

**Advisory Committee on Antimicrobial Resistance and
Healthcare Associated Infection (ARHAI)**
4th Annual Report, February 2012 - March 2013

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Chair's Foreword

It is with pleasure that I present this the fourth Annual Report of the Department of Health's Antimicrobial Resistance and Healthcare-Associated Infections Committee (ARHAI). This report provides a summary of the many activities carried out by members of ARHAI over the period February 2012 to March 2013.

This year has been one of the committee's busiest with the committee providing independent, evidence-based advice and recommendations to the Department of Health England (DH) across the entirety of its remit of healthcare-associated infection, antimicrobial resistance (AMR) and antimicrobial prescribing (AMP). Where evidence does not exist or where there have been uncertainties this has been stated and evidence-based advice and recommendations provided to bridge these gaps and meet emerging challenges.

Membership of the Committee continues to evolve. We welcomed Dr Kieran Hand as a co-opted member of the committee. My thanks go to retiring members Professor Jonathan Cooke; Professor Barry Cookson; Professor David Leaper and those that stood down due to other commitments Dr Alexander Crighton and Dr Naomi Stanton for their invaluable contributions to the work of ARHAI. An open appointment process will begin later in 2013.

This year has seen a number of changes to the way in which the Committee operates. The committee now meets formally three times per year focusing on HCAI, AMR and AMP, sequentially. Much of the work of the Committee continues to be undertaken through output-oriented 'task and finish' subgroups Chaired by members of ARHAI, the subgroups continue to provide an important opportunity to engage with stakeholders and draw upon the expertise of non-committee members.

This year areas focused on by the subgroups have been organism [*Escherichia coli*, methicillin-susceptible *Staphylococcus aureus* (MSSA)], practice (HCAI surveillance review, quality improvement, diagnosis and reporting) and speciality (surgical site infection) specific. New mechanisms, including the establishment of focused expert independent committees, have been set in place to take forward the work initiated by ARHAI.

The results of the 2011 English National Point Prevalence Survey for Healthcare Associated Infections and Antimicrobial Use¹ demonstrated the significant impact that the implementation of evidence-based practice has in driving down HCAs. The overall prevalence of HCAI in acute hospitals in England has decreased significantly from 8.2%, reported in the last survey in 2006, to 6.4%, reported in 2011.

Better understanding of the epidemiology of infections caused by methicillin-resistant *S. aureus* (MRSA) and *Clostridium difficile* and factors influencing their ability to cause infections has led to improved infection, prevention and control guidance and practice, culminating in a continued decrease in their prevalence. In 2012 the incidence of MRSA bloodstream infections in England was 24% lower than in the previous year and the incidence *C. difficile* was 17% lower.

Despite these successes, there remain significant challenges. Ongoing surveillance shows that the incidence of *E. coli* bloodstream infections has continued to rise year-on-year and

the interventions that have effectively reduced the incidence of MRSA have not similarly reduced the incidence of MSSA. Subgroups were established in 2011 to determine potential interventions that may reduce the incidences of *E. coli* and MSSA.

Surveillance is a critical component of HCAI prevention, AMR and AMP. Over the year subgroups have been established to review current HCAI surveillance arrangements to ensure best use of resource and maximise impact. The usefulness of surveillance and feedback has been examined in the context of reducing infections in neonatal critical care units and surgical site infections. The pressing need to develop centralised and accessible systems to capture, link and collate data and enable analysis has been identified and is being addressed.

Overuse and misuse of antibiotics is driving the continued increase and emergence of new, resistant and multi-resistant bacteria at a pace that far outmatches the speed of development and release of new drugs. Increasing international travel also contributes to the spread of multi-drug resistant bacteria. In the forthcoming year ARHAI will focus its efforts on methods to develop robust systems to improve surveillance of prescribing across all healthcare sectors, identify, monitor and prevent AMR spread and raise awareness of these issues through improved public engagement and communication in line with the forthcoming UK Five Year Antimicrobial Resistance Strategy.

Co-ordinating the work of the committee and its subgroups is no mean feat, and for this, I am indebted to the secretariat and thank them for their indefatigable professionalism, tenacity and fortitude.

Professor Mike Sharland

Professor of Paediatric Infectious Diseases,
St George's, University of London
Chair, Advisory Committee on Antimicrobial Resistance and Healthcare Associated Infections (ARHAI)

Plain English Summary

ARHAI is a scientific advisory committee providing independent advice to the Department of Health on antimicrobial resistance and healthcare-associated infection. The Committee provides advice on policies and guidance to minimise healthcare-associated infections, and to conserve the effectiveness of antibiotics by encouraging best practice in prescribing. Recommendations are based on evidence from research, surveillance and reference to other sources, and ARHAI also identifies areas where further research is needed.

This annual report covers the period from February 2012 – March 2013. A survey published during the year found that in acute hospitals in England 6.4% of patients contracted a healthcare associated infection, which is a substantial decrease since the last survey in 2006¹. Better understanding of how infections caused by methicillin resistant *Staphylococcus aureus* (MRSA) and *Clostridium difficile* spread and better infection prevention and control has reduced the number of patients suffering from these infections. In 2012, there were 24% fewer MRSA bloodstream infections and *C. difficile* infections than in the previous year. Though the decrease has been achieved through improving practices, more work remains to be done to reduce infections further.

The measures that have reduced MRSA infections have not led to a reduction in methicillin susceptible *Staphylococcus aureus* (MSSA) and the number of *E. coli* bloodstream infections has continued to rise each year.

