English surveillance programme for antimicrobial utilisation and resistance (ESPAUR)

Executive summary and recommendations extracted from 2016 report
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Key facts

1. The number of people affected by antibiotic-resistant Gram-negative infections continues to increase
2. The incidence of antibiotic-resistant Gram-negative bloodstream infections is higher in the very young and the elderly, reflecting the higher rate of infection in these age groups
3. Antibiotic use has reduced significantly across the whole healthcare system for the first time
4. Antimicrobial stewardship continues to be embedded and improving in both general practice and hospitals, although further work is needed in community health trusts
5. A new antimicrobial stewardship toolkit has been launched for dental practices
6. By November 2016, more than 33,000 people had become Antibiotic Guardians and had pledged an action to reduce the unnecessary use of antibiotics
7. Professional organisations and stakeholders are engaging with PHE to raise awareness, educate, and deliver aspects of the UK AMR strategy
Executive summary

ESPAUR was established by PHE in 2013 in response to the cross-government UK five-year antimicrobial resistance (AMR) strategy.¹

The aims of ESPAUR are to:
- develop, maintain and disseminate robust data relevant to antimicrobial use (AMU), AMR and antimicrobial stewardship (AMS)
- enable optimum use of this data across healthcare settings
- measure the impact of AMU and AMS on AMR and patient safety

The following key objectives have been achieved this year:

1. Better access to and use of data
A major initiative over the last year has been to make local surveillance data available to stakeholders via Fingertips, a publicly accessible interactive web tool. In April 2015 PHE launched a series of AMR local indicators for England on the Fingertips data portal.² Data for more than 70 indicators are now available across three NHS geographies: acute trusts, clinical commissioning groups (CCGs) and GP practices.

2. Improved AMR surveillance
Improvements in data presentation and analysis have been made possible by continual improvements in both the quality and quantity of surveillance data over the last three years through collaborative work with the PHE Field Epidemiology Service and NHS microbiology laboratories. PHE has developed and implemented an enhanced reporting system (ERS) for carbapenemase-producing organisms (CPO) with the objective of collecting risk factor data.³ It has developed outputs for the NHS highlighting the trusts which are reporting through this system and the number of CPO from each trust since the system was launched and in the most recent month.

3. Improved AMU surveillance
ESPAUR can now track antibiotic prescribing from each healthcare sector. The dental subgroup of ESPAUR has worked with the Faculty of Dental Public Health, NHS Business Services Authority, PHE and NHS Digital to develop an options paper and plan for improving the granularity of dental

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prescribing. PHE has worked with NHS England and NHS Improvement to implement the Antibiotic Prescribing Quality Measures advised by the Department of Health (DH) expert advisory committee on Antimicrobial Resistance and Healthcare-Associated Infections (ARHAI) into incentives for CCGs and acute trusts.

4. Improved public and professional engagement

ESPAUR launched the ‘Antibiotic Guardian’ (AG) campaign as a move from engagement to changes in public and professional behaviour around antibiotic use. Process and outcome evaluations were performed and published which showed the wide reach of the campaign and its success in increasing commitment to tackling AMR in both healthcare professionals and members of the public, through increased self-reported knowledge and changed self-reported behaviour, particularly among people with prior AMR awareness.\(^4\)\(^5\)

In collaboration with Health Education England, ESPAUR has scoped and developed implementation options related to education and training of healthcare professionals for antimicrobial prescribing and stewardship competencies in undergraduate and postgraduate education and for continuing professional development.

The PHE Primary Care Unit has continued to work with schools to provide education about the spread, prevention and treatment of infection through the ongoing development and delivery of materials on bacteria, antibiotics and AMR through e-Bug, a free educational resource for use in the classroom and at home.

5. Improved antibiotic stewardship

This year a survey assessing the implementation of recommended antimicrobial stewardship interventions in community healthcare trusts was completed and initial results are presented in this report. ESPAUR developed an antimicrobial stewardship surveillance system including tools to support stewardship audits in acute trusts and these are being used as part of the CQUIN (Commissioning for Quality and Innovation) in 2016/17. A dental antimicrobial stewardship toolkit has been developed and rolled out by the dental subgroup of ESPAUR in collaboration with Faculty of General Dental Practice and British Dental Association.


\(^5\) Chaintarl K et al. Impact of a United Kingdom-wide campaign to tackle antimicrobial resistance on self-reported knowledge and behaviour change. BMC Public Health. 2016;16:393
6. Development and implementation of antifungal resistance surveillance and stewardship

This year we have also increased our outputs to look at fungal resistance, antifungal consumption and stewardship, as this is an area of emerging concern highlighted by increasing numbers of *Candida auris* infections detected in England and elsewhere.

