In memory of Walter E. Stamm, M.D. (1945–2009), highly accomplished clinician, epidemiologist, investigator, collaborator, educator, and mentor. We thank him for his friendship, his leadership, his numerous accomplishments, and his scholarly contributions to the diagnosis, treatment, and control of urinary tract and sexually transmitted infections domestically and globally.
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FOREWORD

Over the past 40 years, emerging infections have become a commonality for the biomedical community. Astute clinicians have recognized new bacterial and viral infections, defined as “emerging” or, in some cases, reappearing (as best illustrated by outbreaks of measles). With recognition of an immune deficiency syndrome in the early 1980s that was subsequently documented to be caused by human immunodeficiency virus (HIV) and resulted in AIDS, society has witnessed one emerging infection after another. From the time of the first clinical identification of AIDS to the isolation and characterization of the responsible organism, a period of approximately 3 years elapsed. Nevertheless, once the virus was isolated, antiviral drugs, such as azidothymidine (zidovudine), entered controlled clinical trials and demonstrated clinical benefit. From identification to licensed therapy, modern science has marked an era during which pathogen identification and the resultant diagnostic and therapeutic inventions have occurred in an increasingly expeditious fashion.

Since the isolation of HIV, the global medical community has witnessed the appearance of severe acute respiratory syndrome (SARS) in 2003, an outbreak of monkeypox in the midwestern United States, and persistent cases of highly pathogenic avian influenza, particularly H5N1, and more recently pandemic H1N1 or 2009 H1N1. Characteristic of all of these diseases has been the rapid identification of the causative pathogen, resulting in either public health or therapeutic interventions or both, which in turn markedly limited the transmission of these agents from person to person.

The most striking example of infection containment has been the control of highly pathogenic avian influenza H5N1 virus in Asia. The careful monitoring of poultry populations and the culling of infected birds have minimized transmission of infection both within the species and to humans. While this currently circulating strain of avian influenza virus is not easily transmitted to or between humans, the elimination of virus from susceptible poultry decreases the probability of a viral mutation that would facilitate its transmission.

Since April 2009, the world has witnessed the rapid transmission of pandemic H1N1 or 2009 H1N1 virus that has resulted in significant illness worldwide. Of striking note, 2009 H1N1 influenza has occurred in populations not normally considered susceptible to infection, namely, young adults, pregnant women, those with neurocognitive dysfunction, the morbidly obese, and immunocompromised hosts. Fortunately, the mortality and morbidity of this infection, while not precisely defined, are less than would be anticipated with a pandemic caused by influenza H5N1. To a great extent, the efforts of public health officials in the early identification of 2009 H1N1 virus and its tracking led to global recommendations for infection control, as well as, ultimately, both vaccine and drug deployment.

With all of these emerging infections, global international travel facilitates transmission of these new pathogens. Global travel traced the 2009 H1N1 pandemic as disease moved around the world. The immigration of children from Africa led to measles outbreaks in the United States. The movement of humans with SARS traced yet another outbreak of infection.
There is no doubt that new and previously undiagnosed infections will occur globally. These infections will require astute clinicians and public health officials to identify new clinical syndromes and, ultimately, develop containment procedures. The ninth volume of the *Emerging Infections* series expands on the prior editions to address newly appearing infections of the 21st century. For example, with the appearance of antimicrobial resistance, gram-negative as well as gram-positive bacterial infections pose an ever-increasing challenge. Parenthetically, the need for new antibiotics cannot be overemphasized and has become a key challenge for the Infectious Diseases Society of America. Similarly, One World—One Health becomes essential in avoiding the problems of resistance and minimizing antibiotic exposure in the food chain.

The following 18 chapters provide a diversity of knowledge that includes diseases associated with bacteria, viruses, and parasites as well as unique health care situations. The authors and editors alike should be congratulated on this excellent contribution to the science of infectious diseases.

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PREFACE

Despite progress in the prevention and control of infectious diseases during the past several decades, the early years of the 21st century provide continued evidence of the persistence and tenacity of infectious disease threats. The interplay of rapid globalization, demographic shifts, ecologic changes, and unprecedented movement of people and goods, while offering increased benefits in many arenas, also yields unexpected risks to health—often with attendant social and economic repercussions. The emergence and rapid global spread of severe acute respiratory syndrome (SARS), the widespread geographic diffusion of West Nile virus since its introduction into the Western Hemisphere and of chikungunya virus from East Africa to islands in the Indian Ocean to India and then to Italy, and the H1N1 influenza pandemic provide dramatic evidence of the continued ability of microbes to emerge, spread, adapt, and challenge the global community.

Since 1995, the program committees of the Interscience Conference on Antimicrobial Agents and Chemotherapy (ICAAC) and the Infectious Diseases Society of America (IDSA) have organized sessions on new and emerging pathogens during ICAAC and the IDSA annual meetings. These sessions are designed to address the spectrum of new and emerging bacteria, viruses, fungi, and parasites of recognized or potential scientific and public health importance, with discussions of strategies for their prevention and control. The chapters in Emerging Infections 9 are derived in part from recent sessions and focus on a range of infections that pose challenges for the clinical, laboratory, research, public health, and animal and plant health communities. Some of these are newly recognized diseases, whereas others are previously known pathogens presenting new challenges. Some are described as domestic threats, whereas others affect populations in other parts of the world. However, as has been clearly demonstrated, infectious agents know no borders: every local threat is potentially a global threat.

Our experiences in responding to the outbreaks of the recent past, many of which are of zoonotic origin, provide important lessons for the future and highlight the importance of the One Health Initiative, which emphasizes the need for closer collaboration between human, animal (livestock and wildlife), and ecosystem health sectors (see chapter 17). Most importantly, a global threat requires a coordinated, interdisciplinary global response. In today’s world, detection and control of infectious diseases call for a wide-ranging and multifaceted international approach that includes strong leadership and sustained political will; a robust network for global disease detection, monitoring, containment, and control; research focused on prediction, early detection, rapid diagnosis, and prevention; and cooperation, collaboration, and seamless communication among nations and leaders. The International Health Regulations, which were promulgated by the World Health Organization in 2005 and became effective on 15 June 2007, provide a global framework for addressing these threats.

Because weak health systems in many areas of the world pose threats to all, investments in health system strengthening, national public health institutions, response capacity, and
workforce development can yield substantial returns for the health and security of the global community. Communication and sharing of experiences and lessons learned among the many disciplines involved are critically important (for example, see chapter 18 on infectious diseases in plants). Finally, in addition to the necessity of managing the immediate and specific risks and vulnerabilities posed by infectious diseases, there is a critical need to tackle the underlying factors that contribute to disease emergence and spread; key among these are poverty, social inequities, food insecurity and malnutrition, and lack of clean water and adequate sanitation.

Future infectious disease challenges are difficult to predict but certainly include continued problems with antimicrobial-resistant infections, foodborne and waterborne diseases, influenza and other respiratory diseases, and vector-borne and zoonotic diseases as well as new threats for immunocompromised populations. Additional links between chronic diseases and infectious agents will likely be discovered, providing new opportunities for disease prevention and treatment. In addition to preparing for naturally occurring infectious disease outbreaks, we will need to continue to strengthen our ability to detect and respond to potential acts of bioterrorism. We hope that this ninth volume in the *Emerging Infections* series will serve as a valuable source of current information for those who are responsible for these and other microbial threats to global health and security.

W. Michael Scheld  
M. Lindsay Grayson  
James M. Hughes
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