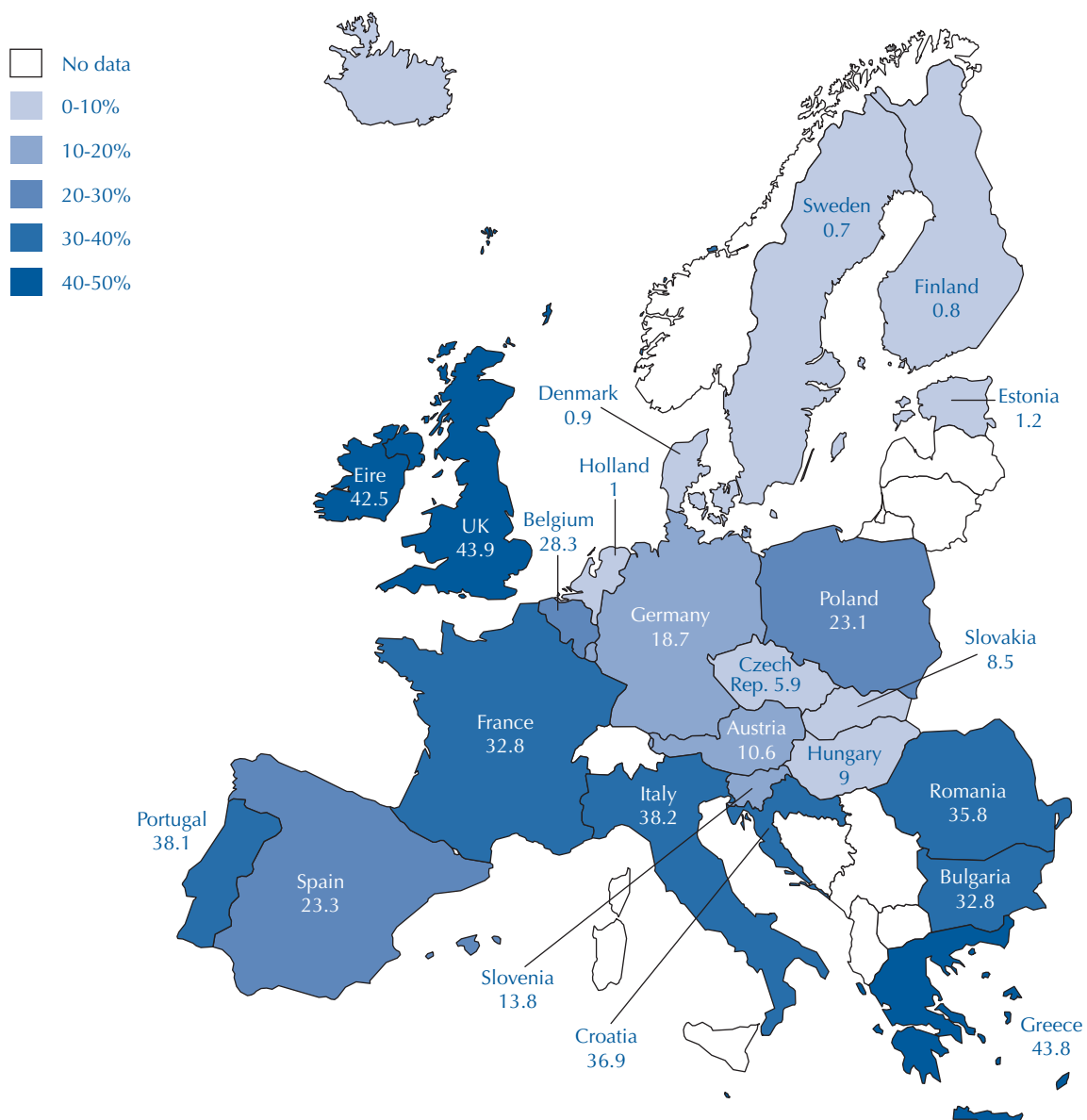
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# Contents

<b>Summary</b>	<b>1</b>	<b>Part 4</b>	
<b>Part 1</b>		<b>Changing clinician and other staff behaviour in order to reduce risks requires multiple approaches to prevention</b>	<b>33</b>
<b>Hospital Acquired Infection is now a National Health Service Priority</b>	<b>9</b>	Better and more consistent information that is owned by NHS clinical staff is crucial to improving practice	33
Departmental Initiatives have raised the profile and the priority of infection control	9	Reducing risks requires multiple approaches to prevention but barriers to effective practice remain	34
There is a greater emphasis on performance monitoring	10	There is a need for improved awareness and uptake of technological innovation to engineer out risks	44
"Winning Ways" re-emphasises the need for infection control to be given a high priority through a set of "must do" actions	10	Approaches taken by other countries	44
Other countries have developed strategies for preventing hospital acquired infection in response to increased awareness of risks	12		
<b>Part 2</b>		<b>Appendices</b>	
<b>Despite a higher profile at NHS trust level, wider factors stand in the way of improving infection control</b>	<b>13</b>	1. Key developments and Departmental initiatives since the National Audit Office report was published in February 2000	45
Infection control has generally had a higher profile in most NHS trusts	13	2. Comparison of the Committee of Public Accounts Report recommendations and the Government's Treasury Minute Response, and developments as at February 2004	47
Wider factors complicate prevention and control	19	3. Comparison of International Practices in the Management and Control of Hospital-acquired Infections	50
<b>Part 3</b>		4. The Management and Control of Hospital Acquired Infection in Other UK countries	52
<b>Despite some local improvements the NHS still lacks sufficient information on the extent and cost of hospital acquired infection</b>	<b>23</b>	5. National Audit Office Study Methodology	55
There is still no comprehensive mandatory surveillance scheme	23	6. Relationships between Department of Health key performance indicators on MRSA and Controls Assurance data	57
Cost information has not improved	30	7. Chronology of developments in mandatory surveillance of hospital acquired infections	59
Though robust cost/benefit analyses are lacking, all available evidence continues to show prevention is better than treatment	31	<b>Bibliography</b>	<b>61</b>
		<b>Glossary</b>	<b>63</b>

Map showing proportion of *Staphylococcus aureus* bacteraemia isolates resistant to methicillin in various European countries



**NOTE**

Data on levels of MRSA bloodstream infections as a proportion of all *Staphylococcus aureus* bloodstream infections show that the United Kingdom is amongst those with the highest levels in Europe.

Source: European Antimicrobial Resistance Surveillance System (EARSS) 2002

# Summary

- 1 In February 2000 our report *The Management and Control of Hospital Acquired Infection in NHS Acute Trusts in England (HC 230 Session 1999-00)* noted that at any one time, 9 per cent of patients had an infection that had been acquired during their hospital stay. The effects varied from extended length of stay and discomfort to prolonged or permanent disability and, in at least 5,000 patients a year, death. These infections were costing the NHS as much as £1 billion a year and around 15 per cent could be prevented by better application of good practice, releasing resources of £150 million for alternative NHS use.<sup>1</sup>
- 2 We found that good practice with respect to the prevention, control and management of hospital acquired infection needed to be more widely known and that there was a lack of basic comparative information on infection rates. We were concerned that there appeared to be a growing mismatch between what was expected of infection control teams and the staffing and other resources allocated to them, and identified considerable scope to improve performance.<sup>1</sup>
- 3 The Committee of Public Accounts (the Committee) concluded in November 2000 that the lack of grip on the extent and costs of hospital acquired infections impeded NHS trusts in targeting activity and resources to best effect. In addition, the Committee said that a root and branch shift towards prevention would be needed at all levels of the NHS if hospital acquired infection were to be kept under control. Such a shift would require commitment from everyone involved, and a philosophy that prevention is everyone's business, not just the specialists.<sup>2</sup>
- 4 Since then the Department of Health (the Department) has issued various guidance and established a range of national advisory structures and expert committees to increase the priority given to this issue (Appendix 1). Yet, in the Chief Medical Officer's December 2003 report, *Winning Ways*<sup>3</sup>, he stated that such data as are available show that the degree of improvement has been small.
- 5 We therefore examined whether our and the Committee's (Appendix 2) recommendations have been implemented, whether the management and control of hospital acquired infection in NHS acute trusts has improved, and whether there have been any discernible changes in patient outcomes. We also examined how other countries are addressing these issues (Appendix 3 and 4). The study methodology is summarised at Appendix 5.



## Overall Conclusion

- 6 Implementation of our and the Committee's recommendations has been patchy. There has been notable progress at trust level in putting the systems and processes in place and in strengthening infection control teams, but wider factors continue to impede good infection control practice and there has been limited progress in improving information on the extent and costs of hospital acquired infections. Progress in preventing and reducing the number of infections acquired whilst in hospital is dependent on changing staff behaviour, but change continues to be constrained by the lack of data, limited progress in implementing a national mandatory surveillance programme that meets the needs of the NHS, and a lack of evidence of the impact of different intervention strategies. More specifically:
- i hospital acquired infection now has a much higher profile and, at the central strategic level, has been accorded a higher priority with the launch of a number of key requirements;
  - ii at trust level, higher priority is now generally given to hospital acquired infection, but the pursuit of other key policies and priorities can adversely affect attempts to improve infection control, a task made harder by the emergence of strains of multi-resistant bacteria, increasing antibiotic resistance, and an increase in the number of outbreaks such as Norovirus reported by trusts;
  - iii despite some local improvements in information, the NHS still lacks sufficient information on the extent and cost of hospital acquired infection;
  - iv further action is required using a range of approaches to change staff behaviour to reduce the risks of hospital acquired infection.

## Actions taken by the Department have increased the priority given to infection control

- 7 Increasing priority has been given to the management and control of hospital acquired infection at the national level, with the launch of a number of high profile initiatives culminating in December 2003 with *Winning Ways*, which aims to bring this issue into the mainstream of service developments. The 1999-2000 clinical governance<sup>4</sup> and controls assurance initiatives<sup>5</sup> have been particularly instrumental in requiring NHS trusts to put systems and processes in place to improve infection control, and in providing a framework for clinical quality improvement.
- 8 External reviews and inspections of trusts infection control arrangements have increased. Whilst raising the profile of infection control there is some overlap and duplication, with a focus on structures and processes, and a limited emphasis on evaluating changes in patient care. The different assessment processes can also result in contradictory findings. *Winning Ways* notes that the Department has asked the Commission for Healthcare Audit and Inspection (now known as the Healthcare Commission) to give priority to this, and they have included this in their 2004 star ratings assessment, but again the focus is on processes and procedures.



## Actions have been taken by trusts but wider factors impede good practice

- 9 Infection control is a higher priority, with trusts making improvements to their infection control management arrangements and increasing their trust boards' involvement. Infection control team staffing levels have also increased, although wide variations between trusts remain. More teams have separate infection control budgets but the amounts vary and 24 per cent claim that their budgets have decreased in real terms. Increased demands on infection control teams with more surveillance and external inspections has meant that there remains a mismatch between expectations placed on the teams and resources allocated to them. Implementing the action areas in *Winning Ways*, whilst aimed at all NHS staff, is likely to place further demands on infection control teams. New risks, but also potential opportunities may arise from the changes to funding flows in the NHS under the Departmental initiatives *Shifting the Balance of Power*<sup>6</sup>, *Patient Choice*<sup>7</sup>, and *Payment by Results*<sup>8</sup>.
- 10 The continuing problem of increasing antibiotic resistance, and the emergence of strains of multi-resistant bacteria has increased the complexity of managing and controlling infection. During the 1990s the number of reported cases of *Staphylococcus aureus* bacteraemias (bloodstream infections) have increased year on year with the number of cases of methicillin resistant (MRSA) bacteraemias increasing from less than 2 per cent in 1994 to around 35 per cent in 2001. In the three years since the Department introduced mandatory reporting in April 2001, the number of reported *Staphylococcus aureus* bacteraemias have increased from 17,933 to 19,311 (8 per cent) and the number that are methicillin resistant have risen from 7,250 to 7,647 (a 5 per cent increase). The overall proportion that is MRSA stands at 40 per cent. European Antimicrobial Resistance Surveillance System data for 2002 showed that the United Kingdom has amongst the worst rates in Europe<sup>9</sup>. Our survey of NHS acute trusts found that there has also been an increase in the number of infection outbreaks which have led to more wards and bays being closed for the purpose of outbreak control.
- 11 Preventing infections continue to be adversely affected by other NHS trust-wide policies and priorities as identified in our original report. The increased throughput of patients to meet performance targets has resulted in considerable pressure towards higher bed occupancy, which is not always consistent with good infection control and bed management practices. Seventy-one per cent of trusts are still operating with bed occupancy levels higher than the 82 per cent target that the Department told the Committee it hoped to achieve by 2003-04 after this issue was highlighted in our 2000 report. The lack of suitable isolation facilities also remains a concern for trusts, as does the increase in frequency of moving patients and a lack of sufficient beds to separate elective and trauma patients.

## The NHS still lacks sufficient information on the extent and cost of hospital acquired infection

- 12** In contrast to the Committee's recommendation that the Nosocomial Infection National Surveillance Scheme (NINSS) should be made mandatory, the Department decided to set up a Healthcare Associated Infection Surveillance Steering Group (HAISSG), to provide them with urgent recommendations on infection surveillance. The Group proposed a revised approach to mandatory surveillance, and their first action was to introduce new mandatory laboratory based MRSA bacteraemia surveillance from April 2001. In September 2002 the Group was disbanded, and responsibility for taking forward surveillance was transferred to the Public Health Laboratory Service (PHLS) which is now part of the Health Protection Agency (HPA) under a service level agreement with the Department.
- 13** Since then, there has been limited progress in the development, implementation and audit of other strands of mandatory surveillance. As a result, robust comparable data other than on hospital wide MRSA bacteraemia data are therefore not currently available for the NHS in England, and it is impossible to quantify with any certainty if there have been any changes in NHS trusts' infection rates. There has also been no progress in introducing a national post-discharge surveillance scheme as recommended by the Committee.
- 14** Our international comparisons study showed that all the countries reviewed have established surveillance programmes, but variations in protocols and numbers and frequency of hospital participation make direct comparison unreliable. Nevertheless, national prevalence studies show rates of between 4 and 10 per cent (compared with 9 per cent in the UK). During 2003 Northern Ireland, Scotland and Wales have collaborated in combining their datasets on orthopaedic surgical site infections over the last three years, which represents a major joint initiative to provide support to clinical teams in this area. In England, the Health Protection Agency implemented, new mandatory orthopaedic surveillance from April 2004, under a service level agreement with the Department.
- 15** In our original report we calculated that hospital acquired infections were costing the NHS around £1 billion a year. Because of the complexities involved in identifying costs, few trusts have attempted to calculate their own costs nor have any attempts been made to refine or validate this estimate. Other countries have had similar problems in developing robust up-to-date evaluations of the economic impact of hospital acquired infection, but all conclude that the cost of introducing preventative measures is less than the cost of treating such infections.

## Changing staff behaviour to reduce risks requires the adoption of multiple approaches to prevention

- 16 Despite the increasing profile of hospital acquired infection and the publication of guidelines on the measures required to contain the problem, there continues to be non-compliance with good infection control practices. To improve practice, a major change is required so that everyone accepts personal responsibility. Feedback of specific local infection rates to clinical staff is vital in engaging them in reviewing and changing their practice.
- 17 The new mandatory national surveillance schemes do not currently enable clinicians to identify and reduce risks within their own specialty. In the absence of ownership and access to such data, hospital acquired infection is still perceived as a problem for the infection control team to deal with, and consequently many of the issues identified as barriers to effective infection control practice in our original report still apply. Considerable improvements could therefore still be made in: the coverage of education and training in infection control to all groups of staff, particularly doctors; compliance with guidance on issues such as on hand hygiene, catheter care and aseptic technique; antibiotic prescribing in hospitals; hospital cleanliness; and consultation with the infection control team on wider trust activities such as new build projects.
- 18 There is scope to improve awareness of, and improvements in, technological innovation to help engineer out risks, but there is a lack of clarity as to the evidence base required before new technologies are approved for use in the NHS. *Winning Ways* has acknowledged this, and as an initial step the Department announced that they would commission a rapid review of new procedures and products for which claims of effectiveness to prevent or control hospital acquired infection have been made.
- 19 *Winning Ways* sets out for the local NHS seven areas together with details of specific actions that, if implemented, should enable trusts to improve prevention and control, including:
- active surveillance and investigation of healthcare associated infection and antimicrobial resistant organisms;
  - reducing infection risk by controlling the use of invasive devices, instruments and other equipment;
  - reducing reservoirs of infection by improving bed management and isolation facilities;
  - adoption of high standards of hygiene and clinical practice;
  - prudent use of antibiotics to minimise the emergence of antibiotic resistant organisms;
  - improving senior management commitment, local infrastructure and systems;
  - research and development to ensure that technological breakthroughs in prevention and control are rapidly translated into benefits for patients.





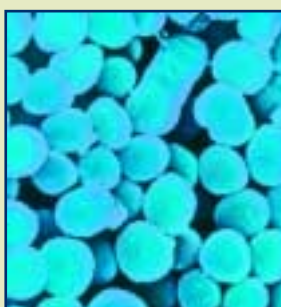
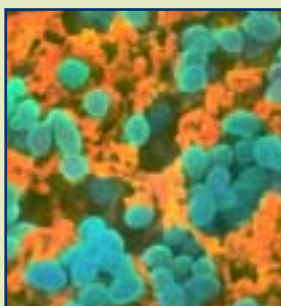
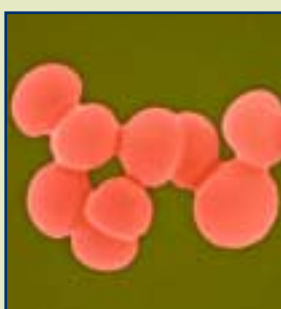
# Recommendations



- 20 Most of the above areas were included in our and the Committee's recommendations, and have also been trailed in previous guidance. But implementation and compliance has been patchy. Our recommendations are aimed at helping the Department, and NHS trusts to overcome some of the constraints and to improve implementation and compliance.

The Department should:

- a clarify an implementation timetable for the various elements within the Action Areas in *Winning Ways*;
- b work with the Health Protection Agency to expedite development of national mandatory surveillance in a way that meets the needs of the NHS, and which provides robust comparable data on hospital acquired infection, including information on high risk areas such as intensive care and renal units. Investment in such a system would be offset by savings from rate reductions;
- c ensure that the national IT strategy accommodates the surveillance and other IT requirements of infection control with links between microbiology, prescribing and patient administration systems;
- d in conjunction with the Health Protection Agency, evaluate the research in Case study C on managing outbreaks and our other findings, and commission research on bed management and isolation, and develop evidence based guidance to help trusts balance bed management and infection control requirements;
- e expedite the publication of the staffing toolkit and the planned guidance on the roles and responsibilities of infection control teams. These should include clarification of the training, grade and experience required of the new Director of Infection Prevention and Control;
- f actively engage with NHS commissioners to impress on them the importance that needs to be attached to trusts having effective infection control systems and processes in place and that commissioners should consider including information on infection rates in information provided under Patient Choice.
- g use the opportunity from recommendations made by the Healthcare Concordat<sup>i</sup> to ensure that one inspection body takes the lead in assuring compliance with the new Healthcare Standards on infection control, and ensure that this is clearly linked to the Commission for Healthcare Audit and Inspection's (now known as the Healthcare Commission's) role as envisaged in *Winning Ways*;
- h expedite the production of a national infection control manual, ensuring that it builds on the large amount of good practice that exists in individual trusts;
- i continue to work with the Royal Colleges and professional bodies to ensure that infection control is a key component in undergraduate training;
- j require infection control induction training to be mandatory for all staff, as for health and safety and fire safety training, and require records to be maintained on this and on regular update training; and
- k as a matter of urgency, define how the rapid review process of new procedures and products is to be implemented, and how the findings will be promulgated so that they can be translated into practice at trust level with minimum delay.



<sup>i</sup> *The Healthcare Concordat is a code of objectives and practices agreed by bodies inspecting health and healthcare bodies in England.*

### The Healthcare Commission should:

- l in developing the assessment/review framework for evaluating the new Healthcare Standards, consult trusts on suitable performance indicators for infection control which measure outcomes rather than systems and processes;
- m work with other bodies such as the NHS Modernisation Agency and the National Patient Safety Agency to identify and promulgate good practice.

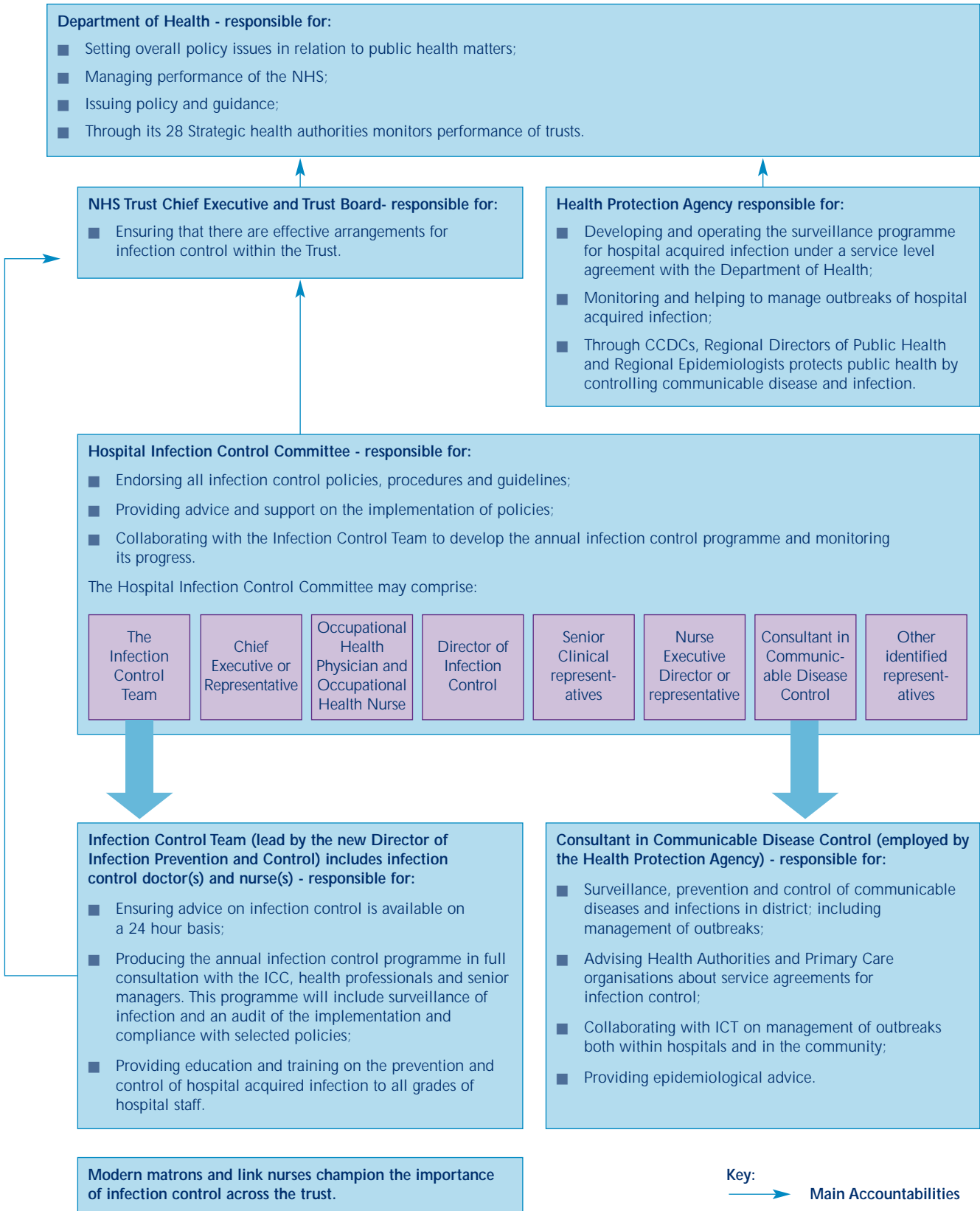


### NHS trusts should:

- n clarify and explain accountabilities, including the role, membership and responsibilities of the Hospital Infection Control Committee;
- o actively demonstrate the commitment from the trust board and senior management in supporting and implementing the action plans in Winning Ways by ensuring that infection control regularly features as a trust board agenda item, and consider the inclusion of compliance with infection control practice as one of the criteria in staff appraisals;
- p review infection control team staffing and other resources, including the designation of the new Director of Infection Prevention and Control, and evaluate the adequacy of resources compared with the demands on the team (investment should provide commensurate improvements in rates releasing resources for alternative use);
- q ensure participation in all mandatory surveillance schemes, obtaining buy in from clinical staff through shared responsibility and appropriate and timely feedback of results;
- r make better use of existing data, for example on antibiotic prescribing, to gain a wider perspective of the extent of hospital acquired infection;
- s ensure all staff receive induction and update training, and use the new Electronic Staff Records system to maintain records of staff education and training;
- t require consultation with infection control teams to be a mandatory step in contract tendering procedures for new build projects, and for cleaning, laundry and catering services;
- u demonstrate that infection control issues are included in patient and public consultations under the trusts clinical governance programme; and
- v increase public awareness of and compliance with good infection control practice and encourage their active participation in improving staff and visitor compliance.



