INTRODUCTION

Antibiotics are the substances produced by the microorganism, which selectively suppress the growth or kill other microorganism at very low concentration. From the 16th century onwards the empirical use of antimicrobial agents (AMA) started. The Chinese used mouldy curd for boil infections, chaulmoogra oil was used by the Indians in leprosy.

The modern era of antimicrobial agents was steered by Domagk in 1935 by demonstrating the therapeutic effect of Prontosil, a sulfonamide dye, in pyogenic infection. It was soon realized that the active moiety was Para amino benzene sulfonamide, and the dye part was not essential. The phenomenon of antibiosis was demonstrated by Pasteur in 1877, by showing that the growth of anthrax bacilli in urine was inhibited by air borne bacteria. Fleming (1929) found that a diffusible substance was elaborated by penicillium mould which could destroy Staphylococcus on the culture plate. Because of the great potential of this discovery in treating war wounds, commercial manufacture of penicillin soon started.

Antibiotics are one of the pillars of modern medical care and play important role in both prophylaxis and treatment of infectious diseases. The issues of their availability, selection and proper use are of critical importance to the global community. Antibiotics had truly become a ‘panacea’ of medicine and were being used to treat even the most common and trivial types of infections, many of these non-bacterial in nature. Way back in 1945 itself, Sir Alexander Fleming warned that inappropriate use of penicillin could leads to the selection of resistant ‘mutant’ forms of Staphylococcus aureus that could cause more serious infection. He was right, within one year of wide spread use of this drug a significant number of strains of this bacterium had become resistant to penicillin. Few years later over 50% were no longer susceptible to this new drug. Unfortunately, things have not improved and more common and uncommon bacteria, previously susceptible to common antimicrobials, are reported as resistant.

Increasing bacterial resistance is a current and worrisome problem, especially in the nosocomial setting. 21st century is accompanied by an increasing number of emerging infectious diseases, some are truly new, e.g., severe acute respiratory syndrome (SARS). With very few new antimicrobial agents being introduced, and even fewer at the discovery stage, a critical question to ask ourselves is whether prescribing practice(s) can be improved to reverse, or at least retard, that portion of the emerging infections problem that is self-inflicted by insignificant use of available antimicrobial agents.

Antimicrobial Resistance
Antimicrobial resistance is defined as expression of the ability of microbes to resist the actions of naturally occurring or synthetically produced compounds inimical to their survival. In a clinical context, AMR refers to a reduction in clinical efficacy so that either the benefits for the individual of treatment with an antimicrobial drug or the benefits to general public health are compromised. Resistant organism (bacteria, viruses, parasites) are able to withstand attack by antimicrobial medicines. So that standard treatment become ineffective and infection persist and spread to others. Antimicrobial resistance develops when a microorganism mutates or acquires a resistant gene and as consequence of the use, particularly the misuse of antimicrobials.

Resistance clearly begins with antibiotic exposure, and even if only one or two bacterial cells survive they have the opportunity to develop into resistant strains. Subsequently, these newly resistant microbes can pass from person to person, amplifying to potentially epidemic proportions. There is no simple explanation for the widespread incursion of antibiotic-resistant organisms. However, there are certainly many examples of the association of increased resistance with increased use of these drugs. Antibiotics have made their way into such areas as animal feed, agriculture, battleship paint, and household cleaning products. Widespread travel has allowed for the transport of resistant clones all over the globe. Bacterial need for “survival of the fittest” has allowed them to evolve mechanisms that resist the action of antibiotics at their site of action.

Pressure on the bacteria to mutate and become “hardy” develops due to (i) inappropriate and excessive use of antibiotics in treating infection, (ii) widespread use of antibiotics in animal husbandry and (iii) use of antimicrobials / antiseptic agents in agriculture and for domestic purposes. Once resistance is established, it cannot be reversed, but proper use of antibiotics minimizes the flourishing of resistant strains. Therefore, measures should be taken to promote appropriate prescribing and minimizing the development and spread of resistant bacteria. Unfortunately, while resistance to older antibiotics is increasing, the development of new generations of antibiotic medicines is stalling. Therefore efficient use of existing antibiotics is needed to ensure the availability in the long term of effective treatment of bacterial infections. Studies from India have uncovered an array of possible reasons for this overuse, similar to other countries, such as lack of microbiology facilities, doctors prescribing antibiotics to any patients with a fever, taking it as a sign of bacterial infection, patient expectations, desire of pharmacists and some doctors to make a profit from drug sales and the public’s lack of knowledge about the appropriate use of antibiotics. Evidence of high and
increasing resistance levels is sparse and generally biased upward because samples are tested only when patients fail to respond to common treatments. Still, the levels of consumption, the cautionary data, and experience elsewhere in the world leave no doubt that antibiotic resistance is rising and will become an ever-greater problem in India, as it has in other countries.

In 1995, Denmark was the first country to establish a systematic and continuous monitoring program of antimicrobial drug consumption. In India there are definite policies / standard treatment guidelines for appropriate use of antimicrobials in specific national health programs e. g. RNTCP (Revised National Tuberculosis Control Programme), NACP (National AIDS Control Programme), NVBDCP (National Vector Borne Disease Control Programme), the same are not available for other diseases of public health importance like enteric fever, diarrhoea / dysentery, pneumonia, etc. The usage of the AMA is not well controlled in Indian hospitals, as well as in community setting. As a part of the control programmes, this research may have been a small contribution towards enhancing the appropriate use of AMA and thereby producing reduction in antimicrobial resistance.

**Antimicrobial Stewardship Programme (ASP)**

Antimicrobial stewardship is a rational, systematic approach to the use of antimicrobial agents in order to achieve optimal outcomes - those of the patient and of the larger population. Through on-going monitoring and, when necessary, a change in antimicrobial prescribing practices successful stewardship programs have improved patient care, decreased antimicrobial use and resistance, and reduced unnecessary pharmacy expenditures, in addition to other direct and indirect hospital costs. These programs focus on ensuring the proper use of antimicrobials to provide the best patient outcomes, lessen the risk of adverse effects, promote cost-effectiveness and reduce or stabilize levels of resistance.

ASP involves a systematic approach to optimizing the use of antimicrobials. It is used by healthcare institutions to reduce inappropriate antimicrobial use, improve patient outcomes and reduce adverse consequences of antimicrobial use including antimicrobial resistance, toxicity and unnecessary costs. Effective hospital ASP programs have been shown to decrease antimicrobial use and improve patient care. ASP is considered a key strategy in local and national programs to prevent the emergence of antimicrobial resistance and decrease preventable healthcare associated infection.

The major role of researcher in antibiotic stewardship program is as follows

Implementation of stewardship policies and initiatives
Identification of patients for stewardship, and streamlining the therapy
Development of antibiogram and antibiotic formulary for the hospital
Promote safe, effective, and cost efficient use of antimicrobials
Surveillance of antimicrobial use
Audit and feedback
Education of health care professionals