

UKHSA Advisory Board

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| Title of paper | Update on UKHSA Antimicrobial Resistance Programme |
| Date | 13 September 2023 |
| Sponsor | Susan Hopkins |
| Presenter | Colin Brown |

1. Purpose of the paper

- 1.1. Following a January 2023 Advisory Board request, we provide an update on UKHSA's activity against the spread of antimicrobial resistance (AMR). We summarise actions implemented to tackle AMR through the extant [5-year National Action Plan \(NAP\) for AMR \(2019 to 2024\)](#)¹, and detail ongoing work to develop the upcoming 2024-2029 NAP. Feedback from the advisory board will help ensure that activities are appropriately ambitious yet achievable, aligning with UKHSA's 3-year strategy.

2. Recommendations

- 2.1. The Advisory Board is asked to:
 - a) **NOTE** the activities underway in UKHSA to tackle AMR and the key inter- and intra-organisation interdependencies to the delivery of the UKHSA AMR programme
 - b) **COMMENT** on and identify any significant gaps in this approach, on the UKHSA plans for engagement within the organisation and externally and provide an assessment on the UKHSA proposed actions on AMR.

3. Background

- 3.1. Antimicrobial resistance (AMR) is a global problem that impacts all countries and all people. Resistant organisms respect no borders, neither geographical nor ecological: the organisms and the genes which encode resistance can easily spread through movements of people, animals, food or water; and certain resistance genes can transfer from one pathogen species into another. UKHSA is committed to supporting the [UK AMR 20 year vision](#)² for a world in which AMR is effectively contained, controlled and mitigated by 2040.
- 3.2. Containing and controlling AMR requires coordinated national and international action across multiple stakeholders, including governments, international organisations, private businesses, investors, civil society, academia and philanthropy.
- 3.3. In the UK, rising AMR levels without action will cause infections to become more difficult (or impossible) to treat, with increases in human deaths and morbidity in addition to the socio-economic costs (see [AMR review](#)³). COVID-19 has impacted the UK's ambitions to tackle AMR, as efforts and resources were redeployed to contain the pandemic and healthcare delivery was altered.
- 3.4. The UK continues to work towards the current AMR associated ambitions and some progress has been made (Annex 1). The current human health targets are to:
 - Ambition 1a: reduce the incidence of a specified set of drug-resistant infections in humans in the UK by 10% by 2025.
 - Ambition 1b: halve healthcare associated Gram-negative bloodstream infections (GNBSI)

¹ <https://www.gov.uk/government/publications/uk-5-year-action-plan-for-antimicrobial-resistance-2019-to-2024>

² <https://www.gov.uk/government/publications/uk-20-year-vision-for-antimicrobial-resistance>

³ <https://amr-review.org/>

- Ambition 2: reduce UK antimicrobial use in humans by 15% by 2024
- Ambition 2a: reduce antibiotic use in the community by 25% from the 2013 baseline
- Ambition 2b: reduce the use of 'Reserve' and 'Watch' antibiotics in hospitals by 10% from the 2017 baseline
- Ambition 4: be able to report on the percentage of prescriptions supported by use of a diagnostic test or decision support tool by 2024, with improvements by 2025.

3.5. In [global comparisons](#)⁴ across AMR NAPs, the UK ranks in the top 3 most developed country plans, with particular strengths in policy design, implementation, monitoring and evaluation. There are countries with considerably higher levels of AMR, such as [Southern and Eastern Europe](#)⁵, where we should identify the root causes of higher AMR with the aim of preventing such resistance levels occurring, and others with best practice, for example a fully integrated One Health AMR surveillance as in [Canada](#)⁶. The new surveillance system (AMRNet), which Canada is the first to fully develop, captures information on antimicrobial susceptibility testing from human clinical and veterinary laboratories including both public and private facilities to inform One Health responses to AMR issues.

