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Pakistan at the verge of potential epidemics by multi-drug resistant pathogenic bacteria

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Antibiotic resistant pathogens are booming in community and healthcare institutions worldwide. Increasing resistance to modern antimicrobials not only limits the treatment options, but also leads to severity of infections and increases the costs of hospitalization. Recent estimates predict that economic losses incurred due to infections of multidrug resistant (MDR) pathogens are incalculable, but mortality and morbidity rates are increasingly becoming more significant rendering MDR pathogens soon to be the leading cause of deaths worldwide [1]. The most devastating situation is the complete disaster of the entire health care system, where antimicrobial drugs will not only stop working against simple infections, but all types of surgeries and transplantation will also face a complete failure because of the attacks of resistant pathogens on vulnerable organs.

Pakistan is a developing country with compromised healthcare infrastructure and economic conditions. Lack of access to basic healthcare facilities and unhygienic life style add up to worsen the conditions. There exists deep deficit in understanding and compliance of biosafety issues in community and healthcare institutions in Pakistan. The rampant use of medicine is on the rise [2]. Lack of education and poor financial conditions incite people to buy such substandard drugs and ultimately misuse them.

The malpractice of medicine has challenged the very efficacy of these magic drugs i.e; the antibiotics. Antibiotic abuse is directly linked to the emerging resistance in bacteria. Resistance is booming in bacteria even to the last line antibiotics carbapenems. The sub-continental carbapenem resistant superbug, NDM-1, is rapidly disseminating in clinical [3], and non-clinical environments in Pakistan [4].

NDM-1 stands for New Delhi metallo-beta-lactamase enzyme. Which belongs to class B, one of the four beta-lactamase enzymes molecular classes that hydrolyse the most important and most widely used group of antimicrobials in clinical practice i.e; the beta-lactam antibiotics. NDM-1 has zinc ions in its active site, unlike other molecular classes of beta-lactamases (A, C, D), that have serine residue at their active site.



NDM-1 was first identified in a Swedish tourist to India when he was hospitalized in New Delhi and diagnosed with an untreatable infection, which later was named NDM-1. NDM-1 was identified in 2008 [5], and was reported as predominant carbapenemase in Pakistan, India and Bangladesh [3]. NDM-1 harbouring bacteria have been found resistant to all available antibiotics which are in clinical use. NDM-1 gene being residing on plasmid can readily be shared between bacteria even not closely related. ARG (antibiotic resistance genes) when reside on mobile genetic elements (plasmids, transposons, integrons) can easily disseminate between bacterial population [6]. Even these genes can be taken up by normal flora and can donate them to pathogenic bacteria at times. Since HGT (horizontal gene transfer) and clonal expansion of antibiotic resistant bacteria is facilitated by sub-standard medical practices in Pakistan [7], there is an extremely threatening environment of potential epidemics of drug resistant bacteria.

In Pakistan, which is among the lowest spending countries on healthcare in the world, such epidemics will lead to a complete disaster. And since infectious diseases respect no borders this could circumvent other countries too. There is an urgent need of the day to make legislations on proper use of antibiotics so that people should not be deprived of the blessings of these wonder drugs. If prompt actions were not taken these superbugs will bring a complete disaster to the health care system.

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