ANTIBIOTICS STEWARDSHIP : NEED OF THE TIME

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Antibiotics are ostensibly the best type of chemotherapy created in the twentieth century and maybe over the whole history of medication. Since their revelation and their commercial introduction, more than 70 years ago, anti-toxins have spared multitudinous human lives each day. Present day prescription relies upon the adequacy of antibiotics to treat and forestall different infections and various routine and advanced medical procedures such as cesarean sections and organ transplants also require antibiotics for their maintenance[1]. Within a relatively short period of time after the first antimicrobial drugs were introduced, bacteria began exhibiting varying degrees of resistance. The uncontrolled use (and misuse) of antibiotics in both human and veterinary medicine, has assumed a basic causative role in enhancing the resistance against antibiotics, which is presently perceived as a health threat across the world[2]. Furthermore, the number of multidrug resistant (MDR) and even extremely drug-resistant (XDR) bacterial pathogens have been observed to multiply, especially during the last twenty years and this too galvanized by the overconsumption and rash utilization of clinically utilized antibiotics, and the continuous advancement and spread of mobile genetic resistance elements. These MDR bacteria in return become drivers of increased morbidity in patients along with their mortality and healthcare costs. Resultantly, the last few years have highlighted several reports that dictate the urgency and criticality of the antimicrobial resistance scenario. In the recent O'Neill report sponsored by the UK Government, it was estimated that by 2050 ~10 million people per year would be dying from antibiotic-resistant infections.

A global priority pathogens list (global PPL) of antibiotic-resistant bacteria came into light in February 2017 under the umbrella of The World Health Organization (WHO) to assist the prioritization of the research and development of the latest and efficacious antibiotic treatments. The list contained 12 bacteria and bacterial families and was divided into three categories: critical, high and medium. *Mycobacterium tuberculosis* was, however, a standout amongst the most savage and dreaded of every single bacterial contamination especially before the age of these antibiotics. Presently the range of untreatable drug-resistant tuberculosis is again taking steps to cause a worldwide pandemic. Toxin– neutralizing agent (TA) frameworks are universal among microscopic organisms and assume an imperative job in the scattering and development of anti-microbial opposition, for instance, by keeping up MDR plasmids, by actuating steadiness arrangement and by assuming a job in biofilm development. A common misconception is to think of antibiotic resistance as being exclusively a function of particular resistance mutations or acquired foreign resistance genes. What is less appreciated is that both the environment and the overall genotype of the target bacteria can significantly modulate the phenotypic expression of antibiotic resistance. In an age of increasing reliance on DNA sequence data, this dissociation of genotype and phenotype has important consequences for the ability of clinical bacteriology to guide optimal therapy[3].

Antibiotic stewardship refers to a set of coordinated strategies to improve the use of antimicrobial medications with the goal of enhancing patient health outcomes, reducing resistance to antibiotics, and decreasing unnecessary costs. Antibiotic stewardship and antimicrobial resistance have recently gained considerable political attention. The first antimicrobial stewardship programs were introduced in hospitals more than 30 years ago to address inappropriate antibiotic prescribing and increasing antibiotic resistance[4,5]. The purpose of antibiotic stewardship is to promote the prudent use of antibiotics in order to optimize patient outcomes while at the same time minimizing the probability of adverse effects, including toxicity and the selection of pathogenic organisms, and the emergence and spread of antibiotic resistance[4]. Key evidence-based stewardship interventions (e.g. empirical treatment according to local or national guidelines, de-escalation of treatment, parenteral-to-oral switch, therapeutic drug monitoring, restricted antimicrobial lists) demonstrate benefits in terms of clinical outcome, adverse events, treatment costs, and antibiotic resistance rates[5]. Recent findings demonstrate that enabling and restrictive interventions are associated with a 15% increase in compliance with desired practice, a 1.95-day decrease in duration of antibiotic treatment, and a 1.12-day decrease in

inpatient length of stay, without compromising patient safety.

Antimicrobial stewardship can incorporate various types of interventions. According to a Cochrane review, both enabling and restricting interventions were shown to be effective in reducing antibiotic use. Additionally, enabling interventions were associated with better acceptance and, when combined with restricting measures, enhanced sustainability of the latter. There were concerns that restrictive interventions could be detrimental to the communication between the clinical and stewardship teams. Furthermore, studies suggest that further improvement could be achieved with additional behavior change intervention functions, particularly explicit goal setting and action planning. Nevertheless, information on behavior change intervention functions is difficult to obtain. Initiatives for implementing or strengthening antimicrobial stewardship were primarily developed as a response to increasing antibiotic resistance. Increasing antibiotic use results in increasing antibiotic resistance rates. But does improving antibiotic prescribing reverse antibiotic resistance rates? The small number of studies with large heterogeneity in study design and microbial outcome endpoints has not yet allowed for certain conclusions to be made. The armamentarium of antimicrobial stewardship interventions is broad. Judiciously harnessing the potential of novel diagnostics, electronic prescribing, and decision support systems is promising, but at the same time challenging and demanding for the healthcare systems, especially in low-resource settings. Effective and sustained improvement in antibiotic prescribing will require multifaceted quality improvement approaches using behavior change techniques and methodologies, so that effective interventions are implemented knowing the target audience, the reasons for the intervention, and the contexts in which to deliver them.

What remains to be done? Despite the extensive evidence base, antimicrobial stewardship programs are not a requirement in all hospitals[7]. Antibiotic resistance requires global action. The available evidence base suggests that antibiotic stewardship programs should be introduced, with sufficient trained staff and funding, as widely as possible. This requires political commitment and resources, suggesting a role for continued advocacy by public health and specialist professionals and organizations.

Antibiotic stewardship is very effective and very safe. We need to ensure that it is implemented, and this Cochrane Review highlights two key delivery methods. Political commitment and adequate funding will be essential if antimicrobial stewardship is to be implemented in every healthcare setting.

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