A committee sub-group was asked to consider the evidence for screening patients for MSSA prior to surgery. The group concluded that that screening patients for MSSA should be based on local risk assessment. The group also recommended that existing guidance to prevent infections in wounds after surgery should be emphasised so that practices which are known to protect patients are more consistently used. With regard to *E. coli*, ARHAI has examined data on infections and trends and work is continuing to recommend measures which could reduce infections.

Surveillance (measuring, monitoring and feeding back data on the number of infections) is very important in preventing healthcare-associated infections and resistance to antibiotics. ARHAI subgroups have been established to review current arrangements for monitoring to ensure that the most important information is collected and used. Particular attention has been paid to neonatal critical care units and infections after surgery.

It is an established scientific fact that current and past overuse and misuse of antibiotics is causing bacteria to become resistant to many antibiotics. Bacteria are evolving much faster than new drugs are being developed. International travel can spread these dangerous types of bacteria, so healthcare facilities in the UK need to be prepared to cope with these infections and protect other patients.

In the forthcoming year, ARHAI will focus on how the prescribing and use of antibiotics is monitored in all healthcare settings; minimising resistance to antibiotics and raising awareness of these issues through improved public engagement. The forthcoming UK Five Year Antimicrobial Resistance Strategy calls for co-ordinated efforts by Government, professionals, patients and the public. ARHAI looks forward to playing its part in delivery of the actions set out within the strategy.

Ms Isabel Boyer
Lay person, ARHAI

ARHAI Annual Review Feb 2012 – March 2013

ABBREVIATIONS

AM	Antimicrobial
AMP	Antimicrobial prescribing
AMR	Antimicrobial resistance
AMS	Antimicrobial stewardship
ASG	Antimicrobial stewardship subgroup
ARHAI	Advisory Committee on Antimicrobial Resistance and Healthcare Associated Infection
BSI	Bloodstream infection
CDI	<i>Clostridium difficile</i> Infection
CIA	Critically important antibiotics
CMO	Chief Medical Officer
CVC	Central vascular catheter
DH	Department of Health England
ESPAUR	English Surveillance Programme for Antimicrobial Utilisation and Resistance
GNB	Gram-negative bacteria
GRE	Glycopeptide resistant enterococcal bacteraemia
HCAI	Healthcare-associated infection
HPA	Health Protection Agency
ICU	Intensive care unit
MRSA	Methicillin resistant <i>Staphylococcus aureus</i>
MSSA	Methicillin susceptible <i>Staphylococcus aureus</i>
NDAU	Neonatal Data Analysis Unit
NHS	National Health Service
NICE	National Institute for Clinical Excellence
NICU	Neonatal Intensive Care Unit
NNAP	National Neonatal Audit Programme
NNU	Neonatal Intensive Care Unit
PHE	Public Health England
SSI	Surgical site infection
UTI	Urinary tract infection

INTRODUCTION

This is the fourth annual report of the expert advisory committee on Antimicrobial Resistance and Healthcare Associated Infection (ARHAI). The Annual Report is produced as part of ARHAI's policy on openness, as set out in its Code of Practice.

This report outlines ARHAI's activities and achievements and covers the period February 2012 to March 2013 and highlights the value its independent scientific advice adds to the Department of Health England (DH).

REMIT

ARHAI was established in April 2007 to provide practical and scientific advice to DH on strategies to minimise the incidence of healthcare associated infections (HCAI) and to maintain the effectiveness of antimicrobial agents in the treatment and prevention of microbial infections in man and animals. In making recommendations, the committee takes into account the relevant work of other expert groups in the human and veterinary fields.

MEETINGS

In 2012 ARHAI amended its meeting format to better reflect the main areas within the committee's remit: Healthcare Associated Infections (HCAI); Antimicrobial Resistance (AMR); Antimicrobial Prescribing (AMP). The committee now holds three main meetings per year, focusing on HCAI, AMR and Antimicrobial Stewardship (AMS) sequentially in February/March, May/June and September. Meetings commence with a themed focus session, provided by external speakers, providing technical updates on e.g. current research, surveillance, epidemiology, modelling, optimising data linkage.

A further meeting, involving the Chair, deputy-chair, sponsor and secretariat, is held in December to review the committee's work over the year, consider current and upcoming research outputs and determine the forthcoming years' work programme.

ARHAI SUBGROUPS

Increasingly, the committee's work is carried forward by 'task and finish' subgroups; established to develop evidence-based guidance and other detailed pieces of work. Subgroups are chaired by a member of ARHAI and include co-opted experts relevant to the task. Subgroup reports and recommendations are considered at the main committee meetings. Following agreement advice is provided to the DH sponsor for consideration and, where appropriate, implementation.

CODE OF PRACTICE AND DECLARATIONS OF INTEREST

ARHAI is an independent expert science advisory committee that operates in accordance with the Code of Practice for Scientific Advisory Committees, 2011².

Declarations of interest are posted on the DH website³. Members are invited to declare interests at the beginning of each meeting. Declarations of interest are dealt with on a case by case basis and in line with government guidance (Making and Managing Public Appointments - A Guide for Departments⁴).

OPENNESS AND TRANSPARANCY

The agenda and minutes of meetings are published on the internet⁵.

The ARHAI membership list is presented in Annex A.

