Introduction: Managing Serious Infections

**SUPPLEMENT ARTICLE**

Challenges in the Management of Serious Infections

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The problem of increasing resistance to antimicrobial agents is of concern to the medical community and to public health. Just 60 years after the commercial release of penicillin, increasing rates of antimicrobial resistance among bacteria have reduced the usefulness of an array of antimicrobial agents (figure 1) [1]. Most troublesome is the trend of increasing resistance to newer antibiotics, including those previously regarded as “drugs of last resort.” Antibiotic-resistant strains of *Staphylococcus aureus*, *Enterococcus faecium*, *Streptococcus pneumoniae*, *Klebsiella pneumoniae*, *Enterobacter* species, *Pseudomonas aeruginosa*, *Acinetobacter* species, and, even, *Escherichia coli* are significant causes of infection in both hospitals and the community [1].

A multifaceted approach to the reduction of antimicrobial resistance in hospitals emphasizes infection-control measures, but it often includes guidelines on antimicrobial use (e.g., promotion of the use of narrower-spectrum agents, shorter courses of therapy, and reduction of empirical therapy) and formulary restrictions on the use of certain broad-spectrum agents. Conversely, recent evidence suggests that prompt use of potent broad-spectrum agents may reduce morbidity, mortality, and health care–associated costs of infection. For instance, in a prospective cohort study of 492 infected patients who required admission to an intensive care unit, Ibrahim et al. [2] found that inap-

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**Figure 1.** Antimicrobial-resistant pathogens causing nosocomial infections in intensive care units [1]. Left, Drugs and the organisms resistant to them. Shaded bars denote the percentage of resistant isolates (± SD) during 1998–2002. Bullet points denote the percentage of resistant isolates during 2003 only. Right, No. of resistant isolates during 2003 and increase in the percentage of resistant isolates between 1998–2002 and 2003. 3rd Ceph, third-generation cephalosporin (i.e., ceftiraxone, cefotaxime, or ceftazidime); CoNS, coagulase-negative staphylococci; *E. coli*, *Escherichia coli*; *K. pneumoniae*, *Klebsiella pneumoniae*; *P. aeruginosa*, *Pseudomonas aeruginosa*. "Quinolone" denotes ciprofloxacin or ofloxacin.
Appropriate initial antimicrobial therapy was an independent determinant of in-hospital mortality among patients with bloodstream infections (adjusted OR, 6.86; \( P < .001 \)).

Dilemmas surrounding the selection of antimicrobial agents are a fact of daily life for clinicians, hospital epidemiologists, microbiologists, pharmacologists, and others. Optimizing the outcome for an individual patient by administering empirical broad-spectrum antibiotic therapy appears to conflict with the goal of minimizing the emergence of resistance, but must the goals of optimal treatment of individual patients and judicious use of antimicrobial agents in hospitals be mutually exclusive? We cannot allow them to be, or we are resigned to either providing suboptimal care or facing the possibility of exponentially increasing resistance in the future.

In their presentations, the advisory panelists of the National Foundation for Infectious Diseases reviewed data on resistance trends and their impact on treatment, the pros and cons of the use of broad-spectrum antibiotics, and the relationship between resistance and patient outcomes. This supplement to *Clinical Infectious Diseases* includes the content of presentations made by the panelists and serves as the foundation for analysis, discussion, and future research to potentially reconcile these complex issues.

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**References**
