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## Editorial

# Antimicrobial stewardship to optimize antimicrobial use

Antimicrobials can be viewed as double edged sword. Their life saving benefits and disease modifying effects are widely known and appreciated. However, the opposing edge of the sword can be just as sharp, which can cause serious patient harm in the form of adverse drug events and emergence of resistance. While the adverse events can occur during therapy and are more tangible to the practicing clinicians, the emergence of resistance often occurs late and is less obvious. In 1956, a noted microbiologist Ernest Jawetz once wrote, "On the whole, the position of antimicrobial agents in medical therapy is highly satisfactory. The majority of bacterial infections can be cured simply, effectively and cheaply. The mortality and morbidity from bacterial diseases has fallen so low that they are no longer among the important unsolved problems in modern medicine[1]."In the current antimicrobial era some 50 plus years, after these optimistic observations were made, shows an increase in number of infections that are difficult to treat, leading to an increase in morbidity and mortality. Studies have shown a strong relationship between antibiotic use and selection of resistance in humans. Controlled studies have also shown in which patients with prior use of antimicrobials were more likely to be colonized or infected with resistant bacteria. A number of infectious diseases remain as unsolved problems in modern medicine. This has become a challenge to many clinicians calling attention to the abuse of antibiotics and its results[2,3].

Stewarding these precious antibiotics has become a priority to many organizations like CDC, WHO and Infectious disease society of America (IDSA) who stress the need for proactive, programmatic efforts to optimize the use of antimicrobials in health care settings. Optimizing antimicrobial use through appropriate selection, dosing and duration can be used as a strategy to minimize the development of resistance among clinically important pathogens[4] For health care associated infections, drug resistance is an important impediment to treating patients with correct antimicrobials and dosage in a timely fashion. The effects of selecting the wrong antimicrobial and at the incorrect dosage have measurable effects on patient outcomes as highlighted by several recent studies[5].

Antimicrobials are generally presumed to be safe by medical professionals and general public alike. When antibiotics are prescribed in situations such as viral infections, there is no benefit of treatment and patient is exposed to possible adverse drug reactions. Each adverse event results in additional medical care and clearly these preventable adverse drug reactions can contribute significantly to the overall health care costs. Minimizing adverse effects associated with antimicrobials is an important outcome of stewardship programmes.

Keeping these factors in mind, antibiotic stewardship programme was initiated. Stewardship programmes is formed for patient safety and quality assurance. Core members of the team include a physician, a clinical pharmacist, a clinical microbiologist and an informatics specialist. Physician is a necessary team member to champion the programme to medical leadership; the clinical microbiologist can assist with evaluation of local antimicrobial resistance trends. An informatics specialist can improve the programme by tracking antimicrobial usage on an ongoing basis. It is also essential to have support from hospital administration in order to secure resources and necessary authority.

Two strategies have been proposed and emerged as viable options for conducting antimicrobial stewardship: [6]

1. Preauthorization/formulary restriction
2. Prospective audit with feedback.

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Preauthorization is a programme that restricts most antimicrobials through an approval process and may be employed in several fashions. Commonly antibiotic use is restricted to a certain set of criteria that maybe based on patient specific factors: allergy, concomitant disease states or antibiotic history and antibiotic specific factors: maximum length of therapy and combination therapy. For instance, linezolid use maybe limited to patients with Methicillin Resistant *Staphylococcus aureus* (MRSA) pneumonia or vancomycin allergy. Use could also be limited to seven days of therapy unless cultures are positive. These restrictions may either be absolute or applied on an individual patient basis and these restrictions can be incorporated into antibiotic ordering forms. For antimicrobials that require review prior to dispensing, the primary service generally contacts the antimicrobial stewardship team in order to review the specific patient case and at the time of interaction, the antimicrobial is either justified and approved or an alternative recommendation is given. With prospective restrictions, institutions can allow for a first dose to be dispensed when review cannot be completed in a timely manner in order for patients to receive active therapy without delay.

Prospective audit and feedback is a method that allows the antimicrobial stewardship programme to interact directly with prescribers in order to tailor specific antibiotic therapy for each patient. It entails obtaining a daily or every other day list of patients receiving antimicrobials and determining interventions such as pharmacodynamics, dosage adjustment, streamlining the de-escalation & identification of redundant therapy based on culture & susceptibility results, parenteral to oral conversions, drug interaction identification, guideline/protocol compliance & recommendation of more cost effective treatments. It allows for a team based approach to patient care with a focus on individual patient outcome[7]. By targeting these specific populations, time efficiency and interventions maybe maximized. Support software systems integrate data and identify patient populations that have overlapping antibiotic therapy and also address both over and under treatment.

To conclude, overuse of antibiotics has led to the multidrug resistant organisms and extremely drug resistant organisms. Unfortunately, the discovery of new agents has not kept pace with rapidly emerging antimicrobial resistance. Currently, there are no national or regulatory mandates designed for optimal use of antimicrobial therapy. Antibiotic stewardship is designed to improve and measure the appropriate use of antimicrobials by promoting the selection of optimal antimicrobial drug regimen, dosage, route of administration and duration of therapy. It also seeks to achieve optimal clinical outcomes, minimize toxicity and other adverse effects, reduce cost of health care and limit the selection of antimicrobial resistant strains. This can be achieved through the proposed two strategies like preauthorization/ formulary restriction and prospective audit with feedback. Antimicrobial stewardship programmes are essential for the continued viability of antimicrobials as a therapeutic entity.

**References:**


1. Jawetz E. antimicrobial chemotherapy. An rev microbial 1956; 10:85-114.
2. Levy SB, Fitzgerald GB, Macone AB, changes in intestinal flora of farm personnel after introduction of a tetracycline supplemented feed on a farm. N-Engl J Med 1976; 295:583- 88.
3. Dinubile MJ, Friedland J, Chan CY, et al. Bowel colonization with resistant gram negative bacilli after antimicrobial therapy of intra-abdominal infections: observations from two randomized comparative clinical trials of ertapenem therapy. Eur J Clin Microbial infect Dis 2005:24:443-49.
4. Owens Re- Jr, Frazer GL, Stogsdill .P Antimicrobial stewardship programs as a means to optimise antimicrobial use: Insights from society of infectious diseases pharmacists. Pharmacotherapy 2004; 24:896-908.
5. Kollet MH Inadequate antimicrobial treatment: An important determinant & outcome for hospitalized patients Clin infect Dis 2000; 31: 13138.
6. Owens RC Jr, Rice L. Hospital based Strategies for combating Resistance. Clin infect Dis 2006; 42:173-81.
7. La Rocco a Jr, Concurrent antibiotic review programs –A role for infectious disease specialists at small community hospitals. Clin infect Dis 2003;37: 742-43



**Dr. Beena P M**

Professor and Head
Department of Microbiology
Sri Devaraj Urs Academy of Higher Education and Research
Tamaka, Kolar, Karnataka
India