HEALTHCARE ASSOCIATED INFECTIONS

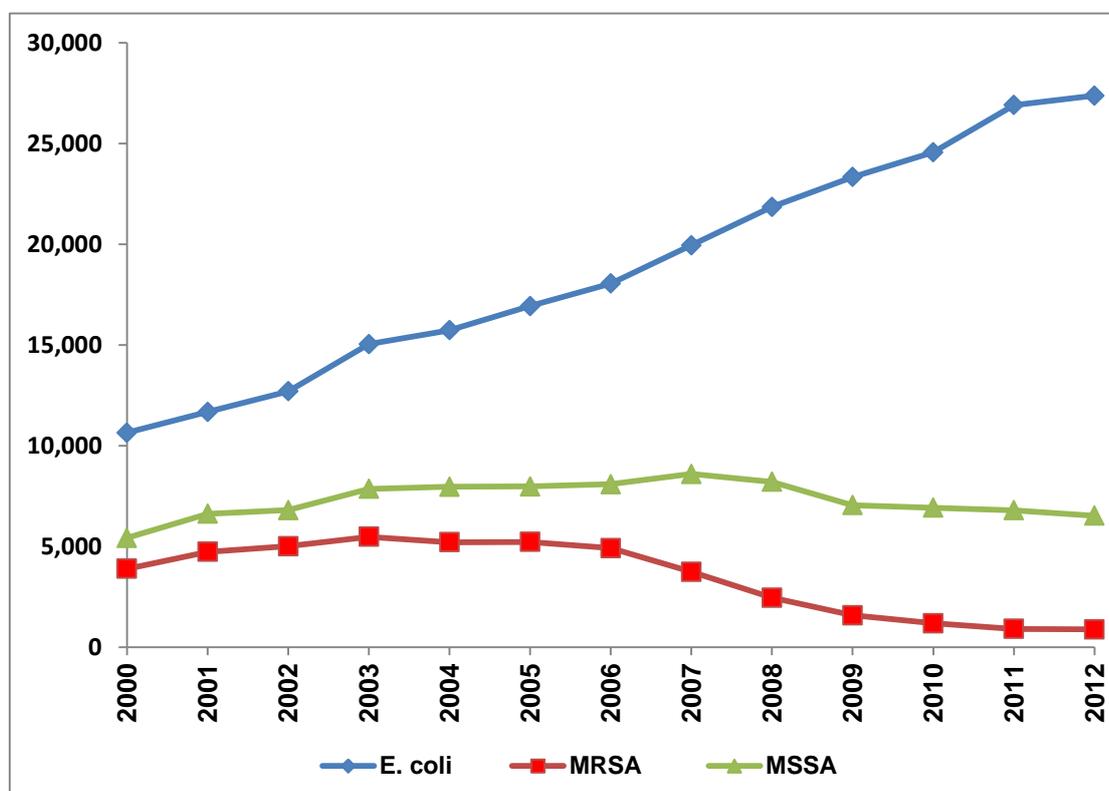
HCAIs are infections associated that occur following or during a healthcare intervention undertaken in a healthcare setting of the community (including the patient's home).

HCAIs remain a major cause of avoidable morbidity and mortality in patients admitted to hospital. The consequences of HCAIs are frequently the most severe in patients with weakened immune systems for example the very young, the very elderly, patients within intensive care units (ICUs) patients on treatment for other diseases such as HIV and cancer which suppress their immune systems. ICUs cater to patients with the most serious injuries and illnesses, many of which are life-threatening, with patients requiring constant, close monitoring and support from specialist equipment and medication. Surveillance has shown that HCAI prevalence is higher in ICUs than other ward specialities¹.

The most well-known HCAIs include those caused by methicillin-resistant *Staphylococcus aureus* (MRSA), methicillin-susceptible *S. aureus* (MSSA), *Clostridium difficile* (*C. difficile*) and *Escherichia coli* (*E. coli*). These HCAIs are subject to mandatory surveillance by the HPA with the data collected published on the HPA website (http://www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb_C/1244763936373).

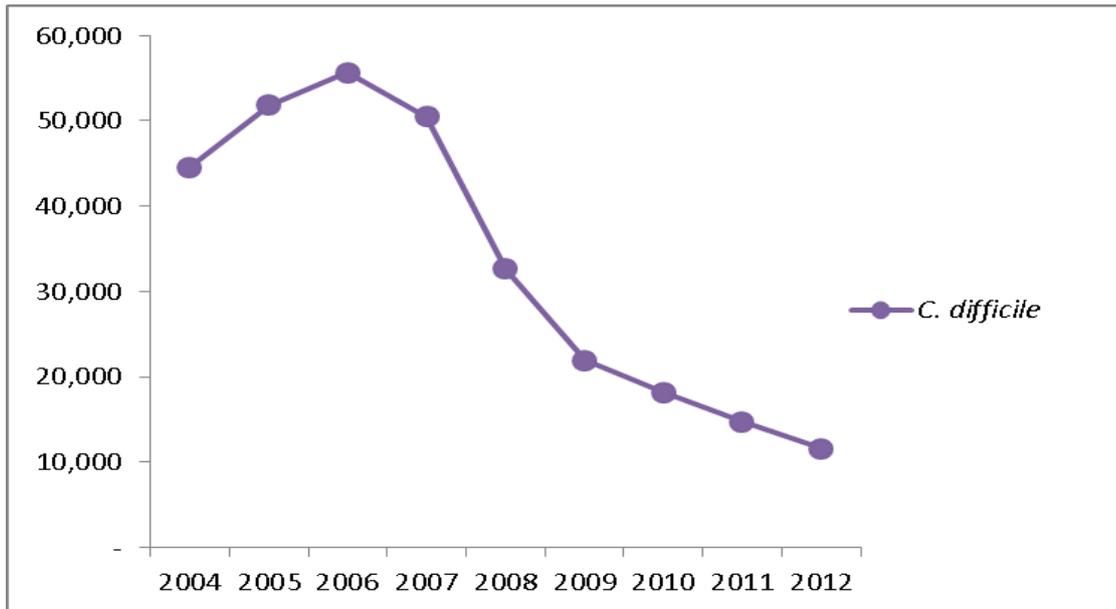
The incidence of HCAIs within NHS hospitals in England is monitored by surveillance using both continuous (incidence) surveillance and, less frequently, point prevalence ('snapshot') surveys. Data are collated and analysed by the HPA (now PHE) and provide an indication of the prevalence of HCAIs, the impact of infection prevention and control measures and emerging issues at both national and local levels.