**Key results**

**Antimicrobial resistance**

- between 2010 and 2014 the rate of bloodstream infections caused by *Escherichia coli* and *Klebsiella pneumoniae* increased by 15.6% and 20.8% respectively. Between 2014 and 2015 the number of cases continued to increase; *E. coli* bloodstream infections increased by a further 4.6% and *K. pneumoniae* increased by 9%. Tackling these infections is a key government priority.

- the proportions of bloodstream infections resistant to piperacillin/tazobactam (the most frequently used antibiotic for the treatment of sepsis) rose dramatically between 2011 and 2015, from 8.5% to 11.7% for those caused by *E. coli* and from 12.6% to 18.5% for *K. pneumoniae*. These increases in resistance will increase the pressure on clinicians to use carbapenems (which are the antibiotics of last resort) unless alternative treatment strategies are developed. Resistance to other antibiotics used for treatment was largely unchanged.

- carbapenem resistance remains low in bloodstream infections in England (*E. coli* 0.2% and *K. pneumoniae* 1.1%), though there continue to be year-on-year increases in the numbers of bacteria confirmed to produce carbapenemases (enzymes that break down carbapenems making them ineffective for treatment), with 1,893 positive referred isolates confirmed in 2015.

- incidence of bloodstream infections and infections caused by resistant bacteria are highest in the extremes of life (the very young and the elderly). Interventions to reduce antibiotic resistance that are focused on the very young and the elderly should be prioritised.

- in this report we present data on resistance to combinations of antibiotics, highlighting that only 2.5% of *E. coli* and 2.0% of *K. pneumoniae* tested for susceptibility to co-amoxiclav and amikacin were resistant to both. Combinations of antibiotics are thus possible alternatives to single antibiotics for empiric therapy of sepsis, preserving carbapenems and putting less selection pressure on antibiotics such as piperacillin/tazobactam.

- there is wide variation in the rates of resistance to antibiotics across England. For example by CCG trimethoprim resistance in Gram-negative urinary tract infection (UTI) ranges from 16.3% to 66.7%; this may be related to variation in sending urine samples for laboratory testing. However, 86% of CCGs have resistance rates greater than 25%, highlighting that trimethoprim can no
longer be advised as the first-line empiric antibiotic treatment for UTIs in England

- antimicrobial resistance is stable in pneumococcal and *Pseudomonas* bloodstream infections and tuberculosis and decreasing in *Staphylococcus aureus* infections. However, vancomycin resistance in bloodstream infections caused by *Enterococcus spp.* rose from 10% to 16% between 2011 and 2015
- an outbreak of azithromycin-resistant gonorrhoea, initially identified in Leeds, has spread across England. Laboratories have been notified to screen all gonorrhoea isolates for resistance and affected patients should be followed up to ensure clinical cure and have rigorous tracing of all sexual contact

**Antimicrobial prescribing**

- total antibiotic consumption (measured as defined daily dose [DDD]) declined significantly between 2014 and 2015 by 4.3%, from 22.9 to 21.8 DDD per 1000 inhabitants per day
- antibiotic prescribing predominantly occurs in general practice (74%), followed by hospital inpatients (11%), and outpatients (7%). The remainder comprised use in dental practice (5%) and other community settings (3%). Decreased antibiotic consumption occurred in general practice, hospitals and dental practices
- antibiotic prescriptions in primary care, measured as the number of prescriptions dispensed, adjusted for the age and sex distributions in the population (Specific Therapeutic group Age-sex Related Prescribing Units [STAR-PU]), has declined for the last four years and is now lower than the similar measure in 2011 (1.11 items per STAR-PU in 2015 compared to 1.23 items per STAR-PU in 2011)
- broad-spectrum antibiotic use (antibiotics that are effective against a wide range of bacteria) continues to decrease in primary care. England now uses the lowest amounts of cephalosporins and quinolones in the EU. These antibiotics are more likely to drive antibiotic resistance than narrow-spectrum antibiotics. However, hospitals continue to increase their antibiotics of last resort currently available: Piperacillin/tazobactam, carbapenems and colistin
- compared with other UK health administrations, England has the lowest primary care prescribing by (items and DDDs). Scotland, however, has the lowest use of last resort antibiotics with England the second lowest use

