Advisory Committee on Antimicrobial Resistance and Healthcare Associated Infection (ARHAI)

6th Annual Report, April 2014 - March 2015

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Chair's Foreword

The global threat of antimicrobial resistance (AMR) was highlighted by the O'Neill review commissioned by UK Prime Minister David Cameron. In the review's 2014 report "Antimicrobial Resistance: Tackling a Crisis for the Future Health and Wealth of Nations" it was estimated that 10 million deaths per year and a total loss of $100 trillion to GDP would be attributable to AMR by 2050.

The Department of Health and the Department for Environment, Food and Rural Affairs jointly published the UK five year antimicrobial resistance strategy (2013-2018) in 2013.[1] The aims of the strategy are to improve the knowledge and understanding of AMR, conserve and steward the effectiveness of existing treatments and stimulate the development of new antibiotics, diagnostics and novel therapies.

In 2014/15 ARHAI continued to provide expert advice with regards to implementing the UK 5 year AMR strategy. The Committee continues an active strategy to combat AMR by optimising the appropriate use of antimicrobials and enhancing infection prevention and control. Specifically the committee reviewed and updated the key bug/drug combinations which are reported by the Department of Health to provide a measure of the burden of AMR. The committee also recommended for the first time detailed antimicrobial prescribing quality measures which informed development of an NHS England Quality Premium for 2015/16.

Resistance in Gram-negative bacteria remained a focus of the committee. ARHAI endorsed recommendations to expand the surveillance of bloodstream infections caused by Gram-negative bacteria from *E. coli* to encompass other key Gram-negative pathogens such as *K. pneumoniae*. A task and finish subgroup also developed a system to detect potential outbreaks of multi-drug resistant Gram-negative bacteria using routine surveillance data.

ARHAI was delighted to welcome Professor Michael Moore and Jane Binyon as committee members over the past year. I am indebted to Professor Alison Holmes, Dr Julie Robotham and Dr William Tong for their contributions to ARHAI and wish them well as they leave the committee.

Professor Mike Sharland
Professor of Paediatric Infectious Diseases,
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Chair, Advisory Committee on Antimicrobial Resistance and Healthcare-Associated Infections (ARHAI)

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[1] Department of Health. UK 5 Year Antimicrobial Resistance Strategy 2013 to 2018. https://www.gov.uk/government/publications/uk-5-year-antimicrobial-resistance-strategy-2013-to-2018 (07 May 2014, date last accessed)

Plain English Summary

ARHAI is one of the committees set up to provide the Government with practical and scientific advice. It does so in three areas: antibiotic resistance, hospital acquired infection, antibiotic prescribing. This report describes the work it has done between April 2014 and March 2015.

Bacteria are increasingly resistant to the antibiotics we use to kill them. This is a major problem for us all. ARHAI's approach based on the UK's five year strategy is to monitor levels of resistance, to reduce the number of hospital acquired infections and improve the use of antibiotics.

Antibiotic Resistance

Antibiotics are used to treat bacterial infections. Resistance happens when a particular antibiotic (drug) no longer works against a particular bacteria (bug). These are called drug/bug combinations. ARHAI decides which of these combinations are the most important to be kept under review. There are two other important and difficult problems. Some bacteria are resistant to many types of antibiotics or even to antibiotics that are called of last resort, to be used only when no others will do. In both these cases ARHAI has made recommendations for extra monitoring (page 13).

Hospital Acquired Infections

When a patient picks up an infection in hospital it can lead to severe illness and even death. The key is to quickly identify and treat infected patients and to have very good infection prevention controls in place.   MRSA and *C. diff* are two well-known hospital infections but better hygiene has been effective in getting the numbers down and keeping them down. . Unfortunately infections caused by a large group of bacteria known as Gram-negative are on the increase. These bacteria are called Gram-negative because they do not pick up a coloured stain used in a laboratory to identify types of bacteria. The group includes familiar ones like *E. coli* and less familiar ones like *Klebsiella*. They cause infections such as pneumonia, and, urinary tract or surgical site infections. At present complete records of all these infections are not available from every Trust . ARHAI recommends ways to collect better data and to reduce the number of cases (page 11).

Antibiotic Prescribing

Over or inappropriate prescribing of antibiotics is one way resistance develops. ARHAI has made recommendations to reduce both the total number of antibiotics prescribed as well as the number of prescriptions for certain antibiotics. These recommendations are called prescribing quality measures and are to be reviewed every year. Work is now being carried out in two areas. First, to decide whether it is possible to reduce antibiotic use further without causing ill health and what would be the best limit. And second, to widen the range of antibiotics used regularly (page 17-18).

An Integrated Indicator

Indicators can be used to report on aspects of complicated systems like the NHS to give a reliable view of its well-being. Some work has begun on developing indicators that may provide an overview of infections, antibiotic resistance and antibiotic use and will continue into 2015/2016 (page 11).

One Health

Bacteria resistant to antibiotics can be found in animals and in the environment. ARHAI, Defra and others are working on a report putting together information on both human and animal use. This report will be published later in 2015 (page 16).

