

ANTIMICROBIAL STEWARDSHIP



Edited by

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Developments in Emerging and Existing
Infectious Diseases

Antimicrobial Stewardship

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Foreword by Prof. Mario Poljak

This book promises to become a state-of-the-art reference in the field of antimicrobial stewardship, which is defined as a coordinated program promoting the appropriate use of antimicrobial agents in order to improve patient outcomes, reduce antimicrobial resistance, and decrease the spread of infections caused by multidrug-resistant organisms. The book “Antimicrobial Stewardship” was initiated and coordinated by the European Society of Clinical Microbiology and Infectious Diseases (ESCMID) Study Group for Antibiotic Policies (ESGAP) and benefited from the knowledge and long-standing practical experience of a team of more than 40 leading experts from all over the world. ESGAP is organized under the auspices of ESCMID, a non-profit society with more than 8,000 members, which has been committed to improving the diagnosis, treatment, and prevention of infection-related diseases since its foundation in 1983. Antimicrobial resistance has been at the core of ESCMID’s activities—at its study groups, committees, courses, and conferences—over the past years. Its experts have been committed to developing hands-on solutions by supporting and promoting evidence-based research and professional training programs to tackle the problem around the world. ESGAP has been most intensively engaged in advancing scientific knowledge and disseminating professional guidelines in the field of antimicrobial stewardship, one of the key strategies to tackle antimicrobial resistance. As current ESCMID President, I am proud to support ESGAP’s activities, especially the publication of a book, which perfectly exemplifies how ESCMID strives to accomplish its mission. The book is not only designed to provide guidance for young health professionals starting their training in this fascinating area of medicine, it also acts as a reference for experts seeking information on the current state of science and practice. I believe that this publication will help expand existing knowledge and increase awareness and understanding of antimicrobial stewardship. It will contribute to the body of evidence required to successfully reduce the misuse and overuse of antimicrobials and thus control antimicrobial resistance—one of the world’s most pressing public health problems.

Prof. Mario Poljak, MD, PhD
ESCMID President

Introduction by Murat Akova

“The times they are a-changin’”: nothing describes better than this lyric song by the latest Nobel laureate, Bob Dylan, the current situation of antimicrobial resistance has become one of the worst nightmares of humanity. Antibiotics have saved lives and contributed significantly to the duration of life expectancy. We have come a long way from the discovery of penicillin to modern-day antibiotics against all of which microbes have been able to find ways to resist. So, the era of one of the most important successful discoveries in human medicine has come to an end. Well, there is a great concern about that, but not a definite answer beyond some pessimistic predictions. What we know best, in simple terms, is that, if one uses antibiotics prudently, then he/she may expect less resistance to develop.

A more complex strategy is offered by “antimicrobial stewardship.” For that, you would need to know how to implement usage of new and old antibiotics into the current practice, better and faster diagnostics, coupled them with infection control practices, other preventive measures that may well include vaccination strategies, and above all a comprehensive educational program for both students and healthcare professionals. Although huge amount of data including several guidelines has been available in the literature, a textbook of comprehensive guidance about antimicrobial stewardship was lacking, so far. Thus, this new book by ESCMID Study Group for Antibiotic Policies (ESGAP) is timely and expected to fill in this gap. As the past president of ESCMID, I wholeheartedly congratulate the editors, Profs. Beović, Can, Ergönül, and Pulcini for their immeasurable efforts. I have no doubts that this textbook will be of great help for those who would like to be updated on antimicrobial stewardship.

Murat Akova

Past President and Communications Officer, ESCMID

Introduction by Jesús Rodríguez-Baño

Antimicrobial resistance is one of the more important and complex challenges of medicine at the present time. Among the actions to be undertaken to fight against resistance, one of the most urgent is improving the use of antibiotics. This is far from easy. The usual figures show that one out of every three prescriptions of antibiotics is inappropriate, which is probably related to intrinsic complexities of antibiotic use and also to the fact that antibiotics can be prescribed by all physicians in very different circumstances. Well-designed antibiotic stewardship programs carried out by specialized multidisciplinary teams are needed to significantly improve the use of antibiotics. However, their implementation is frequently limited by a lack of resources and institutional support and also by a scarcity of experts in the field. Antibiotic stewardship has been frequently neglected in many training programs for infectious diseases, microbiology, or hospital pharmacy.

