

Biochemical Society response to the Public Accounts Committee's inquiry on antimicrobial resistance: addressing the risks

Founded in 1911, the Biochemical Society has been at the forefront of advancing molecular bioscience for over 100 years, promoting its importance as a discipline, facilitating the sharing of knowledge and expertise, and supporting molecular bioscientists across all career stages. We represent researchers and scientists conducting basic and applied research into AMR mechanisms, infectious disease, vaccine strategies and other AMR-relevant areas.

1. The risks posed by antimicrobial resistance

The risk to modern medicine

As summarised in the NAO report on its investigation into how government is addressing antimicrobial resistance¹, AMR is a major public health threat as it makes infections harder to treat, and this risk to public health must be the key driver for action towards tackling AMR. However, it also is worth highlighting that in addition to this, AMR puts at risk almost all modern medical research, since antibiotics are the bedrock on which this has been built. In addition to infections, AMR also makes other medical procedures and treatments much riskier and is already impacting the ability to treat certain conditions. The NAO report highlights the vast inequality between cancer therapies and antimicrobials in clinical development (section 1.12); many cancer chemotherapies require coadministration of antibiotics to counter bacterial infections caused by weakened immune systems. There are many such examples where modern advances and novel treatments could be rendered ineffective if antibiotics fail, compounding the threat to public health and jeopardising a century of scientific and medical progress.

2. Challenges for the antimicrobial pipeline

The NAO's report¹ finds that the development of new antimicrobials has slowed and is insufficient to withstand or reverse increasing AMR (point 6), summarising the woeful state of the current antimicrobial pipeline. However, there are additional challenges that are not mentioned in detail.

Non-traditional biological agents are increasingly being explored as alternatives to antibiotics or complementary therapies, but these come with their own distinct challenges in research, assessment and regulation. The 2024 WHO report on the state of antibacterials in development worldwide² reports that bacteriophages, antibodies, anti-virulence agents, immune-modulating agents and microbiome-modulating agents, are increasingly being explored, and indeed, bacteriophages are mentioned in the NAO report¹ as a potential opportunity (section 3.13). Such non-traditional approaches often have a narrow spectrum of activity, which brings with it issues in facilitating clinical trials, as conducting trials for narrow-spectrum therapies against many pathogens of interest will be enormously challenging, time-consuming, and costly³. In addition, many novel technologies will be developed as adjunctive therapies to be used in combination with traditional antibiotics, also requiring costly and complex clinical trials³.

With many large pharmaceutical companies having stopped or reduced their antimicrobial research activities, it is primarily academic institutes and small- and medium-sized enterprises that carry out research into new antibiotics⁴. Such organisations lack the funds, expertise, and human resource to take products through complex clinical trials, regulatory assessment and to market⁴. It is vital, therefore, that such organisations are supported by push incentives that fund them and support them in bringing novel pre-clinical products

forward to the clinical pipeline and pull incentives to encourage investment in the challenging later clinical phases of development with rewards when they reach the market.

Diagnostics and vaccines to combat AMR

Viable solutions to the AMR crisis will require a combination of novel antimicrobials, diagnostics and vaccines, as well as improved utilisation of current antimicrobials. It is paramount that research into novel vaccines and diagnostics is nurtured. Initiatives such as Pathways to Antimicrobial Clinical Efficacy (PACE), a £30 million fund being deployed over 5 years, co-funded by UKRI and Innovate UK, gives equal importance to diagnostics as well as novel antimicrobials, and such projects must be maintained on a long-term basis. Novel antimicrobial agents with narrow spectrum of activity further reinforces the need for rapid and sensitive diagnostics, which are vital to allow patients who would benefit from such novel treatments in a clinical setting to be identified³.

In addition, the UK is a leader in vaccine innovation, but this is another area where clinical trials bring challenges. In 2023 the Health & Social Care Select Committee warned that the UK risks losing its edge in the field of vaccine development, again with issues around bureaucracy in clinical trials being highlighted⁵. Vaccine innovation was a central example in a recent independent review of clinical trial⁶ and the UK Vaccine Innovation Pathway is the UK's first clinical trial delivery accelerator being developed as part of the response to this. Such initiatives to optimise the conduct of clinical trials and maintain the UK's position as a leader in vaccine innovation should be supported.