Public Engagement

ARHAI wants the public to understand its work and to make sure that its work is for the benefit of patients. Annual reports, papers and meeting minutes are available on the ARHAI webpage.[2] ARHAI actively supports the European Antibiotic Awareness Day held every November (page 19).

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[2] www.gov.uk/government/groups/advisory-committee-on-antimicrobial-resistance-and-healthcare-associated-infection.

Abbreviations

AG	Antibiotic Guardian
AMP	Antimicrobial Prescribing
AMR	Antimicrobial Resistance
AMS	Antimicrobial Stewardship
APQM	Antimicrobial Prescribing Quality Measure
ARHAI	Antimicrobial Resistance and Healthcare Associated Infections
CDI	*Clostridium difficile* infection
CoPSAC	Code of Practice for Scientific Advisory Committees
CQUIN	Commissioning for Quality and Innovation
DARC	Defra Antimicrobial Resistance Coordination group
Defra	Department for Environment, Food and Rural Affairs
DH	Department of Health
EAAD	European Antimicrobial Awareness Day
ESPAUR	English Surveillance Programme for Antimicrobial Utilisation and Resistance
GNHABSI	Gram-negative healthcare-associated bloodstream infections
HCAI	Healthcare Associated Infections
HLSG	High Level Steering Group (for the UK 5 year AMR strategy)
HPRU	Health Protection Research Unit
ICU	Intensive Care Unit
MDR	Multi-drug Resistant
MRSA	Meticillin Resistant *Staphylococcus aureus*
PHE	Public Health England
PIR	Post Infection Review
SSTF	Start Smart Then Focus
SMI	Standards for Microbiology Investigations

Introduction

This is the sixth 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 in the period April 2014 to March 2015 and highlights the value that 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.

From 2013 ARHAI has made recommendations to the High Level Steering Group (HLSG) for the UK 5 year AMR strategy and has formed a partnership with national bodies such as Public Health England (PHE) and NHS England to enable pragmatic and effective implementation of ARHAI recommendations.

Meetings

In 2014/15 ARHAI's meeting format reflected the main areas within the committee's remit: HCAI; Antimicrobial Resistance (AMR); Antimicrobial Prescribing and Stewardship (AMP). The committee holds three main meetings per year, focusing on these areas sequentially in spring, summer and autumn. Meetings commence with a focused session identifying key changes in data over the previous year for the main theme, provided by external speakers, and then proceed with technical updates on e.g. current research, surveillance and epidemiology.

A further meeting, involving the Chair, deputy-chair, sponsor and secretariat, is held each winter to review the committee's work over the past year, consider current and upcoming research outputs and determine the forthcoming years work programme. ARHAI also meets with counterparts at the Defra antimicrobial resistance co-ordination group (DARC) to discuss cross-cutting "one health" aspects of infectious disease and antimicrobial resistance on an annual basis.

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.

Openness and Transparency

ARHAI is an independent expert science advisory committee that operates in accordance with the Code of Practice for Scientific Advisory Committees, 2011.[3] As such the agenda open papers and minutes of meetings are published and accessible from the ARHAI webpage.[4,5]

Declarations of interest are posted on the ARHAI webpage and are updated annually. 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 Departments.[6]

Membership

The ARHAI membership list may be found on the ARHAI webpage, members present during the remit of this report may be found in Annex A. New members are appointed by the Department of Health's Senior Responsible Officer and are accountable to the Chair for carrying out their duties and for their performance. Members are expected to demonstrate a commitment to and an understanding of the value and importance of the seven principles of public life and act in accordance to CoPSAC guidance.

Public and Patient Information

ARHAI is dedicated to evolving and improving its engagement with the public. It strives to make its work better understood by the public and ensure that the work it undertakes is for the benefit of patients and the public. Inclusion of a lay summary is compulsory for all papers presented to the committee.

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[3] http://www.bis.gov.uk/assets/goscience/docs/c/11-1382-code-of-practice-scientific-advisory-committees.pdf

[4] https://www.gov.uk/government/groups/advisory-committee-on-antimicrobial-resistance-and-healthcare-associated-infection

[5] http://webarchive.nationalarchives.gov.uk/20130402145952/http://transparency.dh.gov.uk/tag/arhai-minutes/

[6] http://www.civilservice.gov.uk/wp-content/uploads/2011/09/public_appt_guide-pdf_tcm6-3392.pdf

