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The language of antimicrobial and antibiotic resistance is blocking global collective action

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ABSTRACT
Sustainable access to effective antibiotics is a foundational need for functioning health care that is increasingly threatened by antibiotic resistance. Although resistance has been known as long as antibiotics have been in clinical use, there are still multiple gaps in the global and local responses. One often cited cause for this complacency is the language that is used to describe the problem and its consequences. In this paper, we survey some examples of the current discussions around antibiotic resistance and seek to offer a path towards unified and understandable messaging that is relevant both to the public and policymakers by using narratives that highlight the individual and societal consequences of antibiotic resistance. Major shortcomings in the current language that hamper both the understanding of antibiotic resistance and needed behaviour change have been identified in scientific papers and special reports. These shortcomings range from terminology that is difficult to understand, through a lack of personal relevance, to a fragmented response in the policy field. We propose that scientists, including behaviour change experts, and other key stakeholders that are engaged in the issue take lead to agreement on the core scientific facts and to formulate a vision that can be a foundation for creation of consistent global narratives. These narratives must in turn be adapted to local contexts. Development of such narratives should be viewed as an essential component in national action plans on AMR to raise awareness, empower citizens and incentivise societal behaviour change, policy development and implementation of governance structures.

KEYWORDS
Antibiotic resistance
antimicrobial resistance
narratives
behaviour change
policy
governance
microbiome
Introduction

Sustainable access to effective antibiotics is a prerequisite for the function of basic and modern medicine as well as for global social and economic development. This fundamental global resource is increasingly threatened by antibiotic resistance, and today the global spread of multi-resistant bacteria is an increasing challenge for the effective treatment of common bacterial infections worldwide. Despite this, there are still multiple gaps in the global response to the problem.

One important reason for the lagging political attention and actions against antibiotic resistance is that, because it is not a disease, data on the health burden has largely been missing. The AMR Review [1] in 2014 was among the first to estimate the global burden of antimicrobial resistance and included modelling of the economic cost of AMR, estimating 700 000 annual deaths globally and 10 million deaths by 2050. Of note, the bulk of the burden described in this study, came from projections of high-level resistance to drugs to treat HIV and malaria. Nevertheless, the estimates from the AMR Review have been uncritically used as an estimate of antibiotic resistance. A publication from the GRAM project [2] made the conflation of AMR and ABR evident. This study used a new term – bacterial antimicrobial resistance (bacterial AMR) –instead of the existing and more well-known term antibiotic resistance. The study showed that “bacterial AMR” is a leading cause of global mortality. In 2019, an estimated 1.27 million people died of infections caused by bacteria resistant to antibiotic treatment, with low-income regions and children under five years experiencing the highest mortality.

Unfortunately, antibiotic resistance (ABR) and antimicrobial resistance (AMR) are often used interchangeably both in scientific papers and policy documents. Antimicrobials include a variety of medicines used to treat infectious diseases caused by microorganisms, such as bacteria, viruses, parasites, and fungi. They work by inhibiting the growth of the microorganisms or by killing them. AMR occurs when microorganisms acquire the ability to withstand the drugs, making them ineffective.

While looking at the broader context of AMR may be important to convey a general message of the risks of resistance on societies, by making visible the consequences in a manner that is relatable and inspires action and changed behaviour’. As such, a narrative is an intended to increase understanding amongst the audience or target group through formulating the problem and its consequences in a manner that is relatable and inspires action and changed behaviour. As such, a narrative is a means to articulate a problem and its potential solutions. It can comprise an overarching problem description and specific messaging to different target audiences.

Antibiotic resistance is a complex issue that involves various layers of science and society, and it has rightly been called a super-wicked problem [8]. Tackling antibiotic resistance, and by extension the underlying issue of the need for sustainable access to effective antibiotics, requires further strengthening of national and global coordination, governance, and effective accountability structures [9]. On the global level, there are three important policy documents aimed at guiding national governments and international organisations on actions and governance needed to manage AMR: the Global Action Plan on AMR in 2015 [10], the political declaration of the United Nations General Assembly in 2016 [7], and the recommendations from the ad hoc Interagency Coordination Group on AMR in 2019 [11]. Significant gaps exist in implementing the commitments and recommendations emerging from these three processes.

The weak response so far indicates that something is still missing in our communication. One often cited cause for the weak global response is that the narratives on antibiotic resistance have not effectively changed the attitudes and behaviour of the public, health care professionals, or policy makers [12,13]. It is necessary to understand what types of narratives that are effective and helpful in getting rid of any misconceptions.