Figure 1: Number of reported *E. coli*, MRSA and MSSA isolates reported in England per year



Source: Mandatory Surveillance Data, HPA

Figure 2: Number of reported *C. difficile* isolates reported in England per year



Source: Mandatory Surveillance Data, HPA

Figures 1 and 2 show that the prevalence of MRSA and *C. difficile* infections (CDI) in England has fallen very significantly over recent years. Interventions which have contributed to the reduction in MRSA incidence are thought to have included improved hand hygiene and cleaning, the implementation of mandatory surveillance, admission screening, isolation of carriers, improved management of invasive devices and the use of decolonisation/suppression therapy. Similarly changes to antimicrobial prescribing practices have helped to drive down the incidence of CDI. In contrast surveillance has shown that number of bloodstream infections caused by MSSA have remained relatively unchanged whilst bloodstream infections caused by *E. coli* have increased progressively year-on-year and DH sought ARHAI advice to reduce MSSA and *E. coli* bloodstream infections.

In 2012 ARHAI focused its attentions on examining and improving methods to determine potential interventions to reduce HCAs associated with both Gram negative (*E. coli*, *Pseudomonas aeruginosa*) and Gram positive bacteria (MSSA and *C. difficile*) in the most susceptible patient populations.

MANAGING GRAM-NEGATIVE INFECTIONS IN NEONATAL UNITS

Babies are born with an immature immune system. Neonates, i.e. premature and newborn babies, are more susceptible to infection than older infants and are at greater risk of increased mortality, morbidity and the likelihood of complications in later life.

Minimising the risk of HCAI, including those caused by Gram-negative bacteria (GNB), within neonatal units (NNUs) requires high baseline standards of infection prevention and control practice. In the event of an outbreak the re-invigoration of these measures and continued effective functioning of the neonatal clinical network are paramount to preventing spread.

In 2012 an ARHAI working group chaired by Dr Mark Anthony was tasked with developing practical and pragmatic guidance on the prevention, management and reporting of incidents of Gram-negative infections on NNUs.

The *de novo* guidance produced by the subgroup:

- Provides evidence-based advice on minimising the risk of transmission of GNB and actions to be taken when an outbreak of infection is suspected.
- Emphasises the need to establish a national, standardised methodology to detect and report the incidences of GNB infections and outbreaks in neonatal units.
- Unequivocally advocates the urgent need to establish a national neonatal intensive care quality improvement programme across neonatal intensive care units.

The guidance 'Managing and preventing outbreaks of Gram-negative infections in UK neonatal units' was published in Archives of Disease in Childhood⁶.

WATER SOURCES AND POTENTIAL *PSEUDOMONAS AERUGINOSA* CONTAMINATION OF TAPS AND WATER SYSTEMS

Pseudomonas aeruginosa is a Gram-negative bacterium commonly found in soil and water. It is an opportunistic pathogen and an important cause of HCAs, particularly among infants in neonatal intensive care units (NICUs).

On 20th March 2012, the Department of Health England (DH) published 'Water sources and potential *Pseudomonas aeruginosa* contamination of taps and water systems – Advice for augmented care units'⁷. The guidance included information about the potential use of filtered or sterilised tap water for 'topping and tailing' babies in NNUs and indicated that decisions concerning the use, or not, of filtered or sterilised tap water should be informed by local risk assessments of water systems. In contrast, guidance published on 30th of April 2012 by Northern Ireland^{8, 9} advocated use of sterile water for the 'topping and tailing' of babies in NNUs irrespective of the quality of the water in the units.

ARHAI was asked to comment on whether the guidance issued by DH was appropriate and proportionate and, if a decision were taken to use sterile water, at what point this might be rescinded.

In considering the evidence ARHAI noted that information concerning the presence of *Pseudomonas* spp. in water supplies on NNUs is limited and agreed that, based on the available evidence:

- the advice within the DH guidance was proportionate;
- in the event that contamination of water is suspected the use of sterile water should be continued until the problem has been resolved.

It was agreed that the DH guidance should be reviewed in light of emerging evidence. Water systems Health Technical Memorandum 04-01: Addendum '*Pseudomonas aeruginosa* – advice for augmented care units' was published on 12 March 2013 (<http://media.dh.gov.uk/network/357/files/2013/03/Health-Technical-Memorandum-04-01-Addendum.pdf>).

UPDATED GUIDANCE ON THE DIAGNOSIS AND REPORTING OF CLOSTRIDIUM DIFFICILE

Over the years the DH, HPA and ARHAI have worked collaboratively to develop initiatives and resources in England to reduce the incidence of CDIs and improve the outcomes for those infected.

In 2009 concerns were raised¹⁰ regarding the accuracy and effectiveness of the testing kits available for diagnosing CDIs. These concerns led DH to issue guidance advocating the use of a two-test protocol. In parallel, a study was commissioned to review the effectiveness of the available test kits and to identify the combination of tests producing the most reliable results¹¹.