4. UKHSA AMR programme workstreams and recent successes

4.1. Systems leadership

UKHSA has established and developed several workstreams that collectively contribute to the major human health themes of the UK AMR NAP, collaborating across UKHSA to ensure coordinated input into the next NAP development, providing leadership nationally and internationally. UKHSA specifically leads Programme 5: surveillance and public health, producing robust data which is used by the Department of Health and Social Care (DHSC) and the NHS to inform policy decisions on AMR. Our extensive work includes *proactive activities* (modelling cost-effectiveness, strengthening surveillance, analysis and reporting, development of novel antimicrobials), *reactive activities* (threat detection, management of national incidents and outbreaks, stronger reference microbiology capacity, urgent advice to (inter)national agencies) and *interventions* (infection prevention and control (IPC) measures, including environmental controls, and optimal use of antimicrobials in primary and secondary care with wide reach into both public ([eBug](#)⁷ resource for schoolchildren) and professional education ([TARGET](#)⁸ toolkit for primary care, Start Smart Then Focus for secondary care and [Antibiotic Guardian](#)⁹ pledge campaign).

4.2. Advancing epidemiology

In 2013, we established and chair the world leading population English Surveillance Programme for Antimicrobial Utilisation and Resistance (ESPAUR), an international exemplar with considerable national and international reach, producing an annual report summarising progress and interventions. To augment routine surveillance, to better our understanding of AMR burden we are undertaking a point prevalence survey (PPS) of healthcare-associated infections (HCAI) and antimicrobial use (AMU) in acute care hospitals in England in 2023 (the third such survey conducted in 12 years) where the findings lead to new national actions and priorities. In 2022,

⁴ [https://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(22\)00796-4/fulltext](https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(22)00796-4/fulltext)

⁵ <https://www.who.int/europe/news/item/18-11-2022-who-ecdc-report--antimicrobial-resistance-a-serious-threat-to-patient-safety-in-european-region>

⁶ <https://www.canada.ca/en/public-health/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2022-48/issue-11-12-november-december-2022/antimicrobial-resistance-network-one-health-approach-antimicrobial-resistance-surveillance.html>

⁷ <https://www.e-bug.eu/>

⁸ <https://elearning.rcgp.org.uk/course/view.php?id=553>

⁹ <https://antibioticguardian.com/>

we conducted a PPS on highly-resistant Carbapenemase-producing Enterobacterales (CPE) within intensive care units (ICUs) in 2022 (Annex 2). Data from these works feed into our models of infection, helping determine levels of risk, economic impact and infection protection control intervention candidates.

4.3. *Genomics and laboratory diagnostics*

UKHSA provides UKAS accredited clinical services for AMR prediction from analysis of whole genome sequences (WGS) in *Mycobacterium tuberculosis*, Hepatitis C Virus and Influenza A and B viruses. WGS-based AMR prediction is included, but not accredited, in services for common gastrointestinal disease-causing bacteria (*Salmonella*, *Listeria*, *Escherichia* species etc), *Staphylococcus aureus* and HIV. AMR WGS services are in development for *Clostridioides difficile*, *Streptococcus pneumoniae*, Group A and B Streptococcus and Gram-negative bacterial opportunistic pathogens. WGS methods with longer reads will also allow investigation of the plasmids and other mobile genetic elements which facilitate the spread of the AMR genes they harbour.

4.4. *Analytical tools*

We developed innovative analytical tools for large datasets via the Unified Infection Dataset (UID), from 2019 – this is now used as a proof of principle underpinning future UKHSA analytical infrastructure [EDAP]. In 2020-2021, the UID was extended to include COVID-19 datasets that allowed UKHSA to reduce data processing time from over 2 days to just over an hour. This incorporates data linkage from hospital and primary care healthcare records, laboratory data, enhanced surveillance of diseases and pathogens and antimicrobial consumption data to produce epidemiological outputs, infectious disease surveillance, outbreak response and allied research. UKHSA led the UK contribution to the Global Research on AMR-Global Burden of Disease project providing the first comprehensive estimate of AMR burden in 204 countries and published in 2022.

4.5. *Research, innovation and discovery*

UKHSA takes a broad, multidisciplinary approach to AMR research, with outstanding examples of (inter)national partnerships that produce high value insights on AMR, including co-leading two Health Protection Research Units (HPRUs, see Annex 3 and 4) and partnering with Bristol on the NIHR funded Improving Primary Care Antibiotic Prescribing ([IPAP¹⁰](#)) - Urinary Tract Infection (UTI) study. Over the past 5 years, UKHSA's contribution as principal or co-investigators in grants totals over £22.5m (Annex 5). We conduct world-leading COVID-19 research with the SIREN Study, developing mechanisms for monitoring healthcare worker infection prevalence. We are currently running the AMR in the Community (AMRIC) study, designed to investigate risk factors and fecal and nasal carriage rates on AMR prevalence in randomly selected community individuals in England. This will give us critical information of the reservoirs of resistant organisms with key resistant mechanisms. Our Porton group leads on discovery and development of novel antimicrobials, vaccines and non-traditional therapies.

