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Unless we confront antimicrobial resistance now, we risk the consequences of a post-antibiotic society

The UK government's five year antimicrobial resistance national action plan will need to tackle the lack of progress and a rapidly declining workforce

Tina L Joshi *associate professor of molecular microbiology*

Antimicrobial resistance (AMR) is one of the most pressing challenges of our time. Resistance to commonly used antimicrobial medicines is already disrupting medicine and adversely affecting patient treatment.¹ Efforts have been made internationally to reduce overuse of antimicrobials and to preserve them for future generations, but there is still much to be done. The UK will be at the forefront of these efforts nationally and internationally with its national action plan (NAP)² that sets out five years of action to support a 20 year vision to tackle antimicrobial resistance collaboratively across borders. But the plan overlooks important aspects of antimicrobial resistance and does not consider the declining AMR workforce.

The UK's plan (2024-2029) focuses on four key themes to confront antimicrobial resistance using a One Health approach that recognises the interconnection of human, animal, and environmental health.³ Themes include reducing the need for and unintended exposure to antimicrobials; optimising use of antimicrobials; investing in research and innovation, supply, and access; and being a good global partner. Within these themes are 30 commitments on human health spanning nine strategic outcomes.

The ambition of the plan is commendable, but glaring omissions and questions persist about how targets will be monitored and how the UK government will be held to account to deliver them. This is important on the world stage given that in September 2024, the United Nations General Assembly High Level Meeting on AMR⁴ in New York will discuss ways to build on the framework announced in a 2016 high level meeting.⁵ This will be critical given the lack of global progress, investment, and engagement of UN member states.

The UK NAP has overlooked many areas; one being the One Health aspects of raw human sewage being released into UK waterways and the public health implications of infectious resistant microorganisms transmitting across the environment.⁶ The UK's waterways are reservoirs for antimicrobial resistance. This issue ties into a whole systems approach to infection prevention and control (IPC) and has not been mentioned in the national action plan as a UK issue, thus ignoring this crisis. Concerningly there is limited understanding of how raw sewage release is affecting incidence of infection across the One Health spectrum.⁶ What we do know is that AMR infection incidence rose by 4% from 2021 to 2022, which

suggests we need to tackle a larger underlying whole systems problem.⁷

Infection prevention and control is the cornerstone of preventing transmission—the best infection is no infection at all. We must work together to ensure that the public and healthcare workers from all disciplines comply with infection control and prevention processes including effective handwashing and disinfection. In practice, AMR action is not solely about reducing overuse of antibiotics, but it is a combination of approaches to limit infection transmission across environments, humans, and animals. For example, inappropriate disinfection practices and use of biocides are drivers of resistance in healthcare environments, as they can cause selective pressure in microorganisms and increase their tolerance to disinfection.^{8,9} The involvement of UK policymakers in this key area of AMR is increasing regulation and optimising use of effective biocides in industry and healthcare.¹⁰

The well documented global brain drain in the AMR workforce is not considered in the national action plan.¹¹ The specialist AMR workforce is in serious decline. While we have many industry and patient AMR advocates, we have few trained microbiologists and infectious disease experts in the field trained in AMR and it is unclear why they are leaving the profession.¹² This phenomenon is occurring at a time when the global burden of AMR and infectious disease pandemics is increasing, with AMR expected to cause more than 10 million deaths per year by 2050.¹³

So, how can we better train and retain our declining AMR workforce? We should focus on retaining specialists trained in infectious disease and microbiology and incentivising them to remain within the field. We must encourage new talent and early career researchers to stay in AMR and help grow our knowledge. We need to better train our healthcare workforce during their degree education and through continuous professional development when in practice. This IPC and AMR training is not limited to medical practitioners and is needed across all patient facing disciplines.