Outputs from the study were considered by ARHAI and used to update guidance to healthcare providers. The updated guidance came into effect from April 2012, and provides a cost-effective, evidence-based way to improve the accuracy of diagnosis and deliver better patient management and care.

The guidance includes advice on:

- who should be tested and the type of samples that should be taken;
- the types of tests that should be used for detecting infections,
- what healthcare providers should do, depending on the outcome of the tests.

MSSA SCREENING AND PREVENTION OF SURGICAL SITE INFECTIONS

Surgical Site Infections (SSIs) are infections related to a surgical procedure that affect the surgical wound or deeper tissues handled during the procedure.

The risk of surgical site infections (SSIs) is influenced by numerous factors including the carriage of opportunistic pathogens, such as MRSA and MSSA, by the patient.

At least 5% of patients undergoing a surgical procedure develop a surgical site infection¹², despite the majority of surgical site infections being preventable. The rate of SSIs recorded in the PPS was 15.7%¹.

Surveillance has indicated that whilst HCAs caused by MRSA have decreased significantly since 2003, the incidence of MSSA has not (Illustrated in Fig 1).

In May 2012 a subgroup of ARHAI, chaired by Professor David Leaper, was asked to review the existing evidence base and determine which if any measures, including screening and subsequent suppression therapy, might be introduced to drive down the incidence of MSSA SSIs.

The group concluded that there was insufficient evidence to support a proposal for the implementation of new measures. In contrast good evidence exists to indicate that improved compliance with all elements of the current evidence-based SSI High Impact Intervention care bundle guidance¹³ especially during the intra - operative phase, would effect universal reductions in SSIs, including those caused by MSSA.

NEW SINGLE INFECTION QUALITY IMPROVEMENT PROGRAMME ADVISED FOR ALL CRITICAL CARE UNITS

Intensive Care Units (ICUs) cater to patients with the most serious injuries and illnesses, many of which are life-threatening with patients requiring constant, close monitoring and support from specialist equipment and medication. Surveillance shows that the HCAI prevalence in England is higher in ICUs than other ward specialities¹.

Studies have demonstrated that surveillance of central venous catheter-associated bacteraemia in ICUs and feedback of this data to clinicians can lead to reductions in the incidence of blood stream infections (BSIs). The work of the National Patient Safety Agency to implement the quality improvement programme “Matching Michigan” in Adult and Paediatric Intensive care was considered by ARHAI. The Committee was keen that this momentum should be maintained and expanded to include a single programme to improve infection outcomes for all critical care units (adult, paediatric and neonatal) in England.

An ICU HCAI subgroup, chaired by Professor Peter Wilson, was formed to determine, with stakeholders, the best means of collecting and feeding back across all critical care units as a standard comparative quality indicator.

The following recommendations were made by the subgroup and ratified by ARHAI at its meeting on 31st May 2012:

- i. A professionally led, voluntary Continuous Quality Improvement Programme should be instigated across critical care (adult, pediatric and neonatal).
- ii. A Supervisory Board should be established to oversee the surveillance to include representation from the Intensive Care Society, Pediatric Intensive Care Society, Faculty of Intensive Care Medicine, NDAU and NNAP, British Association of Critical Care Nursing, HPA (now PHE), British Association of Perinatal Medicine, Healthcare Infection Society and the Infection Prevention Society.
- iii. The quality indicator should initially be central venous catheter-associated infection expressed as a proportion of central venous catheter patient-days using the European Centre for Disease Prevention and Control definition. In the longer term, it

would be desirable to move to more rigorous indicators for benchmarking and quality improvement.

At the request of DH, the HPA established professionally led oversight group to run this quality improvement programme. The first meeting of the Supervisory Board was held on the 27th September 2012.

REDUCING *E. COLI* BACTERAEemia RATES

E. coli form part of the normal intestinal microflora in humans. Voluntary surveillance of laboratory reports of *E. coli* bacteraemias over the last 15 years has indicated a year on year increase in the number of these infections. In light of this, the HPA mandatory surveillance programme was extended to include surveillance of *E. coli* bacteraemia from June 2011.

In February 2012 ARHAI asked the HPA to provide an analysis of the first six months of the mandatory *E. coli* data collected as a means of identifying potential interventions to reduce *E. coli* bacteraemia rates.

Analysis of the data identified a close association between urinary tract infections (UTIs) and *E. coli* bacteraemia. The impacts of other potential contributory factors, such as surgery, were less clear due to the quality and quantity of the factor data collected.

In reviewing the evidence accrued, and the limitations associated with it, ARHAI agreed the need for an additional in-depth, time-limited and targeted surveillance study to provide enhanced data to supplement mandatory surveillance. It was felt that the enhanced data set would provide sufficient qualitative data to inform future advice on interventions.

The *E. coli* bacteraemia enhanced sentinel surveillance study commenced in November 2012. Thirty eight Acute NHS Trusts across England agreed to participate in the three month study. An analysis of the data will be presented to ARHAI in 2013.

Preliminary analysis of the data from the enhanced *E. coli* bacteraemia sentinel surveillance scheme indicated that 50% of *E. coli* bacteraemias seeded from a urogenital tract source, and that improved urinary catheter management and earlier diagnosis/therapy of UTIs may effect reductions in *E. coli* bacteraemias.

HCAI SURVEILLANCE REVIEW

The subgroup, chaired by Professor Mark Wilcox, was established to review and rationalise current HCAI surveillance arrangements to ensure best use of resources and maximise impact taking in to account current epidemiological trends.