**1 Roles and responsibilities of Department of Health, the Health Protection Agency and NHS Trusts in relation to hospital acquired infection**



Source: National Audit Office/Department of Health



# Part 1

## Hospital Acquired Infection is now a National Health Service Priority

- 1.1 In February 2000, our report showed that hospital acquired infection was not seen as a priority within the health service. There was a need to strengthen the strategic management of hospital acquired infection both nationally, and at NHS trust level. In a further report in November 2000 the Committee of Public Accounts (Committee) made two main points:
- The NHS did not have a grip on the extent and cost of hospital acquired infection.
  - A root and branch shift towards prevention was needed at all levels of the NHS, requiring commitment from everyone, and a philosophy that prevention should be everybody's business, not just the specialists.
- 1.2 This part of the report shows that the Department has raised the status and profile of this issue through a number of national initiatives and strategies (Appendix 1). These emphasise the priority that the Department expect the NHS to give to improving the strategic management and control of hospital acquired infection. The main roles and responsibilities for the management and control of hospital acquired infection are summarised in [Figure 1](#).

### Departmental Initiatives have raised the profile and the priority of infection control

#### Response to the Committee

- 1.3 In February 2001, the Department accepted the Committee's recommendations and detailed positive actions aimed at raising the profile of this issue<sup>10</sup>. A full list of the Committee's recommendations, the Department's detailed response, and progress to date for each recommendation is given at Appendix 2.

#### Clinical governance and controls assurance

- 1.4 "*Clinical Governance: Quality in the new NHS*<sup>4</sup>", launched in March 1999, provided NHS organisations and health care professionals with a framework for clinical quality improvement. Its main objective was to ensure that quality was embedded within the procedures and systems of accountability within each trust. Complementing the clinical governance initiative were a set of 19 controls assurance standards. The first of these, on infection control, was launched in November 1999<sup>5</sup>. The Department made it a mandatory requirement for NHS organisations to self-assess their performance against these standards.

#### "Getting Ahead of the Curve"

- 1.5 In January 2002, the Chief Medical Officer's infectious diseases strategy "*Getting Ahead of the Curve*" gave further impetus to the need for action on "healthcare associated infection", aimed at transforming the status of infectious disease control from a 'Cinderella service' by bringing it into the mainstream of service development.<sup>11</sup> The strategy recommended that the Health Protection Agency should be created, combining some of the existing functions of the Public Health Laboratory Service (PHLS) and three other national bodies (the National Radiological Protection Board, the Centre for Applied Microbiology and Research, and the National Focus for Chemical Incidents). The objective was to provide an integrated approach to protecting the public against infectious disease as well as chemical and radiological hazards.
- 1.6 The new Agency was also required to deliver a local health protection service working with the NHS and local authorities to deliver specified functions relating to the prevention, investigation and control of infectious diseases, as well as chemical and radiological hazards. This constituted a considerable re-organisation of the public health network including the rationalisation of microbiology laboratories, with the transfer of the PHLS laboratories that provide mostly general clinical microbiology services to the NHS.

1.7 Part of the strategy focussed on improving the control of "healthcare associated infection." The strategy acknowledged that this would, in part, be achieved through the implementation of the National Audit Office and Committee of Public Accounts recommendations. However the strategy switched the emphasis from hospital acquired infection to healthcare associated infection<sup>ii</sup>, in recognition of the fact that infections can be transmitted via care and procedures in both primary and secondary care setting settings, and can be transmitted from organisms in the patient's own body which become invasive as their immune systems are impaired. The strategy emphasised that the prevention of healthcare associated infection would require commitment from everyone, not just specialists in infection control.

### There is a greater emphasis on performance monitoring

1.8 Our 2000 report was the first evaluation of NHS trusts' relative performance in managing and controlling hospital acquired infection. Since then the Department has introduced a number of external performance monitoring and review systems (Figure 2).

1.9 In our September 2003 report "*Achieving Improvements through Clinical Governance*" we mentioned concerns about the proliferation of regulation and inspection bodies and the risk of overlap and duplication.<sup>12</sup> We noted the work of the NHS Review Co-ordination Group whose aim is to try and improve co-ordination and co-operation between relevant audit and inspection bodies. This group has concluded that there are too many reviewing organisations that do or may review infection control and that it would be better that only one of them should provide the basic assurance of compliance with core standards on which the others can rely.<sup>13</sup> The wider issue of the increasing burden of inspection is being addressed through the development of the Healthcare Concordat.

1.10 The Government's NHS Plan (July 2000) included a commitment to introduce NHS performance ratings or "star ratings"<sup>14</sup>. The first set of ratings for 2000-01 was published in September 2001 based on a combination of the results of any Commission for Health Improvement review, performance against key finance and activity targets and a "balanced scorecard" of other quality measures. Although there was no specific infection control indicator, from the outset hospital cleanliness was included as one of the key indicators. In June 2003, the Chief Medical Officer reported that MRSA bacteraemia improvement scores would be included as an infection control indicator for 2002-03 ratings.<sup>15</sup>

### "Winning Ways" re-emphasises the need for infection control to be given a high priority through a set of "must do" actions

1.11 The Chief Medical Officer's December 2003 report, "*Winning Ways: Working together to reduce healthcare associated infection in England*<sup>3</sup>" recognises that modern healthcare has brought unprecedented benefits but also risks, and that no risk is more fundamental than the risk of infection. The report acknowledges that infection in hospitals cannot be completely eliminated, but that it can be substantially reduced, and whilst this is a worldwide problem, the NHS in England is not performing as well as some other European countries.

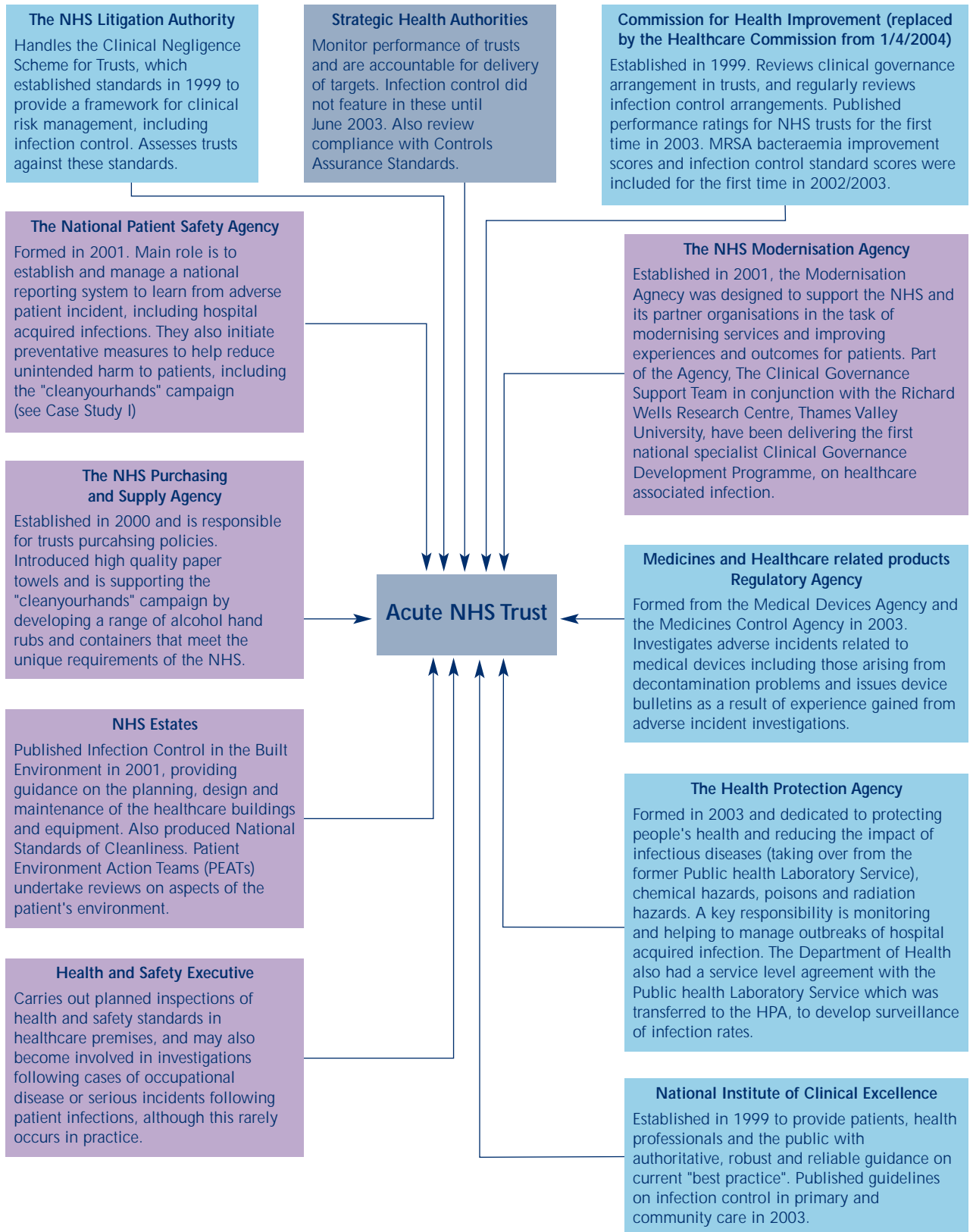
1.12 The report notes that despite the extent of guidance issued to the NHS, such data as are available show that the degree of improvement has been small. For example, the vast majority of trusts have not improved their surgical site infection rates, and levels of MRSA bloodstream infections as a proportion of all *Staphylococcus aureus* bloodstream infections show that this country has amongst the highest levels in Europe. *Winning Ways* therefore re-emphasises the priority that needs to be given to infection prevention and control, setting out seven action areas that are necessary to reduce the relatively high levels of certain healthcare associated infections and to curb the proliferation of antibiotic resistant organisms.

1.13 *Winning Ways* notes that the new Commission for Healthcare Audit and Inspection (now known as the Healthcare Commission) will be asked to make infection control a key priority when assessing hospital performance, and the implementation of *Winning Ways - processes and procedures* has been included as one of the balanced scorecard indicators for the 2004 star ratings. During spring 2004 the Department consulted the NHS and other interested parties on new Healthcare Standards for NHS organisations, in which infection control is featured in both the core and developmental standards. The outcome is expected to be announced in the summer. The Healthcare Commission will assess NHS organisations performance against these standards.

<sup>ii</sup> As this report focuses on the problem of preventing and controlling infections acquired in hospital we have continued to use the term "hospital acquired infection".

**2 Regulatory and support landscape from an Acute NHS Trust's perspective**

There are a number of regulatory bodies (blue) and other supporting bodies (pink) with responsibilities for infection control.



Source: National Audit Office



## Other countries have developed strategies for preventing hospital acquired infection in response to increased awareness of risks

- 1.14 Major international events associated with infectious disease problems such as the outbreak of Severe Acute Respiratory Syndrome (SARS), the spectre of bio-terrorism, and concerns about the potential emergence of other viruses such as new virulent strains of influenza, have all increased the priority given to this issue and focussed attention on the need for all countries to have robust national infection control strategies.
- 1.15 We commissioned a comparative review of international practices in the management and control of hospital acquired infection to see if there were any lessons that might be learned.<sup>16</sup> All of the countries in our review had developed a national strategy for preventing hospital acquired infection in response to threats of antimicrobial resistance and increasing rates and costs of infection in healthcare facilities. The development of more recent strategies in the USA, Australia, New Zealand and France have been influenced by patient safety and risk management agendas, and are closely linked to accreditation of healthcare services.
- 1.16 Quality standards linked to hospital accreditation processes exist in the USA, Australia, New Zealand, Belgium, Denmark and France and include standards on hospital acquired infection. In Canada, Hong Kong and Singapore, in the aftermath of SARS, there is real evidence of a change in staff behaviours and compliance with good practice has improved significantly. Appendix 3 summarises the review findings and, where relevant, international comparisons are drawn on throughout the report.
- 1.17 We also visited Scotland, Wales and Northern Ireland to see how they were tackling hospital acquired infection. These countries have also developed or are in the process of developing strategies to tackle communicable diseases and standards to improve infection control practice (see Appendix 4).
- 1.18 A summary of our study methodology is at Appendix 5.



# Part 2

## Despite a higher profile at NHS trust level, wider factors stand in the way of improving infection control

- 2.1 This Part examines the actions taken at NHS acute trust level since our report in 2000. In that report we showed that infection control was not a priority within many trusts and that health authorities and trusts needed to do more to improve strategic management. We reported a growing mismatch between what was expected of infection control teams and the staffing and other resources allocated to them to carry out their work, and that preventing infection could be adversely affected by other trust wide policies, especially bed management practices.
- 2.2 Since then the introduction of the controls assurance standards has generally helped raise the profile and the systems, procedures and accountability arrangements are now largely in place in most trusts. There has also been investment in infection control team resources. However, bed management policies, the drive to meet performance targets, the increasing number of outbreaks and antibiotic resistance of infectious agents continue to constrain good infection control practice.

### Infection control has generally had a higher profile in most NHS trusts

#### Improvements to NHS trust infection control arrangements

- 2.3 Eighty per cent of chief executives reported that they had made changes to their infection control arrangements since March 2000. The key drivers for these changes were the need to demonstrate improvements against the Controls Assurance standard for infection control and the need to meet the Clinical Negligence Scheme for Trusts assessment criteria.
- 2.4 In ranking controls assurance as the main driver for change, nine out of ten chief executives reported that it provided the necessary framework for monitoring their infection control arrangements. Because self-assessment of performance is mandatory, due consideration is given to this issue by senior management. As a result, most trusts have reported year on year improvement in compliance with the infection control standard, with the average overall compliance for acute NHS trusts

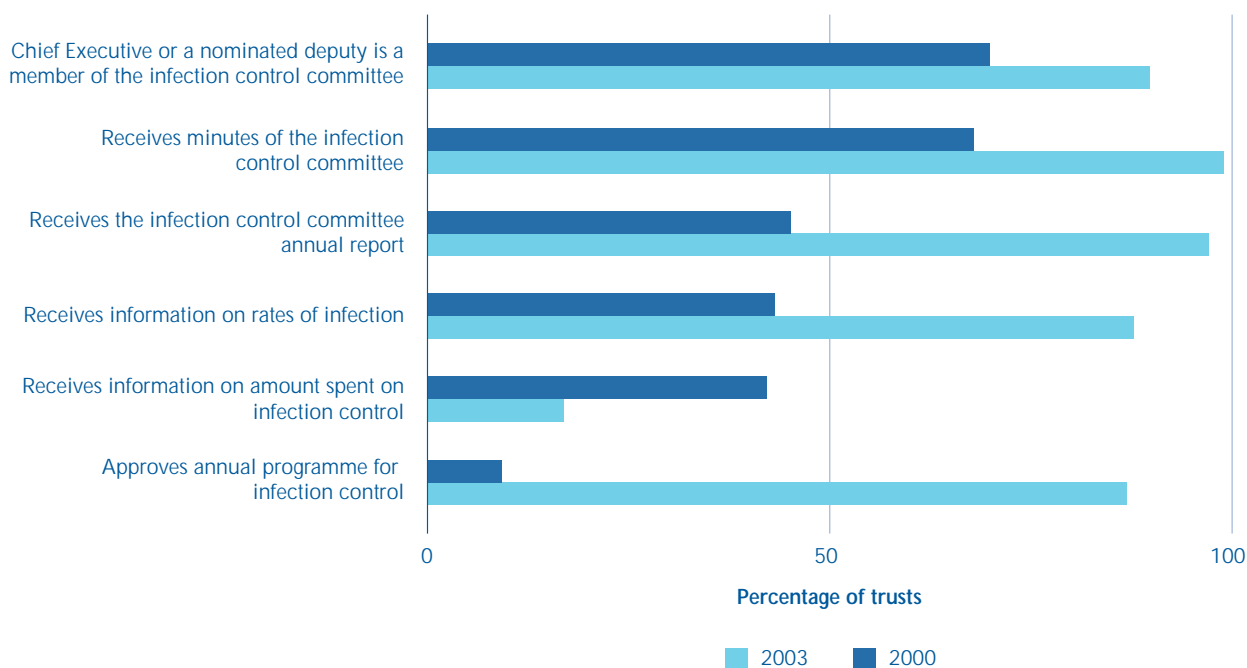
increasing from 64 per cent compliance in 2000, to 68.6 per cent in 2001, 71.8 per cent in 2002 and 76.8 per cent in 2003.

- 2.5 Ninety-three per cent of trusts have incorporated the control of infection into the trust's wider risk management programme, and 87 per cent into their clinical governance programme. And in 82 per cent, infection control is included in the trust's risk register.
- 2.6 Over the last five years chief executives and trust boards have increased the priority given to infection control issues (**Figure 3**). All now have clearly defined lines of accountability leading to the board, and in 90 per cent the chief executive or a trust board representative (usually the director of nursing or chief nurse or the medical director) is a member of the NHS trust Hospital Infection Control Committee. There have been improvements in attendance at committee meetings, in 73 per cent of trusts a board representative is present at over half of the committee meetings (compared with around 60 per cent in 2000). In general, chief executives are more aware of infection control issues, although fewer receive information on the amount spent on infection control (17 per cent, compared with 48 per cent in 2000).

#### A mixed picture of actual performance on infection control

- 2.7 The Clinical Negligence Scheme for Trusts (CNST) provides a means for trusts to fund the cost of clinical negligence litigation whilst encouraging and supporting the effective management of claims and risks. Every trust is independently assessed against these standards at least once every two years. NHS trusts which achieve compliance with the standards are entitled to a discount from their risk pooling contribution for two financial years (compliance at Level 1 gives the trust a 10% discount; Level 2 a 20% discount and Level 3 a 30% discount). Infection control criteria are contained within two of the seven core CNST general standards and compliance with these contributes to achieving Levels 1, 2 and 3 of the scheme. Thus achieving compliance will result in cost savings for trusts.

**3 In general, the chief executives' awareness of infection control has increased in the last five years**



Source: National Audit Office census of acute NHS trusts, - comparing the results presented in our 2000 report (based on our autumn 1998 survey) with the results from our summer 2003 survey

- 2.8 Ninety per cent of infection control teams were aware of the results of the trust CNST risk assessment and of these: 10 per cent failed to reach Level 1; 63 per cent achieved Level 1; 24 per cent Level 2; and 2 per cent Level 3. **Case study A** shows how one trust obtained a discount due to improvements in infection control, investing this in further improvements.
- 2.9 The Commission for Health Improvement's May 2003 annual report "Getting better? A report on the NHS"<sup>18</sup>, noted that control of infection has been a concern in a quarter of its reports on hospitals. These concerns covered hand washing, sterilisation of equipment and the nursing of people who are known to be infectious. The report noted that the Commission had seen few examples of notable practice in infection control; good policies did not always exist and, even when they did, they were often not followed sufficiently well to make them effective.

**Infection control teams have been strengthened, but wide variations in resources remain**

- 2.10 In 2000, we showed wide variations in infection control resources, an absence of Departmental guidelines on infection control staffing and that in some trusts the number of beds that a single infection control nurse was expected to cover was unacceptably high.
- 2.11 The results of our 1998 survey, which was the basis for our 2000 report, showed that there was an average of one infection control nurse to 535 beds. While variations between trusts remain, by June 2003 this ratio had risen to one nurse to 347 beds (**Figure 4a**). Despite this improvement, the ratio still falls short of one nurse to 250 beds, which is used by many countries as the target ratio. Recent research in America recommends ratios as high as one nurse to 100 beds because of the increasing workloads and complexity of activities required to be under taken by infection control nurses.<sup>19</sup>

## CASE STUDY A

### Swindon & Marlborough Acute NHS Trust - Securing funding for infection control through improving their CNST rating and reducing the CNST premium paid

#### Situation

The infection control team needed additional resources to improve the service and to achieve Level 2 compliance with the CNST requirements.

#### Action

An internal Controls Assurance Infection Control assessment was undertaken and agreed by the Clinical Risk Manager to be accurate. The required score for the criteria of two of the standards could not be achieved without improving their approach to surveillance which would require additional support in the form of IT hardware and software, additional infection control nursing and secretarial support, and office capacity. The total cost of this was estimated as £36,000 of which half would be a one off capital payment and half would have revenue consequences as it was to fund additional staff. The total amount of money required was estimated to be 18 per cent of the discount savings available to the Trust if a Level 2 CNST assessment was achieved.

#### Outcomes

- A surveillance nurse has been appointed and IT hardware/software provided to support this post. Monthly alert organism/condition surveillance and quality indicator reports are provided to all directorates and tabled at the trust monthly Clinical Risk Management Committee.
- MRSA bacteraemias are monitored and incorporated within the risk matrices of all directorates and the Trust risk register.
- Surveillance following total knee replacements has commenced and the vascular module will commence in April 2004.
- The Trust has been chosen to pilot one of the three Infection Control Surveillance systems as part of the HPA ASEPTIC project.<sup>17</sup> Monies have been assured to support the pilot following the Trust achievements at CNST level 2 in 2003.

2.12 In 2000 we noted that the Royal College of Pathologists recommended that between five and six sessions of a designated consultant's time should be devoted to infection control (equivalent to one whole time equivalent infection control doctor per 1000 beds). We found that trusts now have, on average, 3.5 designated medical consultant sessions per week. Again, wide variations between trusts remain (Figure 4b). The average planned coverage reported by infection control teams was 4.2 sessions per week for infection control activities, showing that even if they were working at full complement, they would still fall short of the recommended number.

2.13 In 2000, we reported that 27 per cent of infection control teams had no clerical support, just over half had less than one whole time equivalent, and around two-thirds considered that their clerical support was inadequate. As at June 2003, there were still 21 per cent of teams without clerical support and 68 per cent with less than one whole time equivalent (Figure 4c).

2.14 Our earlier work and subsequent research has demonstrated the importance of having adequate clerical support. Not least because it is a waste of valuable expert resources for infection control nurses to be spending a large proportion of time on clerical tasks.

A number of chief executives identified the appointment of clerical staff as one of the main staffing changes introduced to improve their infection control arrangements but the number of failed business cases for these resources demonstrate that in some trusts it is still not given sufficient priority.

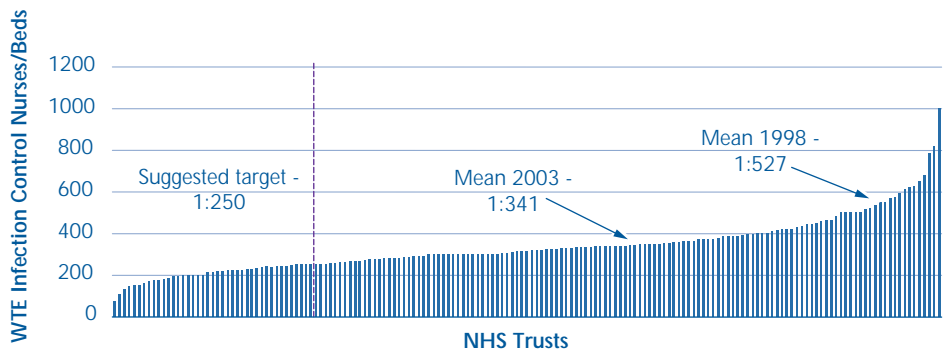
#### The role of link nurses, modern matrons and ward housekeepers in prevention and control

2.15 More trusts now use link nurses (82 per cent compared with 60 per cent). However, the numbers of link nurses vary between trusts, ranging from one to over one hundred, with the average per trust being around 54. Link nurses are not substitutes for infection control teams but they can be an extremely effective way of disseminating and monitoring compliance with good practice. However, for link nurses to be effective, their coverage needs to be widespread across a trust, therefore trusts operating with only a few link nurses may not be realising the full potential of having a link nurse programme (examples of successful link nurse programmes were given in our original report, and in *The Challenge of Hospital Acquired Infection*, published by the National Audit Office in 2001<sup>20</sup>).



**4** There continues to be variations in infection control team staffing levels between trusts

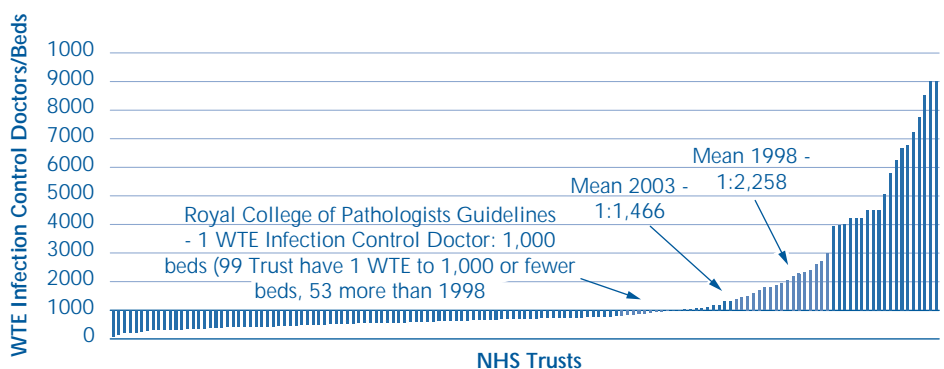
**a) The ratio of whole time equivalent infection control nurses to total number of beds in NHS trusts**



**NOTES**

- 1 Moorfield's Eye Hospital and The Royal National Hospital for Rheumatic Diseases are unique cases in relation to Infection Control Nurses and have been omitted from the data analysis and graph.
- 2 2 Trusts have been omitted from the data analysis and graph as they are outliers with WTE Infection Control Nurses per hospital beds of 1:1500 and 0.2 Nurses for 525 beds - a ratio of 1:2625.

