“Say No to Infection”

Healthcare-Associated Infection and Antimicrobial Resistance

A National Strategy

HCAI Governance Group
HSE November 2007
Executive Summary

• Healthcare-associated infection (HCAI) refers to infection that is usually acquired 48 hours or more after admission to hospital or after contact with a health care facility, such as a day care unit, a nursing home, etc.

• HCAI is not a new and has always been a potential complication of medical treatment. There are many reasons why HCAI appears to be now more common, including improved diagnostics, a greater awareness of the quality of care, an increased population of ‘high-risk’ patients and increased antimicrobial resistance (AMR).

• AMR evolves following the introduction of an antibiotic when some of the bacteria exposed, develop resistance. Measures to control the appropriate use of antimicrobials, without restricting access to new agents that have proven benefit, as well as measures to minimise HCAI, can ensure that such AMR bacteria do not spread in hospitals.

• Not all forms of HCAI are due to antibiotic resistant bacteria but some are particularly well known such meticillin-resistant Staphylococcus aureus (MRSA), which accounts for about 10% of HCAI, vancomycin-resistant enterococci (VRE) and extended-spectrum β-lactamase (ESBL) producing Enterobacteriaceae.

• The HSE is committed to preventing and controlling HCAI and minimising AMR, by building on pre-existing initiatives (e.g.: the Strategy for the control of Antimicrobial Resistance in Ireland (SARI)) and utilising the expertise and commitment of all healthcare workers throughout the health service. The HSE is also availing of the assistance and co-operation of the public, in improving the quality of patient care.

• Although it is acknowledged that we have sub-optimal information on the extent and range of HCAI in Ireland due to inadequate surveillance
systems, the setting of targets represents a commitment to improving the quality of care for all Irish patients. The HSE targets in the area of HCAI are:

- **Reducing all healthcare-associated infections by 20% within 5 years**
- **Reducing MRSA infections by 30% within 5 years**
- **Reducing antibiotic consumption by 20% within 5 years**

As more information becomes available, it may be necessary to alter these targets but not at the expense of compromising patient care.

- The National Strategy contains a number of key components that represent a blueprint for action in this area at local and at national level. These include:
  - a commitment to ensuring that infection control is an integral part of clinical and corporate governance within every healthcare institution in Ireland
  - a public education campaign to highlight the role that the public can play in this area,
  - standard setting and regular audits
  - healthcare worker education and training as part of both staff induction and on-going professional development. Preventing HCAI is everybody’s business.
  - focussed target areas for surveillance, e.g. bloodstream infections
  - initiatives to improve antimicrobial prescribing
  - a commitment to increasing the numbers of the key personnel required (e.g. the appointment of additional infection prevention and control nurses) and a commitment to improving the physical infrastructure of many of our healthcare facilities (e.g. more isolation rooms in acute hospitals),
Introduction

What is healthcare-associated infection?

Healthcare-associated infection (HCAI), previously referred to as hospital-acquired infection, refers to infection that inadvertently occurs as a result of medical treatment or following contact with a health care facility, whether it be an acute hospital, a long stay unit or a nursing home. Most forms of HCAI are acquired 48 hours or more after admission to hospital or after contact with the health care facility. Infections diagnosed or confirmed before that period usually represent infections that were acquired in the community.

How common is HCAI?

The prevalence or frequency of HCAI varies depending on, amongst other things, the patient group and the hospital or healthcare facility. However, approximately 1 in 10 (10%) to 1 in 20 (5%) patients develop HCAI following admission to an acute hospital. HCAI is not a new phenomenon and has always been a potential complication of medical treatment, especially in hospitals. There are many reasons as to why HCAI appears to be more common at present including:

- increased population of patients at ‘high-risk’ for acquiring HCAI such as more patients receiving treatment for cancer
- increased movement of patients between wards due to pressures on hospital beds and old hospital infrastructure with a lack of suitable isolation facilities for patients with HCAI. However, this is discussed in further detail below and explained further.
- improved diagnosis, recognition and reporting of HCAI

Why is HCAI important?

HCAI affects patients, the healthcare service and society. HCAI leads to additional suffering for the patient, e.g. pain and disability following chronic bone and joint infection, and can result in death, particularly when a patient is already seriously ill. In addition, HCAI results in additional costs to; the health service, e.g. prolonged hospital stays, to the patient and his/her family, e.g. loss of income and to society, e.g. loss of tax returns.

