

Era of antimicrobials: winning microbes!

Opinion

Antimicrobial resistance is increasingly serious threat to global public health. Antibiotics have been used for the past 70 years to save countless of lives suffering with infectious diseases. Today, almost all pathogenic microbes worldwide are becoming resistant to routinely used antibiotics. Since from 1940s, antimicrobial drugs that greatly reduced the illness and death of patients from infectious diseases have been used excessively and for too long durations, enforced microbes to develop resistance and making these drugs less effective. According to Centers for Disease Control and Prevention (CDC), at least 2 million people every year in United States has been infected with antibiotic resistant bacteria and approximately 23,000 people died as a cause of these infections (<http://www.cdc.gov/drugresistance/>).

Misuse and abuse of antibiotics has been contributed by number of causes including people demand forcefully to take antibiotics, physicians failed to explain users the drawbacks associated with antibiotics or in certain cases physicians don't know when to exactly prescribe antibiotics. Nearly half of antibiotic usages by humans are unnecessary or not proper in circumstances.¹ Another problem associated with antimicrobial resistance are excessive use and long durations of antibiotic treatment, which likely to increase rates of resistance and have led to other complications such as antibiotic pollution. The use of antibiotics is currently restricted not only for human applications rather they are widely used in large quantities in agricultural production and animal husbandry. In 2013, almost 80% of antibiotics in United States were used in animals and/or agro ecosystems and only 20% in humans.² Therefore, the emergence of antimicrobial resistance is a serious threat not only to humans but also for animals and ecological health. In humans, antimicrobial resistance reduces the effectiveness of treatment and also increases health care cost as well as the economic burden on families and societies (WHO, 2015).

Antimicrobial resistance is a naturally occurring evolutionary process. The genetic mutations and horizontal gene transfer of antibiotic resistance genes (resistome) between microbes are recognized as the leading cause for the development of clinically significant antibiotic resistance. Patients infected with antibiotic resistant strains are generally at greater risk of worse clinical outcomes and deaths. The most common type of organisms threatening to public health are multidrug resistance (MDR) bacteria followed by other types including MDR viruses, fungi and parasites that resist multiple antibiotics. Global surveillance of antimicrobial resistance by WHO (2014) revealed that high rates of antibiotic resistance were observed in diseases including gonorrhea, tuberculosis, malaria, HIV, influenza, etc. More recently, researchers have found a patient for first time in United States infected with *Escherichia coli* resistant to Colistin- an antibiotics of last resort.³ It shows us that the 'end of the road' for antibiotics is not very far away-that we all are in a dreadful situation where we don't have antibiotics to treat minor infections.

The discovery of new antibiotics will never set to end due to rapid emergence of antimicrobial resistance by microbes. In recent years, combinatorial antibiotic treatment using two or three antibiotics have enhanced killing of antibiotic resistant strains and reduce the rates

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of antimicrobial resistance.⁴ Moreover, the problem of antimicrobial resistance cannot be completely eliminated rather it can be managed by educating people, health care provider, policy makers and pharmaceutical industries about safe use of antibiotics. In this way, people can overcome antimicrobial resistance using antibiotics only prescribed by doctor's and it is also essential to take complete course of antibiotic therapy. Health care providers can handle resistance by prescribing appropriate antibiotics to treat diseases considering circumstances if it is truly needed. Policy maker and industries can regulate appropriate use of antibiotics and can also foster innovation to bring in new tools for antimicrobial drug development. In recent years, Antimicrobial stewardship team specialists in hospitals have encouraged ideal use of antimicrobials by educating the health care providers to follow evidence-based prescribing in order to overcome excess use of antibiotics, and thus antimicrobial resistance.⁵

Antibiotics are important tools for modern medicine that can save countless of lives from future infectious diseases, but unfortunately their misuse have led to emergence of microbial resistance to antibiotics. We are continuously losing our wealth of antibiotics due to advancing drug resistance-thus minor infections could be more deadly in future. Therefore, selecting an appropriate antibiotic and optimizing its dose and duration of treatment will minimize antimicrobial resistance and protect us from next killer disease.

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Conflict of interest

The author declares no conflict of interest.

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