In policy development, communication efforts have been focused on showing the impact of antibiotic resistance on societies, by making visible the consequences of antibiotic resistance on mortality, economics (higher
health care costs, decreased productivity), and food safety and security (our ability to produce safe foods in sufficient quantity). Efforts have also been made to introduce antibiotic resistance into global policy frameworks where policymakers have already committed, e.g. universal health coverage [14], strengthening health systems [15–18], global health security [19], international health regulation [20,21] and sustainable development. However, ABR has not yet found a strong place in these contexts. For example, while antibiotic resistance jeopardises the fulfilment of several of the Sustainable Development Goals [22], the UN Statistical Commission has approved only one indicator addressing the health goal, SDG 3. In the ongoing negotiations on revising the IHR, only one country (India) has proposed to include AMR in collaborative surveillance networks [23].

Recently, taking advantage of the understanding of the increased knowledge of the risks of the global spread of infectious disease and the critical functions of health systems that the Covid-19 pandemic has generated, there are also strong efforts to promote the inclusion of AMR as an ongoing silent pandemic in the ongoing negotiations of a pandemic accord [18].

In the discussion on overcoming language barriers some authors have focused on the different names and technical expressions that may hamper understanding and inhibit collaboration and crosstalk between domains [24–26]. Others have focused on how public receives the language used by the scientific community and in awareness campaigns [27,28]. Several calls have been raised for a process to improve the language. Mendelson et al. [24], for example, suggested that ‘A programme of research is needed to optimize the lexicon across different countries and languages’ and Krockow [26] that ‘The rebranding of a global health threat like AMR requires a large-scale, unified campaign led by an interdisciplinary team of psychologists and clinicians’. Recently, the Global Leaders Group on Antimicrobial resistance [29] has identified the need for improved language: ‘The GLG noted that a lack of simple language and messaging on AMR across sectors that can be used for raising awareness – particularly among the general public and decision makers hinders progress’ [30].

Limitations of the current narratives

Narratives targeting the public

Knowledge and awareness among the general public must be significantly improved to meet the growing challenge of ABR. To illustrate, in several EU countries over 50% of respondents to a survey believed that antibiotics killed viruses [31]. From other regions, there are figures on far lower literacy about antibiotics [32–34]. Different approaches have been taken to raise public awareness, but the language used has been ambiguous and difficult to understand. In two reports by Wellcome Trust in 2015 [27], the impact of language on understanding and sense of personal urgency was investigated by interviewing both laypeople and medical practitioners in the UK and abroad. In short, the reports emphasised the need for an effective narrative and presented five principles for communicating about antibiotic resistance: i) framing the problem as undermining modern medicine helps the public to understand why antibiotic resistance is important; ii) explaining the fundamentals briefly, as using a simple and non-technical language makes the issue easier to understand; iii) emphasising that this is a universal issue: it can affect anyone, including you, serves to increase the sense of personal urgency; iv) focusing on the fact that the problems are already present and will only increase with time; and v) encouraging immediate action by presenting the issue as solvable rather than just scare mongering, and pairing the communication with a clear call to action.

Individual consequences of antibiotic use

Although these reports [27,28] highlight individual consequences of antibiotic resistance as important components of effective communication to inform peoples choices, such consequences have not been explicitly featured in public messaging. Changing patients’ demand for antibiotics is crucial in reducing inappropriate use. To achieve such behavioural change, the public needs to be convinced of which infections antibiotics are effective, as well as of the negative effects of antibiotic use on individuals beyond well-known drug-related adverse reactions. It is also important to convey of a positive view of the future, to show that we can do something and that the problem is possible to manage proactively. Communication specialists often underline the need to reduce “doom and gloom” in the messaging to not cause despair and subsequent inaction.

All humans carry microbiomes on and in their bodies, most notably in the gastro-intestinal tract. These bacteria are crucial for our health and well-being, providing critical ecosystem services [35]. This is important to understand as we sometimes talk about being at war
with bacteria, which is a metaphor that must be discarded. It is widely known that antibiotic use exerts a powerful, negative impact on the microbiome, leading to selection of antibiotic-resistant bacteria in the normal bacterial flora. It can take months or even years before the flora returns to normal following a single antibiotic treatment [36–38]. Although the carriage of a resistant bacterial strain in the microbiome does not represent a health risk per se, many infections are endogenous, caused by bacteria present in our normal flora rather than bacteria coming from the environment. Such infections include urinary tract, surgical, and invasive infections in immunocompromised patients. Carriage of resistant bacteria will make many infections more difficult to treat and require antibiotics that are often more costly and less accessible.

Globally, there is a continuous shift towards more resistant strains in different microbiomes. Selection of antibiotic resistance in microbiomes is a powerful driver for the global spread of antibiotic resistance, particularly considering that 1.7 billion people worldwide consume drinking water contaminated with faeces [39]. Clearly, we cannot permanently eradicate ABR; we can only manage it to maintain a treatable microbiome [40]. A microbiome approach to antibiotic resistance also gives a clear justification for why the One Health framework is important, as microbiomes on a larger scale are what connect humans, animals, and the environment, and makes possible the spread of resistant bacteria as well as the exchange of genetic resistance determinants [40,41].