National, mandatory and voluntary surveillance programmes of HCAI currently cover:

- I. All causes of bacteraemia
- II. *Staphylococcus aureus* bacteraemia, including MRSA and MSSA
- III. Surgical Site Surveillance, many categories of voluntary surveillance and mandatory orthopaedic surveillance
- IV. *Clostridium difficile*

- V. Glycopeptide resistant Enterococci (GRE) bacteraemia
- VI. *E. coli* bacteraemia

In addition to the above categories the subgroup agreed that, whilst not strictly a HCAI, the current voluntary surveillance of norovirus should be reviewed.

In undertaking the review the impact and associated burden of the surveillance of each category were considered.

The following recommendations were presented and ratified by ARHAI at its meeting on 21st September 2012:

Recommendation 1: Surgical Site Infections

- i. Trusts should continue to be required to carry out SSI surveillance but to prioritise their activities according to local infection rates.
- ii. The case for continuing to require mandatory orthopaedic SSI surveillance should be reviewed by DH.
- iii. The HPA should review the repertoire of SSI categories, in conjunction with stakeholders; a more limited repertoire of SSI surveillance categories should concentrate on high prevalence infections, particularly those where interventions could yield the most clinical benefit and effective use of local resources. Refocusing should include moving resources away from routine orthopaedic SSIs towards more prevalent SSI categories.
- iv. The HPA should perform in depth national analyses on high prevalence SSIs, including investigating other sources of information, such as Hospital Episode Statistics (HES) data.
- v. The HPA/PHE should instigate regular stakeholder meetings to ensure that surveillance outputs meet the needs of users.

Recommendation 2: *E. coli* bacteraemia

Time-limited (~3 month) sentinel enhanced surveillance should be undertaken (to commence autumn 2012) to generate data on approximately 1500 patients to inform future advice on interventions to reduce the rate of *E. coli* bacteraemia. Mandatory surveillance should continue in the medium term while data on the source of infections and efficacy of interventions are assessed.

Recommendation 3: Glycopeptide-resistant enterococcal bacteraemia

Mandatory reporting of GRE should be discontinued and DH should be asked to progress this. DH has now actioned the recommendation. Mandatory reporting of GRE bacteraemias ceased at the end of March 2013.

Recommendation 4: Infections in Critical Care Quality Improvement Programme

The subgroup supports the introduction of the new Infections in Critical Care Quality Improvement Programme (ICQIP) that is being set up by HPA to take advantage of existing surveillance networks and methods in this area.

Recommendation 5: Norovirus

- i. Norovirus outbreak reporting should be standardised.
- ii. The current voluntary reporting of norovirus outbreaks should be widened to include the community.

Recommendation 6: *Clostridium difficile*

Measures should be put in place for commissioners to audit trusts to ensure that CDI testing and reporting is according to the guidance issued by DH/HPA in 2012. *C. difficile* surveillance and monthly reporting should be continued.

Recommendation 7: MSSA bacteraemia

- i. Mandatory surveillance and reporting should be continued.
- ii. Guidance is needed on interventions to reduce MSSA bacteraemias.

Recommendation 8: MRSA bacteraemia

Monthly, rather than weekly, reporting is sufficient to assure that the marked reduction in MRSA bacteraemia rates is maintained, and to facilitate a narrowing of the gap between the best and worst performing trusts.

Recommendations from the HCAI Surveillance Review subgroup, which include five recommendations on SSI surveillance, were ratified by ARHAI at the September 2012 meeting.

Members of the subgroup met with HPA in January 2013 to agree how to implement the ARHAI recommendations.

ANTIMICROBIAL STEWARDSHIP

Antimicrobial stewardship (AMS) refers to coordinated interventions designed to improve and measure the appropriate use of antimicrobials by promoting the selection of the optimal antimicrobial drug regimen, dose, duration of therapy, and route of administration e.g. oral, intravenous. The principle aims of AMS are to improve efficacy, minimise adverse effects and unintended consequences of antimicrobial use and limit the selection and spread of antimicrobial resistant strains¹².

The ARHAI Antimicrobial Stewardship Subgroup (ASG), originally named the Prescribing Subgroup, was established in 2008 to address all aspects of antimicrobial stewardship within hospitals and primary-care settings. The subgroup met on 8 occasions under the Chairmanship of Professor Jonathan Cooke. Over the lifespan of the ASG, the following actions were delivered:

1. updated the Antimicrobial Self-Assessment Toolkit¹³.
2. developed guidance for "Antimicrobial Stewardship: Start Smart – Then Focus (2011)"¹⁴ which provides an outline of evidence-based antimicrobial stewardship in the secondary healthcare setting, which aims to encourage clinicians to:

- initiate prompt effective antibiotic treatment within 1 hour (or as soon as possible) in patients with life-threatening infections.
- document on drug chart and in medical notes: route, indication, dose, duration (RIDD).
- assistance and planning of the annual Department of Health and European Centre for Disease Prevention and Control Initiative; European Antibiotic Awareness Day.

3. contributed to development of the TARGET Antibiotics Toolkit RCGP (2012)

The TARGET (Treat antibiotics responsibly guidance and education tools) Antibiotics Toolkit was developed by the ARHAI led Antimicrobial Stewardship in Primary Care (ASPIC) group in collaboration with professional societies including GPs, pharmacists, microbiologists, clinicians, guidance developers and other stakeholders to encourage better prescribing by GPs.

The Toolkit, which was launched in November 2012, is hosted on the website of the Royal College of General Practitioners, provides training, audit, information and guidance¹⁵.

