
The threat of antimicrobialresistance as a catalyst for sustainable societal change

Tomislav Meštrović

Antimicrobial resistance (AMR) stands as one of the most pressing global health challenges of our time, threatening to reverse many of the medical advancements made over the past century.

Scientists are well aware how the emergence and spread of AMR can swiftly jeopardize the efficacy of antibiotics and other antimicrobial agents, rendering once-treatable infections increasingly cumbersome to manage, and resulting in an ever-growing burden of morbidity and mortality.[1,2] Hence, addressing AMR requires not only advancements in medical science and technology, but also a truly profound societal transformation.

Societal dynamics play a pivotal role in the emergence and dissemination of AMR. Factors such as antimicrobial misuse and overuse, inadequate infection prevention and control practices, inadequate sanitation and hygiene, as well as limited access to quality healthcare contribute to the proliferation of resistant microorganisms.[3] Across the world, marginalized populations and indigenous communities tend to experience higher rates of poverty and encounter barriers to accessing adequate healthcare services, while in other corners of the world, antibiotics are overly prescribed.[4] Thus, to develop a successful worldwide approach to combating AMR, it will be crucial to guarantee fair, leveraged and equitable access to antibiotics and healthcare services universally.

And indeed, healthcare systems around the world have found themselves compelled to undergo substantial evolution. This primarily pertains to their approaches in implementing salient infection control measures and educating healthcare professionals on the newest developments in the field. One important development was the AWaRe classification developed by the WHO's Expert Committee on Selection and Use of Essential Medicines.[5] This categorization system segments antibiotics into three groups: Access, Watch, and Reserve. Consequently, the AWaRE system serves as a significant instrument for enhancing prescription guidelines and promoting antibiotic stewardship initiatives globally.

The AWaRe classification undergoes updates every two years (primarily aimed at monitoring antibiotic usage and setting benchmarks). In practice, this results in many of the adopters of the AWaRE classification witnessing substantial transformation within their healthcare systems.[5] More specifically, it has led to the development of institutional antibiotic stewardship programs, which prompted a more judicious approach to prescribing antibiotics, in turn reducing their unnecessary usage. The implementation of the AWaRe classification has also facilitated the monitoring and surveillance of antibiotic usage by monitoring antibiotic consumption, resistance patterns, and antimicrobial stewardship interventions.[5] Such data-driven approaches enabled very proactive AMR management at the local and regional levels, but also enabled evidence-based decision-making in healthcare delivery. Going forward, developing and utilizing similar approaches will be indispensable to make a more profound impact.

Recognizing the urgent need for action, societies have increasingly prioritized initiatives aimed at raising awareness and educating the public about the responsible utilization of antibiotics, which is mostly done through well-designed public health campaigns. A recent systematic review indicated that effectively crafted public health initiatives have the potential to notably enhance outcome measures associated with AMR.[6] However, it is pivotal to integrate transparent assessment methods into the planning phase of forthcoming campaigns. In other words, a framework for evaluating campaigns, tailored for campaign developers, could aid in achieving this goal.[6] Likewise, education campaigns stand as indispensable pillars in our collective approach to combatting AMR, leading to informed decision-making among healthcare professionals and the general population alike.

Of course, community engagement stands out as a highly promising avenue for instigating behavioural shifts towards combating AMR, particularly within low- and middle-income nations.[7] The strength of this approach lies in its capacity to provide a personalized touch, empowering communities to formulate solutions that resonate with their unique circumstances. However, it is noteworthy that existing community engagement initiatives predominantly focus on human-centric factors and drivers fuelling the demand for antibiotics.[7] This narrow scope overlooks various other dimensions contributing to the exacerbation of the AMR crisis – such as the overuse of antibiotics in agriculture and veterinary medicine – thereby neglecting crucial facets that have propelled this issue to unprecedented proportions.

This means that any comprehensive approach to addressing AMR has to acknowledge its interconnectedness with human health, animal well-being and the environment – a concept known as One Health. Societal transformation efforts must embrace a "One Health Governance", which represents a comprehensive strategy involving the development and implementation of policies and mechanisms designed to encourage a unified and synchronized strategy for tackling health issues that intersect human, animal and environmental health domains.[7,8] Such a multifaceted concept recognizes the intricate interconnections among these realms and underscores the ne-

cessity for collaborative and interdisciplinary efforts to effectively navigate and prevent health risks that transcend traditional boundaries.

Consequently, within the realm of academia, there is indeed a significant possibility to spearhead the formation of a global framework for One Health.[8] Such a framework would serve as a blueprint or a guide, offering invaluable insights and benchmarks for countries seeking to fortify their governance structures. Through collaborative efforts across academic institutions, researchers can contribute to the development of mechanisms and policies that facilitate coordinated action and effective communication among stakeholders. Moreover, by leveraging their expertise and research findings, academics can play an indispensable role in shaping the future of One Health approaches, promoting innovation and driving progress in addressing complex health challenges on a global scale.

A consensus-driven method aligned with international standards is essential for guaranteeing the effectiveness and coherence of One Health governance frameworks that would be introduced.[7,8] By adhering to internationally recognized principles and guidelines, governance structures can facilitate harmonized action and promote alignment with shared objectives and priorities – in turn driving a societal transformation for curbing AMR.

Consensus-building processes involving diverse stakeholders can help to forge common ground and overcome potential conflicts or disagreements.[8] Moreover, by incorporating feedback and insights from a wide range of sources, governance mechanisms can be refined and adapted to address emerging challenges and changing circumstances effectively.[8] Finally, equity considerations should be fully taken into account to address disparities and promote inclusivity.

All of this means that societal transformations should also encompass changes, and agricultural practices are responsible for the spread of AMR. For instance, reducing the use of antibiotics in agriculture production, improving waste management practices to minimize environmental contamination with antimicrobial agents, and promoting sustainable agricultural practices can help mitigate the emergence and dissemination of resistant pathogens.[7]

Recent research also points towards the impact of anthropogenically-induced factors such as fluctuations in temperature, degradation of soil fertility, heightened levels of soil salinity, and the presence of contaminants like pesticides and metals in facilitating the evolution and spread of AMR.[9] These environmental stressors, exacerbated by human activities, are increasingly recognized as significant drivers shaping the dynamics of antimicrobial resistance across ecosystems, and thus have to be taken into account.

Promoting progress in research and innovation endeavours can be seen as a cornerstone in the ongoing quest against AMR, as it paves the path for the development of cutting-edge diagnostics, new antimicrobial agents and innovative treatment approaches.[10] However, achieving meaningful strides in the fight against AMR requires more than scientific breakthroughs alone, as demonstrated here. In that regard, societal transformation entails dismantling structural barriers that impede equitable access to these ground-breaking innovations, particularly in resource-constrained settings where access to healthcare resources may be limited.

Efforts to foster research and innovation should be complemented by a comprehensive approach that ensures the affordability and sustainability of new antimicrobial technologies on a global scale. By prioritizing accessibility and affordability, we can ensure that the benefits of scientific advancements in the field of antimicrobial research are accessible to all, regardless of geographical location or socioeconomic status – maximizing in turn their impact in the global battle against AMR.

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GYA member Tomislav Meštrović *is a medical doctor with a PhD degree from the University of Zagreb, a Master's of Public Health degree from the London School of Hygiene & Tropical Medicine, and an MBA degree from the Frankfurt School of Finance & Management, Germany. Tomislav is currently an Associate Professor at University North in Croatia, and an Affiliate Associate Professor at the University of Washington School of Medicine. He is also the GYA Connections Co-Editor-at-Large 2022-2024.*

Email: *tmestrovic@unin.hr*