There is increasing emphasis on improving the quality of hospital care to reduce adverse events in hospital, one of which is HCAI. In the United States of America, public and private hospitals participate in initiatives that involve comparisons of adverse events between
Draft Document

hospitals, including HCAI\(^1\). This serves to highlight the importance of HCAI as an area in which to improve the standard of patient care.

**Why has HCAI reached the top of the healthcare agenda in Ireland?**

There has been increased awareness of the importance of HCAI in Ireland and most other countries due to:

- Increased risk of patients acquiring infection, due to the increased survival of many in to old age, the more frequent use of chemotherapeutic agents for cancer which affect the immune system the greater use of invasive medical interventions, such as cardiac catheterisation, etc.
- The capacity of micro-organisms, including bacteria, to evolve and adapt over relatively short periods of time, e.g. weeks and months.
- Inadequate facilities, including sub-optimal isolation facilities, as many hospitals and units were designed and built thirty or more years ago, before many of the advances in health care such as organ transplantation programmes, were developed.
- A historical lack of investment in infection prevention and control personnel and infrastructure, to match the advances in medical technology.
- Lack of accurate and readily available information in real time (surveillance) to ensure rapid and effective preventative and control measures are taken.
- Poor compliance with best practice such as sub-optimal hand hygiene or handwashing amongst health care professionals.

**Are all types of HCAI preventable?**

Some infections are not preventable, as these occur in very high-risk patients, but it has been calculated that approximately 20% of all HCAI is preventable, but this can vary from 10% to 70%\(^2\) depending on the type of infection and pre-existing infection prevention and control programmes. Where processes already in place are sub-optimal, it may be possible to prevent nearly 70% of infections but where all processes are in place and HCAI rates are low, it may be still possible to prevent some HCAI (10%). However, there will always be an inherent risk of HCAI because of the nature of the patient population as outlined above.

**What is the link between HCAI and antimicrobial resistance (AMR)?**

HCAI is frequently linked with AMR. HCAI may be caused by antibiotic-sensitive or antibiotic-resistant bacteria. Either type of bacteria can result in severe, and sometimes life-
AMR evolves following the introduction of an antibiotic when some of the bacteria exposed, develop resistance. However, improved measures to control the appropriate use of antimicrobials, without restricting access to new agents that have proven benefit, as well as measures to minimise HCAI can ensure that such antimicrobial resistant bacteria do not spread in hospitals. Not all HCAI are due to antibiotic resistant bacteria but some are particularly well known. These include MRSA, VRE and ESBL-producing *Enterobacteriaceae*, which may include strains of *E. coli* or *Klebsiella*.

There are other microorganisms that are common causes of HCAI but which are not antibiotic resistant. These include norovirus and *Clostridium difficile*, an increasingly important cause of HCAI in the elderly; both of these cause outbreaks of diarrhoea. While there are specific measures to control and prevent AMR in terms of appropriate antimicrobial prescribing, general measures to control and prevent HCAI will also assist in curtailing the emergence and spread of AMR.

**The Background to HCAI/AMR: the Facts**

Research and surveillance on HCAI and AMR has taken place in Ireland for over 30 years. However, due to the enormous pressures on the health service arising from the major public national debt that existed until the mid to late 1990s, HCAI and AMR have only recently become a health priority. In 1995, the first national guidelines on the control and prevention of MRSA were produced by the Department of Health and Children. In the introduction, it was indicated that MRSA would be a potential indicator of the quality of care and should be an integral part of the clinical audit process. The main recommendations from this set of guidelines are outlined in Table 1.
Table 1. Major components of MRSA control and prevention, 1995