UKHSA are involved in a research application to evaluate the implementation and impact of Pharmacy First (PF), a new initiative for participating pharmacies to supply prescription-only NHS medicines. There is a possibility that widening timely access to antibiotics for seven common conditions: earache; uncomplicated urinary tract infections in women; sore throat; sinusitis; impetigo; shingles; and infected insect bites, may increase AMR. PF is due to be launched in England by the end of 2023 subject to further consultation.

¹⁰ <https://www.bristol.ac.uk/primaryhealthcare/news/2023/ipap-uti.html>

4.6. *Behavioural insights, communications and marketing*

Influencing and understanding behaviour is key to making changes happen and stick. The Antibiotic Guardian campaign has now surpassed 190,000 antimicrobial stewardship (AMS) pledges, encouraging individuals across professional, public and education groups to take ownership of their AMS activity. Pledges have been updated in 2023 to make them more applicable and actionable. The Keep Antibiotics Working national campaign is continuing to raise public awareness and understanding of AMR, and to reduce demand for antibiotics. UKHSA have commissioned iPsos Mori (a market research company) to undertake a series of annual public health surveys between 2020- 2022 including public health seeking behaviour for Respiratory Tract Infections, and public knowledge and attitudes towards antibiotic use, among adults in England. Results of the surveys are published and used to shape future public interventions and engagement.

4.7. *Health Protection activity in regions*

UKHSA Health Protection Teams (HPTs) are working closely with Integrated Care Boards (ICBs) and directly with healthcare providers to put national surveillance and AMR guidance in a local perspective. The teams provide bespoke analysis tailored to the local epidemiology and support for outbreaks. A national working group chaired by Health Protection Operations ensures that a consistent approach is adopted between the different Health Protection teams and that there is a forum to facilitate sharing best practice between local and national teams.

4.8. *One Health AMR approach, interactions humans, animals, food, environment*

UKHSA is committed to a One Health approach to tackling AMR and has worked collaboratively with cross government organisations and agencies to develop Pathogen Surveillance in Agriculture, Food and the Environment (PATH-SAFE), to achieve better national surveillance and data sharing across the UK Governments, Industry and Academia, for the monitoring and tracking of foodborne disease and AMR in the agri-food system and increase our understanding of transmission risks and pathways. Every 2-3 years, we produce a joint One Health AMR report with the Department for Environment, Food & Rural Affairs and the Veterinary Medicines Directorate – we will publish the next report in late 2023.

4.9. *Health inequalities in AMR*

The Division is one of the first in UKHSA to focus on health inequalities, including developing key performance indicators to ensure all routine reporting on AMU and AMR include relevant health inequalities factors, and forged a close collaboration with the Health Equity Division on its inception. This includes presentation of ESPAUR data by available equity data (such as age, sex, ethnicity and index of multiple deprivation), analysing the utility of our tools for ethnic groups and ensuring that information is shared in multiple languages.

5. **The future of the UKHSA AMR Programme**

- 5.1. To maintain and enhance our national and global efforts to tackle AMR, UKHSA will exploit new technologies across disciplines and strengthen professional surveillance networks across government and (inter)national partners, ensuring work is robustly aligned with UKHSA's Strategic plan 2023-2026. Our key pillars will include: (1) big data & threat detection, (2) maximising WGS capabilities to understand and track resistance, (3) modelling and evaluation of population level interventions to drive best investment in innovative solutions, (4) stronger focus on IPC, (5) better harnessing our research to translate findings into tangible policy outputs and public health actions, (6) embedding tackling health inequalities throughout all our activities (see Annex 6 for details).

- 5.2. Our main focus for 2023/2024 is to provide expert, specialist public health functions for AMR, imprudent antimicrobial use, Fungal and Sepsis including delivering UKHSA commitments to the Government's AMR NAP. Key activities for delivery are:
- working alongside DHSC and the devolved governments to develop the next UK 5-year national AMR action plan and use it to drive coordinated efforts nationally and internationally to reduce the burden of AMR via a cross-sectoral One Health approach.
 - improved laboratory diagnostics for AMR infections, using a range of scientific methods to test bacterial responses to antimicrobials.
 - a development and evaluation pipeline to develop new ways to tackle AMR and improve the evidence base, providing the information needed to drive new, improved interventions, nationally and internationally.
 - strengthened international networks tackling AMR. UKHSA will continue to work closely with global health organisations for example the World Health Organisation and individual countries to strengthen national and global AMR surveillance, guidance, policy and detection of emerging threats.

