ANTIBIOTIC RESISTANCE: THE POST ANTIBIOTIC ERA IS NEARER THAN WE EXPECTED!

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Dear Editor,

The discovery and production of synthetic antibiotics in the first half of the last century has been one of medicine's greatest achievements. Penicillin was first administered on a policeman with cellulites following its discovery by Alexander Fleming in London back in 1928; this changed the face of medicine.¹ The first-generation cephalosporin's were active primarily against Gram positive cocci. Similar to penicillin's; newer cephalosporin's were synthesized with expansion of activity against Gram negative rods. Then the Carbapenems were developed and they were considered the antibiotics of last resort.²

However, resistance over the years has emerged against all known classes of antibiotics in all part of the world. In fact, the first penicillinase enzyme that confer resistance to penicillin was detected in *Escherichia coli* by a retrospective survey even prior to the release of penicillin for use in medical practice.¹ Some of the notable resistance mechanisms described among the Gram-positive pathogens are; the Methicillin Resistance *Staphylococcus aureus* (MRSA), Vancomycin resistance *Staphylococcus aureus* (VRSA) and the Vancomycin Resistance *Enterococcus* (VRE) and numerous other beta-lactamases. Among the Gram negatives; several beta-lactamases enzymes have been described.² The Extended spectrum beta lactamase (ESBL) resistance has also been well elucidated. The ESBLs are group of enzymes with the ability to hydrolyze and cause resistance to the oxymino-cephalosporins (i.e. cefotaxime, ceftazidime, ceftriaxone, cefuroxime and cefepime), monobactams (i.e. aztreonam), but not the cephamycin's (i.e. cefoxitin and cefotetan) or carbapenems (i.e. imipenem, meropenem, and ertapenem). Lately, Carbapenems resistance among Enterobacteriaceae have also been described.¹

The current global burden of death attributable to antimicrobial resistance has been estimated at 700,000

deaths annually.³ This figure is much higher than the burden of Tetanus, Measles and Cholera combine. It is unfortunate for the medical world that; antimicrobial resistance is accelerating at an alarming pace with projection that by 2050, drug resistance pathogens could kill more than 10 million people annually globally.³ The overuse, misuse and irrational administration of antibiotics has put selective pressure on bacteria to become mutant and hence drug resistant. Antibiotic misuse comes when they are inappropriately inserted as constituents of animal feeds or farm produce and this are ultimately eaten by man. These are then spread man to man directly or indirectly through unclean hands, contaminated environment or within health facilities.² The lack of access to effective antibiotics is also considered a big challenge for the developing world with substandard and fake medications in wide circulation.

The 'post antibiotic era' refers to a period that was initially seen as an 'apocalyptic fantasy' in medical world but now viewed as a real and imminent danger in which common infections and minor injuries can lead to mortality due to lack of an effective antimicrobial agent to treat them as a consequence of global resistance.⁴ The World Health Organization have called for the setting of a national surveillance system on antimicrobial resistance to curtail its spread and the consequent economic loss. The antimicrobial resistance threat is more worrisome as there is no new antibiotic developed since the 1980s with the exception of Rifabutin and the world is close to running out of its current supply. Provided we continue in this manner, it would not be long before we enter the 'post antibiotic era'.⁵

The consequences of the 'post antibiotic era' implies that even minor infections would then become untreatable and consequently fatal.⁴ The treatment of non-communicable diseases like cancer, diabetes mellitus, renal disorders, heart diseases and sickle cell

disorders would become difficult, if not impossible because of lack of an efficient supportive antibiotic for their co-management. Surgeries also would become impossible to recover from due to lack of antimicrobial for the management of possible surgical site infection.⁵

Consequently, we recommend the engagement of all players and stakeholders of the health system in a statewide intervention that focus on consumer education, strengthening of health systems, appropriate infection control measures, provision of effective antibiotics, safe use of antibiotics of last resort by their rational/antibiotic stewardship techniques to avert the post antibiotic era.

WHO has also selected this year's theme: "Seek advice from a qualified healthcare professional before taking antibiotics". Antibiotics are a precious resource, so it is important to get the right advice before taking them. This not only ensures you and your family get the best treatment, responsible use of antibiotics will also help reduce the threat of antibiotic resistance.⁶

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