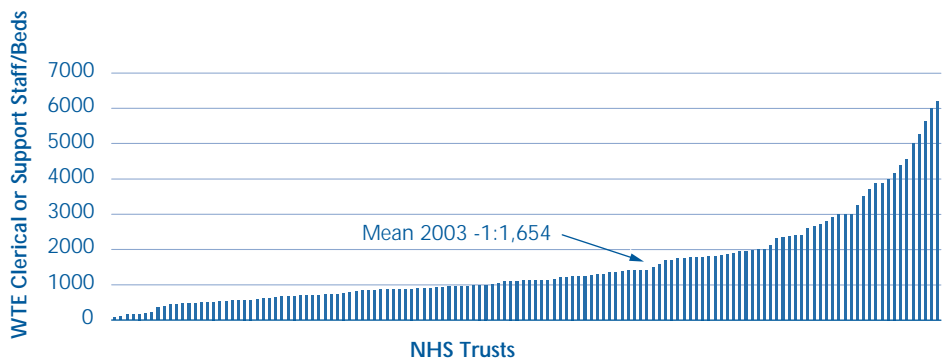
**b) The ratio of whole time equivalent infection control doctors to total number of beds in NHS trusts**



**NOTES**

- 1 25 NHS Trusts did not identify any Infection Control Doctor sessions per week. They have subsequently been omitted from the data analysis and graph.
- 2 Moorfield's Eye Hospital and The Royal National Hospital for Rheumatic Diseases are omitted as per 4a) Note 1.
- 3 3 Trusts have been omitted from the data analysis and graph as they are outliers with WTE Infection Control Doctors per hospital beds ranging between 1:13,000 & 1:25,000.

**c) The ratio of whole time equivalent infection control clerical or support staff to total number of beds in NHS trusts**



**NOTES**

- 1 34 NHS Trusts did not identify any WTE clerical or support staff. They have subsequently been omitted from the data analysis and graph.
- 2 Moorfield's Eye Hospital and Royal National Hospital for Rheumatic Diseases are omitted as per 4 a) Note 1.
- 3 2 Trusts have been omitted from the data analysis and graph as they are outliers with WTE clerical support staff per hospital beds of 0.1 clerical or support staff per 900 beds - a ratio of 1:9000, and 0.4 clerical or support staff per 1032 beds - a ratio of 1:2580.

2.16 The public consultation that informed the NHS Plan in 2000 provoked a call for the return of a matron figure, a strong clinical leader at ward level. In response, HSC 2001/010 heralded the introduction of the new "modern matrons" who were to be accountable for a group of wards and be easily identifiable, visible, accessible and authoritative figures.<sup>21</sup> One of the ten key tasks that they are accountable for is the prevention of hospital acquired infection and a second, related task, is improving hospital cleanliness.

2.17 In September 2003 a poll of 100 matrons identified preventing infection and improving hospital cleanliness as the most challenging of their ten areas of responsibility.<sup>22</sup> Our survey showed that 40 per cent of infection control teams felt that modern matrons had been fairly pro-active in relation to infection control, particularly in raising awareness but 25 per cent felt that they were not at all pro-active. Teams felt that matrons had a large workload with many other priorities, and there was a lack of clarity on their role as regards infection control. Their commitment also depended on their previous experience and interests.

2.18 The NHS plan called for at least 50 per cent of trusts to have a ward housekeeper service by 2004 to improve the delivery of basic care services to patients and enhance the patient environment. Eleven patient-focused national service standards have been agreed by staff and patients and form the basis of the housekeeper role, including ones on cleanliness and the control of infection. Latest figures from NHS Estates show that 40 per cent of all hospitals and 53 per cent of large hospitals with over 100 beds have introduced a ward housekeeping service.<sup>23</sup> **Case study B** shows how ward housekeepers and modern matrons are being used to improve infection control in two trusts.

2.19 In response to *Winning Ways*, the Chief Nursing Officer in partnership with NHS Estates, is leading a newly established working group of nurses, modern matrons, ward housekeepers, allied health professionals and infection control experts to work out ways of preventing and controlling hospital acquired infection in their everyday work.

The Department's requirement is for all NHS trusts to designate a Director of Infection Prevention and Control

2.20 In December 2003, one of the key new actions in *Winning Ways* was that each trust must designate a Director of Infection Prevention and Control, with the power to impose tough new rules on each hospital. The Director is expected to oversee the implementation of all infection policies, be responsible for the infection control team and report directly to the chief executive and the board. The Director will also be an integral member of the clinical governance committee and

patient safety team structures. The post holder should be professionally qualified and competent in the management of all matters of infection control, but not necessarily a doctor. It is not a board level appointment

2.21 We undertook a survey in February 2004 to evaluate the implementation of this requirement and found that 87 per cent of respondents had appointed a Director, 37 per cent nominated the Infection Control Doctor to the post and 48 per cent either the Medical Director or Director of Nursing. All were staff with existing roles and responsibilities. Concerns were raised by trusts that only the Infection Control Doctor would have sufficient expertise to adopt this role, and the difference that it would make to the prevention and management of infection.



## CASE STUDY B

### Improving infection control through the use of modern matrons and ward housekeepers in two NHS trusts in England

#### (i) The role of the Modern Matron in reducing hospital acquired infection at North Bristol NHS Trust

The Modern Matron role has been implemented in the Urology department at North Bristol NHS Trust as part of an organisation wide strategy to address the problems associated with hospital acquired infection. This initiative has been instrumental in engaging the multidisciplinary team. Collaboration and team working using clinical governance structures have been influential in improving practice in the department.

The Modern Matron facilitated and supported Infection Control Nurse (ICN) visits and audit in clinical areas. Findings were then presented at the multidisciplinary Urology Clinical Governance Sessions which are coordinated by the Clinical Audit lead for the speciality and the Modern Matron. Issues that were identified included hand washing in the Out Patient Department (OPD) where invasive investigations took place. The ICN was then invited to the OPD to work alongside the team to observe practice. Feedback was given at the Clinical Governance session on the need to wear aprons to protect clothing from contamination, guidelines for glove usage and hand washing procedures, and subsequent changes to practice were noted immediately.

Modern Matron meetings also provide an ideal forum to address practice issues and developments, and the Modern Matron has also supported infection control forums in other areas such as renal, neonatal unit, theatres and intensive care unit. The current programme aims to identify and address emerging themes in relation to practice across the Modern Matrons area of work, for example reviewing practices relating to wound management during ward rounds which individual ward managers were unable to address. Audit programmes are also being developed which involve Modern Matrons such as on the decontamination of patient equipment. Focus groups are to be implemented for other specialities as the need arises, as well as further training for Modern Matrons in managing hospital acquired infection.

#### (ii) The role of the Ward Housekeeper in improving the hospital environment and cleanliness at the Oxford Radcliffe Hospitals NHS Trust

Ward Housekeepers work within the ward team and are responsible to the Ward Sister/Manager. Their role is to provide for the non-clinical needs of the patients and therefore leaving nursing staff free to focus on clinical needs.

The Oxford Radcliffe Hospitals NHS Trust has employed 35 housekeepers who receive initial training with the infection control team on their induction, and then receive regular updates. Their key responsibilities are for cleaning, the patient environment and patient food. They have been able to address areas which have fallen between the responsibilities of nurses and domestic staff, or have suffered because of other demands such as cleaning fans, commodes and chairs in between patients.

Notable differences have been found between wards with housekeepers and wards that do not have them, including:-

- A 30 per cent increase in cleaning standards;
- Better management of viral gastro outbreaks, for example in keeping up stocks of gloves and aprons;
- Increased availability of wall/bedside alcohol rub, soap and paper towels.

Housekeepers are also responsible for enhancing the patients' environment by reporting defects such as ripped carpets, floor coverings and broken equipment, keeping bed areas clean and tidy, regularly changing flower water, and ensuring the appropriate segregation of waste.

Introducing housekeepers has not always required additional resources. There is growing evidence that nursing staff spend up to 30 per cent of their time on non-nursing activities and therefore a reconfiguration of the existing team worked on some wards.

## Attempts to develop a staffing toolkit determined that a formulaic approach is not appropriate

2.22 In response to the Committee's recommendation that further research should be carried out to develop staffing guidelines for trusts, the Department, with input from the Infection Control Nurses Association and other professional organisations, commissioned a study in 2002 to examine the feasibility of producing a toolkit or formula to help trusts determine staffing levels for infection control teams. We worked with the Department on the design of the study and shared with them the data and other information from our original survey.

2.23 The results, in April 2004, based on survey returns from 140 infection control teams, found that the roles and responsibilities of infection control staff are so complex and varied that guidance on the numbers needed per bed is not straightforward nor necessarily helpful. Instead the research provides a set of questions to enable teams to evaluate whether they have the systems and competencies in place to work effectively, identify needs, and take appropriate action. Other countries however still use the ratio of infection control nurse to beds to help determine resources (Appendix 3).

2.24 During 2003 the Association of Medical Microbiologists also reviewed the role and future of the Infection Control Doctor. They identified that the job description and competencies of the infection control doctor need to be reviewed and re-written, including consideration of the education and skills required and that there was a need for guidance on the level of infection control doctor resources needed. Whilst this should not be overly prescriptive, the parameters that were considered included the number of beds and specialties covered.

## Limited improvements in non-pay budgets and IT facilities

2.25 In 2000, we reported that only 40 per cent of NHS trusts had a separate budget for infection control. Our follow-up survey showed that this has now increased to 55 per cent. Although two-thirds of chief executives have approved real-term changes to infection control staffing resources, fewer than half have approved changes to the non-pay budget and, in 2002/03, 24 per cent reported that their budget had actually decreased. Budgets vary considerably between trusts, with over half of infection control teams having budgets of up to £6000, whilst one in twelve trusts reported having budgets of over £20,000.

2.26 IT facilities are vital for ensuring the efficient and effective performance of infection control teams, particularly in relation to surveillance, research and development of training material. A number of reports highlight the lack of IT as a major constraint for infection control teams (in 2000 we found that over half the teams

did not have access to a computer). Sixty-three per cent of infection control teams consider that they now have adequate access to IT facilities, whilst 24 per cent have only a limited amount of access and 2 per cent have no access at all.

2.27 Our workshop on Informatics in Infection Control, in October 2002, emphasised that the slow pace of Information Management and Technology developments in the majority of trusts and the lack of availability of denominator datasets from trust systems were hampering attempts to improve surveillance of infection.

2.28 In recognition of this, in 2002 the Department commissioned the ASEPTIC project (A System Evaluation Project for Infection Control) to provide an independent evaluation of existing or emerging IT systems that might be able to support infection control in hospitals. The project team reported in 2003, identifying three potential systems.<sup>17</sup> However, the issue has been complicated by the wider IT development issues that have been taking place in the NHS. Following a meeting with the Information Authority the Department agreed that an evaluation of the three systems would be undertaken.

## Wider factors complicate prevention and control

2.29 *Winning Ways* acknowledges that infections in hospitals and other healthcare settings are a major problem for health services around the world, including the NHS. Modern healthcare has brought unprecedented benefits to patients, but has also increased the risk to patients of contracting infections. As have the major international events such as Severe Acute Respiratory Syndrome and the threat of bio-terrorism. Other factors within trusts are also making the task harder, including government targets and their impact on bed management practices, staffing shortages and the increased use of unqualified staff.

## Increasing antibiotic resistance and the number of outbreaks in hospitals have become a significant problem

2.30 Our earlier work and reports by the Department and House of Lords Select Committee on Science and Technology have highlighted the continuing and indeed growing problem of antibiotic resistance and the emergence of strains of multi-resistant bacteria that can complicate and indeed prevent recovery from surgical interventions.<sup>24,25</sup> Gastro-intestinal viruses can also spread quickly through a hospital if not controlled effectively. Infection outbreaks place significant demands on the infection control teams and can impact significantly on the running of the hospital, necessitating the closure of wards, bays and, in rare cases, whole hospitals.



## CASE STUDY C

### Action taken to quantify the burden of and improve the management of gastroenteritis outbreaks in hospitals in Avon, England

#### Situation

A team of researchers and clinical staff headed by the Gastrointestinal Diseases Division at the Health Protection Agency Communicable Disease Surveillance Centre and the Avon Health Protection Unit sought to quantify the burden of outbreaks of gastroenteritis in three acute NHS Trusts in the Avon area over a 12 month period, from April 2002 to March 2003. The findings were presented at the Infection Control Nurse Association Conference in Telford, England in September 2003, and at the International Conference on Emerging Infectious Diseases in Atlanta, USA in 2004.

#### Action

Active surveillance was undertaken in order to capture complete and high quality data from the United Bristol Healthcare, North Bristol and the Royal United Hospital Bath NHS Trusts. Four major acute hospitals and eleven community hospitals were monitored under the surveillance network. There are a total of 2900 acute beds in these hospitals, which, on average maintain 95.6% occupancy. A strict definition of an outbreak, comprising of a series of cases, was employed. When an event occurred meeting this definition, specimens were taken for microbiological analysis and the outbreak details were recorded.

#### Outcome

A total of 227 hospital unit outbreaks, involving 2154 patients were recorded, and 158 of these units were closed to new admissions across various specialties. Norovirus was found to be the predominant aetiological agent in the outbreaks where specimens were taken.

The total cost of bed-days lost and staff absence was £1.97 million, or £657,000 per Trust. The true costs are likely to be higher given that medical staff were also affected, and that other costs will also be incurred for additional cleaning, further bed blocking due to delayed discharge and increased drug prescribing. The impact on patients will also be considerable, particularly as many surgical specialties were affected which will impact on waiting times for surgical interventions.

Comparisons were made to assess the impact of closing a unit. Although closing hospital units is a costly measure, the results showed that it is an effective way to control the duration of an outbreak. Units closed within the first three days of an outbreak were contained significantly faster than those units which were not closed, or closed after the fourth day (7.9 versus 15.4 days,  $p=0.0023$ ).

2.31 Ward and bay closures as a result of infection problems are rising. Two-thirds of trusts had ward closures because of infection problems in 2000-01 increasing to four out of five trusts in 2002-03. In 2000-01 the average number of ward closures was 3.6, rising to 5 in 2001-02 and 9.4 in 2002-03. The closure of bays has also risen significantly but closure of whole hospitals due to infection is rare, with only one per cent of trusts reporting that the whole hospital had to be closed to admissions. Many ward and bay closures have been as a result of MRSA, but more frequently due to gastroenteritis (principally as a result of norovirus) which a number of trusts consider to be endemic and to have produced unprecedented problems during 2002-03. **Case study C** identifies how closing a ward can be the most effective option for a trust.

Other priorities are making the task harder

#### Performance targets

2.32 Given the pressure on meeting performance targets, recommendations to close a ward can have significant implications. Twelve per cent of infection control teams reported that their recommendation to close a ward or hospital to admissions for the purpose of outbreak control was refused or discouraged by their chief executive. Two per cent of teams also reported that their strategic health authority had refused or discouraged their recommendation. A number of strategic health authorities have responded to this problem by encouraging collaboration between trusts in their area so as to minimise the impact of an outbreak. Others noted that they would only override a trusts' decision if there was evidence of mismanagement of the outbreak.

## CASE STUDY D

### Development of an MRSA-Free Zone in Elective Orthopaedics at Mid-Essex Hospital Services NHS Trust

#### Situation

In April 1998, an orthopaedic unit was moved from a dedicated orthopaedic hospital to a district general hospital. The result was an increased MRSA acquisition rate of patients on the elective ward, and it was hypothesized that this was associated with elective orthopaedic beds being used indiscriminately by emergency patients. During the year 2000, 29 new cases of MRSA were identified, one resulting in the death of the patient.

#### Action

The Trust Board were advised that the British Orthopaedic Association guidelines should be followed, separating elective from emergency work and introducing an MRSA free zone.

- Strict admission criteria were introduced for elective orthopaedics and no inter-hospital transfers were allowed. All patients due to have elective orthopaedic surgery were screened at a pre-admission clinic for both MRSA and methicillin sensitive *Staphylococcus aureus* (MSSA). Any MRSA positive patients were given eradication therapy and admitted onto one of the trauma wards for surgery rather than the elective ward. Glycopeptide prophylaxis was used in addition to the usual cefuroxime. Patients who were MSSA positive were also given pre-surgery eradication therapy, but allowed on the elective ward. The practice of admitting day cases to the elective ward was stopped.
- A strict dress and behaviour code was also introduced into the elective ward.

- Empty beds on the elective ward were "fed" from the trauma ward, taking patients known to be MRSA negative after screening. Not all trauma ward patients were screened, only potential transfer candidates.
- Senior staff had ownership and involvement in designing and delivering the policy.
- Use of bank and agency staff were minimised and nursing agencies were informed of the strict policy that had been applied and that all staff were expected to comply with the standard set.
- A strict behaviour and dress culture were introduced in the theatre area. Only essential staff members were allowed into theatre, and those who did go were expected to behave in accordance with the British Orthopaedic Association Guidelines.

#### Outcome

In the year prior to ring-fencing, 417 lower limb arthroplasties were performed. In the year after ring fencing, due to more predictable bed management and fewer complications, 488 lower limb arthroplasties were performed. This demonstrated a 17% increase in number of patients undergoing arthroplasty without increasing theatre capacity or number of beds.

The total number of all infections (including UTI, chest, superficial or deep surgical site wound infections etc.) in post-operative patients reduced from 43/417 prior to ring-fencing (9 of which were MRSA) to 15/488 after the introduction of ring-fencing ( $p < 0.0001$ ). There were no cases of MRSA in arthroplasty patients after ring-fencing.

#### Bed management practices

2.33 In 2000, the Committee noted that some hospitals were operating at very high levels of bed occupancy, and that this compromised good infection control practice. They recommended that infection control should be an integral part of trusts bed management policies.<sup>2</sup> The Department noted that although average bed occupancy levels were around 83.1 per cent in 1999-2000, the NHS Plan's provision for additional beds should enable the occupancy rate to reduce to 82 per cent by 2003-04 and that this would significantly improve bed availability and the management of emergency and elective workloads.<sup>10</sup>

2.34 Figures published by the Department of Health for 2002-03 based on total bed occupancy showed that 71 per cent of trusts are still operating at occupancy levels of more than 82 per cent. High bed occupancy

levels were also observed in our survey, with the average bed occupancy in orthopaedic and vascular directorates being 89 and 91 per cent respectively. Our research on performance indicators confirmed that lower bed occupancy rates were associated with lower MRSA rates in 2002-03, higher PEAT scores, higher levels of risk assurance across the controls assurance standards, and higher star ratings (Appendix 6).

2.35 Seven out of ten orthopaedic and three-quarters of vascular directorates say that changes in bed management practices since March 2000 have affected patient care. For example 47 per cent of orthopaedic and 53 per cent of vascular surgeons reported that the frequency of moving patients within the hospital has increased during 2002/03, increasing the risks of infection. Over half of all orthopaedic directorates noted

that separating elective and non-elective patients was key to improving patient care and reducing the risk of infection (see **Case studies D and H**) but many had real problems achieving this, and a further 23 per cent felt their patients were often placed on other wards or other patients were placed on their wards increasing infection risks. A third of infection control teams felt that shortage of beds reduced the time available for pre-operative care and that this was compounded by the having to ensure accommodation in single sex wards.

2.36 Many of the survey responses from trust senior management identified difficulties reconciling the management of hospital acquired infection with the fulfilment of government performance targets. Almost 50 per cent reported that waiting times for inpatient treatment had caused conflicts, one third that trolley waits in accident and emergency departments caused conflicts, and one in ten experienced difficulties in reconciling the management and control of hospital acquired infection with other targets.

#### Provision of isolated facilities

2.37 In our original report, we found that isolation facilities in some NHS trusts had been significantly reduced and that many infection control teams believed that facilities for isolating patients were unsatisfactory, especially in constraining efforts to deal with MRSA.<sup>1</sup> The Committee of Public Accounts specified that increased investment in isolation facilities was required.<sup>2</sup> In 2001, the Department assured the Committee that the need for isolation facilities was being addressed.<sup>10</sup> However in 2003, we found that while 56 per cent of trusts had undertaken a risk assessment to determine the number and quality of isolation facilities in the last three years, only a quarter had obtained the required facilities. These were generally as a result of a trust new build project.

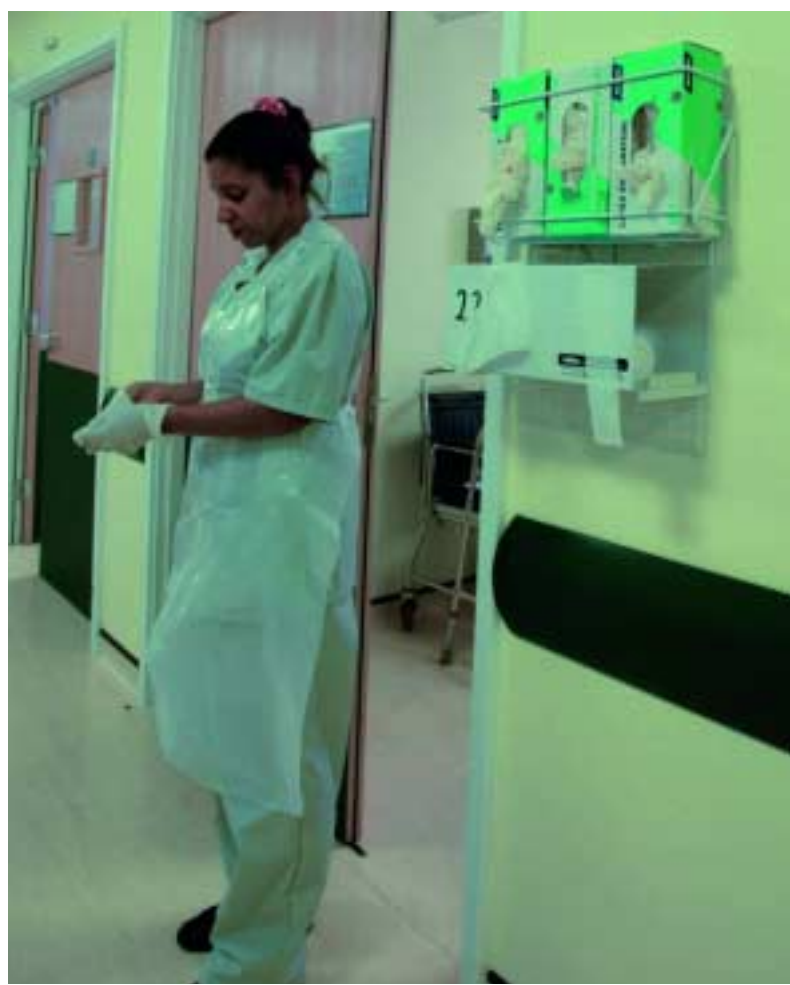
#### Staffing issues

2.38 Despite the overall increases in the number of clinical staff working in the NHS, staff shortages and reliance on temporary agency staff is a continuing issue for many trusts, particularly in London. Both have been shown to impact on good infection control practice, as does the increased used of unqualified staff.<sup>26</sup> Our analysis of performance indicators shows that the level of MRSA in a trust tended to be lower in those trusts that had identified higher levels of risk assurance in their self assessment against the human resources controls assurance standard. Also trusts which have improved their MRSA scores were noted to have lower levels of staff sickness as indicated by higher staff sickness grade scores (Appendix 6).

#### New NHS funding arrangements

2.39 Under Shifting the Balance of Power, primary care trusts now control a large proportion of the health budget and are responsible for commissioning services from NHS acute trusts. Our review of a sample of PCTs suggests that infection control services are incorporated as an overhead into other commissioned activities. There is a risk that the attention of trusts will be directed at ensuring the effective implementation of other operational responsibilities under these new arrangements and that resources needed for effective prevention and control of infection could be undermined.

2.40 Further risks may arise as a result of the forthcoming Patient Choice initiative and the national pricing tariff for treatment which is being piloted during 2004-05 and which will be rolled out in 2005-06. Tariff pricing assigns a price to each type of surgery based on historical information on the costs of different types of interventions. The funding that trusts receive for an operation will be the same regardless of whether any complications arise which may result in an increased length of stay. For example hospital acquired infections increase length of stay by an average of 11 days. These developments may also affect the resources that trusts are prepared to invest, or have available to invest, in preventing infection. However, opportunities may also arise from these initiatives, as trusts will be paid the national tariff for all spells, and there will be an incentive to reduce their costs by minimising length of stay in which hospital acquired infection is a main contributor.



# Part 3

## Despite some local improvements the NHS still lacks sufficient information on the extent and cost of hospital acquired infection

- 3.1 Research shows that surveillance, involving data collection, analysis and feedback of results to clinicians is central to detecting infections, dealing with them, and ultimately reducing infection rates. Our original report concluded that the lack of comparable data on rates and trends of infections limited NHS trusts' understanding of infection problems. We noted that the Nosocomial Infection National Surveillance (NINSS) Scheme, launched in 1996<sup>iii</sup>, was starting to show the benefits of surveillance and recommended that the Department should build on the success of the Scheme and encourage more trusts to participate. The Committee of Public Accounts concluded that the NHS did not have a grip on the extent and costs of infection and recommended that NINSS should be made mandatory for all trusts.
- 3.2 We also reported that hospital acquired infections were costing the NHS £1 billion a year, and that there was scope for a fifteen per cent reduction, achieving annual savings of £150 million a year. The Department accepted that significant reductions with associated costs savings should be possible but did not expect to see any tangible measurable progress until 2003. The Committee recommended that such progress was essential if the NHS was to meet their duty and commitment to patients.
- 3.3 This part of the report shows that to date, there has been little improvement in information on the extent and cost of hospital acquired infection, and many of the key estimates remain as presented in our original report (Figure 5). Whilst the Department has collected three years of data on MRSA bloodstream infections, the decision not to develop NINSS but to develop other mandatory reporting systems means there is still a lack of robust information on the majority of infections at both the local and national level. As a result it is still not possible to say whether there has been any tangible measurable progress. Indeed the information available from those trusts who continued with NINSS suggests that the degree of improvement has been small. The lack of ownership of surveillance data by clinicians is likely to be one of the main reasons.