Healthcare associated infections

HCAIs are infections that occur following or during a healthcare intervention undertaken in a healthcare setting. 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.
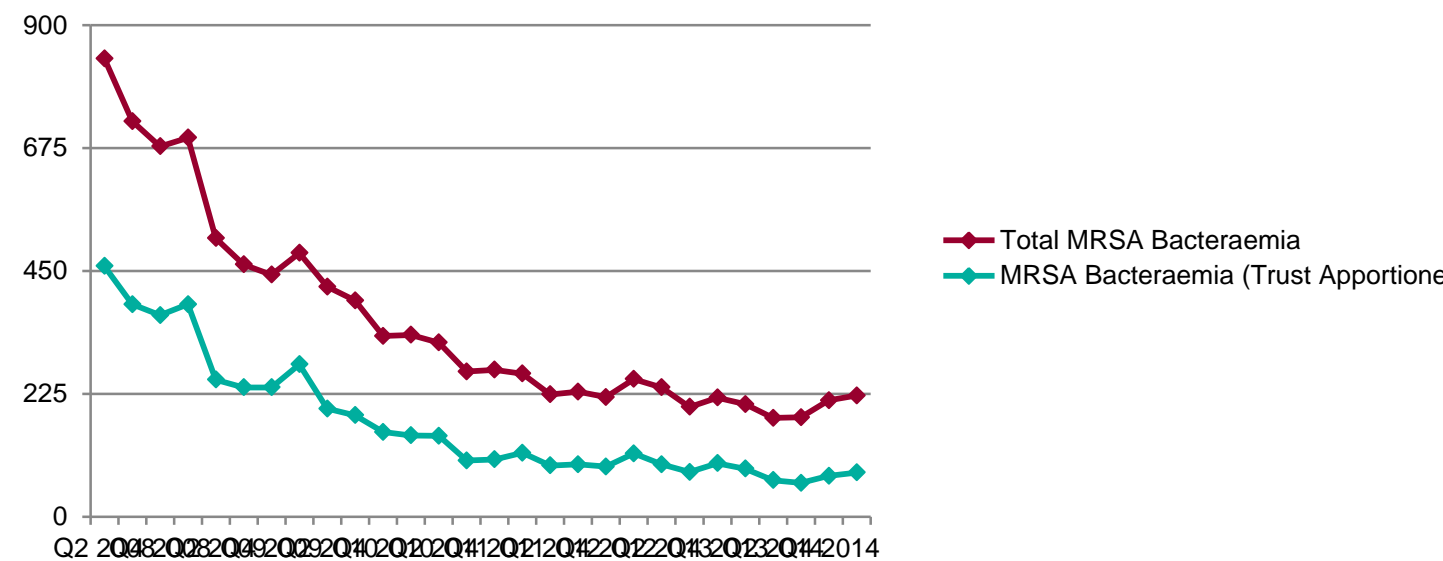
The incidence of HCAIs within NHS hospitals in England is monitored by surveillance using both continuous surveillance and, less frequently, point prevalence ('snapshot') surveys. Data are collated and analysed by Public Health England (PHE) and provide an indication of the prevalence of HCAIs, the impact of infection prevention and control measures and emerging issues at both national and local levels.

The landscape of HCAIs continues to change. The incidence of both meticillin resistant *Staphylococcus aureus* (MRSA) and *Clostridium difficile* (*C. difficile*) in English NHS hospitals has fallen markedly, and focus is shifting to the increasing burden of infections caused by Gram-negative organisms such as *E. coli*.

MRSA
Infection rates for MRSA as measured by cases causing bacteraemia have fallen in recent years from a high of 7659 cases in 2003 to 782 in 2014.

Figure 1: Total and Secondary care associated MRSA bloodstream infections.