Despite the body of knowledge related to antibiotic stewardship rapidly increasing, the textbooks compiling it are still rare. This is therefore the perfect time for a book that is comprehensive enough and orientated to the practice of professionals working in antibiotic teams. At the European Society of Clinical Microbiology and Infectious Diseases (ESCMID), we are proud of the leadership and work of the Editors and the whole European Study Group for Antibiotic Policies (ESGAP) for driving this initiative.

Jesús Rodríguez-Baño
President-Elect, ESCMID

Introduction by Evelina Tacconelli

The rate of infections caused by antimicrobial-resistant microorganisms is seen increasingly by the public and healthcare inspection organizations as an indicator of quality of healthcare and patient safety and a major threat to public health. For these reasons, the European Society of Clinical Microbiology and Infectious Diseases (ESCMID) and ESCMID Study Group for Antibiotic Policy (ESGAP) together with other major international stakeholders have been working restless, since many years, to develop new tools improving antibiotic usage and understanding major limitations and gaps in prescribing. Notably, ESGAP's activity spans a wide range of antibiotic research fields and is internationally recognized for setting the agenda in policy and stewardship. This extensive experience and international collaborations provided ESGAP with a unique opportunity to commit on this book scientists and doctors every day involved in implementation of antibiotic stewardship in hospitals and communities.

The book represents a practical aid for hospitals and healthcare institutions, in putting in place locally tailored stewardship measures taking also in consideration costs and adverse events. Step by step, the authors not only deliver the information you need to plan and implement in your own antimicrobial stewardship program but also specify quality and quantity metrics of antibiotic usage as well instructions on how to organize educational events for healthcare workers. In accordance with the purpose of this project, the book provides a valuable framework for the important collegial relationship between different specialists that must be involved in any stewardship action (infectious disease physicians, microbiologists, pharmacists, surveillance scientists, and infection prevention and control nurses) to have success. What I personally like more in this book is the evidence-based approach applied to provide suggestions and recommendations to be used in "real life." Of even more importance, the authors did not opt for a generic approach but instead clearly focused on different components of the stewardship as location (i.e., long-term care facilities or outpatient settings) or case-mix of patients (i.e., ICU or hematological patients).

I believe that this book represents a valuable resource and will improve your patients' quality of care. It will definitively help in intensifying the global efforts that, together with enhanced infection control and revitalized antibiotic R&D, are needed to reduce the burden of antibiotic resistance.

Evelina Tacconelli
ESCMID Education Officer

Preface

Antimicrobial resistance has developed like any other ecological catastrophe: human enthusiasm in controlling nature was followed by a rebound of uncountable numbers of microorganisms that have been adapting to life on earth for much longer than *Homo sapiens*. As mankind is intensively looking for new sources of sustainable and green energy, the efforts are parallel with the efforts for more responsible use of energy for transport, industry, heating, and other activities. We do need new antimicrobial drugs, but the lesson we have learned observing the rise of antimicrobial resistance taught us that prudent and responsible use of antimicrobials is necessary in all cases. We have also learned that defining and promoting prudent use based on drug pharmacodynamics and pharmacokinetics and development of practice guidelines is not enough. Antimicrobial stewardship has emerged as a set of interventions that brings the principles of prudent use to every healthcare professional and, most importantly, to every patient. The book provides a snapshot about where we are in antimicrobial stewardship and the motivation to challenge such a big public health problem.

This book summarizes the current ‘state of the art’ on antimicrobial stewardship in a short and practical way in order for it to be a ‘hands-on’ tool for students, trainees, physicians, microbiologists, pharmacists, nurses, or anyone involved in antimicrobial stewardship. The first part gives us an insight into the scientific background of antimicrobial stewardship and describes the current global situation regarding antimicrobial use and resistance. The antimicrobial strategies described in the second part are followed by a part on antimicrobial stewardship in special situations. In the last part, experts from around the globe describe their efforts, success stories, and problems related to the local situations in different parts of the world, together with the most important international governmental and nongovernmental initiatives. Unmet needs and challenges in research on antimicrobial stewardship are addressed in the last chapter.

Most of the book’s authors are members of the European Society for Clinical Microbiology and Infectious Diseases (ESCMID) Study Group for Antibiotic Policies (ESGAP), which has almost two decades of experience in educational courses on antimicrobial stewardship. As ESGAP members and as healthcare professionals working in antimicrobial stewardship, we strongly believe that the book will find its place in the libraries and on the desks of

antimicrobial stewardship teams. We hope that you will find it useful and that you will take as much pleasure in reading it as we did in writing it. We hope the book will give you the necessary background for motivation to change.

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