### There is still no comprehensive mandatory surveillance scheme

#### A changed approach to national surveillance

- 3.4 Following our 2000 report, the Department established a Healthcare Associated Infection Surveillance Steering Group (HAISSG) chaired by an NHS Chief Executive to provide the Department with urgent recommendations on infection surveillance needs at local, regional and national level. This Committee was charged with building on and improving the limited coverage of NINSS and sub-groups were formed for post-discharge surveillance, orthopaedic surgical site infection surveillance and hospital acquired bacteraemia. Instead of making NINSS mandatory as recommended by the Committee of Public Accounts, the Department decided to adopt a new national approach to surveillance, starting with mandatory laboratory based MRSA bloodstream infection surveillance in April 2001.
- 3.5 In September 2002, the Steering Group was disbanded and responsibility for implementing their recommendations on surveillance was given to the new Health Protection Agency, including completing the development and roll out of the other mandatory surveillance modules being piloted by the various sub-groups of HAISSG. These developments differed from that envisaged by the Committee of Public Accounts. Instead of developing mandatory specialty specific surveillance of bloodstream, surgical site and urinary tract infections whose information would be fed back to clinicians to improve practice, the Department focussed on trust wide surveillance of MRSA bacteraemias and other specific organisms, together with plans for mandatory reporting of orthopaedic surgical site infection. A chronology of the developments in national surveillance is detailed at Appendix 7.

<sup>iii</sup> The aims of the Nosocomial Infection National Surveillance Scheme (NINSS) were:  
 ■ to improve patient care by assisting hospitals to change clinical practice and reduce rates and risk of hospital acquired infection; and  
 ■ to provide national statistics on hospital acquired infection for comparison with local results.<sup>1</sup>



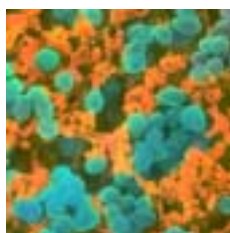
**5 The top five ways that hospital infections can be acquired and their estimated prevalence levels**



Blood infections (bacteraemias: 6% of all hospital acquired infection)



After surgery (11% )



Urinary infections (23%)



chest infections (23%)



skin infections (10%)

**Ten key points about hospital acquired infections**

- at any one time 9 per cent of hospital patients has an infection caught in hospital;
- there are at least 300,000 hospital acquired infections a year;
- they are estimated to cost the NHS around £1 billion a year;
- they can mean 11 extra days in hospital (2.5 times longer than uninfected patients);
- the old and young and those with weakened immune systems due to illnesses are most at risk of catching one;
- the two strongest risk factors are the degree of underlying illness and the use of medical devices;
- there has been an increase in the number and frequency of infections resistant to common antibiotics for example the proportion of *Staphylococcus aureus* blood isolates resistant to methicillin (ie MRSA) was almost 40% in 2003, compared with just over two per cent in 1992 (figure 6), and is amongst the highest levels in Europe;
- hospital acquired infections may kill: a crude estimate suggests as many as 5,000 patients may die annually as a result of a hospital acquired infection (death certificates mentioning MRSA as a cause increased from 53 in 1993 to 800 in 2002)
- not all hospital acquired infection is preventable but in our 2000 report, we noted that infection control teams believed that they could be reduced by up to 15 per cent, avoiding costs of some £150 million; and
- the degree of improvement has been small, for example trend data on over 60,000 operations in six categories of surgery, collected between 1997-2003 shows that while 12% of hospitals had reduced their rates of surgical site infections, 3% had increased and the vast majority whilst there was no evidence of trend, most had close to or below the pooled mean.

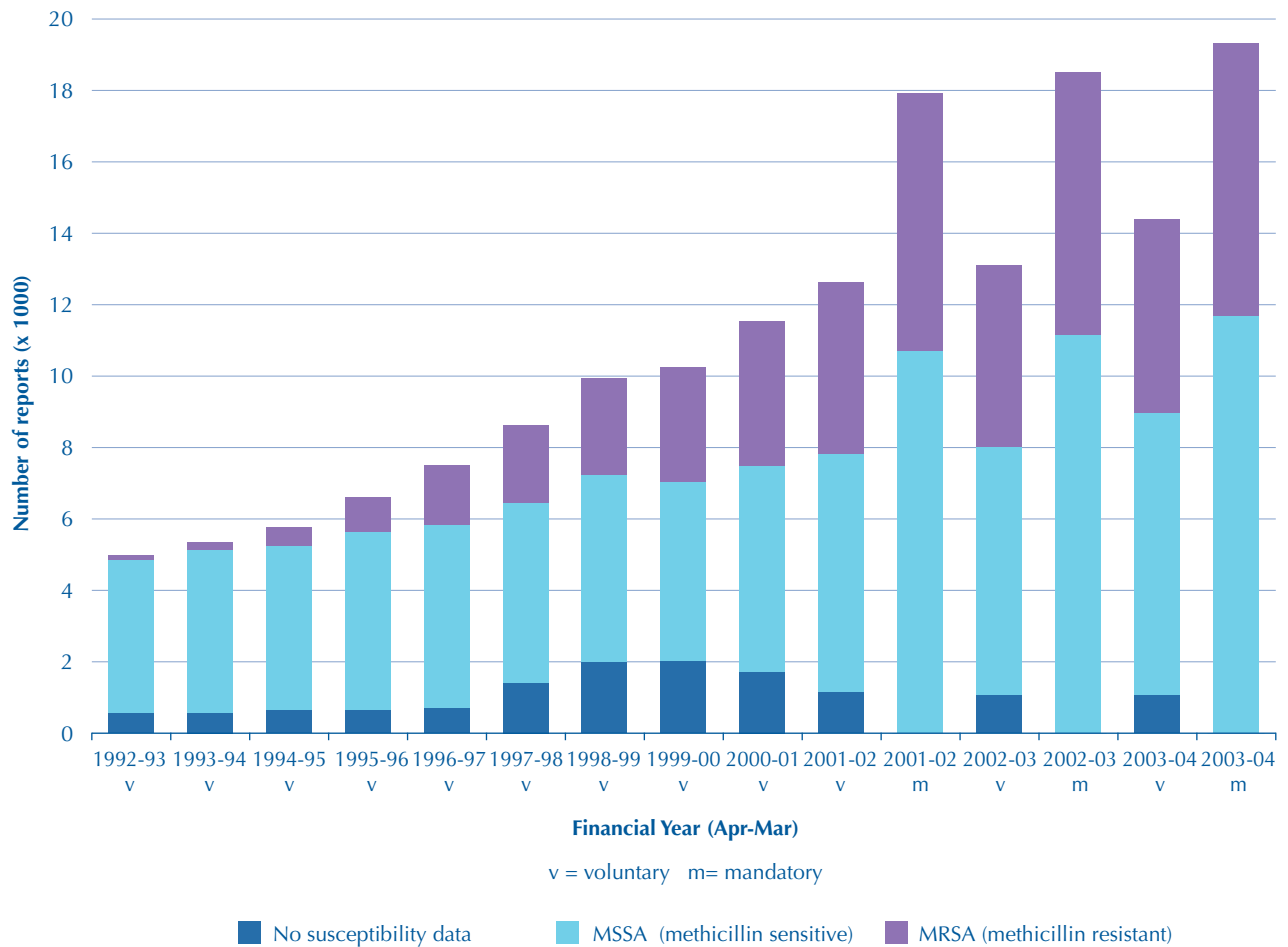
Source: National Audit Office, Health Protection Agency and London School of Hygiene and Tropical Medicine

MRSA laboratory based surveillance data shows an increase in the frequency of infections that are resistant to common antibiotics with wide regional variations

3.6 The decision to focus on MRSA surveillance reflected the Department's substantial concerns about the growth in both the number of *Staphylococcus aureus* infections and, more importantly, in the proportion that were methicillin resistant. These concerns had been the focus of a number of enquiries by the House of Lords Select Committee on Science and Technology and were supported by evidence from the Public Health Laboratory Services Communicable Disease Surveillance Centre's voluntary reporting system which showed year on year increases in both the number of such infections and more importantly, in the proportion that were methicillin resistant (Figure 6).

3.7 Since the introduction of mandatory reporting the increase in the numbers of *Staphylococcus aureus* infections has continued (from 17,933 (7,250 MRSA) in 2001-02 to 19,311 (7,647 MRSA) in 2003-04 - Figure 6). An analysis of aggregate data by region, by type of hospital, shows that overall specialist hospitals have decreased their rates but that in five regions, the aggregates data on general acute hospitals shows a significant increase in both MSSA and MRSA rates (CDR Report 16 July 2004). Some individual general acute hospitals within these regions could well have reduced their rates. The Health Protection Agency is undertaking additional analysis to identify performance at trust level. The European Antimicrobial Resistance Surveillance System data for 2002 showed that the United Kingdom has amongst the highest levels of MRSA in Europe (see map opposite page 1). Researchers from St. George's Hospital, London and the Health Protection Agency also found that 77 cases of MRSA were reported in children under 15 in 2000, compared to only four cases in 1990.<sup>27</sup>

## 6 Number of *Staphylococcus aureus* bacteraemias reported under the voluntary and mandatory surveillance schemes



### NOTES

- The voluntary reporting scheme shows a year on year increase of MSSA, mainly as a result of more laboratories joining the voluntary scheme and improved reporting overall. At the same time the proportion of MRSA to MSSA bacteraemias has increased year on year, indicating a real increase in MRSA bacteraemia infections.
- The introduction of the mandatory MRSA bacteraemia reporting scheme in April 2001, which operates alongside the voluntary scheme, shows that the voluntary scheme has a degree of under-reporting. The three years of mandatory reporting shows that MSSA has increased year on year and MRSA has increased by 4.8% in the last year.

Source: Health Protection Agency Communicable Disease Surveillance Centre

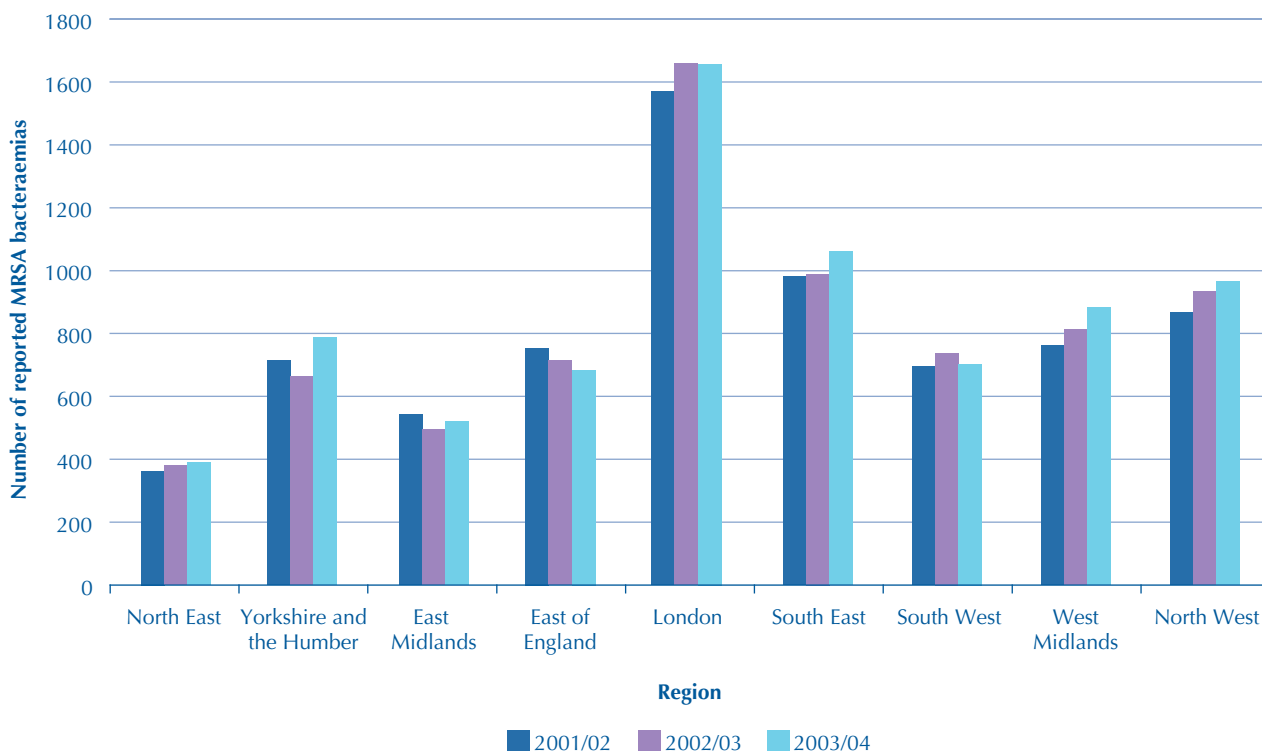
3.8 MRSA bacteraemia mandatory surveillance data for 2002-03 showed that in some general acute NHS trusts, rates were up to 7 times higher than others. A comparison of the first three years of mandatory reporting (Figure 7) shows that there are also marked regional variations, with the highest rates recorded in London. The South East, North West, North East and West Midlands have seen year on year increases, whilst East of England is the only region to show year on year decreases (CDR Report 16 July 2004).

3.9 MRSA is a particular problem in high risk patients such as those in intensive care, haematology and oncology, where the use of invasive techniques and intravascular devices are more common. A subgroup of the HAISG was set up to explore the feasibility of expanding the current national surveillance scheme on MRSA to one specifically designed to obtain information on catheter

related bloodstream infection in Intensive Therapy Units (ITUs). A three month pilot surveillance exercise took place in 2003 in three ITUs in England, this was then expanded into a further pilot phase in six ITUs. The results are expected to be reported in autumn 2004 but early indications show that the subgroup believe the scheme may be feasible at a local level.

3.10 A third of infection control teams told us that mandatory reporting of MRSA bacteraemia has led to an increased awareness of infection control issues by clinical staff, and two out of five reported that it had led to a review of clinical practice, for example intravenous (IV) line insertion and management. However, the main benefit appears to be increased senior management awareness of infection control issues (70 per cent of infection control teams).

**7 Regional analysis of the number of methicillin resistant *Staphylococcus aureus* bacteraemias for each of the first three years of mandatory reporting**



**NOTE**

Based on three years results of mandatory reporting of MRSA bacteraemias in acute NHS Trusts in England.

Source: Health Protection Agency Communicable Disease Surveillance Centre

3.11 The main concerns on mandatory MRSA surveillance were that the denominator data was inappropriate as it was collected across the whole hospital, and as a result, clinical staff did not relate to it, and trust management considered it to be a problem for the infection control team rather than clinicians. Infection control teams and clinicians suggested that MRSA bacteraemia rates needed to be part of star ratings if the information was to be taken seriously, while noting that the rates alone are not an indicator of the efficacy of infection control programmes as the infections were not necessarily acquired in hospital. Improvements in MRSA bacteraemia rates were included in the star ratings for 2002/03, but have not been included as an indicator for 2003/04. Nevertheless mandatory surveillance has increased the profile of infection and hand hygiene as an intervention.

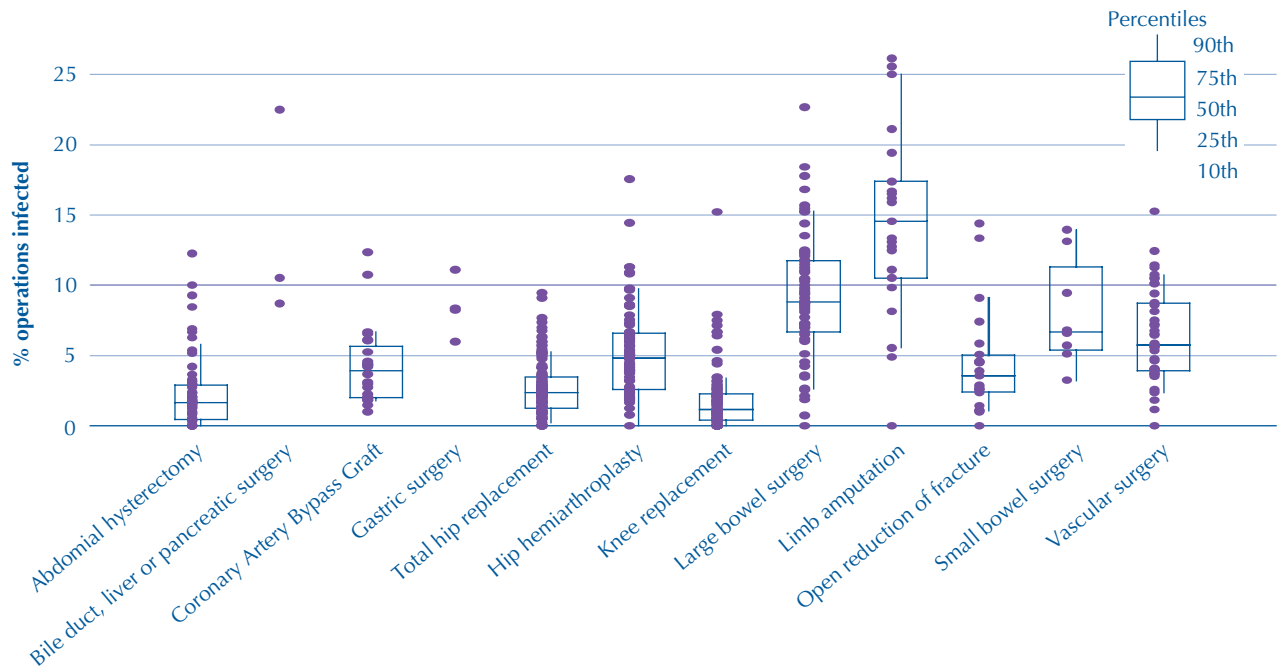
In the absence of a national mandatory reporting system for surgical site infections, clinicians have continued to participate in voluntary surgical site infection surveillance

3.12 In the absence of a national mandatory surgical site surveillance scheme, voluntary participation in NINSS (now known as the Surgical Site Infection Surveillance

System) continued and indeed has increased year on year. By December 2003, the Health Protection Agency had data on around 150,000 operations from some 178 hospitals. The box and whisker plot at **Figure 8** shows the wide variation in infection rates between participating hospitals and the potential for reduction in rates. This information is fed back to trusts and outliers would be expected to investigate the underlying reasons, including the extent to which case mix is a factor.

3.13 Given the wealth of data collected over the last six years we worked with the Surgical Site Infection Surveillance Service of the Health Protection Agency to investigate trends. **Figure 9** shows that the seven largest surgical categories accounted for some 140,000 operations from 175 hospitals and 349 sets of surveillance data from 125 hospitals that had participated in three or more surgical site surveillance periods. An analysis of the trends in these latter hospitals shows that 12 per cent of hospitals with initial high rates of surgical site infection, had reduced their rates; in 3 per cent the rate had increased and, in the vast majority whilst there was no evidence of a trend, most had rates that were close to or below the pooled mean (**Figure 10**).

**8** Distribution of the incidence of surgical site infection by category of surgical procedure. Data collected between October 1997 and December 2003



**NOTES**

- 1 The Surgical Site Infection Surveillance Service (formerly NINSS) has collected data on surgical site infections in twelve categories of surgical procedures since October 1997. Participating hospitals collect data according to standard surveillance methods and case-definitions. In acknowledging the resource intensity of this surveillance and the need to target activity according to local priorities, the scheme was designed to be flexible. Hospitals were able to collect data in their chosen categories of surgical procedures for minimum 3-months periods, while still allowing for continuous surveillance.
- 2 Each point represents the incidence of surgical site infection for a participating hospital contributing data on at least 30 operations. Percentiles are only shown where at least 10 hospitals contributed sufficient data. Hospitals outside the 10th and 90th percentile represent outliers. This surveillance has demonstrated significant variation in rates of SSI between hospitals.

Source: Surgical Site Infection Surveillance Service, Health Protection Agency

**9** Number of participating hospitals and operations in the seven largest surgical categories

Type of surgery	Hospitals with 3+ surveillance periods			
	No. of hospitals	No. of operations	No. of hospitals	No. of operations
Total hip prosthesis	140	43,805	93	40,880
Hip hemiarthroplasty	121	14,751	65	13,376
Knee prosthesis	127	32,786	87	30,568
Large bowel	67	11,446	35	9,142
Abdominal hysterectomy	76	10,715	32	7,676
Vascular	48	6,678	26	5,204
CABG <sup>1</sup>	24	19,445	11	15,697
<b>Total</b>	<b>178</b>	<b>139,626</b>	<b>125</b>	<b>122,543</b>

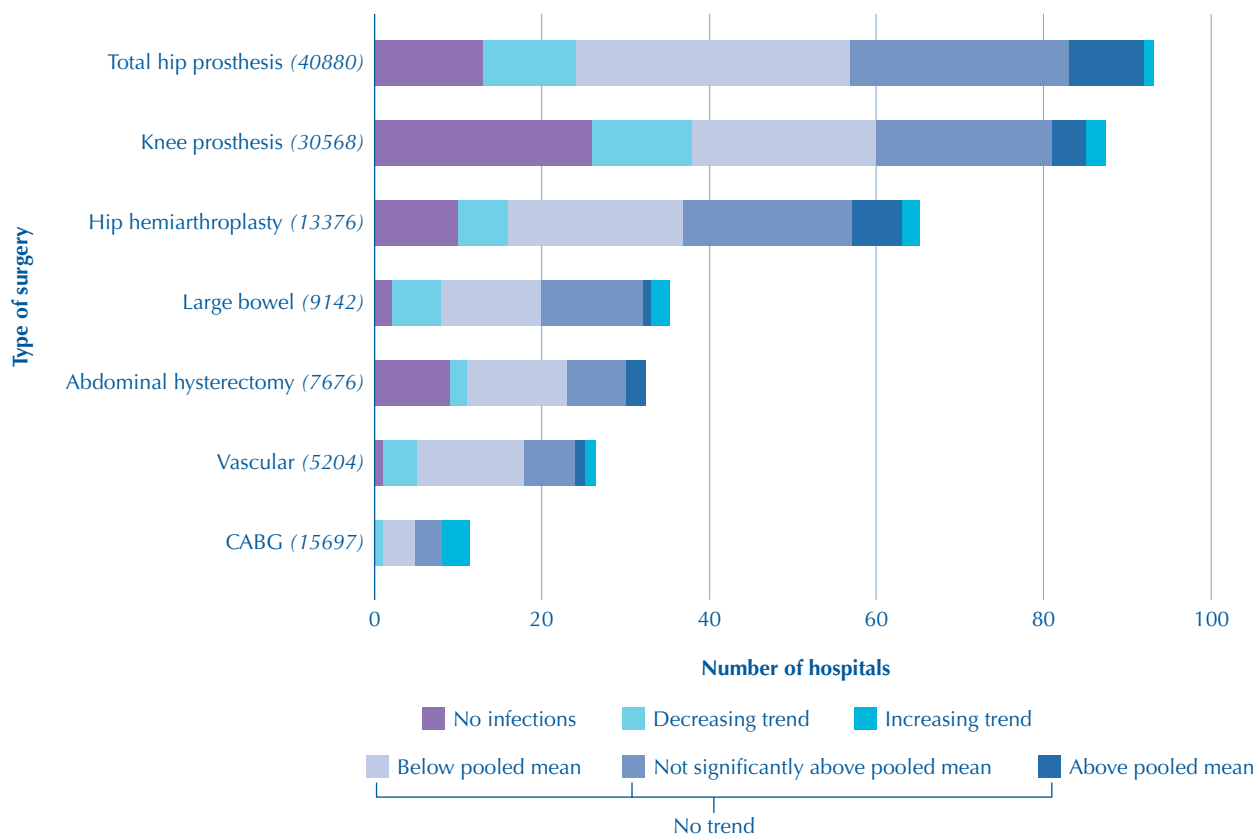
**NOTE**

- 1 Coronary artery by-pass graft.

Source: Surgical Site Infection Surveillance Service, Health Protection Agency



**10 Summary of trends in rates of surgical site infection from hospitals participating in 3 or more periods of surveillance between October 1997 and December 2003**



**NOTE**

Trend analysis on 349 sets of surveillance data show that there has been a statistically significant decreasing trend in 42 (12%) hospitals. Most hospitals (235; 67%) had no evidence of trend and in most of these (212 hospitals) the rate was close to the pooled mean infection rate. In a small number of hospitals (11; 3%) there was an increasing trend in infection rates and the rest had no infections.

Source: Surgical Site Infection Surveillance Service, Health Protection Agency and the National Audit Office

3.14 These analyses provide useful information about distribution of rates and trends in rates of surgical site infections, however they do not take into account any patient or surgical risk factors. Detailed investigative work is necessary to understand cause and effect and to identify wider lessons that might be relevant to other hospitals. In March 2004 the Department commissioned the Health Protection Agency to work with trusts to develop tools to investigate infection rates.

**There has been limited progress in developing post-discharge surveillance**

3.15 In our 2000 report we identified between 50 and 70 per cent of surgical wound infections occurred post-discharge but that only a quarter of infection control teams were carrying out any post-discharge surveillance and that there had been no systematic evaluation of the reliability of different methods. The Department told the Committee that they had commissioned some research and expected to have the results in late 2000. The Committee recommended that these infections should be monitored through NINSS.

3.16 The research results in September 2000 showed that patient reporting augmented by health care professional reporting achieved the best results. However, the very elderly, younger age groups, patients from ethnic minorities and those undergoing certain operative procedures are likely to be under-represented. In the light of the changes to national surveillance, a HAISSG sub-group was established to take forward work on post-discharge surveillance. They focused on piloting a programme for surveillance of surgical site infections after caesarean sections (the outcome has yet to be determined).