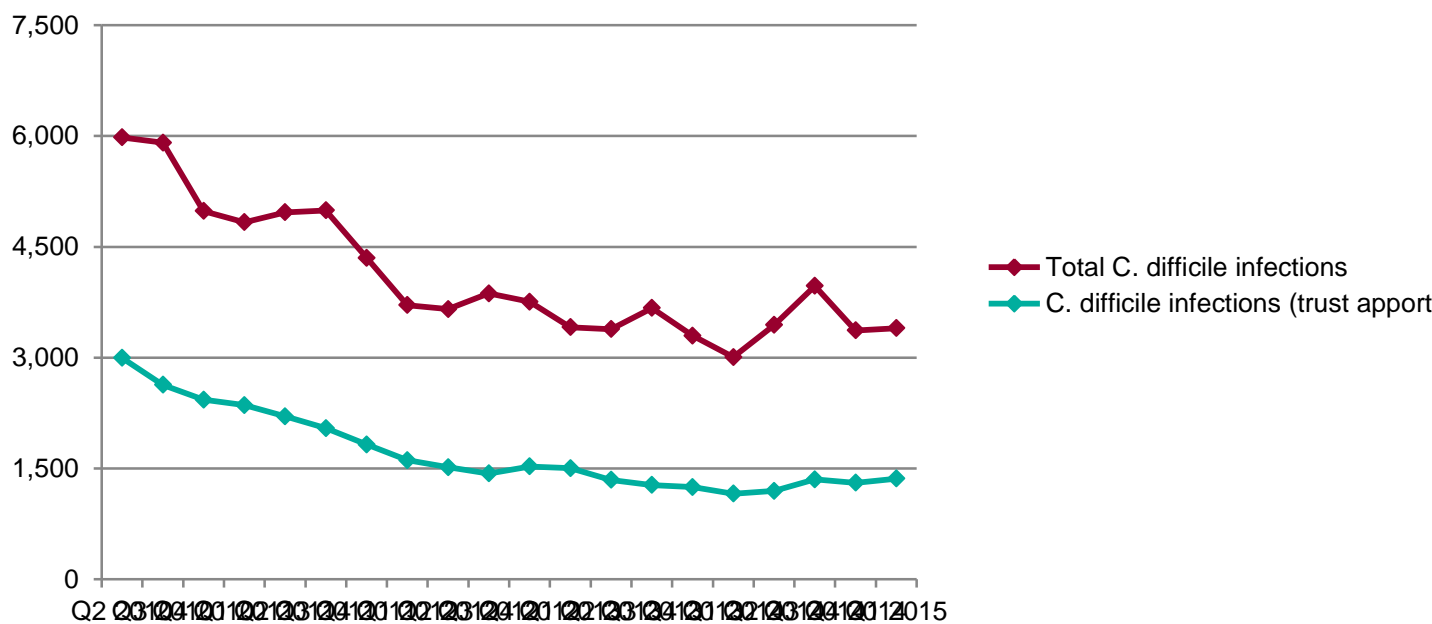

Data imported from the PHE mandatory surveillance service[7]

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[7] https://www.gov.uk/government/collections/staphylococcus-aureus-guidance-data-and-analysis

Informed by the National One Week (NOW) Study of MRSA Screening[8]; ARHAI published guidance for implementation of a pragmatic and cost effective modified admission MRSA screening guidance for local adaptation within the NHS in August 2014[9]. The guidance recommends a more efficient and effective method for identifying and managing high-risk patients who have tested positive for MRSA. This was disseminated by NHS England through the chief nursing officers' bulletin.

C. difficile

Large increases in *C. difficile* infection (CDI) rates occurred in England up until 2007-08, with associated increases in morbidity and mortality. Since this peak incidence, there has been a substantial (circa 80%) decline in CDIs and associated deaths. The rate of decrease in CDIs has slowed in the last year (Figure 2).

Figure 2: Total and Secondary care associated *C. difficile* infections.

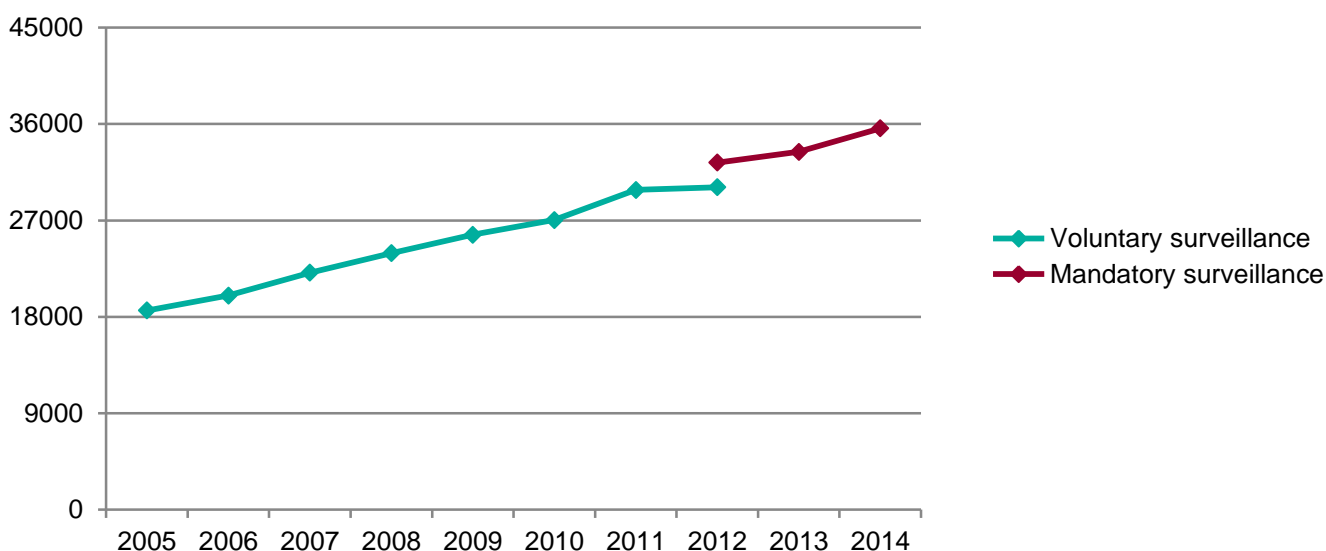Data imported from the PHE mandatory surveillance service[10]

E. coli

Incidence of bacteraemia caused by multi-drug resistant (MDR) Gram-negative bacteria such as *E. coli* has been steadily increasing since 2005.

Figure 3: Total *E. coli* bacteraemia from voluntary and mandatory surveillance systems.

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[8] http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0074219
[9] https://www.gov.uk/government/publications/how-to-approach-mrsa-screening
[10] https://www.gov.uk/government/collections/clostridium-difficile-guidance-data-and-analysis

Data imported from the PHE surveillance service[11]

Surveillance of Gram-negative healthcare associated bloodstream infections.
Trust-level rates of bacteraemia are available for *E. coli* from the PHE mandatory surveillance programme. By contrast, data on bacteraemia caused by other Gram-negative pathogens is currently derived from laboratory reporting undertaken on a voluntary basis. Thus, there is incomplete case ascertainment and data on rates of infection in individual Trusts are not readily available, as some laboratories undertake services for more than one hospital.