<table>
<thead>
<tr>
<th>Component</th>
<th>Examples of Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>General advice</td>
<td>Hand hygiene</td>
</tr>
<tr>
<td></td>
<td>Environmental decontamination</td>
</tr>
<tr>
<td>Management of carriers</td>
<td>Which screening swabs to take</td>
</tr>
<tr>
<td></td>
<td>Isolation/cohorting</td>
</tr>
<tr>
<td></td>
<td>Outbreaks</td>
</tr>
<tr>
<td>Decolonisation</td>
<td>Body washing Adults/children</td>
</tr>
<tr>
<td></td>
<td>Nose neonates</td>
</tr>
<tr>
<td>Patient transfers</td>
<td>Internally</td>
</tr>
<tr>
<td></td>
<td>Surgery</td>
</tr>
<tr>
<td></td>
<td>Discharge</td>
</tr>
<tr>
<td>Healthcare personnel</td>
<td>Screening</td>
</tr>
<tr>
<td></td>
<td>Decolonisation</td>
</tr>
<tr>
<td>Other</td>
<td>Laboratory methods</td>
</tr>
<tr>
<td></td>
<td>Infection control committee</td>
</tr>
<tr>
<td></td>
<td>Communication</td>
</tr>
</tbody>
</table>

In 1999, the North/South study of MRSA in Ireland was carried out which included a review of infection control and diagnostic facilities throughout the island. That survey, which was jointly funded by the Departments of Health in Dublin and Belfast, remains one of the most comprehensive national surveys ever carried out anywhere. It identified a higher prevalence of MRSA in the Republic and deficiencies in facilities and organisation in the Republic,
compared with Northern Ireland. Some of the main findings from this study are provided in Table 2.

Table 2. North/South Study of MRSA in Ireland 1999

<table>
<thead>
<tr>
<th>Demographics</th>
<th>South</th>
<th>North</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cases</td>
<td>508</td>
<td>192</td>
</tr>
<tr>
<td>Rate/100,000 population</td>
<td>14.0</td>
<td>11.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinical status</th>
<th>South</th>
<th>North</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colonised</td>
<td>271 (62%)</td>
<td>119 (68%)</td>
</tr>
<tr>
<td>Local infection</td>
<td>124 (28%)</td>
<td>47 (27%)</td>
</tr>
<tr>
<td>Invasive infection</td>
<td>44 (10%)</td>
<td>9 (5%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Facilities in hospitals</th>
<th>South</th>
<th>North</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single rooms</td>
<td>94/108</td>
<td>19/19</td>
</tr>
<tr>
<td>Cohorting</td>
<td>32/108</td>
<td>12/19</td>
</tr>
<tr>
<td>Barrier nursing on main ward</td>
<td>72/108</td>
<td>11/19</td>
</tr>
</tbody>
</table>

The Strategy for the control of Antimicrobial Resistance in Ireland (SARI) was drafted by a multi-disciplinary group and the document was launched in April 2001 by the then Minister for Health and Children, Mr. Micheál Martin, TD. The strategy provided official recognition of the importance of controlling antimicrobial resistance (and HCAI), and in addition provided recommendations on future approaches and their implementation. The main components of the strategy are briefly outlined in Table 3.
Draft Document

Table 3. Strategy for the control of antimicrobial resistance in Ireland (SARI). Main Recommendations

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Specific aspects (examples)</th>
</tr>
</thead>
<tbody>
<tr>
<td>National framework</td>
<td>Local (e.g. hospital), Regional (e.g. Health Board) and National (e.g. Dept of Health and Children)</td>
</tr>
<tr>
<td>Surveillance of antimicrobial resistance</td>
<td>Hospital, GP, local and reference laboratory</td>
</tr>
<tr>
<td>Monitoring the use of antimicrobials</td>
<td>Enforce legislative controls, collect and analyse data</td>
</tr>
<tr>
<td>Antimicrobial guidelines</td>
<td>Evidence-based national guidelines, monitoring interventions</td>
</tr>
<tr>
<td>Education</td>
<td>All healthcare markers, infection control standards</td>
</tr>
<tr>
<td>Future Research</td>
<td>Development of new agents (pharmaceutical companies), establishment of national reference laboratories, evaluation of interventions to improve prescribing</td>
</tr>
</tbody>
</table>

Revised with the establishment of the Health Services Executive

The various committees and bodies that have emerged following the publication of SARI have resulted in:

- increased surveillance of antimicrobial resistance in Ireland
- the provision of national guidelines on hand hygiene and the updating of guidelines on the control and prevention of MRSA \(^6,7\)
- the education of general practitioners on antimicrobial prescribing
- the education of healthcare workers and the general public about HCAI and AMR.
Ireland has participated in the European Antimicrobial Resistance Surveillance Systems (EARSS) since its inception in 1999 (see Figures 1 and 2) and for some of the bacteria that are part of this surveillance system, Irish participation is amongst the highest in Europe. However, compared with other European countries, we have high rates of MRSA, penicillin-resistant pneumococci, and other resistant bacterial pathogens.8

