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Infectious Diseases & Endocrinology 2019: Antimicrobial resistance-A global public health challenge- Goutam Kumar Acherjya- Upazila Health Complex, Bangladesh

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Antimicrobial resistance (AMR or AR) is a microbe's ability to resist the effects of medication that could once successfully treat the microbe. The term antibiotic resistance (AR or ABR) is a subset of AMR, as it only applies to bacteria that become antibiotic resistant. Resistant microbes are harder to treat which require alternative medicines or higher doses of antimicrobials. These approaches can be costlier, more toxic or both. Multi-antimicrobial resistant microbes are called multi-drug resistant (MDR). Those considered to be highly drug resistant (XDR) or completely drug resistant (TDR) are sometimes referred to as "superbugs." Resistance occurs by one of three mechanisms: natural resistance in some forms of bacteria, genetic mutation, or resistance of one species from another. Resistance may develop in all classes of microbes. Fungi build resistance to antimicrobials. Viruses develop resistance to the antivirals. Protozoa develop resistance to protozoa, and bacteria develop resistance to antibiotics. Due to random mutations resistance will appear spontaneously. Extended use of antimicrobials, however, tends to promote mutation selection which may make antimicrobials ineffective. Preventive steps involve the use of antibiotics only when appropriate, thus preventing the abuse of antibiotics or antimicrobials. Where appropriate, narrow-spectrum antibiotics are favored over broad-spectrum antibiotics, since successful and precise targeting of specific species is less likely to cause resistance and side effects. Education regarding proper use is important for people who are taking these drugs at home. Health care providers can reduce the spread of resistant infections by using good sanitation and hygiene, including hand washing and disinfecting between patients, and should promote patients , visitors, and family members alike. Increasing drug resistance is caused mainly by human and other animal use of antimicrobials, and the spread of resistant strains between the two. Increasing resistance has also been associated with the dumping from the pharmaceutical industry of inadequately treated effluents, particularly in countries where bulk drugs are made. Antibiotics increase selective pressure in populations of bacteria, causing the death of susceptible bacteria; this increases the amount of resistant bacteria that continues to develop. Resistant bacteria can have a growth advantage even at very low levels of antibiotics, and grow faster than vulnerable bacteria. Resistance to antimicrobials is growing globally due to greater access to antibiotic drugs in developing countries. According to figures, 700,000 to several million deaths annually occur. In the U.S., at least 2.8 million people get infected with antibiotic-resistant bacteria each year, resulting in at least 35,000 deaths. There are public calls for collective global action to address the threat which includes proposals for antimicrobial resistance international treaties. Worldwide antibiotic resistance is not completely known but more is being caused by developing countries with weaker healthcare systems. The WHO describes antimicrobial resistance as the resistance of a microorganism to an antimicrobial medication that could once cure an infection from that microorganism. One person can't become antibiotic resistant. Resistance is a feature of the microbe, not a microbially infected human or other organism. Antibiotic resistance is a subset of resistance to the antimicrobials. This more specific resistance is associated with pathogenic bacteria and is therefore broken down into two additional subsets, microbiological and clinical. Microbiologically linked resistance is the most common and occurs from mutated or inherited genes which enable the bacteria to resist the mechanism associated with certain antibiotics. Clinical tolerance is demonstrated by the failure of many therapeutic methods in which the bacteria usually susceptible to medication are immune after surviving the treatment outcome. In both cases of acquired resistance the bacteria can pass through conjugation, transduction, or transformation to the genetic catalyst for resistance. The primary cause of antimicrobial resistance is overuse of antimicrobials. This results in microbes either forming a protection against drugs that are used to treat them, or

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certain strains of microbes that have natural antimicrobial resistance being far more prevalent than those that are easily vanquished with medication. While antimicrobial resistance occurs naturally over time, the use of antimicrobial agents has led to an increasing prevalence of antimicrobial resistance in a variety of settings both within the healthcare industry and outside of. Resistance to antimicrobials can evolve naturally as the evolutionary response to continued antimicrobial exposure. Natural selection means organisms which can adapt to their environment can survive and continue to produce offspring. As a result, the types of microorganisms that can persist over time while these antimicrobial agents continue to strike will inevitably become more abundant in the ecosystem, and those lacking this tolerance will become redundant. Over the course of time, most of the strains of bacteria and pathogens present would be the form immune to the antimicrobial agent used to treat them, rendering this agent now ineffective over combating most microbes. With the increased use of antimicrobial agents this natural process is accelerating.

Over the couple of decades the antimicrobial resistance is one of most common global public health problems not only in the developed countries but also developing countries. In the daily clinical practice antibiotics are commonly prescribed in case of respiratory tract infections, many of the genitourinary tract infections, acute of chronic gastroenteritis or other gastro intestinal symptoms, traumatized patients to prevent secondary infections. Antibiotics are commonly used to prevent and control the bacterial infection for reducing the mortalities and morbidities but its resistance has become the major public health challenge in the era of 21st century. After achieving the millennium development goal, antibiotic resistance will be one of the major stakeholders to set the sustainable developmental goals as the scenario is more endangering and life threatening than our current anticipation. A complex mechanism of interaction between genetic, pathogenic properties, environmental and host factors are related to develop antimicrobial resistance. Out of which several factors including inappropriate antibiotics practicing, patient???s illiteracy, unauthorized sale of antibiotics, inadequate supervision by drug monitoring agencies and nonhuman use of antibiotics such as animal production are modifiable. Many of the pathogens have shown highly resistance to several commonly used antimicrobials reported in various studies which is really alarming for us. So, the judicious strategies should be planned to prevent and combat against the antimicrobial resistance and make the globe livable for our generation next.

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