3. The UK's National Action Plan 2019–2024

Domestic versus international leadership

The NAO report¹ mentions the UK's role in international advocacy (point 8), and this is vital given the global nature of the AMR problem. However, the report fails to highlight the lack of clear leadership on AMR domestically. While Dame Sally Davies once provided clear domestic leadership as Chief Medical Officer, and her leadership was considered to be key to raising the profile of AMR on both the domestic and international policy agendas, in her role as UK Special Envoy on AMR her efforts are focused internationally, which leaves a gap nationally. The NAO report describes the governance arrangements in the AMR NAP19-24, which was overseen by the NAP Delivery Board (section 2.8). While it is positive that this was an interdepartmental effort, given the nature of AMR, and included the devolved administrations, this structure was opaque to external advocates and there has been no clear individual providing clear, strong, public-facing leadership. Such a leader should be introduced, and this should be non-political and well-placed to coordinate the different government departments.

AMR research and talent

The NAO report highlights that one of the UK NAP19-24s strengths is research and development of novel products, as found by an external academic review⁷. Research continues to be a sector where the UK is a leader in Europe and globally⁸ yet the NAO report does not cover a lot of the successes and challenges of the AMR research field.

One challenge is that the AMR research field is in the midst of a 'brain drain', with the AMR R&D workforce having significantly declined over the past 20 years⁹. This report by the AMR Industry Alliance estimates approximately 3,000 AMR researchers currently active in the world, compared to as many as 46,000 for cancer and 5,000 for HIV/AIDS. This is due in

part to the decline in incentives for pharmaceutical companies to invest in AMR research, which comes with decreased employment opportunities and incentives for AMR researchers. The report⁹ concludes that action is needed to restore and build a robust AMR research workforce; such measures to make the sector more appealing must be prioritised to ensure the right skills remain in the pipeline and make the required level of AMR research sustainable. Fixing the broken market for antimicrobials, through push and pull incentives, will ensure that jobs and opportunities are available in the AMR research field, and that it can retain the talent is desperately required to tackle the AMR problem. Greater efforts to introduce early career scientists to AMR research, through fellowships, mentoring schemes, and other incentives should also be introduced to ensure new scientists are entering the field.

4. The UK's future plans for addressing AMR

Mobilising the international community

One of the new areas of focus in the NAP25-29 is 'being a good global partner'. The UK has demonstrated its international leadership in AMR already and should seek to maximise its role in global interfaces, such as those afforded via the AMR Global Leaders Group. The UK must continue to play a key role in promoting NAPs and spurring action at the country level, given the 2024 WHO report¹⁰ that only 28% of countries have costed and budgeted their NAPs and are monitoring implementation. Recently announced cuts to international development aid may present a challenge to the UK's AMR diplomacy and its overall ability to respond to global health crises, making this commitment to AMR more important.

The UK has also showed leadership in early adoption of the subscription model, and the NAO reports tracking the results of this should be a key area for the government to consider (point 24). However, the UK represents only a small part of the global antimicrobials market and therefore requires international advocacy for more national schemes like this to be adopted. Sharing successes and lessons will be highly important for encouraging other countries to take up models, which is essential to reshape the overall global market, and this will require the UK to leverage its influence. There is a need to explore other mechanisms to de-link profits from volume, indeed in Europe as there has been relatively less investment in pull incentives than push incentives¹¹, and different models guarantee grants at different stages. It is vital that the UK is a leader in trialling new incentives, and that results are openly shared to encourage wider uptake.

Improving international collaborative research

Another opportunity is to improve collaborative research between academia and industry, as well as globally, due to the collective response that AMR requires. Research across borders has become increasingly challenging, and initiatives that increase research coordination and reduce the duplication of effort should be supported. As noted in the NAO report, classification of AMR as a chronic risk could serve to better align academic, industry, funders, and other players towards priorities for R&I. UK Research and Innovation funds networks dedicated to accelerating AMR research, and organisations such as the Global Antibiotic Research & Development Partnership, and AMR Action Fund, bring together public, private and non-profit partners to accelerate the development and access of treatments for drug-resistant infections. Such initiatives should be supported and expanded.

References

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