



# Short-course antibiotic therapy: The next frontier in antimicrobial stewardship

Donald Sheppard<sup>1,2,3,4\*</sup>

## Abstract

Ensuring appropriate use of antibiotics is critical to preserving their effectiveness through limiting the development and spread of antimicrobial resistance. Evidence is accumulating that shorter courses of antibiotics are as effective as traditional longer regimens for many common infections and can reduce the risk of adverse events. Despite the availability of evidence and guidelines supporting short-course antibiotic therapy for these conditions, prolonged use of antibiotics remains common. This article will review the origins and evolution of our approach regarding antimicrobial prescription duration, the evidence for the use of short-course therapy for selected infections, barriers to the uptake of this practice and potential approaches that can be taken to reduce inappropriately long antibiotic use.

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**Keywords:** antibiotic therapy; duration; antimicrobial; stewardship; short-course antibiotherapy; antimicrobial resistance

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## Introduction

Antibiotics have transformed modern medicine, but their continued viability is threatened by rising rates of antimicrobial resistance (AMR). Limiting inappropriate use of antibiotics is an important approach to reducing the antibiotic pressure that can accelerate the evolution and spread of AMR. Evidence is emerging that for many common infections, short-course antibiotic therapy (1–7 days) can be equally as effective as traditional, longer courses of treatment (1,2). Expanded use of short-course antibiotic therapy has the potential to reduce healthcare costs, reduce risks of adverse drug events and help curb AMR. This editorial will review the history of the development of antibiotic treatment duration, highlight key evidence for appropriate reductions in antibiotic therapy duration, and outline future directions in antimicrobial stewardship and knowledge generation that could support the reduction of unnecessary prolonged antibiotic therapy.

## Origins of the current approach to antibiotic therapy duration

The modern antibiotic era began with the introduction of penicillin in 1940, and with it, the dilemma of determining the appropriate duration of therapy for infectious diseases. Albert Alexander, a British constable, was the first human to receive penicillin therapy for extensive streptococcal and staphylococcal facial abscesses following an injury sustained in a bombing raid (3). Constable Alexander received five days of penicillin therapy with an excellent short-term response; however, despite attempt to re-purify penicillin from his urine, the supply of purified penicillin was exhausted and therapy was discontinued as a result. Sadly, within several weeks, his infection returned and he eventually succumbed to his disease. While this first use of penicillin demonstrated the power of antibiotics to treat bacterial infections, it also presaged the current challenge of determining antibiotic therapy duration, highlighting both the question of “how much is enough”, and the legitimate fear that inadequate therapy may result in relapse or poorer outcomes.

# Frontiers In Antimicrobial Chemotherapy

**Muhammad Zaffar Hashmi**



## **Frontiers In Antimicrobial Chemotherapy:**

**Frontiers in Antimicrobial Chemotherapy** Robert C. Moellering,1993-01-01      Global Surgery: The Next Frontier in Global Public Health Jaymie Claire Henry,Emmanuel A. Ameh,Andrew Hill,Cheng-Har Yip,Lye-Yeng Wong,2023-10-30

Antimicrobial Stewardship ,2024-06-26 Over the past many years new and novel antibiotics have been developed against resistant bacterial species but their increased clinical usage has led to reduced bacterial susceptibility and increased bacterial resistance to these novel agents When a new antibiotic is developed bacterial species initially show susceptibility to the agent but with the passage of time as the use of the antibiotic increases the bacterial species acquire resistance against the drug or even the drug class This book provides a comprehensive overview of antimicrobial stewardship programs and the obstacles to implementing and maintaining such programs Antimicrobial stewardship is an important part of a multifaceted approach to preventing the emergence of antibiotic resistance in various microbial species The book highlights the basic and initial steps necessary for initiating an antimicrobial stewardship program as well as explores the different strategies of antimicrobial stewardship      *Handbook on Antimicrobial Resistance* Mukteswar Prasad Mothadaka,Murugadas