In September 2012 ARHAI reviewed the work and terms of reference of the ASG and recommended that, given the need to maintain momentum in this area, an independent, professionally led, quality improvement body should be established to take forward the operational monitoring and data capture aspects of antimicrobial stewardship.

- I. Oversight, integration and analysis of the varying antimicrobial usage data sets (including primary and secondary care as well as non-NHS providers).
- II. Development of future quality indicators for optimal antimicrobial prescribing in primary and secondary care.
- III. Development of methods to monitor the clinical outcomes associated with the introduction of the above quality indicators.
- IV. It was clarified that the Board would report to ARHAI who would retain overall responsibility for the consideration of future quality indicators for AMP.

It was agreed that ARHAI should continue to operate at a strategic advisory level and champion the need for improved methods for the collection, monitoring, analysis and communication of antimicrobial resistance.

At its meeting on 21st September 2012 ARHAI recommended that:

1. DH should consider with HPA the feasibility of establishing a multi-disciplinary, independent and professionally led English Surveillance Programme for Antimicrobial Utilisation and Resistance (ESPAUR), to monitor rates of antimicrobial prescribing in primary and secondary care and develop quality prescribing measures linked to clinical outcomes.
2. DH discuss with NICE the feasibility of their being commissioned to develop and maintain comprehensive evidence-based antimicrobial prescribing

guidance for primary and secondary care taking into account the changing rates of AMR, the need for diversity in antimicrobial prescribing and need for active antimicrobial stewardship. It also requested that NICE be asked to develop one or more Quality Standard to determine the optimal use of local and national AMR data to target patient level antimicrobial prescribing guidance.

CRITICALLY IMPORTANT ANTIBIOTICS

Paradoxically antimicrobial use (overuse, misuse and underuse) is the key driver of resistance. In 2012 The Council of The European Union asked that member states note the intention to control the use of critically important antibiotics (CIAs) to preserve their efficacy.

To be designated as critically important an antibacterial agent (or class) must meet two broad criteria¹⁷:

1. Sole therapy or one of few alternatives to treat serious human disease.
2. Antibacterial used to treat diseases caused by organisms that may be transmitted via non-human sources or diseases caused by organisms that may acquire resistance genes from non-human sources.

The current EU list of CIAs, which covers both human and animal husbandry, is extensive and members of the ASG were asked to examine the list and determine which should be prioritised across primary and secondary healthcare.

At the meeting in September 2013 ARHAI recommended that following CIAs should be prioritised within England:

- **Secondary Care:** carbapenems and anti-pseudomonals
- **Primary Care:** quinolones, co-amoxiclav and cephalosporins

Recommendations provided by the ARHAI will be considered within ESPAUR once established.

AMR HORIZON SCANNING

During 2012 Horizon Scans reports on AMR were provided to ARHAI by Professor David Livermore. The reports provided highlighted trends in AMR, raised awareness of the emergence of potential threats and provided an overview of issues related to antibiotic discovery, development and use.

Threats highlighted in 2012 include growing carbapenem resistance in Enterobacteriaceae (*E. coli*, *Klebsiella* and related species), also growing cephalosporin resistance in gonorrhoea. These are important because they erode the last effective antibiotics against important pathogens, already resistant to other antibiotics. A new concern is transferable

'*cfr*' linezolid resistance in enterococci. This was seen for the first time in the UK in 2012, prompting issue of a National Resistance Alert.

Among the few new antibiotics in advanced development are the tetracycline TP-434, the aminoglycoside plazomicin and several β -lactam/ β -lactamase inhibitor combinations. These overcome some current resistance problems, including to carbapenems... *but not all*. A future challenge (if the trials succeed) will be how to deploy these drugs to gain clinical advantage whilst minimising resistance. A disappointment was the suspension of GSK '052 – a unique new boron-containing antibiotic, after resistance emerged in urinary infections. Another disappointment was the withdrawal of telavancin just weeks after it was licensed.

The unattractiveness of antibiotics to pharmaceutical developers is much discussed, but may be changed by new legislation in the USA. The recent Generating Antibiotic Incentives Now Act extends antimicrobial patents whilst the Limited Patent Antimicrobial Drug initiative – now under discussion – would allow licensing based on simpler trials than at present. It is hoped that such initiatives will re-encourage investment.

A final welcome development is the growing array of new diagnostics, seeking bacterial genes in clinical specimens without the need to culture the bacteria in the laboratory. These have the potential to greatly improve antibiotic use by rapidly identifying pathogens and allowing treatments to be 'fine-tuned'. They will also facilitate clinical trials, allowing recruitment of patients with particular types of resistant bacteria.