In February 2015 ARHAI established a subgroup to make recommendations to improve understanding of the total burden of healthcare-associated bloodstream infections caused by Gram-negative organisms and aid the rational design of interventions to decrease these infections.

Integrated Indicator
The AMR strategy Implementation Plan made a commitment to explore the possibility of developing a new integrated indicator for HCAI and AMR. It was envisaged that this would provide a new mechanism to drive action on IPC and AMS, with complex information interpreted and presented in a simple readily accessible format for use at local and national levels.

DH, PHE and NHS England had jointly explored how best to develop a new system-wide approach to move away from performance targets linked to MRSA and *C. difficile* rates, to a broader approach rooted in the principles of good IPC and AMS, which could be simply expressed in the form of a new integrated indicator. In February 2015 ARHAI was asked

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[11] https://www.gov.uk/government/collections/escherichia-coli-e-coli-guidance-data-and-analysis

to comment on the concept for a new integrated HCAI-AMR indicator; from May 2015 ARHAI established a task and finish subgroup to refine this scope in terms of clinical utility and applicability within the healthcare system and recommend implementation options to the HLSG for the UK 5 year AMR strategy.

Antimicrobial resistance

One of seven key aims of the UK five year AMR strategy is better access to and use of surveillance data. This can be achieved through greater consistency and standardisation of data collected and improved data linkage. ARHAI was commissioned by DH to determine the critically important antibiotic resistances and specific bacterial infections to be included in surveillance with reference to the best available evidence.

Quantifying and reporting AMR

In October 2014 ARHAI reviewed the Drug/Bug resistance data included within the surveillance programme in support of the UK Five Year Antimicrobial Resistance Strategy. The committee recommended the expansion of surveillance to further critically important resistances (Table 1)

Table 1: Revised to drug/bug combinations for surveillance October 2014

Bacteria	Antibiotic class	Metric
E. coli	Fluoroquinolones	% NS to ciprofloxacin
E. coli	Cephalosporin	% NS to cefotaxime and/or ceftazidime
E. coli	Aminoglycosides	% NS to gentamicin
E. coli	Carbapenem	% NS to imipenem and/or meropenem
E. coli	β-lactam	% NS to co-amoxiclav
E. coli	β-lactam	% NS to piperacillin/tazobactam
K. pneumoniae	Fluoroquinolones	% NS to ciprofloxacin
K. pneumoniae	Cephalosporin	% NS to cefotaxime and/or ceftazidime
K. pneumoniae	Aminoglycosides	% NS to gentamicin
K. pneumoniae	Carbapenem	% NS to imipenem and/or meropenem
K. pneumoniae	β-lactam	% NS to piperacillin/tazobactam
Pseudomonas spp.	Cephalosporin	% NS to ceftazidime
Pseudomonas spp.	Carbapenem	% NS to imipenem and/or meropenem
S. pneumoniae	β-lactam	% NS to penicillin
N. gonorrhoeae	Cephalosporin	% NS to ceftriaxone
N. gonorrhoeae	Macrolide	% NS to azithromycin

The committee also revised the "shadow" list of drug/bug combinations, on which a watching brief is kept (Table 2).

Table 2. Secondary ("shadow") list of drug/bug combinations to be kept under review for possible inclusion in national surveillance (NS, non-susceptible).

Bacteria	Antibiotic class	Metric
E. coli	β-lactam	% NS to piperacillin/tazobactam
K. pneumoniae	β-lactam	% NS to piperacillin/tazobactam
K. oxytoca	Fluoroquinolones	% NS to ciprofloxacin
K. oxytoca	Cephalosporin	% NS to cefotaxime and/or ceftazidime
K. oxytoca	Aminoglycosides	% NS to gentamicin
K. oxytoca	Carbapenem	% NS to imipenem and/or meropenem
S. aureus	β-lactam	% NS to methicillin
Enterococcus spp.	Glycopeptide	% NS to vancomycin
Acinetobacter spp.	Polymyxin	% NS to colistin
Pseudomonas spp.	β-lactam	% NS to piperacillin

These ratified recommendations were delivered to the HLSG for the UK 5 year AMR strategy to inform the implementation of critical surveillance outputs. ARHAI will continue to review both national bug/drug data and the bug/drug combinations included for surveillance annually.

Monitoring Carbapenem Resistant Organisms (CRO)

The incidence and number of species of Enterobacteriaceae that produce carbapenemases has continued to increase globally over recent years. A number of clusters and outbreaks have been reported in England within the past five years, some of which have been contained. Since 2010, there has been a significant increase in carbapenemase-producing Enterobacteriaceae in North West England.

The key to control is the effective early identification of at risk, colonised or infected patients in conjunction with the rapid and rigorous implementation of Infection Prevention and Control (IPC) measures to prevent spread. Different countries have implemented different strategies in attempts to effectively identify at risk, colonised or infected patients and to maximise infection prevention and control.

In 2014 ARHAI established a task and finish group to provide prioritised options for the surveillance, monitoring and reporting of Carbapenem Resistant Organism Bloodstream Infections (CRO BSIs) within secondary care in England in light of current UK and international guidance and best practice with regard to (CROBSIs).