3.17 We found that only 21 per cent of infection control teams had carried out any post-discharge surveillance since our last report. The most common methods were: telephone follow-up (40 per cent); general practice reporting (23 per cent); patient completed questionnaires (20 per cent); and out-patient follow-up (23 per cent). In addition, three-quarters of orthopaedic and vascular clinical leads noted that they carried out a form of post-discharge surveillance, as part of their routine clinical follow-up of patients. However,

information would generally be recorded in the patient's notes and not held centrally nor analysed. **Case study E** illustrates how one trust has demonstrated improvement in rates through its post-discharge surveillance.

## Other countries have adopted broadly similar approaches to surveillance

3.18 All of the countries in our comparison of international practice have established surveillance programmes that are managed and conducted by either government agencies or University Departments.<sup>16</sup> The most mature is the National Nosocomial Infections Surveillance (NNIS) System operated by the Centre for Disease Control and Prevention in the USA. This has influenced the developments of the definitions and data collection systems in the other countries included in the review, including the United Kingdom. While all are broadly comparable, in terms of methodology, variations in protocols and numbers and frequency of hospital participation make direct comparison unreliable, although the best available data to date are summarised in Appendix 3.

3.19 Northern Ireland, Scotland and Wales recently collaborated to produce a report on the surveillance of surgical site infection related to procedures performed by orthopaedic surgeons in the three countries.<sup>28</sup> The combined dataset from 2001 to 2003 of some 15,213 patient episodes will be used to develop infection control plans in orthopaedics and represents a major joint initiative to provide support to clinical teams in this area.

## Cost information has not improved

The £1 billion that hospital acquired infection is estimated to cost the NHS and the 5,000 deaths that result are still the best estimates available

3.20 In 2000, using information from the London School of Hygiene and Tropical Medicine (LSHTM)<sup>29</sup>, we noted that hospital acquired infections may be costing the NHS £1 billion a year. While recognising that attributing costs is complex and uncertain, this remains the best estimate of the overall cost to the NHS currently available. The main determinants of this costing were that patients with a hospital acquired infection incurred hospital costs that were on average three times those incurred by uninfected patients, equivalent to an additional £3,000 per case and on average stayed in hospital 2.5 times (or 11 days) longer. As the study only included adult non-day cases, the full national costs of hospital acquired infection are likely to be even higher.

3.21 We asked infection control teams if they had performed any similar economic evaluations. Eleven per cent of trusts told us that they had performed a calculation based on the LSHTM method using the extended length of stay cost estimates, and 16 per cent that they had performed some other economic evaluation. These showed a variety of results, but all demonstrate the significant burden of hospital acquired infection. For example:

- A student project at Blackpool Victoria Hospital NHS Trust (now Blackpool Fylde and Wyre Hospital NHS Trust) calculated that the full cost of hospital acquired bacteraemia in general surgical and ITU patients over a 12 month period was £491,984;
- At Brighton and Sussex University Hospitals NHS Trust, the additional cost for 9 orthopaedic patients with deep wound infections was calculated as £231,810 (see **Case study H**);
- University Hospital Lewisham NHS Trust estimated the cost of MRSA as £1.5 million per annum, and St Mary's that Clostridium Difficile, could be costing them upto £1.6 million; and
- A team of researchers in conjunction with three trusts in the Bristol and Avon area have performed a study to estimate the economic burden of gastrointestinal outbreaks for the period 2002-2003. This estimated the cost as £657,000 per trust (see **Case study C**).

3.22 Hospital acquired infections not only complicate illness, cause anxiety and discomfort but they can lead to disability and even death. In 2000, we noted that the Department's 1995 guidance estimated that as many as 5,000 deaths may occur each year as a direct result of contracting an infection whilst in hospital, with 15,000 deaths where infection was a contributory factor.<sup>1</sup>

3.23 In 2002<sup>30</sup> and 2004<sup>31</sup> research projects funded by the Office for National Statistics and the Health Protection Agency (PHLS in 2002) used mortality data to examine the extent of deaths due to MRSA. Such data are not routinely identified as there is no International Classification of Diseases code for MRSA (or indeed for any other hospital acquired infections). Therefore death certificates mentioning MRSA were manually examined. The reviews concluded that the number of deaths which mentioned MRSA increased from 51 in 1993 to 800 in 2002, representing a 15 fold increase during this period.

## CASE STUDY E

### Post discharge wound surveillance at the University College Hospital, London

#### Situation

The increasing emphasis on accountability and performance in the NHS has resulted in a pressure to provide indicators of surgical performance. There are many pitfalls in these comparisons and they are potentially misleading if post discharge surveillance is not performed or different definitions of infection are compared. However, consistent audit of wound infection rates and feedback to the surgeons is known to be effective in reducing infection rates over a period of 5 years<sup>i</sup>. At the University College Hospital London (UCLH), surveillance was performed in some surgical units but was incomplete and erratic as it depended on busy staff with a high rate of turnover. Compliance with Controls Assurance and CNST standards also needed to be improved.

#### Action

Surgical wound surveillance started at UCLH in May 2000 using a grant from the Special Trustees and three full time surveillance staff. In April 2002 the Trust took over the financial support of the project by "top slicing" from the surgical directorates' budgets to fund four full time surveillance staff. The reaction of the surgical directorates to providing the funds was initially mixed, but evidence of demonstrable savings have since overcome their reservations. Part of the cost of surveillance was offset by the fact that the existence of a comprehensive surveillance system helped to achieve a higher level of compliance in the Clinical Negligence Scheme for Trusts, thereby reducing the insurance premium paid.

Cardiothoracic surgery was monitored continuously from April 2002 and neurosurgery from September 2002. Other specialties were monitored for six months in each year, i.e. general, maxillofacial, plastics, obstetrics, gynaecology, urology and orthopaedics. Various methods were used including observation of the wound, questioning of staff, examination of notes, interfaces with hospital computer databases and contacting patients at 1-2 months after their surgery by post or telephone with a series of 9 questions concerning the wound and any treatment. Approximately 88 per cent of patients are followed up post-discharge using the above method.

Three nurses and one health care assistant were trained to collect the data but were not infection control nurses. Undergraduate students were used to enter the data into

the computer and collect follow up information by telephone. Patients were excluded if they stayed in hospital *less than two nights* or if the operation did not involve cutting of tissue (e.g. endoscopy only). Sufficient information was collected to allow wound infections to be defined using several different methods, including ASEPISIS<sup>ii</sup> wound scoring and the Centers for Communicable Disease (CDC) definition. Aggregated results were fed back to the surgeons, hospital administration and ward staff quarterly and surgeon specific rates were sent by post anonymised except for the addressee.

#### Outcomes

Between May 2000 and April 2003, 8329 patient records were entered into the database. There were reductions in thoracic surgery infection rates from 8.6% to 5.2%, and obstetrics from 4.5% to 0.8%, between the first and last years of surveillance. There were also significant decreases in infection rates in cardiac surgery and obstetrics between 2001 and 2002. There were no significant increases in any other specialty. Changes to screening and prophylaxis were key to the improvement in infection rates.

More recently, the rates of infection up to November 2003 have been reported for cardiac, thoracic, orthopaedic and urological surgery. Further reductions have been demonstrated, falling consistently each year since 2001. The changes were 11.2% to 6%, 8.5% to 3.4%, 7.2% to 0.9% and 7.2% to 2.6% respectively. The proportion of infections caused by MRSA has also fallen now to below rates in 2000.

Variations in consultant specific rates showed that higher rates of infection were associated with patient selection and in some cases, surgical technique (in which case the clinical director intervened).

Based on the validated assumption that wound infections could be reduced by 20% over 5 years, the information gathered suggests this would be an annual saving of £105,000, in addition to intangible cost savings due to improved quality of life, together with a reduction in the costs from loss of earnings, litigation and insurance premiums paid. The total budget for the programme is £91,600 per annum. However if the current rate of reduction is sustained, savings 2-3 fold higher can be expected.

<sup>i</sup> Haley RW. The scientific basis for using surveillance and risk factor data to reduce nosocomial infection rates. *J Hosp Infect* 1995;30 Suppl:3-14.

<sup>ii</sup> ASEPISIS stands for Additional treatment, Serious discharge, Erythema, Purulent exudates, Separation of deep tissues, isolation of bacteria, Stay as inpatient prolonged.

3.24 The Chief Medical Officer in *Winning Ways* announced plans to establish a national audit of deaths from healthcare associated infections which will investigate a proportion of deaths that occur to identify avoidable factors and lessons to be learned from them, although the details of the methodology have yet to be announced. Fundamental changes to the way in which deaths are certified have also been proposed, enabling death certification to be done electronically and information from patient records to be linked electronically to the registration. Thus cases in which hospital acquired infections may have played a role will be more clearly identifiable. There are also plans to introduce codes for antibiotic resistance in the international classification of diseases from 2006.

Clinical Negligence Claims mentioning Hospital Acquired Infections, in particular MRSA are increasing

3.25 Hospital acquired infections can lead to NHS trusts incurring costs as a result of clinical negligence claims. The Department told the Committee that while there was no centrally held information they believed that these costs were increasing. Since April 2002, information on all claims has been held by the NHS Litigation Authority although due to limitations of the claims database, they are often unable to differentiate between claims involving infections in general and infections acquired in hospital. Furthermore at present, only one cause can be recorded against each claim, so excluding cases where hospital acquired infection was a contributory factor.

**11** Number of clinical negligence claims where MRSA was mentioned as a main or contributory factor

Incident year	Number of claims	Reserves (damages and costs) £
1996-97	8	1,157,078
1997-98	11	1,052,502
1998-99	35	2,635,737
1999-00	44	4,027,820
2000-01	45	3,607,211 <sup>1</sup>
2001-02	26	1,556,274 <sup>1</sup>
2002-03	8	177,500 <sup>1</sup>

**NOTE**

1 A claimant has three years to bring a claim therefore the figures from 2000-01 onwards are not complete. To successfully litigate the claimant must show on the balance of probabilities that the infection was required as a result of a negligent act, which is often not the case with MRSA.

Source: NHS Litigation Authority

3.26 **Figure 11** details data provided by the NHS Litigation Authority on cases where MRSA was mentioned in the incident details recorded on the claims database. Unfortunately, this data cannot be refined to clarify whether it is being alleged that to acquire MRSA was negligent or whether it is recorded merely as a non-negligent complication of the initial act. This data shows that, by 1999-00, the latest year on which full claims data is available, the numbers of claims where MRSA is recorded as part of the outcome was increasing. The initial indications are that the upward trend is continuing. On 1 April 2004, the NHS Litigation Authority introduced a new database which will allow more risk management information to be recorded on each claim in the future. This will enable those claims where it is alleged that MRSA was acquired as a result of negligence to be identified separately.

3.27 Two thirds of chief executives told us that they were able to separately identify clinical negligence claims which were due to hospital acquired infection. Fifteen per cent of these had settled such claims, but the limited information that was supplied showed that the cost to the NHS between 2000-01 and 2002-03 for these 19 hospitals was some £2.659 million.

Though robust cost/benefit analyses are lacking, all available evidence continues to show prevention is better than treatment

Only a few trusts have carried out cost/benefit analyses to demonstrate the impact of improvements at trust level

3.28 Three in five infection control teams provided examples of infection control activities that had been successful in reducing rates. However only 5 per cent were able to quantify this. Similarly only 4 per cent of orthopaedic directorates and one per cent of vascular directorates had performed any economic evaluation of changes to practice that had improved the management and control of infection. Some specific interventions, for example changing antibiotic regimens were shown to have particularly positive cost benefits (see **Case study F**).



## CASE STUDY F

### Cost savings associated with the adoption of the Scottish Intercollegiate Guidelines Network (SIGN) on Antibiotic Prophylaxis in Surgery at Portsmouth Hospitals NHS Trust

#### Situation

The SIGN guidelines on the use of antibiotic prophylaxis in surgery was published in July 2000, as this was recognised as an area where there was greatest variation in practice across Scotland which might be addressed by evidence-based practice guidelines.

In 1994 at Portsmouth Hospitals NHS Trust, a Consultant Microbiologist and Infection Control Doctor formulated a policy on antibiotic prophylaxis with the general and vascular surgeons based on a single pre-operative dose. This was audited about a year later and showed good compliance. The Consultant was repeatedly unsuccessful in convincing the orthopaedic surgeons and they continued to use three doses (one pre and two post operatively). Over the years, several new consultants had been appointed and the policy of single dose in general surgery had drifted. This, together with the use of very prolonged courses of antibiotic therapy following ENT and head and neck surgery, and the increase in MRSA colonisation and post operative *Clostridium difficile* diarrhoea, convinced the Consultant that a more forceful approach to antibiotic control was needed.

#### Action

The SIGN guidance provides an authoritative basis for prophylaxis and draws on good quality research. It allowed the Consultant to state clearly which procedures needed prophylaxis and which did not, that a single dose was adequate and that repeated doses for prolonged surgery were generally unnecessary. Local guidance was written which included the antibiotics and dose, with alternatives

to use in circumstances of allergy and resistance. This was put out for consultation with a hyperlink to the SIGN guidance, so the full document could be read if need be.

Following consultation and with the support of the pharmacy department, the policy was presented to the district Formulary and Medicines Group which passed it. This has subsequently been ratified by the Clinical Governance Committee. This policy empowers pharmacists to cross off post operative doses of prophylaxis and to report any persistent transgression of the policy to the Consultant.

#### Outcomes

The major benefits of this policy are:-

- that junior doctors and anaesthetic staff know what is going to be given for a procedure, rather than it varying from consultant to consultant,
- reduced opportunity for colonisation of patients with resistant organisms; and,
- reduced direct costs of antibiotics. A three-dose regimen costs at least three times as much in drug and delivery costs as a single dose regimen. So for 1,000 procedures a month (the trust performed 722 major orthopaedic operations in November) at about £3 a dose, the annual costs are £36,000 for single dose as opposed to £108,000 for a triple dose.

The Trust plan to perform an audit of compliance with the new policy in Summer 2004.

Other non-UK countries have also had difficulties in evaluating the economic impact of hospital acquired infection

3.29 Up to date data on the economic impact of hospital acquired infection is lacking in most countries, with some referring to the economic costs that were estimated in the 1980's by extrapolating the results from

the SENIC study conducted in the USA. Published literature in the field concentrates on how economic analysis tools might be used to inform the issue rather than presenting analyses of the economic impact. What data do exist, concentrate on the direct cost of treatment (Appendix 3). All of the analyses conclude that the mean attributable costs of the infections were greater than the mean corresponding interventions.

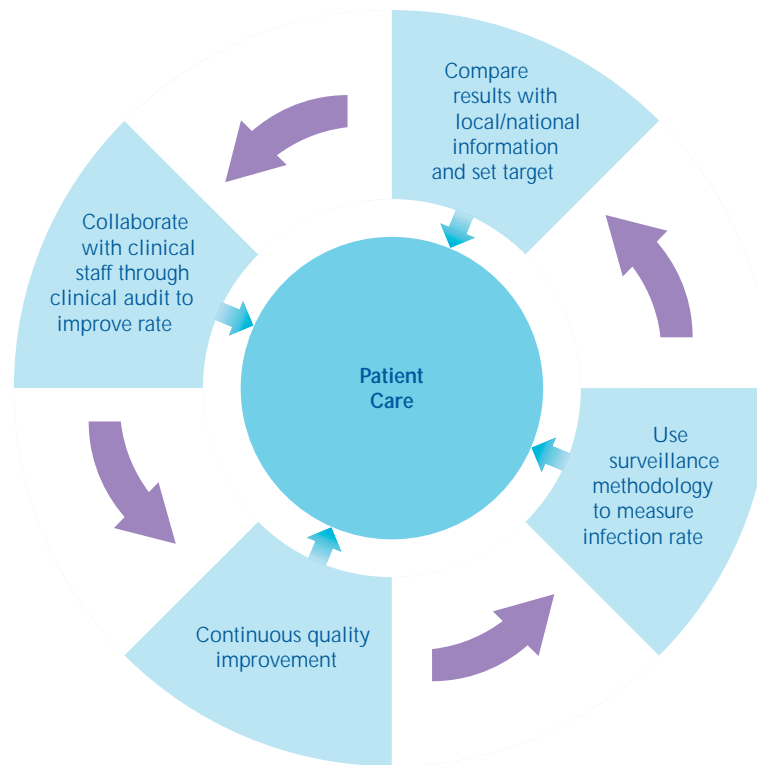
# Part 4

## Changing clinician and other staff behaviour in order to reduce risks requires multiple approaches to prevention

- 4.1 Despite the array of initiatives that the Department of Health have introduced and concerted efforts by infection control teams, hospital acquired infection remains a significant problem for the NHS. While *Winning Ways* sets out a clear direction on the actions necessary to reduce the levels of infection and curb the proliferation of antibiotic resistant organisms, it acknowledges that a plethora of previous guidance has not had the desired effect and that evidence based countermeasures of known effectiveness are not being implemented consistently or rigorously in many hospitals
- 4.2 The research on the staffing toolkit showed that it is possible to comply fully with the infection control standard and adhere to other guidance and still not reduce hospital acquired infection. This is partly because most of the guidance addresses the behaviour of the infection control teams who cannot directly affect clinical outcomes and also because this is a complex issue with infections constantly evolving. As emphasised throughout this report, infection control must be everyone's responsibility, from clinicians, cleaners and ancillary workers to patients and relatives, but evidence that this message has been adopted is scarce. This part of the report identifies some of the improvements that have been made and the constraints to better and more widespread compliance with prevention and control practices.
- 4.3 To target activities to improve practice, clinicians and other staff need robust comparable information on infection rates, costs and patient outcomes (Figure 12). However, 18 per cent of infection control teams are not carrying out any surveillance activities other than the mandatory MRSA bacteraemia surveillance. Thirty-six per cent of orthopaedic and 61 per cent of vascular directorates did not have data on rates and in these directorates over a third stated that they had no plans to do any surveillance in the foreseeable future.
- 4.4 Clinicians participating in our workshops agreed that it was necessary to measure rates of infection, but that it was important that the surveillance results were owned by the clinicians. They also felt that infection rates should be measured as part of the continuous measurement of all postoperative complications. Orthopaedic and cardio-thoracic surgeons suggested that there should be a single national scheme for each of their specialties that would record all significant complications including surgical wound infections. Orthopaedic clinicians thought this could be done as part of the National Joint Registry. Seventy per cent of orthopaedic directorates and 36 per cent of vascular directorates thought that ownership should be encouraged by having surgeon specific rates as part of the professional appraisal system.
- 4.5 Our survey showed that in those trusts that had access to comparative surveillance data, for example on MRSA or through participation in NINSS, higher than expected rates of infection had led to changes in practice and in turn a reduction in infection rates. Eighty-four per cent of orthopaedic surgeons and 93 per cent of vascular surgeons undertake regular peer review or audit of clinical practice, and many reported to have reviewed and/or changed their clinical practices as a result of surveillance or audit information. **Case study G** shows how a cardiothoracic unit in a London hospital reduced their rates of MRSA as a result of multiple intervention strategies, and **Case study H** shows how an orthopaedic unit in a district general hospital reduced their infection rates to zero as a result of a number of initiatives and changes in practice.
- 4.6 "*Winning Ways*" also calls for the new Inspector of Microbiology and the National Patient Safety Agency to ensure that techniques such as "Root Cause Analysis" are developed for healthcare associated infection to investigate the underlying causes. We will be examining this in more detail in our forthcoming report on "*Patient safety and organizational learning in the NHS.*"

### Better and more consistent information that is owned by NHS clinical staff is crucial to improving practice

## 12 Using surveillance data to improve the quality of patient care



Source: Health Protection Agency

### Reducing risks requires multiple approaches to prevention but barriers to effective practice remain

Despite implementation of hand hygiene campaigns and increased availability of hand gel, compliance is still patchy

4.7 The Committee of Public Accounts found it inexcusable that compliance with guidance on hand-washing was so poor, especially given the undisputed evidence that effective hand hygiene is vitally important in the control of infection. However, research evidence and experience suggest that failure to comply is rarely due to laziness or carelessness and that there are a large number of barriers to proper hand hygiene. Some are due to poor knowledge of guidelines or lack of education but other more important factors are inadequate facilities, time pressures and lack of access to hand hygiene agents.

4.8 An increase in hand-hygiene initiatives is one of the top three changes that trusts say they have implemented since the publication of our original report. We also found that alcohol hand rub is now much more widely available. For example all of the orthopaedic directorates responding to our survey, and all but one vascular directorate, said it was available on wards, and in about a third of directorates it was available at all beds. Some trusts have made non-compliance a disciplinary offence.

4.9 Whilst there is evidence of some improvements, particularly following local hand-hygiene initiatives, compliance with good practice is not always sustained and amongst some staff groups, particularly doctors, compliance is still very mixed. Evidence from Hong Kong, Singapore and Canada, where the outbreak of SARS caused significant infection control problems and resulted in several hundred deaths, including some healthcare workers, shows that there has been a whole sale change in staff behaviour and full compliance is now part of the culture.

## CASE STUDY G

### The reduction of MRSA rates in the cardiothoracic directorate at Guy's and St Thomas' NHS Trust

#### Situation

In May 2000, the cardiothoracic unit at Guy's and St Thomas' NHS Trust experienced a significant increase in the amount of MRSA, and two patients had died as a result.

#### Action

In collaboration with the infection control team, several changes to practice were introduced across the directorate:-

Intervention	Description
<b>Unit closure &amp; cleaning</b>	After carrying out a full risk assessment, the unit was closed to admissions and surgery for 2 weeks while a deep cleaning and disinfection programme was undertaken.
<b>Pre-admission screening &amp; isolation</b>	Preadmission screening was extended to all patients who were due to have surgery in the cardiothoracic unit. If MRSA was detected, or if the status was unknown, the patient was admitted directly into a side room and nursed in isolation until a negative result was obtained.
<b>Staffing</b>	An isolation nursing team, comprising of established specialist cardiothoracic nurses was introduced as opposed to using agency nurses.
<b>Revision of skin preparation</b>	All pre-operative shaving was stopped immediately and new hair clippers were introduced. Pre-operative skin disinfection was replaced with an alcoholic iodine solution.
<b>Antibiotic therapy</b>	The prophylactic antibiotic therapy for treatment of MRSA was altered in line with current guidelines which recommended teicoplanin 800mg and gentamicin 5mg/kg instead of cefuroxime 1.5g.
<b>Hand decontamination</b>	Alcohol hand gel dispensers were sited at the end of each bed, and aprons and gloves were placed prominently next to colonized patients.
<b>Education of staff &amp; patients</b>	Staff were reminded of the importance of a good hand washing technique. Education of patients colonized with MRSA was also seen as a priority and leaflets were devised for this purpose.
<b>Regular monitoring</b>	The amount of MRSA infection in the unit was collated on a monthly basis. Results were fed back to staff in all areas in order to increase responsibility for the problem.
<b>MRSA care pathway</b>	To enable staff to adhere to best practice guidelines, a care pathway was devised combining all relevant information.

#### Outcomes

Following the implementation of changes in practice in August 2000, there was an immediate reduction in acquired infections, and a significant reduction over the three year period following the changes ( $p < 0.01$ ).



## CASE STUDY H

### The reduction of orthopaedic infection rates at the Princess Royal Hospital, Brighton & Sussex University Hospitals NHS Trust

#### Situation

In 2000, the Infection Control Doctor put forward a business case to recruit a part time Infection control surveillance/audit nurse, on the back of the National Audit Office Report, the Controls Assurance Standard requirements and HSC 2000/002. The case pointed out that the Trust achieved only 31% against the Controls Assurance Standard for infection control, failing in surveillance, audit and education.

The new post was taken up in July 2000 by a senior nurse with an interest in surveillance and collecting data. At the same time, the orthopaedic surgeons had become increasingly concerned over infection rates, evidenced by complications arising post-operatively, and at follow-up appointments.

#### Action

Over the subsequent two years, the following changes were implemented, aimed at reducing infection rates:-

- The setting up of separate elective and trauma orthopaedic wards which are closely managed with the full support of bed managers. The wards are blocked from taking non-orthopaedic patients, and bed managers have adhered to this.
- Screening of elective patients. Those that tested positively receive treatment as per an eradication protocol including oral antibiotics, skin cleanser and nasal ointment. Patients that tested positively are usually kept until last on the theatre list and recover in theatre rather than the recovery room to avoid unnecessary contact with other patients as an extra precaution.
- Patients admitted to the 27 bedded trauma ward are kept in a 6 bedded holding bay whilst they are screened, and moved out onto the ward if they are clear. The ward also has 3 side rooms if patients test positively.
- Nurses have been trained to do dressings as a separate intervention, i.e. not when the patient is being washed in the morning and when the beds are being made. A separate clinical treatment room has been set up to take the patient into to perform the dressing.
- Other improvements have been made, in staff education, standardising post-op dressings and the tightening up of ward/theatre housekeeping, with an increase in hours spent by domestics in the theatre staff changing rooms, and improved access to alcohol gel (using mini dispensers which clip onto the nurses uniform).
- Post-operative surveillance - the surveillance nurse sends a reminder list to outpatients each week of patients coming for their 6 week outpatient follow up appointment. She requested feedback on these patients of any complications that have arisen after discharge.

#### Outcomes

The Princess Royal Hospital estimated that the cost of infections in the preceding 6 months was £231,000, excluding the costs of additional treatment. This is based on the calculation of the additional length of stay of 9 patients who had acquired an infection after undergoing total hip replacements over a 6 month period. Sixty-seven thousand pounds of this is related to one case, which resulted in an additional 155 days spent in ICU. Since the changes were implemented, the unit now has a 0% infection rate, and having a designated elective ward resulted in a general reduction in the length of stay. Physiotherapists have more time to mobilise patients quickly by participating in group work, and therefore enabling them to be discharged earlier. Also, staff are more motivated and more able to focus on the care of patients within their speciality.