The climate change analogy
Connecting antibiotic resistance with climate change can be done in two different ways. One is a physical connection by investigating how climate change may impact disease prevalence and subsequently development and spread of resistance [42]. The second is by making a more structural analogy between the two phenomena: several essential similarities are worth noting; clean air vs. effective antibiotics as a common good, a tipping point after which events may take a catastrophic turn that will permanently change our world, and that everyone’s decisions as individuals, societies, and a global community will affect the outcome. Building on these similarities, a legally binding framework has been proposed [43], and analogies have been made with the Paris Agreement for climate change [44,45]. One major difference to climate change, though, is that it would not be possible to agree on one numerical target, similar to the overarching goal to hold the increase in the global average temperature to well below 2 °C above pre-industrial level. Rather, a common global vision that addresses the need for equitable access, could be agreed upon and, like climate change, include commitments to support transformative changes in resource-limited countries. Since there is, in the foreseeable future, no way to replace antibiotics in healthcare with other technology or interventions, the aim needs to be to achieve balance between supply and demand of these critical medicines.

While this analogy, with its structural similarities, might best be suited for policy discussions, much can be learned from how the climate change narratives have promoted individual responsibility [44,46,47]. A recent analysis showed that from November 2019 to August 2021, there were over 3.5 million mentions of climate change on Twitter, in comparison to 71,552 tweets on AMR [48], which shows the difference in impact that these two potentially world-changing phenomena have had on the public. Interestingly, since both issues are very complex and multi-faceted, the difference in impact is not plausibly explained by the complexity of antibiotic resistance.

Improving the rhetoric on antibiotic resistance: the classic modes of persuasion
The problem of raising public awareness, inspiring behaviour change and mobilising political actions around antibiotic resistance is not only an issue of knowledge; it is a much more complex process. In classical rhetoric, Aristotle taught 2300 years ago that success in persuading someone involves an interplay between three fields: Logos, Ethos, and Pathos. Based on this principle, we have attempted to exemplify the current messaging on antimicrobial and antibiotic resistance, pointing on some limitations and potential improvements.

Logos
Logos concerns the facts and logic in the messaging, presenting credible evidence in a way the audience understands. We acknowledge that there are still important gaps in our knowledge about for example the global burden of ABR, but the knowledge that does exist allows for cohesive argumentation and necessary actions. In our view, communication issues related to
logos can be found in imprecise language. The most obvious example is the difference between antimicrobials in general and antibiotics in particular, as evidenced by the estimates presented by the AMR Review and how they have been used. In our view, this conflation of antibiotic resistance with antimicrobial resistance has caused confusion. Similarly, distinctions between terms like attributable and associated mortality need also to be clarified and explained. We believe that this imprecise language even among experts has led to differences in interpretation of scientific data, key barriers, and potential ways forward, thus causing confusion among both policymakers and the public. A convergence of expert opinion on these key factors is needed to improve the communication on antibiotic resistance.

Generally, we believe that moving away from a language using difficult terminology, towards a stronger patient-centred approach where the problem is described with an emphasis on the diseases affected by antibiotic resistance, would create a better understanding of the problem, as well as a bridge to a deeper emotional connection (Pathos). Furthermore, using examples of individual consequences through a microbiome lens can help people make the connection between use of antibiotics and its large-scale implications.

**Ethos**

Ethos concerns the communicator’s character and credibility. These attributes naturally relate to who the communicator is and what relevant expertise the communicator possesses. In the scientific community, negative characters may consist of vested interests, persuasive tone without substance, cherry-picking data, and fudging. Positive characters include using credible and well-documented sources, respecting multiple points of view, and using suitable tone and diction for the audience. For the scientifically minded person, scientific publications and presentations often mark the height of credibility and reliability. Thus, we tend to believe that there are no problems with the credibility of communicators/messengers, given that most are experts or represent organisations with expertise, even though not everyone has discerned the weaknesses of the data used.

For messages to be understood and accepted, the communicator must understand the context, local culture and mindset of the audience. Importantly, in many societies and (sub)cultures, citizens may consider a community leader or social media influencer more trustworthy than scientists. To increase the impact of messaging in this sector, scientists and healthcare professionals needs to engage better with civil society, local leaders and opinion-makers to get the message through to the general public. An example of such approaches is the ABR-smart community, where scientists have been able to engage local leaders and the community to discuss antibiotic resistance and how to prevent it [51].

**Pathos**

Pathos concerns how the communicator can connect with the audience to achieve an emotional response and behaviour change. This is generally seen as the major shortcoming in communicating antibiotic resistance; if the audience is not engaged, the knowledge transfer will not be effective. Antibiotic resistance is often described by painting a big picture of war and disaster, with millions of people dying. However, the impersonal language of biomedical science often fails to bring issues to a personal level.