The funding for AMR is included within each group's allocated spend e.g. laboratory and sequencing staff, core bioinformaticians, modelers, epidemiologists, surveillance teams, health protection teams and supported by corporate services. While the core activities that are easily costed can be accounted for, disaggregation of AMR activities in virology, tuberculosis, sexually transmitted infections, and other areas are more difficult to determine. However, all parts of the organisation have prioritized activities in this area and joint business planning is facilitated by the UKHSA AMR internal programme board.

6. Cross-organisational relationship

6.1. *DHSC/UKHSA relationship*

DHSC is our Government sponsor and has ownership of the current and future UK AMR national action plans and works closely with UKHSA and wider stakeholders on their implementation and development, increasingly relying on UKHSA knowledge and expertise.

6.2. *Cross sectoral integration with NHSE*

NHSE is our closest partner in the delivery of the NAP. There are opportunities, as well as challenges, for more seamless integration of AMR diagnostic and investigatory services across the health sector, including the developing of a strategic position with regard to NHS diagnostics, input into surveillance, and collaborations with NHS-X.

7. Key challenges

7.1. The following key challenges have all been progressed to some degree during the current NAP, however structural changes in NHSE, UKHSA and devolved administrations since the pandemic has limited progress. There are resource implications but the magnitude of these is yet to be fully determined.

7.2. **Cross-UK and cross-sectoral integration with NHSE.** Providing timely access to analysis and interpretation of data is key component to combating AMR. We need to maximize shared systems and data interoperability within the organisation, across England between (to and from) UKHSA and NHSE, and across the UK nations. Cloud-based solutions have enabled greater scalability and we need to advance data availability and analysis across the whole healthcare system to us information for action on AMR in a timely manner. Use of existing routine data

feeds for surveillance and ensuring robust analysis will reduce duplication of effort and resource burden across local and national services.

- 7.3. **Building the evidence.** Understanding what really works. We need appropriately designed observational or national trial evidence, alongside detailed modelling and economic evaluation, to develop evidence based, robust impactful interventions that can be targeted and measured appropriately. In the next 5 years, we aim to close this evidence gap, translating knowledge into tangible outputs for policy and public health action to inform large scale, innovative population interventions (see Annex 7).
- 7.4. **Embedding lessons learned from COVID-19.** The COVID-19 response has reinforced the key role of effective IPC measures and of staff, bed occupancy, and patient factors likely to promote transmission and the role of the built environment. We are working to build on data-driven innovations from COVID-19 (spatial visualization, modellings, tools for healthcare-onset infection, embedded behavioural sciences, monitoring and prediction of resistance to novel therapeutics) to develop new approaches and interventions. We are collaborating with the Future Hospital Programme and the NIHR capital funded model ward to optimise the healthcare environment to reduce transmission of infections in hospitals.
- 7.5. **How can we support the UK be a better world leader on AMR?** UKHSA plays a key role in the UK's position as a world leader in surveillance and WGS, but we need to enhance WGS for AMR and strengthen our bioinformatic capacity, to inform our understanding of the development and spread of AMR and intelligence sharing. We need to integrate AMR activities alongside existential threats of climate change and pandemic preparedness, with increasing temperatures driving increased population migration and pathogen spread and increasing contact with animal reservoirs facilitating AMR spread. UKHSA will strengthen leadership within international fora and with individual countries to enhance global AMR surveillance, guidance, policy and detection of emerging threats.
- 7.6. **Tackling Health Inequalities in AMR.** Understanding the impact of ethnicity, deprivation, regional divergence, along with potential confounders, remains crucial to identify appropriate targeted interventions in AMR. We need to define quantifiable and impactful targets, outcomes and commitments for the next UK AMR NAP 2024-2029.
- 7.7. **Unified metric for AMR.** AMR is complex and the threat it poses to the public can be a challenge to communicate. This is not helped by the assortment of AMR and AMU metrics we have developed, mostly with the healthcare sector in mind. We are working to develop a single overarching metric much like the 1.5°C target adopted for global climate change.

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