**Relationship between prescribing and resistance**

- despite low levels of use of cephalosporins and resistance, the proportion of bloodstream infections resistant to these antibiotics has not changed significantly in the last five years
- the continued increase (50% over five years) in the use of piperacillin/tazobactam, an antibiotic of last resort, is now associated with a significant increase in resistance of both *E. coli* and *K. pneumoniae* bloodstream infections. The proportions of these isolates that are resistant have increased by 50% and 60% respectively, over five years. While this may relate to different antibiotic susceptibility breakpoints used in clinical laboratories, this is nevertheless important as this is the information clinicians use to guide patient treatment
this highlights the importance of reducing the use of piperacillin/tazobactam, as well as carbapenems, to reduce the emergence and subsequent spread of resistance

Antimicrobial stewardship
- a dental antimicrobial stewardship toolkit was developed and launched, building on work carried out in the North West of England
- a survey of antimicrobial stewardship was performed in community health service trusts. This demonstrated that further work needs to be developed to embed antimicrobial policies, guidelines and education within these trusts
- an evaluation of TARGET resources for primary care was performed. It demonstrated more than 7,000 course completions have occurred since the materials were launched
- ESPAUR developed and piloted a secondary care stewardship surveillance tool. This was subsequently amended and rolled out to support the AMR CQUIN

Public and professional engagement
- PHE continued to develop and lead the UK-wide Antibiotic Guardian campaign as a move from raising awareness to stimulating behaviour change in members of the public and healthcare professionals; by November 2016, more than 33,000 people had pledged an action to become an Antibiotic Guardian at www.AntibioticGuardian.com
- three professional roadshows and a public event were supported and commissioned by PHE
- health education institutions were surveyed to understand how the PHE developed ‘antimicrobial prescribing and stewardship competencies’ were being embedded in undergraduate curricula of healthcare students. The average implementation rate for all the dimensions was reported as 67% from those who responded
- PHE e-Bug (an educational resource for children and young people, including resources for teachers in line with the national curricula) team launched Beat the Bugs, a six-week course on hygiene, antibiotic and self-care for use by community groups. A pilot occurred for adults with learning disabilities and results found that knowledge, awareness, and behaviour improved. ‘e-Bug’ now has partners with 26 countries across the world

Antifungal resistance, prescribing and stewardship
- PHE developed antifungal resistance, consumption and stewardship data in collaboration with national experts and professional organisations
- considerable work needs to occur to improve the resistance data being performed in NHS laboratories and submitted to the national surveillance system
- antifungal consumption differs between community and hospitals; the majority of consumption in the community occurs with antifungals (eg terbinafine and griseofluvin) used to treat skin, nail and hair infections. Within hospitals the predominant antifungals are azoles and amphotericin to treat mucocutaneous or invasive disease
• very few organisations have a dedicated antifungal stewardship programme, predominantly due to lack of resources and competing priorities

ESPAUR will continue the work to meet its aim and objectives over the coming year. The oversight group continues to provide expertise, direction and challenge to PHE and others working in this area to ensure that the projects and surveillance meet the needs of the national AMR strategy. The enthusiasm and engagement of the individuals and professional organisations working with ESPAUR allow this output and much more to be delivered.
Recommendations to PHE regions and centres

This report should have a valuable role in supporting the development of action plans to reduce prescribing. PHE centres should ensure that this report is discussed at relevant meetings including those held by local quality surveillance groups, strategic clinical networks, health protection committees and local infection prevention and control committees.

PHE staff should promote the use of the national AMR surveillance system by NHS colleagues through the active dissemination of the system weblink (https://sgss.phe.org.uk/) and the data outputs for local AMR Indicators available on the PHE Fingertips web portal: https://fingertips.phe.gov.uk/profile/amr-local-indicators

PHE staff should ensure they are able to direct organisations and individuals to the resources for AMS guidance available for primary care and secondary care from NICE and PHE, including TARGET and SSTF toolkit and the NICE Antimicrobial Stewardship Guidance.

PHE staff should continue to promote the enhanced surveillance and electronic reporting system (ERS) for carbapenemase-producing organisms. The protocol is available at: https://www.gov.uk/government/publications/carbapenemase-producing-gram-negative-bacteria-enhanced-surveillance-ers-user-guide.