Vaiyapuri,Madhusudana Rao Badireddy,Chandragiri Nagarajrao Ravishankar,Rajesh Bhatia,Joykrushna Jena,2023-07-18 Antimicrobial resistance AMR is a global public health threat The menace of antimicrobial resistance is present across health animal agriculture food and environment sectors It therefore requires an inter disciplinary combat approach the one health approach envisaged by the FAO UNEP WHO WOAQ Quadripartite Food and Agriculture Organization of the United Nations FAO the UN Environment Programme UNEP the World Health Organization WHO and the World Organisation for Animal Health WOAH This comprehensive reference book provides a thorough understanding of antimicrobial resistance across different sectors It presents deep insights and gives a global perspective on antimicrobial resistance for policymakers The book offers essential and up to date information that enables researchers from multiple fields to design research on antimicrobial resistance The book discusses molecular mechanisms and antibiotic resistance genes of significant antimicrobial resistant pathogens regulatory frameworks available worldwide and mitigation strategies across the sectors including probiotics prebiotics antimicrobial peptides bacteriophages phytochemical compounds immunostimulants vaccines bacteriocins etc It compiles essays from leading experts in the field of antimicrobial resistance research The book is meant for students and researchers in microbiology medical microbiology and public health It is also helpful for clinicians and policymakers      Antibiotics and Antimicrobial Resistance Genes in the Environment Muhammad Zaffar Hashmi,2019-11-22

Antibiotics and Antimicrobial Resistance Genes AMR in the Environment summarizes and updates information on antibiotic producing organisms and their resistance and entry routes in soil air water and sediment As antibiotic use continues to rise in healthcare their fate bioavailability and biomonitoring and impacts on environment and public health are becoming increasingly important The book addresses the impact of antibiotics and AMR to environment and public health and risk

assessment Moreover it focused on the metagenomics and molecular techniques for the detection of antibiotics and antimicrobial genes Lastly it introduces management strategies such as treatment technologies for managing antibiotics and AMR ARGs impacted environment and bioremediation approaches Summarizes and updates information on antibiotics and AMR ARGs production and its fate and transport in the environment Includes phytoremediation and bioremediation technologies for environmental management Provides analysis of risk assessment of antibiotic resistance genes to help understand the environmental and socioeconomic impacts of antibiotics and AMR ARGs

**Antibiotic Use in Animals** Sara Savic,2018-01-31 The book Antibiotic Use in Animals has everything said in the title but it is not only meant for the veterinarians It is intended to be used also by the medical doctors animal owners consumers of food of animal origin etc The book has five sections Introduction Use of Antibiotics in Animals Antibiotics and Nutrition Probiotics and Antimicrobial Resistance Each of the sections discusses about one side of the antibiotic usage Each group of authors has dedicated their work to one of the topics with key roles of antibiotics in the health of animals and public health in general This book is a work of scientists and researchers in the topic of antibiotic use and with this book we hope to open new questions and deepen the research on roles of antibiotics in everyday life

*Infection Control in Small Animal Clinical Practice* Fergus Allerton,Kelly L. Bowlt Blacklock,2023-05-03 Infection prevention and control is vital within a veterinary setting but can find itself an automated part of care and therefore vulnerable to time constraints forgetfulness and routine This book is written by experts in the field and uses evidence based findings to elevate infection prevention to a well understood dynamic concept relevant to both veterinary practitioners and nurses in practice Beginning with an introduction to the importance of infection control dedicated chapters in this book then consider key principles such as hand hygiene personal protective equipment infection control for the surgical and hospitalised patient and care for immunosuppressed individuals Importantly this book presents an up to date exploration of responsible antibiotic use in the context of rising resistance

**Probiotics against Antimicrobial Resistance** Mohmmad Younus Wani,Irfan Ahmad Rather,Aijaz Ahmad,2025-08-28 This book provides an overview of antimicrobial resistance AMR including its underlying causes mechanisms global ramifications and the potential of probiotics as a viable approach in combating AMR It explores the potential of probiotics to counteract resistance by competing with pathogenic bacteria modulating the immune system and producing antimicrobial compounds It also examines the applications of probiotics in biofilm related infections respiratory health urinary tract infections and oral health Additionally the book covers important considerations such as safety regulatory frameworks challenges and risks associated with probiotics in AMR It provides insights into the development of novel approaches including engineering probiotics for enhanced antimicrobial activity and exploring synergistic approaches by combining probiotics with traditional antibiotics Toward the end the book explores future directions and potential applications of probiotics including their role in neonatal care and personalized probiotic interventions This book is primarily intended for healthcare professionals researchers and

individuals working in the fields of microbiology infectious diseases and public health Key features 1 Discusses the mechanisms impacts and global concerns associated with antimicrobial resistance 2 Highlights the various methods utilized by probiotics to effectively counter resistant pathogens 3 Explores the potential of probiotics in enhancing human health and combating antimicrobial resistance 4 Presents novel approaches such as engineering probiotics for enhanced antimicrobial activity 5 Focuses on personalized probiotics and their role in bridging the gap between antimicrobial resistance and nutritional precision 6 Examines safety considerations and regulatory frameworks for probiotics in the context of antimicrobial resistance

