



The Drug Lattice in Hospital Practice

Bella Mahajan, MD

Two Microbes meet. "Are you ill?" asks one. "You look terrible".

"Yes", the other answers, "I think I've caught an ampicillin". (Paula Alexandra Martins Lisboa Silva, Portugal).

The battle for survival between man and the microbial world was thought to have been won (by man). That the microbes are fighting back is indicated by the reappearance of forgotten diseases such as tuberculosis in the developed world. Shortly after penicillin became widely available in 1942, Alexander Fleming sounded the first warning of the potential for resistance, 57 years later 80% Staph.aureus isolates in hospitals are penicillin resistant.

The global topic of antibiotic resistance is of grave concern especially when it is encountered in the hospital practice. Although antibiotic resistance is a world wide problem, developing countries face special difficulties because alternative and effective therapeutic options are either unavailable or unaffordable.

This serious public health problem emerges mainly by overuse and misuse of chemotherapeutics all over the world. It has been estimated that 50% of the antibiotic prescriptions in hospitals are given without clear evidence of infection or adequate medical indication.

Resistance to chemotherapeutics exhibited by micro-organism is described as Primary Resistance and Acquired Resistance. Primary resistance is the innate property of the organism unrelated to its prior exposure to the drug. Whereas, resistance is acquired by the organisms by mutations and gene transfers.

Mutations occur in micro-organisms from time to time and usually are because of sub-curative exposure to the drug (as in medical personnel), erratic treatments (poor compliance and self-prescriptions) and prophylactic use of the drug. Prophylactic use of the drug not only increases the incidence of resistance but also leads to higher chances of colonization, thus further accentuating the problem of infection.

The use of large amounts of anti-microbials by Veterinary staff for growth promotion, prophylaxis and better yield of products results in resistant strains being selected and then transferring the resistant factors (gene transfer) to human pathogens. The spread of drug resistant pathogens is one of the most serious threats to the successful treatment of disease.

Several strategies can be employed to discourage the emergence of drug resistance. An Antibiotic policy should form a very important part of Hospital Infection Control Strategy. Starting with an Empirical treatment regimen,

From the Department of Microbiology, Govt. Medical College, Jammu (J&K) India.

Correspondence to : Dr. Bella Mahajan, Asstt. Professor, Department of Microbiology, Govt. Medical College, Jammu (J&K) India.

backed up by a laboratory report should be the order of the day. In this Empirical treatment or the BEST GUESS treatment, the accumulated results of the sensitivity pattern of a pathogen grown from patients in a hospital over a certain period, help in formulating a scheme in treatment till confirmed by the laboratory reports. It also helps in saving time in serious patients by applying the knowledge of the most likely pathogens in a given condition and its usual antibiotic sensitivity.

In addition, the accumulated results over a period can reveal the change in resistance pattern and the particular drug can be withdrawn from the prescribing pen for a period till again the organism shows sensitivity to the drug in vitro—*Rotation of drugs*. An effective antibiotic policy should also include dividing the antibiotics into the first, second and third lines of treatment schedules, spell out the indication of treatment, the appropriate dose and the duration.

Antibiotics should only be administered for an established infection that makes a patient sufficiently ill to require specific treatment; trivial self limiting infections in healthy individuals should not be treated with antibiotics. The drug can be given in a high enough concentration to destroy the susceptible bacteria and the spontaneous

mutants that might arise during treatment. Sometimes a combination of drugs can be administered simultaneously so that each drug will prevent the emergence of resistance to the other. The duration of treatment requires to be prolonged in severe infections and is aimed at eradication of the pathogen, but the majority of acute infections respond to a short course of antibiotics leaving the body defense mechanism to cope with any infection that remains.

Tackling antibiotic resistance requires a concerted effort by both the clinical and veterinary professions. That includes an active link between the diagnostic and research laboratories and the practising clinicians and the veterinarians, a link that has been conspicuously lacking. Clear policy guidelines on the rational use of antibiotic need to be drawn up and enforced.

References

1. Antimicrobial Chemotherapy. In : Prescott, Harley. Klein (Eds.) Microbiology 1st Ed. 1990 ; pp 250-66.
2. Antimicrobial therapy In : Sleight JD, Timbery MC (Eds.) Notes on Medical Bacteriology 2nd Ed. 1986 ; pp 325-42.
3. Nath I. Forward to the past. *Lancet* 1996 ; 348 (Suppl. II) : 11.
4. Heymann DL, Rodies G. Re-emerging pathogens and diseases out of control. *Lancet* 1997 ; 349 (Suppl III) : 8-11.