I. Meropenem susceptibility testing should be carried out by healthcare providers for all Gram-negative bacteraemia isolates
    ☐ Meropenem susceptibility testing methodology in all Gram-negative bacteraemia isolates is described in the Standards for Microbiology Investigations (SMI); the SMI is included in the NHS Standard Contract.

□ All Gram-negative bacteraemia isolates with confirmed Ertapenem resistance should undergo meropenem susceptibility testing.

II. Data for meropenem resistant cases should be collated and analysed by Public Health England (PHE) and equivalent bodies in the Devolved Administrations
□ All trusts, GP practices and laboratories use the voluntary web-based enhanced surveillance system when reporting meropenem resistant isolates.
□ CRO monitoring is submitted as a national Commissioning for Quality and Innovation (CQUIN): 100% of patients infected with meropenem resistant Gram negative bacteria to be reported using the enhanced surveillance system for one financial year (2015-2016).

III. Where meropenem resistance has been detected, an investigation into the cause should be undertaken
□ Encouraging support and input into the new electronic enhanced surveillance system to collect the epidemiological investigation data aimed at finding the cause for all isolates with either a high suspicion of, or confirmed meropenem resistance; this will need to involve the local health protection units, infection control team, treating doctor and nurses and possibly Estates.
□ A PHE briefing note is cascaded to promote usage of the web-based enhanced surveillance system and to highlight the clinical importance of meropenem testing and good practice. Laboratories are signposted to the revised SMI once published.

Reducing the burden of HCAI, by the earlier detection of potential outbreaks of multi-drug resistant bacteria

Numerous species of Gram-negative bacteria are capable of causing infections in humans. Exposure of the bacteria to antibiotics has resulted in the development of resistance to single or multiple types of antibiotics. Current surveillance methods do not provide all of the information necessary to flag action on potential outbreaks.

ARHAI established a task and finish subgroup in 2014 to consider the feasibility and optimal methods of enhanced surveillance for monitoring, detecting and reporting clusters (i.e. possible outbreaks) due to multi-resistant bacteria. These data are intended to inform early intervention, prevention and control processes.

The subgroup determined that existing local and national surveillance systems, run by PHE, may be useful for detecting such clusters and is appropriate for statistical exceedance algorithms to be applied to the collected data. A retrospective pilot carried out using resistance data from the West-Midlands showed that exceedance reporting using was able to flag clusters of infection deserving further investigation locally. A further prospective (real-time) pilot carried out in the West-Midlands and East of England supported this conclusion.

In February 2015 ARHAI endorsed the following recommendations:

I. Applying an exceedance algorithm to national antimicrobial surveillance data has been proved, in principle, to permit detection of clusters of resistance to specific drug/bug combinations in secondary care.

II. There is value in the further development of an exceedance reporting tool for detection of exceptional occurrences of resistant bacteria, with data remitted via AmSurv/SGSS.

III. For such a system to function it is critical that labs a core set of antibiotics and identify bacteria at least to genus level. To ensure this, a minimum standard for sensitivity testing should be introduced and improvements to the automation of reporting made.

PHE has agreed a phased national roll-out of reporting from April 2016 which will include Trusts with the highest quality historical data in the first instance.

Research recommendations

☐ The exceedance reporting system could detect Trusts as outliers for resistance, which could be an area for further investigation.

☐ Local evaluation of the exceedance reporting system – are clusters flagged in sufficient time to allow rapid response.

☐ Cost/ health-economic benefit of the exceedance reporting system to the NHS.

☐ Could the exceedance reporting system provide a mechanism for highlighting isolates which should be sent to AMRHAI for typing/sequencing? At present typing submissions are ad hoc, based largely on local practice and level of suspicion of an outbreak, not on systematic criteria, as with resistance per se.

☐ Could the exceedance reporting system provide an indication of which specimens should be retained at a local level to allow further investigation?

☐ How can the exceedance reporting system be improved to track plasmid outbreaks, which may involve multiple species?

ARHAI/DARC

ARHAI held a joint meeting with the Defra Antimicrobial Resistance Coordination (DARC) Group in September 2014 to discuss the threat of antimicrobial resistance to human and animal health and the environment.

The group agreed the need for a UK "One-Health" report containing antimicrobial consumption and sales data for human and animal healthcare together with resistance data and trends for both sectors. Both committees worked with PHE, the veterinary medicines directorate (VMD) and the devolved administrations to produce the first UK one health report which was published in July 2015[12].

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[12] https://www.gov.uk/government/publications/uk-one-health-report-antibiotics-use-in-humans-and-animals

ARHAI and DARC will continue to meet once a year to discuss mutually important areas of interest.

Antimicrobial prescribing and stewardship

There is strong evidence to suggest that the inappropriate prescribing of antibiotics drives antimicrobial resistance, which can persist for at least 12 months.[13] Optimisation of prescribing practices was identified as one of seven key areas in the UK 5 year AMR strategy, with the aim of conserving the effectiveness of available antimicrobials.