4.10 In 2002, the National Patient Safety Agency launched a pilot hand-washing campaign aimed at improving compliance with hand hygiene in healthcare. The objective was to produce a toolkit of measures to assist healthcare organisations to improve patient safety by reducing risks of infections, including empowering patients through the provision of greater information. **Case study I** provides a summary and update on the project.

4.11 A detailed report and guidance was also produced in the USA by the National Center for Infectious Diseases, including clear recommendations on when hand washing or decontamination should be undertaken, hand-hygiene technique, surgical hand antisepsis and on the selection of hand washing products.<sup>32</sup>

### There is growing recognition of a relationship between hospital cleanliness and infection

4.12 Hand hygiene is but a part of the issue of cleanliness in hospitals that has attracted a considerable amount of Parliamentary and public interest. The public and the media believe that there is an undisputable link between cleanliness and hospital acquired infection, and a review of international literature highlights a growing recognition of the relationship between the effective cleaning of hospitals and the health and safety of patients and staff.<sup>33</sup>

4.13 The NHS plan placed great emphasis on getting the basics right and that patients should be able to receive high quality care in clean, tidy and welcoming surroundings. In July 2000 the "Clean Hospitals" Programme was introduced and National Standards of Cleanliness were published by NHS Estates in 2001<sup>34</sup>, including an audit tool for trusts to assess themselves against the Standards. This tool was updated in August 2003 to provide greater clarity, and to ensure a more consistent application of the Standards.<sup>35</sup> NHS Estates also published a detailed Healthcare Cleaning Manual in March 2004.<sup>36</sup> The Scottish Executive Health Department has also placed a significant emphasis on improving environmental hygiene including the September 2003 publication of an NHSScotland Code of Practice for the Local Management of Hygiene and Healthcare Associated Infection (Appendix 4).

4.14 In the NHS Plan, the Department allocated £61 million over two years to finance the clean up of hospitals, (with a further £7 million allocated in 2003-04. Patient Environment Action Teams (PEATs) were set up,

comprising volunteers from the NHS (including representatives of professional bodies such as the Association of Domestic Managers and the Infection Control Nurses Association), as well as patient representatives and private sector companies providing services to the NHS. PEAT teams report on "patient environment" conditions, food services, and privacy and dignity issues, and award "traffic light" ratings to each trust. Trusts are graded as red (poor), yellow (acceptable) or green (good), and these form part of the Healthcare Commission's (formerly the Commission for Health Improvement) star ratings performance indicator set. Components of the inspections were selected based on what patients had previously said were important aspects of their journey through a department/hospital.

4.15 The results from the fourth year of inspections show that almost 80% of the hospitals assessed (including non-acute trusts) provide overall standards that are considered "good" with the remainder being assessed as meeting "acceptable" standards. No hospitals have been graded as poor since Autumn 2001.

4.16 The analysis of our survey responses indicates that the standard of cleanliness within hospitals remains a concern. For example, only a third of Infection Control Teams believe that standards have improved in over half of the clinical areas in their trust over the last two years. Two in five believe that it has improved in less than a quarter of the clinical areas and one in ten think cleanliness has not improved at all. Similar concerns were raised from our survey of orthopaedic and vascular directorates. Around two in five orthopaedic and vascular clinical leads believe that the standard of cleanliness within their directorate has improved. However there remains a significant number of directorates (23 per cent of orthopaedic and 19 per cent of vascular) reporting a perceived decrease in standards.

4.17 Evidence from patient surveys also shows that there is still room for improvement. The Department of Health's Acute Inpatient Survey results for 2001/02 published in 2003 showed that more than one in ten of patients reported toilets and bathrooms to be not very clean or not clean at all.<sup>37</sup> More than half of the patients surveyed reported their ward to be very clean and just over one in three patients reported the ward to be fairly clean. There are wide variations between trusts and areas within trusts. Half of the Commission for Health Improvement's clinical governance reviews raised concerns about décor, cleanliness, privacy or security.<sup>18</sup>

## CASE STUDY I

### The National Patient Safety Agency "cleanyourhands" campaign

#### Situation

The NPSA cleanyourhands campaign builds on work initially undertaken at the Oxford Radcliffe Hospitals and has incorporated learning from other centres both nationally and internationally.

#### Action

The campaign and toolkit have been piloted in 6 NHS Trusts<sup>1</sup>. The contents of the prototype toolkit can be seen in table 1.

<b>Alcohol</b>	At the point of care <sup>2</sup> /Near-patient (and/ or staff carried) Feedback data on consumption Economic case Generic 2 weekly change of posters <sup>3</sup>
<b>Posters/ communication materials</b>	Staff champion posters A range of promotional materials including enamel badges Guide to implementation
<b>Patient involvement</b>	Leaflets; stickers; aprons Patient Poster

Table 1: prototype toolkit

The toolkit has been constructed to assist front line staff in the achievement of currently existing national guidelines, local policies and standards relating to hand hygiene with the cornerstone of the toolkit consisting of alcohol hand rubs at the point of care. Work is also being undertaken to strengthen the role of Ward Housekeepers and Modern Matrons in improvement. Involvement of patients and the public adds a novel aspect to attaining sustained improvements.

#### Outcomes

The campaign was evaluated using a range of methods including survey (staff and patient), observation, product usage, interview and direct feedback. The evaluation report has been produced and is currently being used as a basis for enhancement and development of the toolkit prior to national roll-out in 2004. The in-depth development work undertaken within 3 separate Trusts focusing solely on patient involvement and empowerment<sup>4</sup> will feed in to overall evaluation. A national campaign is scheduled during 2004 following publication of the outcome of the pilot sites.

The project has joined up with a range of organisations connected to hand hygiene and in particular is co-working with the NHS Purchasing and Supplies Agency who are leading on work related to supply and monitoring of use of specific alcohol hand rubs.

Transferability into Primary Care is due to be assessed in 2004.

1 Pilot Sites: Aintree; St Georges; York; North Lincs; Queens Medical Centre; Royal Devon & Exeter  
 2 "At the point of care" has been shared with NPSA by Swindon and Marlborough NHS Trust  
 3 Posters are currently being revised due to evaluation results and are the property of the NPSA  
 4 Patient Empowerment Development Sites: St Cadocs, Wales; East Kent; Morecambe Bay

4.18 The Liberal Democrat MP, Paul Burstow, in his 2002 report *Now wash your hands* criticised the PEAT inspections for focussing on wider environmental issues and that only one standard directly related to cleanliness.<sup>38</sup> A follow-up report entitled *Now wash your hands 2* continued to raise concerns on the priority given to infection control in hospitals and their ability to tackle "superbugs."<sup>39</sup>

4.19 The PEAT assessment forms for 2004 have been revised after consultations with PEAT assessors and NHS managers in order to ensure a more consistent approach

and to provide a greater range of information about standards across hospitals. The forms have been subdivided, allowing clearer distinctions to be made, for example between the cleanliness and tidiness of a bathroom. The "rating" mechanism has been changed from a traffic light scale to a 5 point scale (Excellent, Good, Acceptable, Poor and Unacceptable) with the first assessment under this revised rating expected to be published in the summer. This increased transparency is intended to help close the gap between the PEAT inspection results and the clinicians' and patients' perception on the standard of cleanliness in hospitals.

Pre- and post-registration medical and non-medical training have very limited coverage of infection control issues.

4.20 The House of Lords Select Committee report on *Fighting Infection* recommended that the General Medical Council, Nursing and Midwifery Council and the Health Professions Council should ensure that universities strengthen the clinical and public health aspects of infection control in their undergraduate syllabus.<sup>25</sup>

4.21 In our original report we highlighted important gaps in the extent to which trusts ensured that education and training in infection control was provided to key health care staff, and that they needed to review their policies to ensure all staff are targeted. In 2003, we found that few infection control teams maintained training records, but those that did estimated that between 80-90 per cent of staff in most non-medical staff groups received induction training. An important exception however is the consultant doctor staff group, of which just under half received this training. The proportion of staff receiving annual update training on infection control is much lower, with an average of around six out of ten receiving annual updates, falling to around a quarter of consultant doctors. Typically staff receive between an hour and an hour and a half of induction training.

4.22 The Department has recently awarded a contract to the University of Salford, Faculty of Health and Social Care to develop a framework for health professionals learning beyond first registration. This framework will address how staff can be freed up in order to attend courses, particularly update training, and to give it the same priority as other mandatory training such as fire safety and cardio-pulmonary resuscitation.

4.23 A national specialist Clinical Governance Development Programme on Healthcare Associated Infection and funded jointly with the Department is currently being delivered in partnership between the Clinical Governance Support Team (part of the NHS Modernisation Agency) and the Richard Wells Research Centre at Thames Valley University. The programme is aimed at improving the quality of services for patients through working with multidisciplinary healthcare teams to reduce rates of healthcare associated infection.





## Translating guidance and protocols into action is slow

- 4.24 The Controls Assurance Infection Standard requires that trusts should have written policies, procedures and guidance for the prevention and control of infection which reflect relevant legislation and published professional guidance, and that they should be implemented. The Commission for Health Improvement identified that even where good policies existed they were often not followed sufficiently well, rendering them ineffective.<sup>18</sup>
- 4.25 In our original report we drew attention to the lack of evidence based guidelines on the effectiveness of measures to reduce hospital acquired infection, and identified the need to improve the dissemination of good practice. National evidence based guidelines, commissioned by the Department of Health and produced by Thames Valley University were published as a supplement to the *Journal of Hospital Infection* in 2001.<sup>40</sup> However it was left to the infection control team to disseminate the guidelines across the trust.
- 4.26 Two thirds of infection control teams considered that the evidence based guidelines on hand hygiene, use of personal protective clothing, and safe use and disposal of sharps had been adopted by more than 75 per cent of their trust. However, only two fifths of teams felt that the guidelines aimed at preventing infections associated with the use of short term indwelling catheters and insertion and maintenance of central venous catheters had been adopted by 75 per cent of the trust. More than 10 per cent of trusts had not adopted these latter guidelines.
- 4.27 As 80 per cent of urinary tract infections can be traced to indwelling urinary catheters and over 60 per cent of blood infections are introduced by intravenous lines, the lower levels of uptake of these guidelines increases the risk of infection. In recognition of this, *Winning Ways* drawing on the above guidelines, emphasises the need to reduce the infection risk from the use of catheters, tubes, cannulae, instruments and other devices as one of the seven areas for action.
- 4.28 In 2001 the Department commissioned a feasibility study to consider producing a National Infection Control Manual. However there has been little progress on this to date. Responses to our survey and in our workshop showed there was strong agreement on the value to NHS staff of a national manual that could be adapted for local and speciality use. Given the strong evidence of wide local variability in the use of existing guidelines, and significant reinvention of the wheel, there is a need for templates to facilitate local adaptation of national guidelines.

## The Antimicrobial Resistance Strategy has raised awareness, GP prescribing has decreased, but less is known about hospital prescribing

- 4.29 It is widely acknowledged that complacency, poor prescribing practice and misuse of antibiotics have led to the emergence of drug resistance infections. The Department issued a new Antimicrobial Resistance Strategy and Action Plan in June 2000 to tackle antibiotic resistant infections, and the Committee of Public Accounts expected this work to lead to evidence-based guidance on effective prescribing strategies. *Winning Ways* includes, as an action area, the prudent use of antibiotics, drawing on the key points from the Antibiotic Resistance Strategy and also on the Hospital Pharmacy Initiative for promoting prudent use of antibiotics in hospitals, issued in December 2003.
- 4.30 There is clear evidence of a steady decline in GP prescribing of antibiotics, and initiatives launched to improve public awareness of this issue have been generally successful. However, there is still limited information on hospital prescribing. Recent work in hospitals in the USA has considered using antibiotic prescribing data as a marker for levels of hospital acquired infection.<sup>41</sup>
- 4.31 We found 5 per cent of infection control teams still do not have a written antibiotic policy in place. Eighty-eight per cent of the policies include advice on prophylactic use of antibiotics. Most trusts have made changes to their antibiotic policies in the last three years, and in a number of cases they were able to demonstrate reductions in infections and associated cost savings (see [Case Study F- paragraph 3.23](#)).
- 4.32 Research in the Netherlands demonstrated that hospital deaths among longer stay patients in intensive care units could be reduced by a quarter if patients were given a combination of prophylactic antibiotics; rates of colonisation by resistant organisms were lower and length of stay shorter.<sup>42</sup> The cost of antibiotics was also reduced by 10 per cent, although the wider applicability of their findings remains uncertain, and in general, the evidence base on the use of prophylactics is still not conclusive.
- 4.33 Microbiologists and pharmacists are mainly involved in developing and monitoring compliance with antibiotic policies and compliance is also included in clinical audits in three out of five trusts. [Case study J](#) shows how one trust has developed a multidisciplinary approach to antibiotic management.

## CASE STUDY J

### Hammersmith Hospitals NHS Trust (HHNT) and Imperial College Multidisciplinary Antibiotic Management Programme

#### Situation

The Trust is a 1300 bedded acute specialist London Trust, which includes 4 hospitals. Annual expenditure on anti-infectives (£4 million) represents 20% of the Trust's total drug budget. A strong public health commitment and experience of practice outside the UK led to the development of a multidisciplinary antibiotic management model that promotes the role of the pharmacist.

#### Action

Since 1996 HHNT has had a Multidisciplinary Antibiotic Steering Group, chaired by the Chief Pharmacist. The group includes key figures from microbiology, infectious diseases, hospital epidemiology, infection control, and pharmacy, including the Infectious diseases (ID) pharmacist. The group is chaired by the Chief Pharmacist. The group directs the trust's antibiotic programme and the management of the ID Pharmacist. Surveillance and audit data from regular trust-wide prevalence studies of antibiotic prescribing are used to target much of the activity. The antibiotic control programme is integrated with the Infection Control programme, both of which have a high clinical profile and managerial support within the Trust and are embedded in the Clinical Governance framework.

#### Outcomes from this programme include:

- Numerous direct reductions in antibiotics expenditure, as a result of focused action, either measured at a trust or directorate level or on a per bed level on the ICU's. The ID pharmacist post was fully established in 1997 when it had been shown to produce annual recurrent saving of in excess of £80,000 pa. In 2002/2003 antibacterial expenditure in the Trust fell by 2% despite an overall 3% rise in patient activities associated with increasing case mix complexity. This achievement is being sustained into 2003/04 where a further 4% reduction in expenditure is being projected.
- A well-established Medical Directorate reserve antibiotic policy was extended Trust-wide and was requested for implementation in the Private Patient Service.
- IV to oral switch programmes. A targeted IV to oral switch programme within orthopaedics produced a significant increase of oral use with the potentially inappropriate IV use being reduced from 69% to 12%.
- Protocols to control the introduction of new drugs. The pharmacy departments have introduced the need for 'Mandatory order forms' to be completed before linezolid, caspofungin or voriconazole are dispensed. This has led to an increased awareness between pharmacy and prescribers regarding the appropriate use of these new drugs and has contained their use within the Trust.
- Feedback networks to Directorates Infection 'Link Consultants' for data regarding antibiotic prescribing and resistant organisms.
- The pharmacists have become integral members of the Trust's *C difficile* action group.
- Education programmes. These feature highly in the work of the ID pharmacist and has ensured that antibiotic prescribing is an integral part of the Induction Programme for new junior doctors
- A number of local and regional networks have been formed to provide peer support for both clinicians and pharmacists and to reduce duplication of effort.
- A national network for ID Pharmacists has been formed, providing a forum for support sharing of information.
- Methodology for antibiotic surveillance and audit in the absence of electronic prescribing. Our studies show that 34% of our in-patients are prescribed anti-infectives at any time with the vast majority of these being the right drug in the right dose for the right duration in an appropriate combination. This enables us to target action to the areas of less appropriate prescribing. Our approach has been published and is about to be adopted by most trusts in the London region.
- Promoting the role of ID Pharmacists nationally and developing higher professional academic training by developing and running a MSc programme Infection Management for pharmacists in collaboration with Imperial and the Health Protection Agency, which began in October 2003.

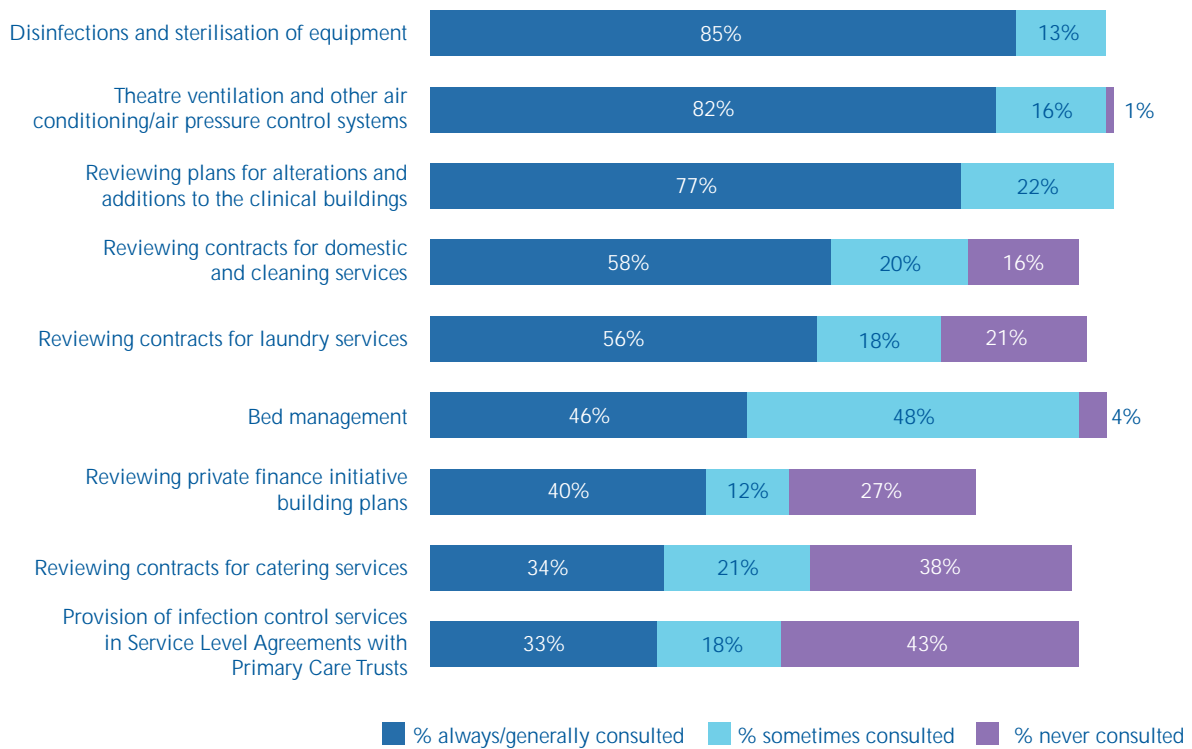
There is scope for further involvement of infection control teams in other trust activities in order to minimise infection risk

4.34 In our original report we emphasised the importance of seeking the advice and input of infection control teams in key trust wide activities so as to minimise the risk of infection. We found that there has been some improvement in the extent to which infection control teams are always or generally consulted but there are still a notable number of teams who are never consulted in these areas (Figure 13) nor in other areas where infection control advice could reduce risks, for example in ensuring adequate ventilation systems are installed or in planning the numbers and spaces between beds.

There is a need for improved awareness and uptake of technological innovation to engineer out risks

4.35 Following our initial report we received a large number of representations from companies who believed they had developed a product or new technology that would reduce or prevent hospital acquired infection but were unable to find an outlet for their products. While we referred them to NHS Estates or The NHS Purchasing and Supply Agency, it is unclear whether there is a robust methodology for evaluating effectiveness. More recent research into the use of hydrogen peroxide vapour to eradicate MRSA from ward surfaces<sup>43</sup> and on the use of silver alloy indwelling catheters could also reduce the risk of contracting an infection whilst in hospital<sup>44</sup> (see Case study K).

**13 Infection control teams are still not always consulted on wider hospital activities**



Source: National Audit Office census of acute NHS trusts, Summer 2003

4.36 In *Winning Ways*, the Chief Medical Officer announced that £3 million of new funding was to be made available for high quality research and development into ways of reducing healthcare associated infection. Included is a rapid review process to assess new procedures and products which claim to be effective in preventing or controlling healthcare associated infection, although options for this are still currently being explored. In time, the benefits of using the products should outweigh the costs, and savings can be made through fewer infections being acquired (**Case study K**).

4.37 Evidence on other developments that could be more widely adopted, such as the use of safer needles in high risk areas, were highlighted in our report *A Safer Place to Work: Improving the Management of health and safety risks to staff*.<sup>45</sup> Furthermore, there is growing evidence that appropriate ventilation systems in wards, theatres and isolation rooms are crucially important, but in many older buildings are somewhat lacking. For example negative pressure isolation rooms are vital to combat infectious diseases but just over a third of infection control teams reported that they had appropriate facilities (an average of 6.5 adult rooms and 2.2 paediatric rooms). NHS Estates is currently in the process of formulating guidance for trusts on the provision of isolation facilities, including negative pressure rooms.

## Approaches taken by other countries

4.38 The strict and consistent application of guidelines for preventing MRSA infections in Denmark and the Netherlands have proved to be successful in preventing the organism from being endemic in healthcare facilities and these countries have the lowest rates in Europe, although the economic costs of the strategies have not been evaluated. The Hospitals in Europe Link for Infection Control Through Surveillance (HELICS) initiative may also provide the opportunity to further develop collaborative and consistent approaches to the problems of preventing and controlling hospital acquired infection.





## CASE STUDY K

### Reducing catheter associated urinary tract infections by using silver alloy-coated catheters

#### Situation

Urinary tract infections (UTIs) account for 35 per cent of all hospital acquired infections and are costing the NHS more than £126 million a year according to research conducted by the London School of Hygiene and Tropical Medicine and the then Public Health Laboratory Service.<sup>29</sup> Although UTIs can be relatively mild in nature, up to five per cent develop into secondary bacteraemia which are often very painful and can be life threatening. It is estimated that 80 per cent of UTIs are associated with catheterisation.

#### Action

Ashford Hospital in Middlesex (part of Ashford and St Peter's Hospital NHS Trust) participated in a quality improvement project aimed at reducing the incidence of catheter associated urinary tract infections (CAUTIs). The aim was to reduce CAUTIs by at least 30 per cent through the use of silver/hydrogel coated catheters, as opposed to silicone/hydrogel-coated catheters.

The EPIC guidelines<sup>40</sup> noted that silver alloy coated catheters are associated with a lower incidence of bacteria, although they were not available in the UK at the time. They have been used extensively in the USA and Japan for over six years, but because of their lack of availability in the UK, silver/hydrogel catheters were used in this study.

For a three month period in early 2001 a baseline CAUTI rate was determined. The silver/hydrogel coated catheters were then introduced for a three month evaluation period.

Two hundred and eighty-seven patients were catheterised and evaluated, 144 in the initial baseline period and 143 in the trial period.

#### Outcome

Analysis of the data collected showed that CAUTIs were reduced from 7.4 infections per 1000 catheter days during the baseline period to 2.9 infections per 1000 catheter days in the trial period, achieving an over all reduction of 60.6 per cent and exceeding the initial target of 30 per cent.

An economic analysis showed that:

- with the cost of each UTI estimated at £1,327 by the London School of Hygiene and Tropical Medicine and the Public Health Laboratory Service study, a saving of £42,464 a year would be made by using the silver/hydrogel coated catheter to prevent a total of 32 CAUTIs over a 12 month period;
- taking increased catheter costs into account, the net saving in the hospital would be £38,000 a year;
- on the basis of Department of Health estimates that a hospital-acquired UTI prolongs a patient's hospitalisation by six days, the prevention of 32 UTIs would release 192 bed days a year.

As a result of the evaluation, it was recommended that the Trust should use silver alloy-coated catheters. These have recently been launched in the UK and have a greater weight of clinical evidence backing their use.

# Appendix 1

Key developments and Departmental initiatives since the National Audit Office report was published in February 2000

(Further details on developments in surveillance can be found in Appendix 7)

Date	Details
Feb 2000	Departmental guidance (HSC 2000/002) was issued as a programme of action to strengthen the management and control of hospital acquired infection.
May 2000	The Department adopted and published, through NHS Estates, " <i>Standards for Environmental Cleanliness</i> " which had been previously issued by The Infection Control Nurses Association and The Association of Domestic Managers.
June 2000	The Government's new UK antimicrobial resistance strategy was launched at the NAO conference on the management and control of hospital acquired infection - "The Way Ahead".  The Department published " <i>An Organisation with a Memory: report of an expert group on learning from adverse events in the NHS</i> ".
July 2000	The Government's NHS Plan included a £61 million campaign to clean up hospitals, based on the introduction of national standards of cleanliness with performance monitored through Patient Environment Action Teams.
September 2000	A Healthcare Associated Infection Surveillance Steering Group (HAISSG) chaired by an NHS Executive was set up to provide the Department with urgent recommendations on infection surveillance needs.
October 2000	The Government announced that all hospitals will be required to monitor levels of hospital acquired infections, and that these figures will be published.  The Department published HSC 2000/032 which set out the requirements for the effective decontamination of medical devices.
December 2000	The NHS Implementation Programme was published. One of five core requirements was the need to put in place effective systems to prevent and control hospital acquired infection, and to reduce microbial resistance.
January 2001	National evidence based " <i>Guidelines for Preventing Healthcare Associated Infections</i> " (EPIC) commissioned by the Department were published as a supplement to the Journal of Hospital Infection.
April 2001	" <i>National Standards of Cleanliness for the NHS</i> " were published by NHS Estates.  Departmental guidance (HSC 2001/010) " <i>Implementing the NHS Plan - Modern Matrons: Strengthening the role of ward sisters and introducing senior sisters</i> <sup>21</sup> " was published.  Healthcare acquired bacteraemia surveillance statement was issued by the Department of Health announcing the mandatory reporting of MRSA bacteraemia rates.
July 2001	" <i>Building a Safer NHS for Patients</i> " was published, setting out the Government's plans for promoting patient safety and for the implementation of <i>An Organisation with a Memory</i> .  " <i>Government response to the House of Lords Select Committee on Science and Technology Report: Resistance to Antibiotics</i> " was published.

