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Editorial

Rising Threat of Antimicrobial Resistance: Judicious Use of Antibiotics is the Way Forward

The discovery of antimicrobial agents revolutionised the treatment of infectious diseases during the second half of the 20th century. Antibiotics made it possible to treat infectious diseases, such as septicaemia, pneumonia, tuberculosis and syphilis. The medical community believed naively that it had conquered infectious diseases and non-judicious use of antimicrobials became common. However, a few important facts had been overlooked, mainly the theory of Darwin: the adaptation by life forms to challenging environment and survival of the fittest. Ever since antibiotics were developed in the 1940s, scientists have warned that indiscriminate use of antibiotics leads to bacterial resistance, called antimicrobial resistance (AMR). Today's threat of widespread AMR mainly due to indiscriminate antimicrobial use and simultaneously, downward trend of development of new antimicrobial raises the prospect of a world without effective antimicrobials, where a patient can die from previously treatable infections.

Antimicrobial resistance is resistance of a microorganism (bacteria, parasites, viruses or fungi) to an antimicrobial drug that was originally effective for treatment of infections caused by it. Among AMR, the biggest threat is antibacterial resistance (ABR) because common infections (respiratory, skin, wound, etc) could become untreatable. Moreover, many common and safe surgical or medical interventions (cancer therapy, caesarean section, hip replacement etc) could become impossible or associated with major risks. A recent report estimated that if no proactive actions are taken now to slow down the rise of AMR, then by 2050, 10 million lives a year and a cumulative 100 trillion USD of economic output are at risk due to the rise of drug resistant infections.[1] Most of the direct and much of the indirect impact of AMR will fall on low and middle-income countries.

The steep rise in AMR/ABR is a result of many factors, but the foremost cause is the overall volume of antibiotic consumption. About 80% of antibiotics are used in the community and the rest are used in hospitals. Main contributors of AMR and inappropriate antibiotic use are: lack of access to affordable health care, leading to self-medication with antibiotics, combined with truncated course of treatment due to poor knowledge and costs; poor use of antibiotic based on patient demand or perceived demand but not clinical need; poor use of up-to-date treatment guidelines, which are lacking altogether or are not percolated; inappropriate availability of antibiotics and use of sub-standard product; and global trade and travel that facilitate cross-border transfer of resistance. Global antibiotic consumption in humans has increased by 36% between 2000 and 2010.[2] Half of this increased use is regarded as unnecessary, e.g. when antibiotics are used to treat illnesses like common colds that are caused by viruses, where antibiotics have no effect. The problem of resistance is not only seen in human medicine consumption. Antibiotics are also used in veterinary medicine, for growth promotion in animals and disease prevention in agriculture, aquaculture and horticulture. Worldwide consumption in animals is estimated to rise by 67% from 63%, 151 tons in 2010 to 105,596 tons in 2030.[3]

It is realised now that AMR poses a multi-dimensional challenge – social, economic and environmental dimensions, that encompass food production system as well as human and animal health. The 'One Health' concept captures this scope, by recognising the interdependence of human health, agriculture and animal health and the environment. World Health Organization (WHO) in 2015 endorsed the Global Action Plan (GAP) to contain AMR based on one health approach.[4] The GAP was prepared by WHO with regular consultation with FAO (The Food and Agriculture Organization of the United Nations) and OIE (Office International des Epizooties, World organisation for Animal Health), as a part of the tripartite collaboration to ensure a one health approach for containment of AMR. All Member States had agreed to develop their own National Action Plan (NAP) by May 2017 and most of the countries have developed their NAP on AMR which is aligned with GAP of WHO. Government of India has developed NAP on AMR which is aligned with the GAP of WHO and is committed to combat AMR.[5] The GAP on AMR (GAP-AMR) identifies five strategic objectives given below:

1. to improve awareness and understanding of AMR through effective communication, education and training;
2. to strengthen the knowledge and evidence-base thorough surveillance and research;
3. to reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures;
4. to optimise the use of antimicrobial medicines in human and animal health;
5. to develop the economic case for sustainable investment that takes account of the needs of all countries and to increase investment in new medicines, diagnostic tools, vaccines and other interventions.

The objective four is for optimising the use of antimicrobial medicines which requires many policy

and regulatory interventions, especially in countries where antimicrobials are inappropriately used and are available over-the-counter. Detailed antibiotics use surveillance in the community is one of the strategies to guide and control the antibiotic overuse and misuse. In a number of developed countries, extensive surveillance programmes have been developed to study patterns of AMR and antibiotic use.[6,7] Based on the findings, interventions can be developed and continuous monitoring of AMR and use can detect any change. However, the problem of AMR had received relatively little recognition in developing countries and the ability to undertake extensive surveillance is lacking in resource-constrained settings. Optimum prescribing and use of antibiotics also require behaviour change of all stakeholders. To develop effective strategies to change prescriber behaviour, qualitative research into their beliefs, motivations and practices are needed. The first objective of GAP/NAP on AMR is to improve awareness and understanding of AMR through effective communication, education and training of prescribers and general public.

In India, we have developed a methodology with WHO to monitor antibiotic use in the community,[8,9] and surveillance of antibiotic use in the community was done.[10] The pattern of antibiotic misuse in self-limiting viral conditions, like cold and acute diarrhoea was also surveyed.[11,12] Few qualitative studies for behaviour and knowledge of doctors,[13] pharmacists[14] and high school teachers and students[15] have also been conducted. These baseline studies will help in developing policy interventions to improve antibiotic use in the community. As most of the countries have developed their NAP on AMR[16] and committed to operationalise the plan, there is a great hope that actions will be taken across nations to combat AMR. Current political commitments of all countries across the globe can contribute to an enabling environment for actions which can translate into optimum use of antibiotics. These actions not only help individual country and their citizens but will help also in preserving effective antibiotics across globe.

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