This problem is not limited to medicine; we are also losing scientists that have the knowledge to develop new antimicrobials, vaccines, diagnostics, and disinfection formulations. These specialists understand microbial evolution and surveillance genomics, develop new alternative technologies, and evaluate diagnostic tools that identify infection and support treatment. This is even more worrying as a

recent review of the global preclinical antibacterial pipeline¹⁴ shows that there are only around 250 projects ongoing, with even fewer (50-100) of these focused on World Health Organization priority pathogens.¹⁴ We have a limited pool of antimicrobial candidates available to tackle AMR.

The impact of the declining AMR workforce remains to be seen, but it does point to catastrophic consequences when seeking to tackle AMR. If we do not invest in our workforce now, we may have to face the consequences of a post-antibiotic society.

Competing interests: LTJ is employed as an associate professor of molecular microbiology at the University of Plymouth, UK. She is an unpaid member of the Microbiology Society Council and sits unpaid on the Science Committee of charity Antibiotic Research UK. TJ has provided voluntary expert opinion, written thought leadership pieces, blogs, and given media interviews on the topic of AMR internationally. She is co-chair of the Knocking Out AMR project (Microbiology Society), deputy editor-in-chief of the *Journal of Medical Microbiology* and sits on international research grant panels.

Provenance and peer review: commissioned; not externally peer reviewed.

- 1 World Health Organization. Antimicrobial Resistance. 2023. [amr-factsheet.pdf](https://www.who.int/publications/m/item/antimicrobial-resistance) (who.int)
- 2 UK Government. Antimicrobial resistance national action plan. 2024. Confronting antimicrobial resistance, 2024 to 2029. <https://www.gov.uk/government/publications/uk-5-year-action-plan-for-antimicrobial-resistance-2024-to-2029>.
- 3 World Health Organization. One Health. https://www.who.int/health-topics/one-health#tab=tab_1
- 4 United Nations political declaration of the high-level meeting on antimicrobial resistance. 2024 https://www.un.org/pga/wp-content/uploads/sites/108/2024/05/20240520-AMR-Political-Declaration-Zero-Draft_FINAL.pdf
- 5 United Nations General Assembly. High level meeting on antimicrobial resistance. 2016. <https://www.un.org/pga/71/2016/09/21/press-release-hl-meeting-on-antimicrobial-resistance/>
- 6 Walsh TR, Gales AC, Laxminarayan R, Dodd PC. Antimicrobial resistance: addressing a global threat to humanity. *PLoS Med* 2023;20:e1004264. doi: 10.1371/journal.pmed.1004264 pmid: 37399216
- 7 Mahase E. Antibiotic resistant infections and deaths rose in England after pandemic controls ended. *BMJ* 2023;383: doi: 10.1136/bmj.p2672 pmid: 37967886
- 8 Jones IA, Joshi LT. Biocide use in the antimicrobial era: a review. *Molecules* 2021;26:.. doi: 10.3390/molecules26082276 pmid: 33919993
- 9 UK Parliament POST Notes. Horizon scanning: Responding to the challenge of antimicrobial resistance. <https://post.parliament.uk/responding-to-the-challenge-of-antimicrobial-resistance/>
- 10 Maillard JY, Bloomfield SF, Courvalin P, et al. Reducing antibiotic prescribing and addressing the global problem of antibiotic resistance by targeted hygiene in the home and everyday life settings: A position paper. *Am J Infect Control* 2020;48:9. doi: 10.1016/j.ajic.2020.04.011 pmid: 32311380
- 11 The AMR Brain Drain. *Lancet Microbe* 2024;5:E409. doi: 10.1016/S2666-5247(24)00102-2 pmid: 38677303
- 12 AMR Industry Alliance. Leaving the lab: tackling the decline in AMR R&D Professionals. 2024.
- 13 O'Neill J. Review on antimicrobial resistance: tackling drug-resistant infections globally: final report and recommendations. 2016. https://amr-review.org/sites/default/files/160518_Final%20paper_with%20cover.pdf
- 14 Gigante V, Alm RA, Melchiorri D, et al. Multi-year analysis of the global preclinical antibacterial pipeline: trends and gaps. *Antimicrob Agents Chemother* 2024;68:e0053524. doi: 10.1128/aac.00535-24 pmid: 39007560