

Editorial

Taming Antimicrobial Resistance: A national challenge

The use of antibiotics revolutionized medicine and increased survival for patients with cancers, those undergoing organ transplantation and many others, and improved quality of life for those with an immune-compromised status by treating life-threatening infections. However, the euphoria of having conquered infectious diseases was short-lived as resistant strains emerged soon after the wide and indiscriminate use of antibiotics, which negated major advances in disease management. Antimicrobial resistance is now a global challenge. The selective pressure on bacteria due to extensive use of antibiotics has led to the emergence of multidrug-resistant strains of bacteria, thus taking us back to almost the pre-antibiotic era. This is perhaps the only situation where the use of a resource in one patient can contribute to damage in other patients or the community.

The genes for antimicrobial resistance are present in the environment in bacterial populations as part of their natural defence mechanism. Many bacteria that carry these antimicrobial-resistant genes do not infect a normal host. Advances in medical therapeutics and interventional diagnostics have increased the number of compromised hosts and longer survival of patients with chronic diseases; as a result, more persons are at risk of acquiring infections due to opportunistic multidrug-resistant bacteria. Today our options are limited and new antimicrobial molecules are not in sight in the near future; thus, our effort should be to save the available antibiotics by preventing and controlling infections as well as preventing the emergence of antibiotic-resistant bacteria. While imposing restrictions on antibiotic use is required, a balanced approach has to be maintained to ensure easy availability of antibiotics to patients who need this life-saving resource.

The publication of the origin of *NDM-1* (New Delhi metallo-beta-lactamase) gene in India and its spread all over the world, generated much medical as well as political debate.¹ There have been major international efforts to tackle antimicrobial resistance, and India too is expected to make an important contribution.

The national policy recommendations for containment of antimicrobial resistance in India were formulated in 2011 but their implementation has not been satisfactory.² It is not easy to monitor 'prescription-only' sale of antibiotics in India because there are not enough qualified doctors in peripheral healthcare facilities. A step-by-step practical approach was suggested in December 2012 by the 'Chennai declaration' formulated by various scientific and policy-making bodies. The document proposed a 5-year plan for implementation of strategies to control emerging antimicrobial resistance.³ Subsequently, in 2013 the Government of India published an H1 schedule of drugs to rationalize over-the-counter sale of some antibiotics. The modified H1 list has 24 antibiotics and 11 antituberculosis drugs which are not to be dispensed without prescription.⁴ Ensuring compliance all over India is a challenge and will need continuous monitoring.

Methicillin-resistant *Staphylococcus aureus* (MRSA) accounts for about 40% of the *Staphylococcus aureus*. However, most of these remain sensitive to vancomycin and linezolid.⁵ The community-acquired MRSA (CAMRSA) infections, now a problem in community settings, have to be properly identified and monitored as the options for treating these infections vary—these being less resistant as compared to healthcare-associated MRSA (HAMRSA) strains.⁶ The prevalence of vancomycin-resistant enterococci (VRE) is increasingly associated with infections in high-risk patients. The new drug daptomycin is effective against MRSA, vancomycin-resistant *Staphylococcus aureus* (VRSA) and VRE.⁷ However, the major problem remains multidrug-resistant Gram-

negative bacteria, not only in hospital settings but also in some common community-acquired infections such as typhoid fever⁸ and urinary tract infections.⁹ An increase in extended-spectrum beta-lactamase (ESBL)-positive and carbapenemase producing strains is a cause of concern especially in healthcare-associated infections (HAI), as this not only increases the mortality but also the morbidity and the cost of treatment by prolonging hospital stay.¹⁰ In India, on one hand are central teaching and research institutes and corporate hospitals of international standards, while on the other are peripheral healthcare centres with no access to a microbiology laboratory or a qualified medical doctor. The challenge remains to make evidence-based policies and practices to address our local needs.

The WHO has published evidence from the initiatives taken by some countries in implementing guidelines for control of antimicrobial resistance, the gaps they identified in implementation of these strategies and the way forward to overcome these gaps.¹¹ The evidence shows that national networks help in surveillance and audit of antibiotic use especially with computerized data management. However, a key message is the need for administrative will, a systems-based approach and an organizational change with multidisciplinary involvement to control HAIs and advocacy for the appropriate use of antimicrobials.

No policy on control of antimicrobial resistance can be successful if we do not focus on prevention and control of infections simultaneously as HAIs due to multidrug-resistant organisms is a major challenge in any healthcare facility. A hospital infection control committee is necessary in all hospitals. Prevention of community-acquired infections should be addressed by strong immunization programmes, provision of safe water and continuous health education. Strengthening of diagnostic services at all levels of healthcare is also needed to ensure the availability of specific diagnosis and thereby enhancing the confidence of treating physicians in not choosing antibiotics in viral or non-infectious illnesses.

For designing any interventional programme, we have to determine action points where effective and implementable protocols can be introduced. The plan to implement strategies for control of antimicrobial resistance must begin with defining the outcome measures to determine the impact of such interventional programmes. The outcomes should be quantifiable so as to make an objective assessment of the progress being made. Based on published evidence, some of the measurable outcomes suggested are audits of antimicrobial use and prescribing practices, monitoring surgical prophylaxis and studying the length of hospital stay and cost to healthcare.¹¹

Involving patients and society in this endeavour has been successful in other countries. Awareness and education of the community for measures such as practice of hand hygiene or use of respiratory precautions and informing people that antibiotics are not needed for every illness, are important tools that increase public awareness and opinion, thereby helping control infections and further reducing the need for using antimicrobials.

The way forward would be to have a national regulatory framework on the use of antibiotics (including use in veterinary practice), develop guidelines for hospital infection control, build capacity at peripheral healthcare centres including availability of point-of-care testing, training of healthcare professionals and increasing public awareness. Administrative and political will is as important as cooperation and commitment from prescribers, patients and the community.

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