Date	Details
January 2002	The Chief Medical Officer's report entitled <i>"Getting Ahead of the Curve: A strategy for combating infectious diseases<sup>9</sup>"</i> was published by the Department of Health.
March 2002	NHS Estates published National Standards of Cleanliness for the NHS.
August 2002	The National Patient Safety Agency initiated a Hand Hygiene Project "cleanyourhands", designed to improve hand hygiene in NHS Trusts (see case study I).
December 2002	NHS Estates published <i>"Infection Control in the Built Environment - guidance on infection control in relation to design and planning"</i> .
May 2003	NHS Estates published a <i>"Decontamination programme: strategy for modernising the provision of decontamination services"</i> .
June 2003	The Chief Medical Officer: <ul style="list-style-type: none"> <li>■ reported the next tranche of surveillance, and that improvements in MRSA rates were to become part of the balanced score card that contribute towards the star ratings.</li> <li>■ announced the Hospital Pharmacy Initiative for promoting the prudent use of antibiotics in hospitals.</li> </ul> <p>The National Institute for Clinical Excellence published <i>"Infection control: prevention of healthcare associated infection in primary and community care"</i> which had been developed by Thames Valley University.</p>
August 2003	Revised Standards of Cleanliness were published by NHS Estates.
December 2003	The Chief Medical Officer's report entitled <i>"Winning Way: Working together to reduce healthcare associated in England"</i> was published by the Department of Health.
March 2004	NHS Estates published <i>"The NHS Healthcare Cleaning Manual"</i> .

## National Advisory Committees

The Specialist Advisory Committee on Antimicrobial Resistance established in July 2001.

The Microbiology Advisory Committee - started as the microbiological advisory panel in 1984 and later became the Microbiological Advisory Committee but no longer meets on a regular basis although it can be reconvened by e-mail or a meeting.

The Advisory Committee on Dangerous Pathogens established in 1984.

The Spongiform Encephalopathy Advisory Committee established in April 1990.

The Healthcare Associated Infection Surveillance Steering Group (September 2000 - September 2002)

# Appendix 2

## Comparison of the Committee of Public Accounts Report recommendations and the Government's Treasury Minute Response, and developments as at February 2004

Committee of Public Accounts recommendations	Government's Treasury Minute Response	Position as at end 2003/04
<p><b>i</b> Research indicates that between 50 per cent and 70 per cent of surgical wound infections occur post-discharge, but these infections are not monitored. We recommend that post-discharge infections are monitored in future through the national surveillance scheme.</p>	<p>A UK-wide meeting of consultant microbiologists and others with a key interest in this area was held in Glasgow on 16 January 2001 to review progress and make recommendations. The NHS Healthcare Associated Surveillance Group referred to below would be taking this work forward.</p>	<p>A study of post discharge surveillance of patients who had undergone a delivery by Caesarean Section was carried out by the Public Health Laboratory Service. The study is continuing and being extended to other units in the Region. No further national work on post-discharge surveillance has been undertaken.</p> <p>Only 21 per cent of infection control teams reported that they carry out post-discharge surveillance, although more clinicians do so as part of routine clinical follow-up in some specialties. (para 3.15)</p>
<p><b>ii</b> The NHS Executive have now taken action to improve surveillance, doubling their investment in the Nosocomial Infection National Surveillance Scheme (NINSS). We recognise that the Executive are expanding the Scheme, but we believe that they should go further and make it mandatory.</p>	<p>A new NHS Healthcare Associated Infection Surveillance Steering Group (HAISSG), was set up in September 2000 to provide the Department with urgent recommendations on infection surveillance, building on the limited coverage of NINSS to deliver mandatory national surveillance reporting of hospital acquired infection by all Acute Trusts from 1 April 2001.</p>	<p>NINSS was not made mandatory, and the Department adopted a new approach to surveillance, commencing with the mandatory laboratory based surveillance of MRSA bacteraemia in April 2001. The HAISSG was disbanded in September 2002. There has been limited progress in the implementation of other strands of surveillance. The mandatory surveillance of glycopeptide resistant enterococci and serious untoward incidents commenced from September 2003 and clostridium difficile from January 2004. None of these are specialty specific. Mandatory reporting of orthopaedic surgical site infection was also rolled out from April 2004. Some trusts have continued to use NINSS in the absence of any other national specialty based surveillance system. (para 3.4 -3.14.)</p>



Committee of Public Accounts recommendations	Government's Treasury Minute Response	Position as at end 2003/04
<p><b>iii</b> The NHS Executive acknowledge that it should be possible to reduce the incidence of hospital acquired infection by 15 per cent or more, avoiding costs of some £150 million and saving lives. Tangible, measurable progress is not expected until 2003.</p>	<p>The Implementation Programme for the NHS Plan made it clear that, as one of the core requirements underpinning the NHS targets set out in the NHS Plan, all relevant organisations must have effective systems in place to prevent and control hospital acquired infection. The Department was to consider how best to strengthen current NHS performance management arrangements for infection control.</p> <p>Tangible progress is already being delivered in a number of areas for example in increased senior management commitment and in the implementation of infection control programmes by trusts.</p>	<p>The Department has issued a number of initiatives to improve the management and control of hospital acquired infection as detailed in Appendix 1. Most trusts have improved the systems and processes in place for the management and control of hospital acquired infection with accountability arrangements leading to the trust board. The majority of trusts do not have the data necessary to demonstrate changes in rates, except for a few individual areas where reductions have been demonstrated. The Government announced that infection control would be part of the broader set of performance indicators monitored by CHI and were included in the NHS star ratings from 2002/03. (para 3.20)</p>
<p><b>iv</b> Key to achieving Progress will be the effective implementation of the new Controls Assurance System, which builds on the statutory duty of chief executives for quality of care. This will raise the profile of hospital acquired infection.</p>	<p>As part of the controls Assurance process for 1999-2000, NHS organisations were required to self assess against a number of standards, including one on infection control. The NHS Litigation Authority (NHSLA), issued a number of standards for assessing the effectiveness of risk management in support of the Clinical Negligence Scheme for Trusts (CNST).</p>	<p>Revised NHS Standards for Infection Control were issued in October 2002. Compliance with the standards is improving which is indicative of the strengthening of systems and processes at trust level to manage and control hospital acquired infection. CNST have been inspecting trusts against their standards since 2001/02 and most trusts have achieved Level 1 or above, indicating that they have basic risk management systems in place. (para 2.4)</p>
<p><b>v</b> The NHS Executive have launched initiatives to look at the more prudent use of antibiotics, and to monitor and control prescribing including the new Government strategy to tackle antibiotic resistant infections announced in June 2000. We expect this work to lead to evidence-based guidance on effective prescribing strategies</p>	<p>An Interdepartmental Steering Group (IDSG) is overseeing and co-ordinating work on The UK Antimicrobial Resistance Strategy and Action Plan. The National Prescribing Centre (NPC) has developed a tool kit providing clinical audit guidance on antimicrobial prescribing and monitoring and produced a change management resource pack in which the prudent prescribing of antimicrobial agents is used as an illustrative example.</p>	<p>The UK Antimicrobial Resistance Strategy and Action Plan was published in June 2000, including action areas on surveillance, prudent antimicrobial use in humans and infection control. The need for the prudent use of antibiotics was included in the Government strategies Getting Ahead of the Curve and in Winning Ways, published in December 2003. Most trusts were found to have antibiotic policies in place, although not all covered their prophylactic use. (para 4.31)</p>
<p><b>vi</b> Hospital hygiene is crucial in preventing hospital acquired infection, including basic practice such as hand washing. We find it inexcusable that compliance with guidance on hand washing is so poor and look to the NHS Executive to audit progress and report back to us by the end of 2001.</p>	<p>The Controls Assurance Standard on Infection Control expects Trusts to have a policy on hand hygiene. New evidence based guidelines for the prevention and control of hospital acquired infection were published and also include hand hygiene. £31 million was allocated directly to NHS Trusts to secure improvements in the patient's environment with a further £30 million to be allocated next year.</p>	<p>Hand hygiene initiatives were noted to be one of the three main changes to infection control arrangements that trusts have initiated since 2000. £61 million was allocated to improve the patient's environment alongside the launch of other initiatives as detailed in Appendix 1. However the level of cleanliness in clinical areas remains a concern for clinicians, patients and as also highlighted in the Commission for Health Improvement's report Getting Better. (para 4.7- 4.19)</p>

Committee of Public Accounts recommendations	Government's Treasury Minute Response	Position as at end 2003/04
<p><b>vii</b> The increased priority and attention that is rightly now being given to hospital acquired infection has not been matched by resources. The scale of hospital acquired infection calls for sufficient funding to ensure that hospitals can tackle the problem effectively, and so reduce the impact on patients and NHS costs.</p>	<p>The Department welcomed the Committee's acknowledgement of the high priority which it gave to combating hospital acquired infection, and agreed that this needed to be matched by appropriate funding locally. Over the next four years the NHS will receive its largest ever level of sustained real terms growth in resources, and the Department expected the Chief Executive of each NHS Trust to judge how much should be allocated to infection control.</p>	<p>Funding to the NHS has increased significantly since April 2003. Primary Care Trusts have been responsible for allocating these funds via the commissioning of services from hospitals. Infection control is not being resourced separately but is incorporated within these arrangements. Many trusts do not have separate budgets for infection control or service level agreements to provide infection control services. Although two-thirds of trusts have approved real term increases in infection control staffing resources fewer than half have approved changes to the non-pay budget and 24 per cent reported a decrease. (para 2.25)</p>
<p><b>viii</b> The NHS Executive recognise that more effective bed management can help reduce hospital acquired infection. Greater use of smaller rooms and single bed rooms is now part of health service planning, and the Executive accept that increased investment in isolation facilities is a priority. But high throughput of patients is also a factor. Wider application of best practice will help Acute Trusts manage beds better. Trusts also need to ensure that infection control is an integral part of their bed management policies</p>	<p>Through the National Booked Admissions Programme, NHS Trusts are taking forward work on the relationship between demand and supply in order to schedule work more effectively. Central to this is effective bed management. The NHS Plan provision for an additional 2,100 general and acute beds by 2003-04 will enable, among other things, the occupancy rate to be reduced to 82 per cent, significantly improving bed availability in hospitals and the management of emergency and elective workloads. National Beds Inquiry planning guidance to be issued soon will help Health Authorities to consider where extra beds are required. NHS Estates is to develop guidance on ways in which the built environment can assist with the control of infection.</p>	<p>In 2001 NHS Estates published design and planning guidance on 'Infection control in the built environment' This document encourages collaborative working through all the stages of a capital build project from initial concept through to post-project evaluation and has specific requirements to facilitate good infection control practice. This guidance was expanded and reissued in 2002. Bed management continues to be a problem. Pressures from other government targets are militating against good infection control practice and 71 per cent of trusts are operating at bed occupancy levels of higher than 82 per cent. Orthopaedic and vascular leads also reported average bed occupancy levels of 89 per cent and 91 per cent respectively in their directorates. (para 2.34)</p>
<p><b>ix</b> The Chief Medical Officer accepts that in staffing infection control teams, a ratio of one nurse to 250 beds is a good benchmark for NHS Trusts. But many Trusts have much larger numbers of beds per nurse. While local variations in circumstances and practice may account for some of these variations, we expect the NHS Executive to carry out further research, in conjunction with the Infection Control Nurses Association, with the aim of developing staffing guidelines for Trusts.</p>	<p>It is for NHS Trusts and Health Authorities, who are accountable for the quality of services they provide, to decide on the number, grade and mix of staff they require, to provide this service to patients. The Department will have discussions with the Infection Control Nurses Association and other professional organisations about the development of an assessment tool for NHS Trusts to help them to reach decisions about staffing levels and skill mix required within their Infection Control Teams.</p>	<p>Although staff resources have improved in many trusts, the demands on their time have also increased. In 2002 the Department of Health funded a project to produce a staffing toolkit or formula to enable acute NHS Trusts in England to determine staffing levels for infection control teams. This work has been completed, but the report has yet to be published. (para 2.22-2.23)</p>

# Appendix 3

## Comparison of International Practices in the Management and Control of Hospital-acquired Infections

The review focused on the occurrence, cost and strategic response to hospital-acquired infections in a range of comparable countries with western healthcare systems, mature infection control structures and arrangements, and established networks of infection control professionals. Countries that were included in the review were: the USA, Australia, New Zealand, Belgium, Denmark, France, Germany, The Netherlands and Spain. Not surprisingly there are more similarities between the countries selected for this review than there are differences. In general, the overall prevalence of HAI is similar and the strategic responses are driven by corresponding imperatives. In general terms those countries reviewed faced similar challenges in reducing rates and the accompanying cost of HAI. There is a common imperative to improve patient safety and minimise the infection risks associated with modern healthcare.

### Extent

All the countries reviewed have established HAI surveillance programmes that are managed and conducted by either government agencies or University departments. The most mature of these is the National Nosocomial Infections Surveillance (NNIS) System operated by the Centers for Disease Control and Prevention (CDC) in the USA which has been influential in the development of the definitions and data collection modules in surveillance systems in the other countries included in the review (and the United Kingdom).

Variations in protocols and numbers and frequency of hospital participation between countries make direct comparison unreliable. **Table A** shows the extent of hospital acquired infection in selected countries calculated as prevalence rates.

Comparatively low rates of methicillin-resistant *Staphylococcus aureus* (MRSA) bacteraemia were found in countries such as Denmark and the Netherlands, attributed by them to the very strict application of screening and isolation guidelines together with stringent antibiotic prescribing policies. In the Netherlands, the past ten years has seen the 'search and destroy' strategy prevent MRSA infection from becoming endemic. In Denmark, the consistent and strict application of guidelines and the development of systems to monitor resistance patterns lead to the early identification and management of local clusters of MRSA infection. The economic costs of this strategy are unclear.

The current trend in Europe through the DG SANCO funded HELICS collaboration to share protocols and develop standardised surveillance protocols for targeted areas of surveillance (such as ICU) are likely to make future comparisons possible.

Germany	4%
France	6-10%
Spain	8%
Denmark	8%
England	9%
USA	5-10%
Australia	6%
Norway	7%
Netherlands	7%

Source: Richard Wells Research Centre, Thames Valley University and other expert sources

### Costs

Up to date comparable data concerning the economic impact of HAI in the selected countries is lacking with some countries referring to economic costs that were estimated in the 1980s by extrapolating from the results of the SENIC study conducted in the USA in 1985. Published literature in the field concentrates on how economic analysis tools might be used to inform the issue of controlling HAI rather than presenting analyses of the economic impact. Where data does exist, it is generally based on the direct costs borne by hospital in the treatment of HAI and ignores the preventive, future and indirect costs (**Table B**). Additional costs to patient care in the United States due to hospital acquired infections were estimated to be 4.5-5.7 billion US\$ per year.

One review of 55 economic papers published between 1990 and 2000 identified the attributable costs of HAI and the related costs of interventions. The majority of the papers retrieved in this review were from the USA and Europe and presented a simple cost analysis that did not include a comparison group. The analysis concluded that the mean attributable costs of the infections were greater than the mean corresponding interventions.

Bloodstream infections (BSI) and MRSA infections have the highest attributable costs. A study conducted in Denmark, similar to that conducted by Plowman and Graves in the UK, suggested that costs were similar to those in the UK.

Country	USA	Australia	New Zealand	Belgium	Netherlands
<b>Cost</b>	4.5-5.7 billion US \$ per year additional costs to patient care	180 million Australian \$ per year (data from 1998 and is therefore likely to be an underestimate)	137 million US \$ per year (estimated from the costs associated with HAI in 2 hospitals in Auckland)	194 million Bf cost saving if guidelines on antibiotic prophylaxis followed	2.8 million € (estimated 10 year cost of MRSA measured in 1 medical centre)

Source: Richard Wells Research Centre, Thames Valley University.

## National Policy/Strategy

All the countries reviewed identified that a national strategy for preventing HAI had been developed over the past twenty years as a response to the threats of antimicrobial resistance and increasing rates and costs of infection in healthcare facilities. The development of more recent strategies in the USA, Australia, New Zealand and France have been influenced by patient safety and risk management agendas and are closely linked to accreditation of healthcare services. In other countries, strategic direction for preventing HAI is implicitly contained in a range of linked activities including legislation, surveillance programmes, guideline development and funding streams for specific components of activity. The USA CDC Division of Healthcare Quality Promotion (DHQP) campaign "Seven Healthcare Safety Challenges" launched in 2001 represents a significant government initiative to set targets for reducing the risks of HAI over a five year period. In May 2004, the Hong Kong Health Authority decided to adopt the Scottish standards as a framework for the management and control of hospital acquired infection.

The priorities within research are set at national level and studies are conducted by specialist government funded institutes or university research departments. In Europe research programmes are conducted by national networks and European collaborations and none of the countries surveyed identified that there was a ring-fenced research fund for HAI but indicated that funding came from general healthcare research funding. Current research initiatives are focused on the establishing the epidemiology of antimicrobial resistance in different settings but particularly ICU and developing standardised surveillance methods. Similar to the UK, most European research is conducted by university research departments. The USA CDC DHQP "Prevention Epicenters" represents a significant national government initiative to coordinate relevant research for developing the evidence base and assessing the cost of infection prevention and control.

## Quality Standards

There is a growing trend towards placing surveillance data and rates of nosocomial infection in the public domain. This trend is partly driven by the development and focus on governance issues in healthcare. Quality standards linked to hospital accreditation processes exist in the USA, Australia, New Zealand, Belgium, Denmark and France and include standards relating to the management and control of HAI. The Netherlands is in the process of developing quality standards for HAI and the Spanish Ministry of Health uses a set of benchmarks based on EPINE surveillance data.

## Guidelines

The development of National Guidelines features as a part of each of the selected countries strategy to reduce the incidence of preventable HAI and to provide guidance for hospital infection control committees and healthcare professional. All guidelines are linked to evidence from relevant literature but are predominantly developed by appropriate groups of clinical experts on the basis of consensus.

## Roles and Responsibilities of Specialist Professionals

All the selected countries (with the exception of Spain) identified that there were official profiles for the roles of Infection Control Doctor (ICD) and Infection Control Nurse (ICN). These profiles are described in a range of administrative instruments including national/state law, accreditation criteria, national guidelines and standards. The role of ICD is undertaken by a range of medical professionals and includes medical microbiologists, hospital epidemiologists and infectious disease specialists. In some countries profiles for the responsibilities of technical professionals are also included. The ratio of infection control professionals (ICPs) to hospital beds is also identified in some countries, although these ratios are rarely met.

	USA	Belgium	France	Germany	Netherlands
<b>ICD</b>		1:1000	1:800	1:450	1:1000
<b>ICN</b>	1:250	2.5:1000	1:400	1:300	1:250

Source: Richard Wells Research Centre, Thames Valley University.



# Appendix 4

## The Management and Control of Hospital Acquired Infection in Other UK countries

### Scotland

**Background:** The Scottish Executive Health Department (SEHD) set up a Working Group in November 2000 to produce guidance to NHS Scotland with regard to assessing and managing risks related to Healthcare Associated Infection (HAI), decontamination and hospital cleanliness. The report produced by this group 'Managing the risk of healthcare associated infection in NHS Scotland' was produced in August 2001 and recommended that NHS Scotland adopt a standard approach to HAI risk management. ([http://www.show.scot.nhs.uk/sehd/mels/HDL2001\\_53Carey.pdf](http://www.show.scot.nhs.uk/sehd/mels/HDL2001_53Carey.pdf))

**Clinical Standards:** The production of the above report set out draft standards for NHS Scotland for infection control, decontamination of reusable medical devices and cleaning services. The Clinical Standards Board for Scotland (CSBS), now known as NHS Quality Improvement Scotland (NHS QIS) further developed the HAI; Infection Control standards, and a methodology to evaluate and verify compliance. The standards were published in December 2001. Trusts and NHS Boards were then reviewed against these standards during summer 2002 and reports on these reviews and a national overview published in January 2003. In addition, HAI; Cleaning Services standards were published in June 2002. ([http://www.clinicalstandards.org/pdf/finalstand/HAI\\_CLEANING.pdf](http://www.clinicalstandards.org/pdf/finalstand/HAI_CLEANING.pdf))

**Watt Group Report:** In May 2002 a group was formed to review the circumstances surrounding the onset of the outbreak of salmonella infection at the Victoria Infirmary, Glasgow in December 2001 and January 2002. The report was published October 2002. (<http://www.scotland.gov.uk/library5/health/twgr-00.asp>)

**The Scottish Ministerial HAI Task Force:** In June 2002 a Ministerial Convention of HAI experts took place in recognition of HAI being a high priority issue, both in terms of the safety and well-being of patients, and of the resources consumed by potentially avoidable infections. The recommendations from this Convention and from the Watt Group Report were used to inform the Scottish Ministerial HAI Action Plan, Preventing infections acquired while receiving healthcare (October 2002). (<http://www.scotland.gov.uk/library5/health/preventinfect.pdf>). The approach included the formation of a multi-disciplinary HAI Task Force, in January 2003, led by the Chief Medical Officer (CMO), which comprises members of the public and senior executives from both NHS and non-NHS sectors and the

SEHD. Their remit is to co-ordinate the development and implementation of the Action Plan, monitor and to report on progress to the Minister. Completion December 2005.

Progress includes: Issuing guidance on The NHSScotland Code of Practice for the Local Management of HAI and Hygiene; The NHSScotland National Cleaning Services Specification The Code of Practice - outlines specific guidance on a range of factors, from staff education to compliance management, management of basic ward equipment, and guidance on the prevention and control of infection. (<http://www.scotland.gov.uk/library5/health/lmhhai-00.asp>) Information on how hospitals and other healthcare sites should be cleaned, including how frequently, is set out in the National Cleaning Services Specification. It also highlights staff training and development as well as performance management requirements. (<http://www.scotland.gov.uk/library5/health/ncss-00.asp>)

Other documents issued include guidance on media handling during incidents and outbreaks, and a Best Practice Statement on Urinary Catheterisation. Documents being finalised include national standards for infection control in adult care homes, a framework for mandatory induction training on HAI, guidance on the management of HAI outbreaks (including staff screening), risk-based methodologies for prioritising measures to reduce the risk of HAI and national guidance for prudent antimicrobial prescribing.

**HAI education:** Both the Code of Practice and the Cleaning Services Specification acknowledge the education of relevant staff as essential in ensuring a safe healthcare environment for service users, staff and visitors. Work is currently underway to develop packages for regular ongoing training for all NHSScotland staff groups, including the mandatory HAI induction training framework, an "on-call" training programme for public health and infection control teams and a training framework for those involved in media handling.

**HAI surveillance:** in Scotland is progressed by the Scottish Surveillance of Healthcare Associated Infection Programme team, based at SCIEH. The Health Department Letter (HDL(2001)57) A Framework for National Surveillance of HAI in Scotland requires operating divisions (formerly Trusts) to undertake mandatory specified HAI surveillance initiatives, namely:

- Data on methicillin resistant *Staphylococcus aureus* (MRSA) bacteraemias to be made publicly available from April 2002 and to be published quarterly. Trend data are fed into the Performance Assessment Framework and is used by SEHD to evaluate the performance of individual operating divisions.
- Surveillance of surgical site infection (SSI) following two categories of operative procedure, one of which should be an orthopaedic procedure, selected from a list of nine commonly performed surgical procedures, as well as surveillance of SSI following neurosurgical procedures. All trusts were collecting in-patient data by May 2003. The first national report of SSI surveillance in Scotland was published in October 2003.
- Voluntary components of the HAI surveillance programme include: HAI outbreak/incident surveillance; Post discharge surgical site infection surveillance; Surveillance of HAI in intensive care units; Surveillance of RSV infection in paediatric units; Surveillance of catheter-associated urinary tract infection.

**Reviews of compliance** with national standards for control of HAI and for cleaning were published in January 2003 by NHS QIS and Audit Scotland respectively. Both reports identified significant progress in meeting standards but also areas where further improvements could be made. Each Trust received its own detailed evaluation, highlighting areas for further improvement. In summer 2003 NHS QIS the Minister asked for a progress report. Update reviews commenced in October 2003 and the report will be published in 2004.

## Wales

The 2000 NAO report on infection control in hospitals in England formed a useful route to build on previous work in this area in Wales. Professionals from Wales were full members of the Department of Health's Healthcare Associated Infection Strategy Steering Group and as a result, many developments have in the main been running parallel across the UK.

**Surveillance and Outputs:** Wales launched a mandatory bacteraemia reporting scheme for *Staphylococcus aureus* from April 2001. The Welsh scheme presents data on all four major items collected (total blood culture, positive blood cultures, MSSA and MRSA). All hospitals receive open feedback (i.e. all named trust results) on the scheme. Each trust may publish their own data but not that of other trusts without permission. Aggregated but anonymous results are published on the National Public Health Service web site (<http://www.wales.nhs.uk/whaip>).