PHE staff should use the opportunity to sign up their own staff and to promote with stakeholders, the Antibiotic Guardian call to action: “The Antibiotic Guardian campaign calls on everyone in the UK, the public and the healthcare community to become antibiotic guardians by choosing one simple pledge about how each will make better use of antibiotics and help save these vital medicines from becoming obsolete.”
www.AntibioticGuardian.com

Recommendations to local authorities

Directors of public health should ensure that health and wellbeing boards are aware of the strategic nature and priority of AMR and that it receives due attention at their meetings and in the Joint Strategic Needs Assessment.
Directors of public health should work with stakeholders to provide information and advice to the public regarding steps they can take to address AMR.

Directors of public health should work with local healthcare commissioners (via their routine channels for assuring provider quality) to ensure effective clinical leadership and collaboration on AM stewardship by all providers.

Directors of public health should ensure robust arrangements are made to mobilise, monitor and sustain effective multi-agency action by stakeholders from across whole local system, to develop interventions to reduce high prescribing where it occurs in their population.

Directors of public health should ensure that their local commissioners are commissioning microbiology services that follow the Standards for Microbiological Investigations published by PHE as part of the clinical and public health care package for their population. https://www.gov.uk/government/collections/standards-for-microbiology-investigations-smi

Directors of public health should support the development of local AMS collaboratives in line with NICE Antimicrobial Stewardship Guidance (NG15).

Recommendations to NHS organisations

NHS England and NHS Improvement regional teams are requested to disseminate this report to CCG accountable officers and directors of quality, and medicines management teams, medication safety officers and hospital chief pharmacists.

The boards of NHS organisations should review the data available for their organisation on the Local AMR Indicators page of PHE Fingertips. (https://fingertips.phe.gov.uk/profile/amr-local-indicators)

Directors of Infection Prevention and Control (DIPCs) and medical and nursing directors should ensure that they have an active programme of antibiotic resistance and antibiotic use surveillance and that these programmes inform a local AMR strategy and action plan which are reported to the board at regular intervals.

Antimicrobial stewardship and microbiology laboratory teams should ensure their laboratory and pharmacy is reporting AMR and CQUIN data to PHE.
They can compare the results of their local AMR surveillance to other hospitals and laboratories in their region through regular access online via https://sgss.phe.org.uk/ and PHE Fingertips site. This should inform their local antibiotic guidelines to optimise prescribing.

Microbiology laboratories should use the enhanced surveillance and electronic reporting system (ERS) for all bacteria with suspected carbapenemase enzymes when referring isolates to the national reference laboratory for confirmatory testing. The protocol is available at: https://www.gov.uk/government/publications/carbapenemase-producing-gram-negative-bacteria-enhanced-surveillance-ers-user-guide.

CCGs can be directed to review the CCG and general practice data on the NHS BSA website, PresQIPP prescribing resources, open-prescribing, NHS Digital website, and on PHE Fingertips. Acute NHS trusts can review their own pharmacy data, held within their hospitals and the data submitted for the AMR CQUIN on PHE Fingertips site.

Regional pharmacists, heads of medicines optimisation (or equivalent) in CCGs, medication safety officers and chief pharmacists are invited to sign up and promote the Antibiotic Guardian call to action: “Antibiotic Guardian campaign calls on everyone in the UK, the public and the healthcare community to become antibiotic guardians by choosing one simple pledge about how each will make better use of antibiotics and help save these vital medicines from becoming obsolete.” www.AntibioticGuardian.com

Commissioners of NHS services should ensure that the microbiology services they commission follow the Standards for Microbiological Investigations published by PHE as part of the clinical and public health care package for their population.

All healthcare organisations (both community and hospital) should perform a self-assessment of their organisation’s antimicrobial stewardship practice against the NICE Antimicrobial Stewardship Guidance (NG15), and use the toolkit to develop an organisation focussed action plan.

Recommendations to regulatory authorities

Regulatory authorities for all health and social care settings should ensure policies and procedures are in place to monitor the appropriate use of antibiotics, the effective surveillance for antibiotic resistance and that
medical, nursing and pharmacy employees are aware of the importance of their actions in this area.

Regulatory authorities should review the pathology services and ensure that they are following the standards for microbiology investigations.

Regulatory authorities should use the data on Fingertips as part of the information assessment process for NHS organisations.

**Recommendations to professional organisations**

Professional organisations should cascade this report to their members to raise awareness on antibiotic resistance and to help inform individual actions, including pledging to act as an Antibiotic Guardian on: www.AntibioticGuardian.com.

Professional organisations should work with Health Education England to develop effective undergraduate and postgraduate curricula on antibiotic use and resistance for their trainees, members and fellows.

Professional organisations should promote use of resources supporting AMS, such as TARGET and SSTF.