Salmonella Maria Teresa Mascellino, 2018-07-18 This book deals with the microorganism *Salmonella* This bacterium is well known for a long time being involved in systemic typhus and paratyphus infections and nonsystemic diseases such as food poisoning Major and minor *Salmonellae* are widespread worldwide in developing countries and industrialized areas respectively In 2015 about 3576 *Salmonella* strains have been isolated from human infections in Italy *S typhimurium* and *S enteritidis* are the most prevalent serotypes and represent 80% of cases of infections over the last 10 years The antibiotic susceptibility decrease over the last decades is a big issue in the management of this bacterium once considered easy to treat The use of antibiotic combinations in order to overcome the microorganism resistance should be hoped

**Insights Into Drug Resistance in *Staphylococcus aureus***, 2021-12-08 *Staphylococcus aureus* is a coccus gram positive non spore forming and non motile bacterium Its commensal and opportunistic capabilities make it able to colonize different sites of animals and humans Resistance to antibiotics has resulted in development of new strains and new types within strains Types of methicillin resistant *S aureus* MRSA include hospital acquired MRSA HA MRSA community acquired MRSA CA MRSA and livestock acquired MRSA LA MRSA There are also new strains like vancomycin resistant *S aureus* VRSA and vancomycin intermediate *S aureus* VISA Expansion in resistance is expected to give rise to newer strains resistant to antibiotics such as macrolide *erm* gene tetracycline *tet* genes mupirocin *mupR* and fusidic acid *fusD* Alternative approaches like nanoparticles bacteriophages phytochemicals and more are required to tackle this pathogen This book contains information on epidemiology resistance mechanisms and alternative ways to curtail *S aureus* infection as well as future research opportunities

*Bacterial Enzymes as Targets for Drug Discovery* Punit Kaur, Priyanka Sharma, 2024-11-27 *Bacterial Enzymes as Targets for Drug Discovery* Meeting the Challenges of Antibiotic Resistance addresses the gap between medical microbiology structural biology and genomic science in the development of new antibacterial drug development This book consolidates detailed profiling of bacterial target enzyme families for the drug discovery process and methodologies for use and validation of the potential drug targets The contents cover the foundations of the antibiotic drug discovery process and focus on bacterial enzymes as drug targets building across these disciplines to provide a comprehensive resource in bacterial structural biology and genomics This is the ideal reference for antibiotic drug discovery researchers in the pharma industry and academia Biochemists microbiologists and medicinal chemists will also

benefit from this book's content. Provides strategies and approaches to drug design aiming at overcoming antibiotic resistance. Includes most common roadblocks in identifying novel drug targets and presents the strategies to overcome. Provides potential methods to identify new drug targets by genome mining. [The Global Antimicrobial Resistance Epidemic](#)

Guillermo Téllez-Isaías, 2022-09-14 Antibiotic resistance is a global health crisis. Misuse of antibiotics in humans, animals, food, and agriculture has compounded the situation. Bacterial infections have returned decades after medicines were first used. This book discusses antibiotic resistance and some of the organisms that pose immediate serious and alarming dangers. It highlights the need for a broader, more comprehensive approach to fighting bacterial infections, which may involve non-compound techniques other than standard antibacterial drugs that target bacteria or the host, such as antibodies, probiotics, phytobiotics, and vaccinations. **Routledge Handbook of Climate Change and Health System Sustainability** Jeffrey