**Figure 1. MRSA bloodstream prevalence rates in Europe, 2005 (EARSS & HPSC)**

**Figure 2. MRSA bloodstream infection trends in Ireland (Source HPSC)**

(In 1999, 11 laboratories participated but by 2005, 42 were contributing data)
This high level of antimicrobial resistance may partly be explained by our relatively high consumption of antimicrobial agents, compared with other European countries such as the Netherlands and Denmark (Figure 3). Detailed analysis of our national antibiotic consumption data has shown that,9

- The rate of antibiotic consumption has been increasing, while other European countries have succeeded in reducing their level of antibiotic consumption
- A high proportion of antibiotics used in Ireland are “broad-spectrum” antibiotics, and the proportion of antibiotic use accounted for by these drugs is increasing. This contrasts with many European countries, where the predominant antibiotics used are “narrow spectrum” drugs
- There is a marked seasonal variation in antibiotic consumption in Ireland, with antibiotic consumption considerably higher during the winter months, compared to the summer months

These three patterns of antibiotic use are all predictive factors for high levels of antibiotic resistance.

Figure 3. Total antibiotic consumption and by class of antibiotic (e.g. penicillins, quinolones etc) in European countries for 2002 (Source: European Surveillance of Antimicrobial Consumption (ESAC))
The most comprehensive and up-to-date data on the frequency of HCAI in Ireland is provided by the Hospital Infection Society (HIS) Prevalence Survey of HCAI that was carried out in acute hospitals in the UK and Ireland in the Spring and Summer of 2006. (see Table 4 for the overall results in the UK and Ireland).

### Table 4. HCAI in the UK & Ireland (HIS 2006)*

<table>
<thead>
<tr>
<th>Country</th>
<th>Total number of patients surveyed</th>
<th>Number of patients with HCAI</th>
<th>Prevalence rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ireland</td>
<td>7,541</td>
<td>369</td>
<td>4.9%</td>
</tr>
<tr>
<td>Northern Ireland</td>
<td>3,644</td>
<td>198</td>
<td>5.4%</td>
</tr>
<tr>
<td>Wales</td>
<td>5,734</td>
<td>364</td>
<td>6.4%</td>
</tr>
<tr>
<td>England</td>
<td>58,755</td>
<td>4,812</td>
<td>8.2%</td>
</tr>
</tbody>
</table>

* From, the Hospital Infection Society Prevalence Survey of HCAI conducted in the UK and Ireland, February to May 2006

Forty-four acute adult hospitals in Ireland participated, categorised into regional/tertiary, general and specialised hospitals. The overall prevalence of HCAI was 4.9% but this varied from 6% in regional/tertiary hospitals to 4.2% in general hospitals and 2% in specialised hospitals. The most common types of HCAI were urinary tract infection (1.1% of patients), surgical site or wound infection (1.1% of patients) and bloodstream infection (0.8% of patients). Approximately 1 in 10 (10%) HCAIs were due to MRSA. MRSA was a particularly important cause in bloodstream infection. Further data from this survey are outlined in Figures 4 and 5.
The data from this 2006 survey have provided us with vital baseline data for patient care into the future. It will also inform future developments in the area of HCAI surveillance. The survey was a significant undertaking and would not have been possible without the cooperation and enthusiasm of infection control and prevention teams, the co-ordination and organisation provided by the Health Protection Surveillance Centre (HPSC) and essential funding from the HSE to support the employment of specialist data collectors, without whom hospital infection control and prevention teams would not have been able to participate due to pressure of day-to-day work.
Draft Document

HCAI is a worldwide problem and rates do vary from country to country. These variations are due to different criteria used to diagnose infection and the survey of different populations, e.g. some patients are more at risk of infection than others. Furthermore, when microbiological confirmation of infection is required to confirm the presence of infection, which has been the case for some national surveys in other countries, the rates of HCAI are often lower as not all HCAI are confirmed by laboratory tests. In addition, the rates of infection can be expressed differently, e.g. as a percentage of the total patient population or as a rate per thousand patient days. Caution is required therefore, in comparing infection rates between countries and surveys unless the methods used are similar. However, because the approach and methodology used in the HIS 2006 study were similar throughout these islands, comparisons within the HIS Survey are valid.