Implementing Antimicrobial Prescribing Quality Measures
In March 2014 ARHAI endorsed the following evidence-based antimicrobial prescribing quality measures (APQM) the aim of improving the quality of antimicrobial prescribing in primary and secondary care.

Primary care quality measures:
- A reduction in total prescribing to 2009/10 financial year levels at a CCG level.
- A reduction in the proportion of antibiotics from cephalosporin, quinolone or co-amoxiclav classes to <10% of total antibiotic prescribing.

Secondary care quality measures:
- A reduction in total antimicrobial consumption by 1% per annum for next 5 years.
- A reduction in total carbapenem consumption to previous consumption levels of 5 years ago (corresponding to an approximate 20-25% average reduction).

The 2014 quality measures informed an NHS England quality premium in 2015/16. Quality Premiums are intended to reward clinical commissioning groups (CCGs) for improvements in the quality of the services that they commission and for associated improvements in health outcomes and reducing inequalities.

Quality Premium 2015/16- Improved antibiotic prescribing in primary and secondary care

- Reduction in the number of antibiotics prescribed in primary care by 1% (or greater) from each CCG's 2013/14 value. Individual practice reduction to be agreed by the CCG with each practice.
- Number of co-amoxiclav, cephalosporins and quinolones as a percentage of the total number of selected antibiotics prescribed in primary care to be reduced by 10% from each CCG's 2013/14 value, or to be below the 2013/14 median

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[13] Costelloe C, Metcalfe C, Lovering A, et al. Effect of antibiotic prescribing in primary care on antimicrobial resistance in individual patients: systematic review and meta-analysis. BMJ 2010;340(May18_2):c2096. http://www.ncbi.nlm.nih.gov/pubmed/20483949

proportion for English CCGs (11.3%), whichever represents the smallest reduction for the CCG in question

☐ Secondary care providers with 10% or more of their activity being commissioned by the relevant CCG have validated their total antibiotic prescribing data as certified by PHE

ARHAI will review antimicrobial prescribing data and revise APQMs on an annual basis.

Optimal prescribing in Primary Care

The committee determined that further evidence was required to determine whether setting an optimal safe range of antimicrobial prescribing in England was feasible. A task and finish subgroup was commissioned in February 2015 to perform a literature review of available evidence to support an estimation of an optimal safe range of antimicrobial prescribing and develop recommendations for further work. A final subgroup report is expected in autumn 2015.

Joint IDRN/ARHAI "hard choices" workshop

At the request of the Department of Health, In September 2014 ARHAI and the infectious diseases research network (IDRN) held a joint meeting to discuss the potential consequences of national antimicrobial reductions. They highlighted the need for research to monitor potential adverse consequences through changes in patient outcome. They noted recent advances in national healthcare surveillance databases had made such research possible for patients being treated in both hospitals and general practice.

In collaboration with PHE and the antibiotic resistance focused Health Protection Research Units (HPRUs); ARHAI developed a methodology and research proposal for monitoring clinical outcomes associated with reductions in antibiotic prescribing. The committee endorsed the research proposal in February 2015; this work has received funding and is currently under-way through a PhD studentship.

Heterogeneity and diversity of antimicrobial prescribing

The UK 5 year AMR strategy highlighted the need for guidance on heterogeneity of prescribing in both secondary and primary care as a key part of optimising prescribing practice. In addition the English Surveillance Programme for Antimicrobial Utilisation and Resistance (ESPAUR) 2014 report noted that 66 antibiotics were prescribed across general practice and the hospital sector in England and that the top 15 antibiotics in general practice and hospitals accounted for 98% and 88% of consumption respectively.[14] In October 2014 ARHAI established a task and finish subgroup to consider how best to measure and promote heterogeneity and diversity of antibiotic prescribing, to explore how the NHS can best be encouraged to use a range carefully selected antibiotics and to

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[14] https://www.gov.uk/government/publications/english-surveillance-programme-antimicrobial-utilisation-and-resistance-espaur-report

devise an evaluation of the effect of these prescribing strategies on both prescribing and patient outcomes. The group is expected to report to ARHAI in autumn 2015.

Start Smart Then Focus

The Start Smart then Focus (SSTF) antimicrobial stewardship (AMS) toolkit for secondary care was updated by PHE in light of user-testing and newly published evidence. ARHAI also commented on the draft document before it's publication in March 2015.[15]

In 2014 PHE performed an audit of SSTF implementation. The majority of NHS Acute Trusts reported reviewing the SSTF guidance formally or informally (88%). However only 48% of Trusts had developed an action plan to implement SSTF AMS principles, and implementation of actions plans varied across NHS Area Teams. The study also determined that 94% of trusts had a dedicated AMS committee. Membership of the committees varied; with Microbiologists and specialist antimicrobial pharmacists commonly represented (92% and 87% of Trusts respectively) whereas representation from general pharmacists and junior doctors was lower (7% and 21% respectively). Full results of this study can be found in the ESPAUR 2014 report.[16]

European Antibiotic Awareness Day

A key area of the UK 5 year AMR strategy is improving professional education, training and public engagement. The UK has participated in European Antibiotic Awareness Day (EAAD) since 2007. Activities and resources for EAAD 2014 were developed and run by a PHE-led interdisciplinary committee with representation from animal and human health sectors across England and the Devolved Administrations. Resources for professionals to use locally to raise antibiotic awareness with professionals and the public as part of the EAAD 2014 activities had been developed and made available to print through the NHS supply chain.