The Chief Medical Officer for Wales approved the establishment, by the Welsh Committee for Control of Communicable Diseases, of the Welsh Healthcare Associated Infection Subgroup. This group has worked with the rest of the UK and in early 2003, further mandatory schemes were introduced: hospital outbreak reporting from April 2003, surgical site surveillance in orthopaedics from September 2003 and locally based infection reduction targets to be identified from January 2004.

DataStore is an information management tool created by the former PHLS in Wales that captures all microbiology information, both positives and negatives. The product is being rolled out across Wales so that country wide data becomes available. The system forms the backbone for enhanced surveillance, including antibiotic resistance.

**Structures and Services:** The National Public Health Service (NPHS) was established in April 2003. This includes the Infection and Communicable Disease Service (ICDS), which comprises a network of public health laboratories,

strategically placed across Wales, the communicable disease surveillance centre and health protection teams based around consultants in communicable disease control. This gives a central focus for national infection control systems and services, keying into all parts of the NHS.

In November 2003, the draft healthcare associated infection strategy for hospitals was launched for professional consultation. The final version will be published mid 2004. This has a clear emphasis management accountabilities and on personal responsibility of all healthcare staff for healthcare associated infection. A directorate based infection control structure is required, with directorates in trusts developing local infection control plans, with a prioritised disease reduction target, as part of their response. The strategy is set within national standards and recommends improvements to infrastructure and organisation of infection control. Specialist infection and epidemiological control support will be provided by a dedicated project team based within the NPHS. The activities within the strategy have clear performance indicators bringing together NHS Wales performance management structures ensuring regular audit of processes and practice.

Training of staff at all levels will be enhanced. Sharing outputs and developments in infection reduction will be supported by further enhancements of the national surveillance tools. A community based strategy is currently being developed.

Finally, as a supplement to the wider management of HCAI, decontamination and sterilisation services have been enhanced during the past 3 years. At the time of writing, 65% of hospital sterilisation and decontamination units have achieved accreditation to the European medical device directive standard. Accredited sites may provide services to outside organisation, including primary care. A primary care pilot has demonstrated the feasibility of provision to GP's across a wide rural area. Opportunities to develop this across Wales will be sought as all units gain accreditation. Full accreditation across Wales is targeted for December 2004.

## Northern Ireland

As with Wales, Northern Ireland had a representative on the Healthcare Associated Infection Strategy Steering Group and kept abreast of developments across the UK.

The Hospital Acquired Infection Sub-Committee of the Regional Advisory Committee on Communicable Disease Control was set up in October 1999. Its key objectives are to advise on:

- a Infection control practices in hospitals including routine hygiene procedures such as hand washing;
- b To promote optimum antimicrobial prescribing; and
- c To improve surveillance of hospital acquired infection and resistant organisms and monitor antimicrobial use.

All hospital trusts in Northern Ireland were surveyed in 2001/2002 in relation to their management and control of hospital acquired infection. The priorities identified included increasing the complement of infection control nurses within trusts, improving the computerisation of data collection systems, and providing clerical officer/surveillance officer support to trust hospital microbiology departments. The complement of infection control nurses both at acute and community level is currently being looked at by a Sub-Committee of the Central Nurse Advisory Committee.

Controls assurance standards for infection control for the health service in Northern Ireland were issued in April 2004.

There has been a great deal of activity undertaken at trust, board and regional level to improve infection control arrangements as part of the contingency planning for SARS. This has included a look at current provision of isolation facilities. Specific SARS training material has been developed for training staff in hospitals and the community. This covered generic elements of infection control.

There have been a number of initiatives in relation to surveillance of hospital-acquired infection:

- a Since 2002, the Northern Ireland Department of Health, Social Services and Public Safety (DHSSPS) has made the surveillance of MRSA bacteraemias mandatory for all Trusts. Two regional reports on MRSA bacteraemias have been produced.
- b Trusts have been asked to undertake *C.difficile* surveillance on a voluntary basis from summer of 2004 with a view to making *C.difficile* surveillance mandatory from 1st January 2005.
- c European Antimicrobial Resistance Surveillance System (EARSS) - All laboratories here are submitting data on *S.aureus* bacteraemias to EARSS.

## Northern Ireland Healthcare Associated Infection Surveillance Centre (HISC)

DHSSPS has funded HISC since April 2001. The objectives of HISC are to develop and improve surveillance methods by assisting hospitals to monitor healthcare acquired infection by facilitating data collection, handling, analysis and feedback. HISC has developed a standardised model for core surgical site infections surveillance, procedure-specific models including post-discharge surveillance and tools for the interrogation of databases that will enable timely and appropriate feedback. HISC has established a surveillance programme in elective orthopaedics and vascular surgery throughout Northern Ireland which has also being adapted for use in Scotland and Wales. A pilot is currently underway to undertake post-discharge surveillance of caesarean section.

## Pan Celtic Collaboration

A collaboration between the Northern Ireland Healthcare Associated Infection Surveillance Centre (HISC), the Scottish Surveillance of Healthcare Associated Infection Programme (SSHAIP) and the Welsh Healthcare Associated Infection Programme (WHAIP) represents a major UK initiative to provide support to orthopaedic clinical teams. A report was published in March 2004 combining data from 2001 to 2003 and representing some 15,213 patient episodes, in the hope that it will be widely disseminated and used to develop infection control plans for orthopaedics in the three countries involved.<sup>25</sup>

# Appendix 5

## National Audit Office Study Methodology

The key features of our study methodology were that we:-

- Conducted a census in July/August 2003 of all 176 acute NHS trusts in England. The census comprised of four questionnaires to be completed by chief executives, infection control teams, orthopaedic clinical leads and vascular clinical leads. The census sought information on changes to the management and control of hospital acquired infection since the publication of our original report in 2000, whether the Committee of Public Accounts recommendations had been implemented, and whether there had been a discernible change in patient outcomes as a result of these changes. We commissioned Market & Opinion Research International Ltd. (MORI) to undertake the census on our behalf and to provide a summary report of the findings. Response rates were as per the table below.
- Visited some acute trusts to identify examples of good practice.
- Organised seven one-day multidisciplinary workshops to ascertain the views of clinicians and other healthcare professionals who have demonstrated an interest in preventing and reducing healthcare associated infections.
- Examined key documents at the Department of Health on surveillance and also discussion with the Health Protection Agency.
- Examined data held by other bodies that have a regulatory role on infection control including the Commission for Health Improvement and the NHS Litigation Authority and interviews with key members of staff at these bodies. We also interviewed staff at other bodies that have a role in monitoring and supporting infection control activity including the National Patient Safety Agency and The Medicines and Healthcare Related Products Agency.
- Conducted a further electronic census in February 2004, which was sent to Association of Medical Microbiologists, Hospital Infection Society and Inflex members, particularly to ascertain how trusts had responded to *Winning Ways* and the need to designate a new Director of Infection Prevention and Control.
- Commissioned The Richard Wells Research Centre, Thames Valley University to undertake research on international comparisons on the management and control of hospital acquired infection (Appendix 3). In addition we visited Hong Kong and Singapore to understand how SARS had impacted on their infection control arrangements - Hong Kong like New Zealand have undertaken a similar audit to us based on our original questionnaire.

NAO Survey of acute NHS July-September 2003	Chief Executives	Infection Control Teams	Orthopaedic Directorates	Vascular Directorates
Number of trusts	176	176	176	176
Number stating survey not applicable to their trust	0	0	13	38
Total applicable trusts	176	176	162	138
Responses received for in time for inclusion in analysis	154	165	96	90
Response rate for MORI analysis %	88	94	59	65
Total responses including post-deadline returns	165	174	111	98
Total response rate (all included in NAO open question analysis) %	94	99	69	71



- Interviewed key staff at a selection of strategic health authorities to understand their role in performance monitoring with respect to hospital acquired infection. We also sought information from a sample of primary care trusts on the commissioning of infection control services from acute NHS trusts via a combination of telephone interviewing and an email survey.
  - Commissioned CARA Research Ltd. to undertake analysis of the relationships between key performance indicators and data held by the Department of Health Controls Assurance Team.
  - Undertook an extensive literature review and attended a number of sector conferences on infection control.
  - Constituted an expert panel who provided advice and guidance throughout the study. A full list of its members is shown below.
- Full details of our study methodology and detailed survey analyses are on our website [www.nao.org.uk](http://www.nao.org.uk)

Membership of Expert Advisory Group	
<b>Dr. Georgia Duckworth</b>	Head of Department of Healthcare Associated Infection and Antimicrobial Resistance in the Communicable Disease Surveillance Centre, Health Protection Agency
<b>Professor Brian Duerden</b>	Newly appointed Inspector of Microbiology for the Department of Health. Previously was the Director of Clinical Governance at the Health Protection Agency
<b>Professor Gary French</b>	Professor of Microbiology, King's College London; Consultant Microbiologist & Chairman Infection Control Committee, Guy's & St Thomas's Hospital Trust, London
<b>Ms. Carole Fry</b>	Nursing Officer - Communicable Diseases, Department of Health
<b>Dr. Helen Glenister</b>	Director of Safety Solutions, National Patient Safety Agency
<b>Dr. Tony Howard</b>	Director of the Infection and Communicable Disease Service, National Public Health Service for Wales
<b>Dr. M.C. Kelsey</b>	Consultant Microbiologist and Infection Control Doctor, Whittington Hospital
<b>Dr. Vicki King</b>	Formerly Head of the Blood and Healthcare Associated Infections Unit, Communicable Diseases Branch, Department of Health
<b>Dr. Deirdre Lewis</b>	Consultant Epidemiologist, South West Communicable Disease Surveillance Centre
<b>Mrs. Ruth Lockwood</b>	Senior Nurse Infection Control, Swindon and Marlborough NHS Trust
<b>Mr. John F. Nolan</b>	Consultant Orthopaedic Surgeon and Department Chairman at the Norfolk & Norwich University Hospital NHS Trust
<b>Dr. William Pascoe</b>	HM Inspector of Health & Safety, Health Services Unit of the Health & Safety Executive
<b>Dr. Sally Pearson</b>	Director of Clinical Strategy for Gloucestershire Hospitals NHS Trust
<b>Professor Robert Pratt</b>	Professor of Nursing and Director of the Richard Wells Research Centre at Thames Valley University, London. President of the Infection Control Nurses Association
<b>Dr. Gina Radford</b>	Regional Director of Public Health, East of England Public Health Group
<b>Stephen Ramsden</b>	Chief Executive, Luton & Dunstable Hospital NHS Trust
<b>Dr. G.L Ridgway</b>	Consultant Microbiologist, University College London Hospitals & Senior Medical Officer, Blood and Healthcare Associated Infections Unit, Department of Health
<b>Professor Jennifer A. Roberts</b>	Director of the Collaborative Centre for Economics of Infectious Disease, Department of Public Health and Policy, London School of Hygiene and Tropical Medicine
<b>Dr. Richard Slack</b>	Consultant/Senior Lecturer for Communicable Disease Control, University of Nottingham and Health Protection Agency East Midlands (North)
<b>Dr Robert Spencer</b>	Chairman Hospital Infection Society/Consultant Medical Microbiologist Health Protection Agency, South West Regional Laboratory, Bristol
<b>Sharon Waight</b>	Project Manager- Older People Services NSF Reviews, Commission For Health Improvement
<b>Professor Mark H. Wilcox</b>	Consultant/Clinical Director of Microbiology, Director of Infection Prevention and Control, Leeds Teaching Hospitals NHS Trust & Professor of Medical Microbiology, University of Leeds

# Appendix 6

## Relationships between Department of Health key performance indicators on MRSA and Controls Assurance data

### Methodology

We commissioned CARA Research Ltd, an independent analyst with experience of working with the Department of Health Controls Assurance Team, to analyse raw performance data from the Department of Health, Health Protection Agency, Dr. Foster and the then Commission for Health

Improvement, with controls assurance data for 2002/2003 obtained from the Department of Health Controls Assurance Team, using the analyst's own tailor-made software.

The objectives of the study were to identify if there were significant relationships between levels of mortality, MRSA and other potentially interesting variables.

	MRSA bacteraemia rate 2002-2003	MRSA bacteraemia improvement score <sup>iv</sup>
1 Total % bed occupancy	2P	
2 PEAT score		1N
3 Infection control standard	2N	
4 Star rating	3N	
5 Mortality index - fractured neck of femur	1P	
6 Overall numbers of controls assurance actions	2P	
7 Risk assurance	1N	
8 Staff sickness grade		2P
9 Human resources risk-assurance level	1N	
10 Corporate governance standard	2N	

#### Number coding indicates significance of relationship:

3 = Higher weighting - more influence; 2 = Mid weighting; 1 = Lower weighting;

P = Positive relationship between variables, i.e. as one increases, so does the other;

N = Negative relationship between variables, i.e. as one increases, the other decreases

Source: CARA Research Ltd/Department of Health Controls Assurance Team

Full report can be found on the NAO website at [www.nao.org.uk](http://www.nao.org.uk).

<sup>iv</sup> Based on the number of MRSA bacteraemia diagnoses in the nine months from April to December 2002 with the number in the same period during 2001.

## Explanatory notes of key relationships

- 1 Lower rates of bed occupancy tend to be associated with lower rates of MRSA bacteraemia.
- 2 As the MRSA bacteraemia improvement score improves, then the PEAT score tends to be lower (indicating that better PEAT scores are not an indication of improving MRSA bacteraemia rates).
- 3 Trusts with higher scores in the infection control standard tended to have lower rates of MRSA bacteraemia.
- 4 There is a tendency for the higher star-rated trusts to have lower rates of MRSA bacteraemia.
- 5 Trusts with higher MRSA bacteraemia rates tended to have a higher mortality index for fractured neck of femur (but no relationship was found between the MRSA bacteraemia rates or improvement scores, and the overall mortality rates).
- 6 Higher rates of MRSA bacteraemia occur at lower levels of risk-assurance and increasing levels of action in the trusts (lower levels of risk assurance indicates lower assurance and more risk in a trust, hence a higher number of actions generated by trusts).
- 7 There is a general positive relationship between the MRSA bacteraemia improvement score and the staff sickness grading.
- 8 The average level of MRSA bacteraemia tends to reduce as the human resources risk-assurance score increases.
- 9 Higher assurance levels in the clinical governance standard are also associated with lower levels of MRSA bacteraemia.

# Appendix 7

## Chronology of developments in mandatory surveillance of hospital acquired infections

Developments in Surveillance	
<b>1996</b>	The Department of Health /Public Health Laboratory Service jointly funded (5 year) Nosocomial Infection National Surveillance Scheme (NINSS) was launched. Participation was voluntary and confidential. The aim was to help identification of and reductions in avoidable hospital acquired infections. There were two modules, hospital acquired bacteraemia and surgical site infections (covering twelve categories of surgical procedures).
<b>January 2000</b>	The Department commissioned a quinquennial review of the NINSS scheme (Cunningham report) which recommended that: the scheme needed to be re-packaged as a service provided for and owned by the NHS; existing management arrangements should be replaced by a broadly based steering group which should focus on extending the surgical site infection and healthcare acquired bacteraemia modules to even more trusts.
<b>February 2000</b>	The National Audit Office report on The Management & Control of Hospital Acquired Infection concluded that NINSS was starting to show the benefits of surveillance and recommended that the Department should build on the success of the scheme and encourage more trusts to participate.
<b>February 2000</b>	The Department issued HSC 2000-02 requiring all trusts to undertake surveillance.
<b>March 2000</b>	At the Committee of Public Accounts hearing in March 2000 there were concerns that the NHS did not have a grip on the extent and costs of infection. The Committee therefore recommended that NINSS should be made mandatory for all NHS trusts (report published in November 2000).
<b>September 2000</b>	A Healthcare Associated Infection Steering Group (HAISSG) chaired by an NHS Executive was set up to provide the Department with urgent recommendations on infection surveillance needs at local, regional and national level, building on and improving the limited coverage of NINSS. Sub-groups were formed for post-discharge surveillance, orthopaedic surgical site infection surveillance and hospital acquired bacteraemia.
<b>October 2000</b>	The Minister of State for Health gave an undertaking that there would be compulsory surveillance of hospital acquired infections in all trusts in England.

Developments in Surveillance	
<b>November 2000</b>	The HAISSG recommended that in order to meet the immediate national and regional surveillance needs that they would use existing data to capture relevant data on MRSA.
<b>January 2001</b>	A healthcare acquired bacteraemia statement was issued by the Department of Health requiring the mandatory reporting by trusts on MRSA bacteraemia rates from April 2001 and that data would be published from 2002.
<b>February 2002</b>	The first report on MRSA surveillance for April 2001 - September 2001 was published. These showed that the number of cases of MRSA bacteraemia ranged from 0 to 0.69 cases per 1000 bed days; single specialty hospitals had lower rates than general acute and specialist treatment trusts; and rates between regions varied with London having the highest and the North West the lowest rates.
<b>September 2002</b>	The HAISSG was disbanded and a service level agreement between the Department of Health and the Health Protection Agency was established to take forward the development of mandatory surveillance.
<b>June 2003</b>	<p>The Chief Medical Officer announced that trusts should report to the Health Protection Agency any bloodstream infection caused by enterococci resistant to the glycopeptide group of antibiotics (GRE) and serious untoward incidents associated with hospital infections.</p> <p>It was also announced that improvements in MRSA rates were to be included as a performance indicator to be included in the trusts' star ratings.</p>
<b>September 2003</b>	Mandatory reporting of serious untoward incidents and GRE commenced.
<b>December 2003</b>	The Chief Medical Officer's report "Winning Ways" announced the expansion of the mandatory surveillance system to include bloodstream infections, surgical site infections, <i>Clostridium difficile</i> associated disease, serious incidents associated with infection and infections after discharge from hospital. In addition, a national audit of deaths is also to be established.
<b>January 2004</b>	Mandatory reporting of <i>Clostridium difficile</i> commenced.
<b>April 2004</b>	Mandatory reporting of orthopaedic surgical site infection rolled out.



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# Glossary

<b>Acute beds</b>	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.
<b>Acute NHS Trust</b>	Hospitals, which are managed by their own Boards and which provide acute beds linked to medical and surgical intervention.
<b>Agency Nurse</b>	Temporary nursing staff booked by the NHS trust from a commercial employment agency to provide holiday cover or to deal with temporary staff shortages.
<b>Antibiotic</b>	A substance that destroys or inhibits the growth of bacteria. Action may be selective against certain bacteria.
<b>Antibiotic policy</b>	Written guidance that recommends antibiotics and their dosage for treating and preventing specific infections.
<b>Antimicrobial/Antibiotic resistance</b>	Resistance to anti microbial agents that is either naturally occurring or develops in a microorganism over time.
<b>Antimicrobial agent</b>	Any compound that selectively destroys or inhibits the growth of micro-organisms.
<b>Aseptic technique</b>	A precautionary method used in any procedure in which there is a possibility of introducing pathogenic organisms into the patient's body. Achieved by ensuring that only sterile equipment and fluids are used during specified clinical procedures.
<b>Audit</b>	Organised review of staff of current practices and comparisons with pre-determined standards. Action is then taken to rectify any deficiencies that have been identified in current practices. The review is repeated to see if the pre determined standards are being met.
<b>Bacteraemia</b>	Presence of bacteria in the bloodstream.
<b>Bacterium (Bacteria)</b>	A simple microscopic single-celled organism(s) that lacks a true nucleus.
<b>Catheter/cannula</b>	A tubular flexible instrument passed through body channels for withdrawal or introduction of fluids.
<b>Clinical Governance</b>	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.
<b>Clostridium difficile</b>	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.
<b>Committee of Public Accounts</b>	The senior Select Committee of the House of Commons. The main work of the Committee is the examination of the Reports produced by the Comptroller and Auditor General (C&AG) on his value for money (VFM) studies of the economy, efficiency and effectiveness with which Government Departments and other bodies have used their resources to further their objectives. About 60 of these reports are adopted by the Committee, either by taking oral evidence or, occasionally, by sending written questions to the Government departments concerned. The Committee's objective is to draw lessons from past successes and failures which can be applied to future activity by the Department examined or more generally.

<b>Communicable disease</b>	A disease that can be transmitted from a person, animal or the environment to another susceptible individual.
<b>Compliance</b>	The degree to which patients follow the instructions for taking a course of treatment or healthcare workers follow an infection control policy.
<b>Consultant in Communicable Disease Control (CCDC)</b>	A doctor, appointed by the Health Protection Agency, who has responsibility for the surveillance, prevention and control of infections within a defined geographical area.
<b>Controls Assurance</b>	A process designed to provide evidence that NHS bodies are doing their reasonable best to manage themselves so as to meet their objectives and protect patients, staff, the public and other stakeholders against risks of all kinds.
<b>Criteria</b>	A standard way by which you judge, decide about, or deal with something.
<b>Denominator</b>	The population considered to be at risk eg. the total number of people admitted to a hospital or receiving a particular anti microbial agent.
<b>Endemic</b>	A disease or infection constantly present in the community.
<b>Enterococcus</b>	A bacterium which normally colonises the human bowel and is associated with bladder and wound infections.
<b>Epidemiology</b>	The study of the occurrence, cause, control and prevention of disease in populations, as opposed to individuals.
<b>Epidemiologist</b>	An expert in epidemiology.
<b>European Antimicrobial Resistance Surveillance system (EARSS)</b>	An international network of national surveillance systems, collecting comparable and validated antimicrobial resistance data for public health purposes.
<b>Healthcare Associated Infection</b>	An infection acquired via the provision of healthcare in either a hospital or community setting.
<b>Hospital acquired infection</b>	An infection that was neither present nor incubating at the time of a patient's admission which normally manifests itself more than forty eight hours after the patient's admission to hospital.
<b>Hospital Infection Control Committee</b>	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.
<b>Hospital hygiene</b>	The hospitals routine procedures on cleaning, housekeeping, disinfection, sterilization of instruments, equipment, production of sterile supplies, safe collection and disposal of clinical waste, kitchen hygiene, control of insects, vermin, etc.
<b>ICU/ITU</b>	Intensive Care Unit/Intensive Therapy Unit.
<b>Immune</b>	Being resistant to a disease due to the formation of antibodies and/or the development of immunologically competent cells.
<b>Incidence</b>	The number of new events/episodes of a disease that occur in a population in a given time period.
<b>Infection</b>	Invasion and multiplication of harmful micro organisms in body tissues.
<b>Infection control doctor</b>	Normally a consultant medical microbiologist, with knowledge of aspects of infection control, which should include epidemiology. The infection control doctor normally provides leadership to the infection control team and is responsible to the NHS Trust Chief Executive for its work.
<b>Infection control nurse</b>	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.

<b>Infection control team</b>	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.
<b>Infectious</b>	Caused by or capable of being communicated by infection.
<b>Inspection</b>	A visit carried out as part of a review, investigation or study to inspect premises or documents, or to require explanation.
<b>Intravascular (device)</b>	Catheter/cannula inserted into a vein or artery.
<b>Isolation</b>	To remove a patient from the general ward setting to a place where contact with other people can be controlled.
<b>Link Nurses</b>	Ward-based nurses who receive regular and appropriate training in infection control, which they then apply in the ward setting. In some cases, they are also trained to collect surveillance data for the infection control team.
<b>Medical Microbiologist</b>	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.
<b>Microbiology</b>	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.
<b>Micro- organism</b>	An organism too small to be seen with the naked eye. The term includes bacteria, fungi, protozoa and viruses.
<b>Morbidity</b>	The state of having a disease, or reduced state of health.
<b>Mortality</b>	Death
<b>MRSA (Methicillin Resistant <i>Staphylococcus aureus</i>)</b>	A strain of <i>Staphylococcus aureus</i> that is resistant to methicillin and other penicillin and cephalosporin antibiotics.
<b>MSSA (Methicillin Sensitive <i>Staphylococcus aureus</i>)</b>	A strain of <i>Staphylococcus aureus</i> that is sensitive to methicillin.
<b>Multi resistance</b>	A micro-organism that is resistant to two or more unrelated anti-microbial agents. These can be MSSA or MRSA.
<b>National Joint Registry</b>	A central database launched on 1 April 2003 which stores information on hip and knee replacement procedures across England and Wales.
<b>Normal flora</b>	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.
<b>Norovirus</b>	The Term used for a group of viruses including Norwalk-Like Virus (NLV) and small Round Structured Virus (SRSV) that cause infections gastroenteritis.
<b>Nosocomial</b>	Hospital acquired
<b>Outbreak</b>	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.
<b>Prevalence</b>	The total number of cases of a specific disease in existence in a given population at a certain time.
<b>Primary Care Trust</b>	Receives budgets directly from the Department of Health and provide primary care (services provided by GPs and in the local community), as well as commissioning services from acute NHS trusts.



<b>Prophylaxis</b>	Any means taken to prevent infectious disease. For example, immunisation, or giving antibiotics when patients undergo surgery.
<b>Regional Epidemiologist</b>	A medically qualified consultant specialising in epidemiology and working with a regional unit of the Health Protection Agency Communicable Disease Surveillance Centre.
<b>Screening</b>	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 , e.g. MRSA.
<b>Self-assessment</b>	A method whereby individuals and organisations assess their own performance using a series of questions or statements.
<b>Standard</b>	A deserved and achievable level of performance against which actual performance can be measured.
<b>Staphylococcus</b>	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.
<b>Strategic Health Authorities</b>	Twenty-eight SHAs are responsible for the performance of the local NHS and for setting strategies within which the national framework set out by the Department of Health can be achieved. SHAs have assumed many of the duties of the former 95 health authorities abolished in 2002.
<b>Surveillance</b>	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 control measures.
<b>Virus</b>	A very small micro-organism of simple structure, only capable of surviving within a living host cell.