There is general international agreement on the approaches to minimising HCAI, which include:

1. **Education of healthcare workers and the public**
2. **Hand hygiene**
3. **Surveillance**
4. **Appropriate facilities, including the correct maintenance and decontamination of equipment**
5. **Adequate nurse to patient ratios**
6. **Appropriate resources in terms of physical facilities to facilitate patient isolation**
7. **The availability locally and nationally of the relevant expertise**
8. **Collaboration between local organisations, national organisations and international organisations and societies**

**The National Strategy**

The HSE, through all its agencies, is committed to preventing and controlling HCAI and minimising AMR. The HSE seeks to build on pre-existing initiatives and utilise to the full the expertise and commitment that there is throughout the health service to improve the quality of patient care. This National Strategy includes a number of components which are
Draft Document

outlined in detail in the appendices (appendix 1, National Action Plan, appendix 2, Local Implementation Team action plan). The National Strategy identifies what actions need to be taken, who has responsibility for ensuring that these actions are implemented, and what the timeframe is for their implementation. Through a combination of initiatives, it is intended to:

1. **Reduce all healthcare-associated infections by 20% within 5 years**
2. **Reduce MRSA infections by 30% within 5 years**
3. **Reduce antibiotic consumption by 20% within 5 years**

It is acknowledged that these targets have been set in the context of sub-optimal information on the extent and range of HCAI in Ireland due to inadequate surveillance systems to date. Nonetheless the setting of targets represents a commitment to improving the quality of care of Irish patients. As more information becomes available, it may be necessary to alter these targets but not at the expense of compromising patient care.

The major components of the National Action Plan are as follows:

1. **A public education campaign**
   This will involve national media, the production of posters and leaflets, and the empowerment of patients to, for example request health workers to decontaminate their hands before patient contact, and the provision of a telephone help line such as for patients with MRSA.

2. **Standard setting and audits**
   Hygiene audits in hospitals, which were first introduced in 2005, will be enhanced. Interim infection control and prevention standards have been distributed and definitive guidelines are being drafted by the Health Information and Quality Authority. Hand hygiene audits will be increased to maximise compliance with hand hygiene standards.

3. **Healthcare worker education and training**
Draft Document

It is intended that healthcare worker education on the prevention and control of HCAI and AMR will be mandatory and will include education at induction and ongoing education throughout the work experience as part of professional development. This will be delivered through a variety of innovative means.

4. Focussed target areas for surveillance

These will include surveillance of:

- Bloodstream infection, e.g. infections caused by *S. aureus*
- Acquisition of MRSA in intensive care units
- Antibiotic use in hospitals
- Alcohol hand gel consumption
- Surgical site (wound) infections will follow after an agreed dataset has been finalised.

5. Antimicrobial prescribing

This will include improving the prescribing of antibiotics in the community, the appointment of antibiotic liaison pharmacists to enhance prescribing in hospitals, and the provision of guidelines for hospitals, the community and in community units.

6. Improving personnel and physical infrastructure

SARI identified personnel requirements for implementation such as increased numbers of consultant microbiologists, infection control and prevention nurses, surveillance scientists and antibiotic liaison pharmacists, to assist in the control of AMR. It is also recognised that the physical infrastructure in which many acutely ill patients are currently cared for, is sub-optimal as these facilities were designed and built thirty and more years ago, when patient needs were different. Consequently, there is a commitment to ensure that any new building developments are in line with best international practice, including the provision of adequate numbers of isolation rooms and national guidelines in this area are being drafted.

7. Governance and performance management

This involves a commitment to
Ensuring that infection control is an integral part of clinical and corporate governance within every healthcare institution in Ireland, and an acceptance that the prevention of infection is every healthcare worker’s responsibility.

The establishment of regional, network and local infection control committees with infection control and prevention teams in each acute hospital and community units.

The identification of a named individual in each ward/clinical area with responsibility for overseeing the implementation of recommendations on infection control and prevention.

The provision of regular reports on progress made in achieving national and local targets.
References


7. SARI Infection Control Subcommittee. The control and prevention of MRSA in hospitals and in the community. Health Protection Surveillance Centre, 2005.