As part of 2014 UK activities for EAAD, and in support of the UK 5-year AMR strategy, PHE developed the Antibiotic Guardian (AG) campaign to move from raising awareness to engagement and stimulating behaviour change. AG is an intervention to improve knowledge and behaviours regarding antibiotic prescribing and use among both healthcare professionals and the public through an online action-based pledge system. There was no dedicated budget for EAAD activities in England or for the development of the AG campaign. Sponsorship was received for website development and promotion at conferences.

The main objective of 10,000 pledges was achieved and surpassed by 30 November 2014. By 20 January 2015 there were 12,509 Antibiotic Guardians (AG) of which 69% were healthcare professionals; 26.5% of unique website visitors made a pledge

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[15] https://www.gov.uk/government/publications/antimicrobial-stewardship-start-smart-then-focus

[16] https://www.gov.uk/government/publications/english-surveillance-programme-antimicrobial-utilisation-and-resistance-espaur-report

(n=47,158). There was variation in the uptake of pledges across UK geographies. The website received international attention; it was visited by individuals in 156 different countries and pledges were made in 81 of these. A full evaluation of the first year of the antibiotic guardian campaign has been submitted for peer-review.

Antimicrobial prescribing and stewardship research needs

- Research is needed to rapidly establish the clinical and cost effectiveness of point of care tests (POCT) in the NHS (given that some POCT tests have been shown to be cost effective in Europe).
- In patients started on broad spectrum antibiotics, for whom tests subsequently yield an aetiological diagnosis, is de-escalation targeted against the identified pathogen non-inferior to continued broad spectrum treatment?
- In patients started on broad spectrum antibiotics, who recover rapidly but without an identified pathogen, is protocol-driven de-escalation non-inferior to continued broad spectrum treatment?
- Which of the following measures of antimicrobial consumption is most closely correlated with prevalence of resistance or incidence of resistant organisms in hospitals? Numerators: defined daily doses (DDDs); days of therapy (DOTs); number of patients exposed. Denominators: occupied bed days; admissions; number of beds.

Summary

Within the past year, ARHAI have made wide ranging recommendations regarding the monitoring, reporting and reduction of healthcare associated infections, antimicrobial resistance and antimicrobial prescribing. ARHAI continued its work in support of the UK 5 year AMR strategy and to address the inexorable rise in infections caused by Gram-negative bacteria, work in both of these areas will continue in the coming year as can be seen in the ARHAI forward work plan (annex B).

Annex A

ARHAI membership

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
Jane Binyon	Lay Member	
Ms Isabel Boyer	Lay Member	
Dr Kieran Hand	Consultant Pharmacist of anti-infectives	University Hospital Southampton
Professor Peter Hawkey	Professor of Clinical and Public Health Bacteriology	Birmingham Heartlands Hospital
Professor Alastair Hay	Professor of Primary Care	University of Bristol
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 Livermore	Professor of Medical Microbiology	University of East Anglia
Dr Cliodna McNulty	Head of PHE Primary Care Unit	Gloucestershire Royal Hospital
Professor Michael Moore	Professor in Primary Health Care Research	University of Southampton
Dr Julie Robotham	Senior Mathematical Modeller & Health economist	Public Health England
Dr William Tong	Consultant Virologist, Department of Infectious diseases	Guy's and St. Thomas' NHS Foundation Trust

Professor Andrew Peter Wilson	Professor of Microbiology & Consultant Microbiologist	UCLH NHS Foundation Trust

Observers

Alistair Leonard (Scotland)

Mrs Tracey Gauci/Ms Jenny Thorne (Wales)

Dr Elizabeth Reaney (Northern Ireland)

Mr Brian Brown (Care Quality Commission)

Ms Suzanne Eckford/Dr Katherine Healey (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/Dr Anna Cichowska (Public Health England)

Department of Health

Mr Mike DeSilva (Sponsor)

Ms Maree Barnett (Assessor)

Ms Claire Boville (Assessor)

Ms Sally Wellsteed (Assessor)

Public Health England Secretariat

Dr Diane Ashiru-Oredope (Pharmacist Lead, September 2010 - Present)

Dr Emma Budd (September 2013 - Present)

Annex B

Further ARHAI main meetings in 2015
22nd May 2015 (AMR theme)
25th September (AMP theme)

ARHAI forward work plan 2016

Gram-negative healthcare associated bloodstream infections (GNHABSI) interventions

Optimal Safe Prescribing range in Primary Care

Integrated Indicator/Enabling local AMR action plans

Heterogeneity and diversity of antimicrobial prescribing

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.

Epidemiology The study of the incidence, spread, causes, and effects of diseases in defined populations. Epidemiology forms an evidence base which may inform policy decisions and targets for preventive healthcare.

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.

One Health Collaborative multi-disciplinary work at local and national levels to attain optimal health for people, animals and the environment.

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 central measures.