

Mayo Clinic Proceedings

Introduction to the Symposium on Antimicrobial Therapy

In this issue of *Mayo Clinic Proceedings*, journal readers will discover the first of 15 articles that constitute the new Symposium on Antimicrobial Therapy.¹ The articles will be published sequentially in the monthly issues of the journal, ending in mid-2012. This new symposium is published in part because of readers' requests to once again address antimicrobial drugs, as was done in the *Proceedings'* Symposium on Antimicrobial Agents, published between October 1998 and February 2000. The new 2011-2012 symposium arrives at an important time for infectious disease management worldwide.

The past 2 decades have seen an unprecedented wave of new and old infections thrust into the public's attention. During that time, the number of emerging and reemerging infectious diseases has substantially increased. Emerging infections are infections that appear for the first time in a population, whereas reemerging infections are known infections that reappear after a decline in incidence or extend their geographic impact. Examples include pandemic influenza A (H1N1) virus,² avian influenza virus,³ severe acute respiratory syndrome (SARS),⁴ west Nile virus infection,⁵ and ehrlichiosis.⁶ A feature of current emerging and reemerging infections is that disease first appearing at one geographic location traverses continents and affects millions of people within a very short period. First reported from Mexico in the spring of 2009, pandemic influenza A (H1N1) virus infection was noted in almost all countries in the world by March 2010, resulting in nearly 18,000 deaths.⁷ In only a few months, SARS spread from China to 26 countries and affected 8098 people, causing 774 deaths.⁴

The human immunodeficiency virus (HIV) epidemic continues to affect communities worldwide; at the end of

2009, an estimated 33.3 million people were living with HIV.⁸ However, the most recent global figures indicate that the epidemic is beginning to slow down and perhaps reverse its course. Both HIV incidence and HIV-related deaths have decreased by nearly 20% worldwide. This decline is attributable in part to access to antiretroviral therapy; in 2009, more than 5 million people were receiving antiretroviral therapy.

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Globally, tuberculosis (TB) continues to account for a substantial burden of disease, with 9.4 million (11%-13% HIV-positive) incident cases, 14 million prevalent cases, and 1.7 million deaths in 2009.⁹ The number of cases of multidrug-resistant TB in 2008 was estimated at 440,000. By July 2010, 58 countries and territories had reported at least 1 case of extensively drug-resistant TB. Intensive efforts to reduce the global burden of TB are under way. The cornerstone of these efforts is access to quality diagnosis and treatment. Although little progress has been made in the development of new anti-TB drugs, the scale-up of intensive efforts to improve TB care and control globally has resulted in up to 6 million lives being saved.⁹ The introduction of newer diagnostic modalities, including automated molecular tests that can be used in a resource-limited setting where the burden of TB is the highest, has generated great optimism and excitement.

Many infections have become increasingly difficult to treat because of the emergence of resistance to commonly used antibiotics.¹⁰ Bacteria develop resistance in response to selective pressure exerted by inappropriately used antibiotics. Mutations that confer resistance may be passed on to other bacteria of the same species as well as those of different species and genera. Hospital-acquired antibiotic-resistant infections are estimated to cause 100,000 deaths in the United States, with substantial direct and indirect economic costs to the country.¹¹ These antibiotic-resistant infections are caused by a variety of organisms, including methicillin-resistant *Staphylococcus aureus*, penicillin-

Address correspondence to Zelalem Temesgen, MD, Division of Infectious Diseases, Mayo Clinic, 200 First St SW, Rochester, MN 55905 (temesgen.zelalem@mayo.edu).

resistant pneumococci, vancomycin-resistant enterococci, and resistant gram-negative bacteria (eg, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*), and extended-spectrum β -lactamase-producing bacteria (eg, *Escherichia coli*, *Enterobacter* species).¹² Some of the reasons for this epidemic of antibiotic resistance among bacteria include poor infection control practices, injudicious use of antibiotics in human medicine, and injudicious use of antibiotics in agriculture. The problem is further aggravated by the lack of a robust antibiotic drug-development pipeline.

Advances in cancer chemotherapy and transplantation, with the resultant increase in the number of people with compromised immunity, as well as an increase in the use of invasive procedures and wide-spectrum antibiotics, have contributed to an increase in the incidence of invasive fungal infections. Although some progress has been made in the development of new diagnostic assays and new antifungal drugs, they remain wholly inadequate, and optimal treatment strategies for many of these invasive fungal infections remain to be defined.¹³

The *Mayo Clinic Proceedings*' Editorial Board has selected 15 topics for the Symposium on Antimicrobial Therapy that we think will be of relevance and of practical value to general internists and other clinicians. In the first article, Leekha et al¹ discuss general principles of antimicrobial therapy, dispensing pearls of infectious diseases practice that are difficult to find in any other single publication. Subsequent articles address a variety of infectious disease-related topics, ranging from pharmacology of antimicrobial agents to current concepts in the management of various infections, including bacterial, fungal, viral, mycobacterial, and parasitic infections. Topics addressed in this symposium also include laboratory testing to guide antimicrobial therapy, antibiotic prophylaxis, and current concepts in outpatient antibiotic therapy. All articles are authored by experts in the subject matter. As with previous

symposia published by *Mayo Clinic Proceedings*, once all the articles in this Symposium on Antimicrobial Therapy have appeared in the journal, they will be compiled into a book that we hope will serve as a valuable resource to the practicing clinician.

Zelalem Temesgen, MD
Division of Infectious Diseases
Mayo Clinic
Rochester, MN

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