Editorial

ANTIMICROBIAL RESISTANCE: A GROWING THREAT IN CLINICAL PRACTICE.

Ahmad M[1], Uddin MN[2]

Antimicrobial resistance (AMR) is a natural phenomenon. Bacterial resistance occurs either by genetic mutation or by acquiring resistance from another bacterium (plasmid mediated). Mutation, a rare phenomenon occurs in 1:1 million cases where the bacteria produces potent enzymes that can inactivate antibiotic , eliminate the cell target that the antibiotic attack, close up the entry ports of antibiotic to cells, manufacture pumping mechanisms that export antibiotic back outside so that it never reaches its target area. On the other hand bacteria acquire antibiotic resistance genes from other bacteria by different mechanisms, where genetic materials are transferred from resistant bacteria to a sensitive one.

Indiscriminant use of potent and broad spectrum antibiotics in food animals (cow, chicken etc.) give rise resistance to microorganisms which are pathogenic both to animals and human being. A few governments restrict which antibiotics can be used for food animals, with the goal of preserving the most powerful antibiotics for treating human disease. One example of micro bacterial resistance from Minnesota is a group of Campylobacter strains of diarrhea-producing bacteria that came from chickens that were given fluoroquinolones[1]. Another example comes from China, where fluoroquinolone is used in high doses as common antibiotic for various diseases and 60% of the E.coli causing urinary tract infections, septicemias and other life threatening diseases are resistant to the fluoroquinolones. Very recently, two global surveillance groups, SENTRY and the Alexander Project, have detected the first signs of fluoroquinolone resistance in Haemophilus influenza. In some countries, antibiotics can be purchased 'over-the-counter and also been sold over the Internet, a commerce mechanism that gives rise to non justified use of antibiotics.

The process of producing a new antibiotic is long and expensive, requiring approximately ten years and average $300 million. Many newly invented compounds are very similar to previously discovered antibiotics thus eventually developing resistance. One approach taken by scientists to combat antibiotic resistance is to strengthen the action of existing antibiotics by modifying them so the bacterial enzymes that cause resistance cannot attack them. Alternately, "decoy" molecules can be used along with the antibiotic, as clavulanic acid or sulbactam for blocking the beta-lactamase enzymes that destroy the penicillin family of drugs. Some hospitals have 'Antibiotic Policy' guidelines and antibiotic review committees, to ensure rational antibiotic use.

Antibiotic resistance has devastating economic and social costs. The 1995 US Office of Technology Assessment report attributed a cost of $1.3 billion (1992 dollars) per year for antibiotic-resistant infections due to six species of bacteria in US hospitals. The total societal costs of ARIs to U.S. households in the year 2000 was approximately $35 billion.

Dr. S. Cosgrove et al. (2006).states that patients with ARI cost $6,000-$30,000 more than patients with infections due to antimicrobial-susceptible organisms. Dr. J.A. O'Brien et al. (2007) summarize the costs of Clostridium difficile infections in Massachusetts hospitals to be $3.2 billion per year. In 2009, the Alliance for the Prudent Use of Antibiotics (APUA), in conjunction with a Chicago teaching hospital, showed in its study extrapolated that $10.7 to $15.0 million in societal costs can be attributed to antibiotic resistance. Dr. Richard Shannon, (2011), University of Pennsylvania School of Medicine estimates $5 billion of additional health care costs can be avoided

1. Lt Col Mushtaq Ahmad, MBBS, DFM, MCPS, Associate Professor & Head of the Dept of Forensic Medicine & Toxicology, AFMC; 2. **Maj Gen Md Nasir Uddin**, MBBS, MPH (HM), M.Phil (PSM), Commandant, AFMC.

by eliminating hospital-acquired infections. Lloyd-Smith et al. (2013). analyze the costs of vancomycin-resistant enterococci in Canadian hospitals and estimates $17,949 Canadian dollars per ARI-patient . Betsey McCaughy, (2014). health policy expert and chairman of Reduce Infection Deaths (RID), estimates $30.5 billion for total hospital-acquired infection costs[1,2].

In 2011, the theme of World Health Day was "Antimicrobial resistance: no action today, no cure tomorrow", and a six-point policy package was published to assist countries with tools to combat antimicrobial resistance. In 2014, World Health Organization (WHO) published its first global report on surveillance of antimicrobial resistance, with data provided by 114 countries which reveals that antibiotic resistance is no longer a prediction for the future[3]. WHO is guiding the response to AMR by: bringing all stakeholders together to agree on and work towards a coordinated response; strengthening national stewardship and plans to tackle AMR; generating policy guidance and providing technical support for Member States and actively encouraging innovation, research and development.

The article published in this edition of JAFMC on antimicrobial resistance: recent trend in Armed Forces of Bangladesh is praise worthy observational study; it will contribute a lot to develop antimicrobial policy at national level and also help to isolate the resistant microbes and antibiotics on present perspective of Bangladesh.

To preserve the potency of existing antibiotics indiscriminate use by physicians, pharmacists and patients must be decreased. Antibiotics should be prescribed only for bacterial infections and in the proper dose for the correct duration. Narrow spectrum drugs can be chosen by doctors whenever possible to avoid destroying populations of beneficial bacteria. For treatment of any microorganism the appropriate MIC (Minimum Inhibitory Concentration) of the drug should be determined and proper drug (Low MIC and highly sensitive) should be selected. In addition, non-therapeutic uses of antibiotics in farm animals and agriculture are needed to be eliminated gradually.

References

1. Alliances for the Prudence of Antibiotics. Anti Microbial Resistance 2012. [cited 2014 April 25] Available from http://www.tufts.edu/med/apua/index.html.

2. Centre for Disease Control. About Antimicrobial Resistance: A Brief Overview; 2007. [cited 2014 April 28] Available from http://www.cdc.gov/drugresistance/index.html.

3. World Health Organization. Report on global surveillance of Antimicrobial Resistance. By WHO Geneva. World Health Organization ;2014:1-24.