ARHAI MEMBERSHIP

Members

Member	Profession	Organisation
Professor Mike Sharland (Chair)	Professor of Paediatric Infectious Diseases	St George's Hospital
Professor Mark Wilcox (Deputy Chair)	Professor of Medical Microbiology	Leeds Royal Infirmary
Ms Isabel Boyer	Lay Member	
Professor Jonathan Cooke (Retired May 2012)	Honorary Chair, School of Pharmacy & Pharmaceutical Sciences	University of Manchester (Retired May 2012)
Professor Barry Cookson (Retired Feb 2012)	Director, Laboratory of Healthcare Associated Infection	Public Health England (Retired Feb 2012)
Dr Alexander Crighton (Resigned Oct 2012)	Honorary Clinical Senior Lecturer	University of Glasgow Dental School (Resigned Oct 2012)
Professor Peter Hawkey	Professor of Clinical and Public Health Bacteriology	Birmingham Heartlands Hospital
Dr Kieran Hand (Co-opted June 2012)	Consultant Pharmacist of anti-infectives	University Hospital Southampton (Co-opted June 2012)
Professor Alison Holmes	Professor of Infectious Diseases	Imperial College London
Professor Alan Johnson	Head of HCAI & AMR (Healthcare Associated Infections & Antimicrobial Resistance) Department	Public Health England
Mr Martin Kiernan	Nurse Consultant	Southport and Ormskirk Hospital NHS Trust
Professor David Leaper	Emeritus Professor	Cardiff University
Dr Cliodna McNulty	Head of PHE Primary Care Unit	Gloucestershire Royal Hospital
Dr Julie Robotham	Senior Mathematical Modeller & Health economist	Public Health England
Dr Naomi Stanton (Resigned Dec 2012)	Clinical Lecturer, Institute of Primary Care & Public Health	Cardiff University (Resigned Dec 2012)
Dr William Tong	Consultant Virologist, Department of Infectious diseases	Guy's and St. Thomas' NHS Foundation Trust
Professor Peter Wilson	Consultant Microbiologist	UCLH NHS Foundation Trust

Observers

Dr Lorna Willocks/ Ms Carol Fraser (Scotland)

Mrs Tracey Gauci/Ms Jenny Thorne (Wales)

Dr Elizabeth Reaney (Northern Ireland)

Mr Brian Brown (Care Quality Commission)

Ms Suzanne Eckford (Veterinary Medicines Directorate, Defra)

Ms Kara Thomas/Mr Paul Cook (Food Standards Agency)

Dr Paul Lee/Ms Mair Powell (Medicines and Healthcare products Regulatory Agency)

Professor Anthony Kessel (Health Protection Agency)

Department of Health

Mr Mike DeSilva (Sponsor)

Ms Claire Boville (Assessor)

Ms Carole Fry (Assessor)

Ms Sally Wellsteed (Assessor)

Secretariat

Dr Joanne Wallace (Health Protection Agency) (joined April 2012)

Ms Sharon LeCount (Health Protection Agency) (joined January 2012)

ARHAI FORWARD WORK PLAN 2013 - 2014

Healthcare Associated Infections:

- **Identification of potential interventions from the enhanced *E. coli* surveillance data**
- **Surveillance review conclusions**

Antimicrobial Resistance:

Development of a Method to Measure Antimicrobial Resistance

1. To produce a single unified matrix and a summative index of the current drug/bug AMR rates as a baseline for:
 - The UK,
 - England and Devolved Administrations, and
 - English regions (once 'region' has been determined)
2. Include an assessment of underlying biases to assist with interpretation of AMR Index

Antimicrobial Prescribing:

Development of Antimicrobial Prescribing Quality Measures

1. To determine the ability of the current data sets to provide a baseline from which to measure impact of the strategy
2. To define a small number of local quality measures for community and hospital prescribing.
3. Determine the optimal methodology for monitoring and reporting for local quality measures.
4. Identify options to monitor the safety of the implementation of these antimicrobial prescribing quality measures on infection syndrome specific clinical outcomes.

ANNEX C

GLOSSARY

Antibiotic A drug that destroys or inhibits the growth of bacteria. The action of the drug may be selective against certain bacteria.

Antimicrobial stewardship Antimicrobial stewardship is a key component of a multifaceted approach to preventing emergence of antimicrobial resistance. Good antimicrobial stewardship involves selecting an appropriate drug and optimising its dose and duration to cure an infection while minimising toxicity and conditions for selection of resistant bacterial strains.

Antimicrobials An antimicrobial is a drug that selectively destroys or inhibits the growth of micro-organisms.

Bacteraemia The presence of bacteria in the bloodstream.

Catheter A tubular flexible device passed through body channels (e.g. artery, vein, or urethra) for the withdrawal or introduction of fluids.

Clostridium difficile A toxin producing bacterium which can cause severe diarrhoea or enterocolitis. This most commonly occurs following a course of antibiotics which has disturbed the normal bacterial flora of the patient's gut.

Enterobacteriaceae A family of Gram negative bacilli that contains many species of bacteria that normally inhabit the intestines. Enterobacteriaceae, that are commonly part of the normal intestinal tract flora, are referred to as coliforms.

HCAI An infection that was neither present nor incubating at the time of the patient's admission (normally seen more than 48 hours after admission to hospital).

Incidence The number of new events/episodes of a disease that occur in a population in a given time period.

Infection Invasion and multiplication of harmful microorganisms in body tissues.

MRSA (Methicillin resistant *Staphylococcus aureus*) A strain of *Staphylococcus aureus* that is resistant to methicillin and other penicillin and most cephalosporin antibiotics.

MSSA (Methicillin susceptible *Staphylococcus aureus*) A strain of *Staphylococcus aureus* that is susceptible to methicillin.

Neonates Children up to 1 month of age

Pathogenic organisms Microorganisms that can cause disease in a host.

Surgery a procedure, where an incision is made (not just a needle puncture) with breach of mucosa and/or skin - not necessarily in the operating theatre.

Surgical site infection Surgical site infection can be defined as being present when pathogenic organisms multiply in a wound giving rise to local signs and symptoms, for example heat, redness, pain and swelling, and (in more serious cases) with systemic signs of fever or a raised white blood cell count. Infection in the surgical wound may prevent healing taking place so that the wound edges separate or it may cause an abscess to form in the deeper tissues.

Surveillance Systematic collection of data from the population at risk, identification of infections using consistent definitions, analysis of these data and dissemination of the results to those responsible for the care of the patients and to those responsible for implementation of prevention and control measures.

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