Letters to the Editor

Antibiotic resistance: The need for restriction policies in hospitals

Sir,

Since the discovery of antimicrobial agents, microorganisms have acquired virtually unlimited capacity to develop resistance to all antimicrobial agents developed by man. The hospital setting provides the ideal environment for the selection and development of antibiotic resistance by most hospital microorganisms.[1] Bacteria can resist antibiotics as a result of chromosomal mutation or inductive expression of a latent chromosomal gene or by exchange of genetic material through transformation (exchange of DNA); transduction (through bacteriophage) or conjugation through transposons and plasmids (extrachromosomal DNA), which is very common among the gram-negative bacilli.[2,3] Four main mechanisms of resistance in bacteria have been described; (1) change in the drug target, (2) production of drug inactivating enzymes, (3) reduction of antibiotic uptake and (4) efflux system by which antibiotics are pumped out of the bacteria.[3] It is now widely accepted that the wide usage of antimicrobial agents not only in hospital settings but also in the outpatient environment (nursing homes, day care centers, animal feeds) has encouraged the selection and emergence of resistant organisms.[5] Similarly, the common practice of prescribing a broad spectrum of antimicrobial agents for common viral infections has increased the selective pressure.[5] Resistance among bacteria has not been confined to the gram-positive organisms but has also occurred widely in recent years among gram-negative pathogens, especially among hospital strains, as well as in acid-fast bacilli.[5] On one hand the resistance of organisms is increasing, even among traditionally penicillin-sensitive organisms such as the pneumococcus, while on the other hand only few new antimicrobial agents are being introduced into the market. Thus the ability to effectively treat and control the spread of multi-resistant organisms is diminishing, compounded by the use of antimicrobials in veterinary medicine and poultry feeds.

Antibiotic control programs. Antibiotic control programs have been suggested as an effective means of reducing inappropriate use of antibiotics in hospitals (for treatment and prophylaxis) in order to prevent and control the emergence and spread of antimicrobial-resistant microorganisms in hospitals and community practice.[2] There are numerous published guidelines from governmental agencies and professional bodies dealing with strategies for antimicrobial restriction in hospital and community practice. All emphasize as an important component of control strategy, the dedicated and consistent application of basic infection control techniques by hospital personnel, particularly the washing of hands before and after patient contact.[4] Restriction of the use of some selected expensive antibiotics has been practiced by many hospitals in order to reduce their antibiotic expenditures.[4] However the effect of these programs on reducing the prevalence of multi-resistant organisms has been minimal due to the logistics and difficulties of implementation.[4,5]

Strategies for implementing antibiotic control and restriction policies. The Society for Healthcare Epidemiology of America (SHEA) and Infectious Diseases Society of America (IDSA) have proposed guidelines for the prevention and control of antimicrobial resistance.[4,5] The main component of the recommendations are: the selective removal, control or restriction of antimicrobial agents or classes, the rotation of antimicrobial agents, and use of a combination of antimicrobial agents, wherever possible. However administrative support at the highest level is important for the success of any control measures. Some of these strategies will be briefly reviewed with the reasons for their recommendation. Written hospital guidelines: Practice guidelines for physicians may be helpful in guiding physicians in the appropriate use of antimicrobials for therapy and prophylaxis, for example, the judicious use of antimicrobials in common respiratory tract infections.[4,5] Education to change the prescribing practices of physicians: Intensive effort is required to change the prescribing practices of physicians and in some cases may be an uphill task. This can be achieved by providing them with surveillance data on antimicrobial resistance and recommendation by peer-leaders and expert opinions so that they can compare these with their own perceptions. Pharmacy and Therapeutics Committee-based restrictive measures: This method is the most widely used in many hospitals not only to reduce antibiotic expenditure but also to contain antibiotic resistance. This is usually carried out by restricting the use of some agents to senior medical personnel, cyclic rotation of antimicrobials within a class, institution of antibiotic order forms and antibiotic stop orders for both therapeutic and prophylactic use. Also computerized review of the prescribing practices of physicians is carried out along with the review of patients' records, which are then fed back to the physicians for their own review. Utilization review with guidelines for rational and appropriate use: A computerized system must be in place to monitor antibiotic use in every department or unit in the hospital. In addition, treatment guidelines must be developed to guide antibiotic prescribers, with a system to monitor compliance and physician feedback. Requirement of consultation with

Infectious Diseases Physician/Clinical Microbiologist for selected antimicrobial agents: While this strategy has been used effectively in some hospitals, the main objection to this has been the reluctance of senior physicians to consult, especially in emergencies at a risk of delays. Microbiology laboratory services: The Microbiology Laboratory must identify the resistance pattern of the common organisms in the hospital, regularly provide the antimicrobial susceptibilities pattern of hospital and community isolates and monitor the resistance rates of the isolates, particularly in key areas, where antibiotics are heavily used, such as the Intensive Care Units (adult and pediatrics) and Oncology Units.

There is now abundant evidence of increasing resistance of both gram-positive and gram-negative pathogens to most of the commonly used antimicrobial agents. If the usefulness of these agents is to be prolonged, concerted effort must be made to restrict their use in one way or the other and limiting their use to specific indications. There is evidence that decreased use of 3rd generation cephalosporins will reduce the development of extended spectrum beta-lactamases and resistance among gram-negative bacilli.[1] Similarly, the restriction of vancomycin and 3rd generation cephalosporins has been found to reduce the development of vancomycin resistant Enterococci. Institutional administration must show leadership and commitment in executing antibiotic control programs not only to reduce the antibiotic expenditure but also to reduce the resistance of the common hospital organisms to beta-lactams, quinolines and the more expensive or toxic agents. The overall aim should be to ensure that all patients receive the most effective, least toxic and cheapest agent for the shortest period of time to effect cure or prevention of infection, with the hope of reducing or preventing the development of antibiotic resistance. The best option for now in curtailing the increasing resistance of microorganisms to antimicrobials is the prudent use of the available agents and their measured restriction.

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