AMJ Australasian Medical Journal [AMJ 2017;10(8):743-745]

# Antibiotic stewardship, antimicrobials resistance, and rational use of medicine

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## EDITORIAL

Please cite this paper as: Haque M. Antibiotic stewardship, antimicrobials resistance, and rational use of medicine. AMJ 2017;10(8):743–745.
https://doi.org/10.21767/AMJ.2017.3143

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Present-day healthcare was constructed over the last 100 years on the principal constituent that infections can be averted or treated utilizing antimicrobials.[1] Subsequently, antimicrobials turn out to be the backbone of modern medicine. Thereafter, the US Surgeon General Dr William H. Stewart superbly announcing in 1968 that "it is time to close the book on infectious diseases, and declare the war against pestilence won."[2] The situation quickly changed in the early 1970s, physicians were finally required to desert their confidence that almost all microbial infections were treatable. Medical doctors' sanguinity and confidence were traumatized by the emergence of resistance to multiple antibiotics among *Staphylococcus aureus*, *Streptococcus pneumonia*, *Pseudomonas aeruginosa*, and *Mycobacterium tuberculosis*.[3] A few decades back when antibiotics development process was flourishing; it was thought that even when resistance developed, a new medicine will be available to treat microbes. Fourteen new classes of antimicrobials were introduced between 1935 and 2003. Nevertheless, quick antimicrobial growth came with a price named antimicrobial resistance (AR).[4] Then, AR is going on all over the planet in microbes accountable for common but grave infections, including sepsis, diarrhoea, pneumonia, urinary tract infections, and gonorrhoea, according to a new report from the WHO.[5,6] AR is a comprehensive public health challenge, which has amplified by the universal overuse of antimicrobial. Increased AR is the cause of severe infections, difficulties, extended hospital stays and increased mortality.[7] Furthermore, AR could reduce gross domestic product (GDP) noticeably - but unlike in the current financial catastrophe of 2008, the impairment could last longer and the low-income nations suffer most.[8] Additionally it has speculated that AR will cause to lose more than five per cent of their GDP and at least 28 million people generally of developing countries will move to indigence by 2050.[9] Methicillin-resistant *Staphylococcus aureus* (MRSA) alone kills more Americans every year than emphysema, HIV/AIDS, Parkinson's disease and homicide combined.[10] Henceforth, the epidemic of AR is winding-up the golden age of antibiotic therapy. AR produces a negative impact on all areas of medicine, and particularly successes stories empirical antibiotic treatment became extremely difficult. Antibiotic selections are strictly limited, and the pipeline of new antibiotics is almost dry.[11] It has been reported that a rapid diminution in the number of new antimicrobials to be approved and several post-marketed withdrawals on the basis quality and safety grounds.[12] Most alarming is that no new categories of antimicrobials anticipated being in use in the next 20 years.[13] Thereafter, the prevailing categories of antimicrobials are perhaps the best possible treatment options for mankind.[14] AR thought to be very difficult for totally halted as the development of microbes towards AR is inevitable as it epitomizes a precise characterization of the general evolution of microbes[15] but the speed of growth and transmission AR can be decelerated.[7] It has been reported that the highest cost of AR is $55 billion per year in the USA.[12] It was assessed that up to 40–50 per cent of antibiotic use did not follow local and national antibiotic guidelines or was conflicting with culture and sensitivity results.[16] Henceforth, the conservation of antimicrobials what are currently available became an essential issue to safeguard the mankind.[17] A number studies reported that antibiotic stewardship program improves rational utilization of antibiotic and reduces resistance.[17-26] Antimicrobial stewardship has been defined as "the

optimal selection, dosage, and duration of antimicrobial treatment that results in the best clinical outcome for the treatment or prevention of infection, with minimal toxicity to the patient and minimal impact on subsequent resistance."[18] The goal of antimicrobial stewardship is 3-fold. i. Patient receives the most appropriate antimicrobial with the correct dose and duration. ii. To prevent antimicrobial overuse, misuse, and abuse. iii. To minimize the development of resistance.[17] Regarding the first goal optimization of antimicrobial therapy – a concept of 4Ds has been popularized. Those are the right Drug, right Dose, De-escalation to pathogen-directed therapy, and right Duration of therapy.[27] Consequently, the answer of AR remains in rational use of antimicrobials will not only promote prudent use of antimicrobials but also prevent development of resistance but also conserve and prevent all aspects of medicine utilization together with financial aspects. As the rational use of medicine is defined as "patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period, and at the lowest cost to them and their community."[28] Antibiotic stewardship program will promote and progress the rational use of antimicrobials.

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## PEER REVIEW

Peer reviewed.

## CONFLICTS OF INTEREST

The author declares that they have no competing interests.

## FUNDING

None