DOI: https://doi.org/10.4038/jmj.v36i2.215

Editorial

Confronting Antimicrobial Resistance: The Change Starts with Us

Sathiadas MG

Antimicrobial resistance (AMR) poses a major threat to human health worldwide. Bacterial antimicrobial resistance occurs when changes in bacteria cause the drugs used to treat infections to become less effective and has emerged as one of the leading public health threats of the 21st century. Estimates suggest that bacterial AMR is a health problem whose magnitude is at least as significant as major diseases such as HIV and malaria. It is crucial to identify the leading pathogens and drug combinations that contribute to the bacterial AMR burden. If left unchecked, the spread of AMR could make many bacterial pathogens much more lethal in the future than they are today

An estimated 4.95 million (3.62–6.57) deaths were associated with bacterial AMR in 2019. At the regional level, the death rate attributable to resistance was highest in western sub-Saharan Africa, at 27.3 deaths per 100,000 (20.9–35.3), and lowest in Australasia, at 6.5 deaths (4.3–9.4) per 100,000. Lower respiratory infections accounted for more than 1.5 million deaths associated with resistance in 2019. The pathogen–drug combination of methicillin-resistant *S. aureus* caused more than 100,000 deaths attributable to AMR in 2019, while six other combinations—multidrug-resistant, third-generation cephalosporin-resistant *E. coli*; carbapenem-resistant *A. baumannii*; fluoroquinolone-resistant *E. coli*; carbapenem-resistant *K. pneumoniae*; and third-generation cephalosporin-resistant *K. pneumoniae*—caused 50,000–100,000 deaths each. (1)

Resistance to fluoroquinolones and β-lactam antibiotics (i.e., carbapenems, cephalosporins, and penicillins), which are often considered first-line treatments for the empirical therapy of severe infections, accounted for more than 70% of deaths attributable to AMR. In 2017, the WHO published a priority list for developing new and effective antibiotic treatments. The aim was "to guide and promote research and development of new antibiotics, as part of WHO's efforts to address growing global resistance to antimicrobial medicines." The microbes were divided into three categories: critical, high priority, and medium priority. The critical category included the carbapenem-resistant pathogens *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and Enterobacteriaceae. *Vancomycin-resistant Enterococcus faecium* and *clarithromycin-resistant Helicobacter pylori* were among the high-priority pathogens, whereas *penicillin-non-susceptible Streptococcus pneumoniae* and *ampicillin-resistant Haemophilus influenzae* were classified as medium priority. Notably, multidrug-resistant *Mycobacterium tuberculosis* was not included in the list. It is worth noting that these medium-priority and excluded microorganisms cause the highest burden of disease in low- and middle-income countries (LMICs). We cannot expect the authority to deal with AMR but it has to come within ourselves.

Intervention strategies to overcome AMR are the prevention of infection. Preventing healthcare-acquired infections, and community-based programmes focused on water, sanitation, and hygiene are key to overcoming AMR. Vaccinations are paramount for reducing the need for antibiotics. Minimizing the use of antibiotics unrelated to human disease treatment is a crucial strategy for reducing risk. The increased use of antibiotics in agriculture has been recognized as a significant contributor to antimicrobial resistance (AMR) in humans. Minimising the use of antibiotics should be prioritized especially when they are not necessary to improve human health such as treating viral infections.

Building infrastructure that allows clinicians to diagnose infection accurately and rapidly is crucial so that antimicrobial use can be narrowed or stopped when appropriate. Investment in research to develop new antibiotics must be initiated. Inappropriate use of

antibiotics driven by insufficient regulations and ease of acquisition are the areas that need change. Access to second-line antibiotics in locations without widespread access is essential. (2)

Antibiotic stewardship remains a core strategy in most national and international AMR management plans, although barriers to implementing stewardship programmes in LMICs should be addressed.

Individual behavior and personal responsibility as AMR interventions are strongly influenced by personal attitudes and, in consequence, the behavior and the choices made, which is known as the 'ABC' paradigm for social change. (3)

Multisectoral approaches are also important as most microorganisms dwell in animals as well. Microorganisms that affect human, animal, food, and environmental systems are crucial, highlighting the need for multisectoral approaches to address antimicrobial resistance (AMR) from a 'One Health' perspective.

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