We believe that narratives of resistance that create more emotion are necessary to generate the needed sense of urgency. One example of such narratives could be to describe the health consequences of antibiotic resistance when commonly known diseases like pneumonia are becoming increasingly untreatable. Another is analogously to the successful climate change narrative, to show that antibiotic resistance has far-reaching consequences through impact on, and the interconnectedness of microbiomes. The challenge is making the issue personal, actionable, and manageable without too much of an apocalyptic dimension. However, to find out what could be effective, a deep dialogue between the biomedical and behavioural scientists is needed. At the heart of this also lies the need for a long-term platform for this discussion, and an organisation that has the outreach to actualise it. This discussion is intricately connected to logos, in that a correct and unambiguous factual description of the problem is foundational for effective messaging.

**Discussion**

Despite numerous declarations and commitments, antibiotic resistance has not received the attention required to mitigate the problem, including national and global governance and financing. Although antimicrobial or antibiotic resistance is mentioned in several global health policy processes, the issue has not found a strong
and tangible mechanism globally to bring about the urgently needed multisectoral systems changes.

One major cause for the slow response is likely that the language used by experts has largely failed to change attitudes, actions, and behaviours among target groups (the public and policymakers).

Most policies in the field are labelled ‘antimicrobial resistance’ or ‘AMR’, although the content almost exclusively pertains to bacterial infections and the major global threat of antibiotic resistance. In our judgement, the focus must be on bacterial infections and the need for access to effective antibiotics as part of the infrastructure of all health systems.

A recent survey [50] of people in the USA and UK underscored the need to change how the issue is explained and communicated. The survey measured the memorability and risk association of 40 health terms, including AMR, antibiotic resistance, antimicrobial resistance, bacterial resistance, drug-resistant infections, and superbugs. The findings suggest that existing AMR-related health terms – particularly ‘AMR’ and ‘Antimicrobial resistance’ – are unsuitable for public health communication because they score consistently low on memorability and risk association. Although of the AMR terms, ‘Antibiotic resistance’ performed best, this term also scored lower than other diseases (e.g. cancer and HIV).

The value of building bottom-up approaches within health programs has been well established in numerous other disease areas such as TB and HIV. To engage civil society and community in a meaningful way in the global response to antibiotic resistance, the language on antimicrobial and antibiotic resistance needs to be improved to create emotions, actions, and behaviour change. Unfortunately, although behaviour change is seen as one component in the recently launched One Health research agenda [52], priority research areas did not include the underlying language barrier. Several measures have recently been proposed to encourage social and behavioural scientists to put antimicrobial resistance on their research agenda [53]. Behaviour change was a recognised objective in 34 of 108 national action plans on AMR, but none of the plans acknowledged the need to tailor messages to different audiences [54].

In September 2024, a high-level meeting on AMR will be held during the United Nations General Assembly. In the current discussions on the content of an expected political declaration from this meeting, it is important that the ‘Global AMR community’ engages in a coordinated multisectoral initiative to improve language and messaging. As mentioned in the introduction of this paper, such a process has been repeatedly requested and is now more urgent than ever. This task could have been fulfilled by an Independent Panel on Evidence for Action against Antimicrobial Resistance as proposed by the UN ad hoc Interagency Coordination group on AMR (IACG) in 2019 [11], but such a panel has not yet been established.

It is, therefore, urgent that a process is initiated where key actors in the scientific community including anthropologists and behaviour change experts, take leadership by forming a multidisciplinary technical group to agree on core scientific facts and simplify the current diverse and sometimes conflicting narratives. A starting point would be to agree on a common vision, such as those discussed by the Global Leaders Group on AMR [55] i.e. ‘A world free of untreatable infections” or “Securing sustainable and equitable access to antibiotics for all’. Linked to this vision, a set of globally consistent core messages could be developed in close collaboration with communicators, practitioners, and policy makers, that form a foundation for formulating more detailed narratives for different target groups leading to desired changes.

To be effective, narratives must also be adapted locally, considering context-specific socioeconomic factors, cultural beliefs, and social norms. The development of such narratives needs to be viewed as an essential component in implementing national action plans and be communicated through all levels of society and incorporated into school curricula. Several UN agencies, notably WHO and UNESCO, are well positioned to provide leadership for sustainable support to the long-term work towards increased awareness and behaviour change. These processes need to be adequately and sustainably supported by global funding.

In this overview we summarised and discussed recent publications on the language barrier, which limits the effects of messaging around antimicrobial and antibiotic resistance. Global efforts to remove this barrier are vital to raising awareness and societal behaviour change, empower citizens and incentivise the urgent policy development and governance needed.

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