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Antimicrobial resistance: connecting disciplines, systems, and solutions

Branwen Morgan, Laura Shallcross

Corresponding Author: Branwen Morgan; antimicrobialresistancejournal@gmail.com

Antimicrobials have transformed human and animal health by successfully treating bacterial, fungal, viral and parasitic infections, reducing infection risks associated with medical procedures, and improving the quality of life and livelihoods of millions of people worldwide. Yet their widespread use has also intensified a natural and unavoidable process: antimicrobial resistance (AMR), in which microbes evolve rapidly to withstand environmental pressures and survive. AMR cannot be eradicated. Instead, it must be managed efficiently and effectively to minimise its impact on society. Over the past two decades, the One Health approach has become central to efforts to contain the development and spread of AMR (Pettan-Brewer *et al.*, 2024).

This means recognising that AMR in humans, animals and the environment is interconnected. It also requires coordinated action across sectors and industries, while ensuring that action in one area does not shift the problem to another. A response focused solely on technical and scientific measures is unlikely to succeed because antimicrobial use itself promotes resistance. Protecting existing anti-infectives, as well as those in development, therefore requires behavioural change supported by effective and consistent policies across public and private sectors and between countries. Together, these measures form a systems-thinking approach. Causal loop diagrams can help map the relationships within this system and identify areas in which to target interventions (Pham and Wozniak., 2025).

A further challenge is aligning research investment with disease burden. Many research studies on AMR are conducted in hospital settings, but most of the prescribing of

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antimicrobials and transmission of infections in human and animal health occur in community settings. Similarly, much of the human health AMR research focuses on the populations who are in contact with healthcare systems and tends to exclude vulnerable populations and those in remote and underserved regions. Research that systematically excludes those experiencing the highest rates of AMR is unlikely to deliver impact for policymakers, the healthcare system, patients or the public. In contrast, research that is collaborative and co-designed with communities and stakeholders is more likely to be sustainable and impactful (Acharya *et al.,* 2026).

Potential interventions include reducing the need for antimicrobials through preventive and alternative strategies that include diagnostics, vaccination, new alternative technologies such as microbiome-based approaches and bacteriophage, addressing the social and behavioural determinants of health, and assessing how waste and waste management amplify AMR. Whether these approaches involve products, processes or policies, each needs a clear business and investment case, and early consideration of how the approach might be implemented to maximise future adoption and scaling to support biosecurity, food and water security, and optimal healthcare system delivery. For product-based solutions, there are numerous other practical considerations that can affect real world impact beyond effectiveness. These include regulatory feasibility, manufacturability, uptake, adoption, and scalability.

One of the greatest challenges in tackling AMR is determining which interventions to prioritise based on economic assessments and likely returns that include financial and societal benefits. This underscores the need for pragmatic inter-disciplinary teams who are skilled in designing AMR interventions that are both system and solution focused. AMR is not going away anytime soon and with ageing populations globally the incidence and rates of drug-resistant infections are set to increase (GBD 2021 Antimicrobial Resistance Collaborators., 2024).

As the volume of AMR publications continues to grow annually, there is a critical role for an open-access journal such as Antimicrobial Resistance in the Cambridge University Press Prisms series. The journal provides a forum for interdisciplinary collaboration, bringing together researchers, clinicians, communicators, veterinarians, economists, policymakers, regulators, and stakeholders from industry to share insights that can deliver impact. It also seeks to examine how and why efforts to curb AMR have not yet produced the expected results.

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As joint editors-in-chief of AMR, we encourage the generation of evidence for action, as well as evidence of effective action to curb AMR. To support this goal, we want to move beyond reports of new genes, molecular mechanisms, and surveillance conducted for its own sake, and instead focus on evidence that can inform decisions and drive meaningful change. We are particularly keen to receive submissions on AMR approaches deployed in settings or populations that are traditionally under-represented in research. We also welcome analyses of why promising approaches fail at different stages of development and deployment, alongside thought leadership on how to better balance effort and attention between prevention and treatment.

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