Braithwaite, Yvonne Zurynski, Carolyn K-lynn Smith, 2024-05-20 The Routledge Handbook on Climate Change and Health System Sustainability takes the reader on a journey to understand the interconnectedness of human health, climate change, and healthcare systems. The book begins by exploring how climate change is affecting human health through the increasing frequency of natural disasters such as bush fires, droughts, and heatwaves, and the emergence of new infectious diseases such as the SARS-CoV2 virus, all of which drive up demand for health services that are already heavily burdened by increasing rates of chronic diseases and ageing populations. Chapters then turn to the contribution of the healthcare system itself to climate change, explaining how current clinical practices, including wasteful care of low value, create an unsustainable carbon footprint and threaten the very viability of healthcare systems. Throughout the volume, descriptions of practical solutions and implemented case studies are used to illustrate the feasibility of taking action in the real world of the healthcare delivery ecosystem. Bringing together a mix of forward-thinking environmental and health researchers, policymakers, leaders, managers, clinicians, patients, and health industry leaders to clarify the current state and future of sustainable healthcare systems, this book will be of interest to researchers and policymakers of climate and health systems. **Antimicrobial Peptides**

Guangshun Wang, 2017-09-01 Antimicrobial peptides (AMPs) have attracted extensive research attention worldwide. Harnessing and creating AMPs synthetically has the potential to help overcome increasing antibiotic resistance in many pathogens. This new edition lays the foundations for studying AMPs, including a discovery timeline, terminology, nomenclature, and classifications. It covers current advances in AMP research and examines state-of-the-art technologies such as bioinformatics, combinatorial libraries, high-throughput screening, database-guided identification, genomics, and proteomics-based prediction and structure-based design of AMPs. Thoroughly updated and revised, this second edition contains new content covering defensins, cathelicidins, anti-MRSA, antifungal, antiviral, anticancer, and antibiofilm strategies, combined treatments, adjuvants in vaccines, advances in AMP technologies that cover surface coating to prevent biofilm formation, nanofiber encapsulation technologies for delivery and sustained release, and understanding innate immunity and the basis for

immune boosting to overcome obstacles in developing AMPs into therapeutic agents Written and reviewed by a group of established investigators in the field Antimicrobial Peptides is a valuable resource for postgraduate students researchers educators and medical and industrial personnel Bacterial Infectious Diseases Annual Volume 2023 ,2023-12-20 Despite the development of numerous antimicrobial agents the successful eradication of bacterial infections remains a challenge and bacteria continue to pose a major public health threat It is estimated that due to the increasing prevalence of antibiotic resistance infectious diseases will become a leading cause of death by 2050 The current annual focus is on the challenges and advantages in the prevention and diagnosis of infections caused by ESKAPE pathogens The book also includes a dedicated chapter on the diagnosis of tuberculosis one of the leading infectious causes of death worldwide Additionally readers will find chapters describing achievements in the diagnosis and detection of common gastrointestinal tract pathogens *Listeria monocytogenes* and *Campylobacter jejuni* authored by experts in their fields **Preclinical Evaluation of Antimicrobial Nanodrugs** Juan Bueno,2020-05-08 Translational medicine addresses the gap between research and the clinical application of new discoveries To efficiently deliver new drugs to care centers a preclinical evaluation both in vitro and in vivo is required to ensure that the most active and least toxic compounds are selected as well as to predict clinical outcome Antimicrobial nanomedicines have been shown to have higher specificity in their therapeutic targets and the ability to serve as adjuvants increasing the effectiveness of pre existing immune compounds The design and development of new standardized protocols for evaluating antimicrobial nanomedicines is needed for both the industry and clinical laboratory These protocols must aim to evaluate laboratory activity and present models of pharmacokinetic pharmacodynamic and toxicokinetic behavior that predict absorption and distribution Likewise these protocols must follow a theranostics approach be able to detect promising formulations diagnose the infectious disease and determine the correct treatment to implement a personalized therapeutic behavior Given the possibilities that nanotechnology offers not updating to new screening platforms is inadequate as it prevents the correct application of discoveries increasing the effect of the valley of death between innovations and their use This book is structured to discuss the fundamentals taken into account for the design of robust reproducible and automatable evaluation platforms These vital platforms should enable the discovery of new medicines with which to face antimicrobial resistance RAM one of the great problems of our time *Advances in Applied Microbiology* ,2015-01-20 A compilation of up to date reviews of topics in biotechnology and medical field Contributions from leading authorities Informs and updates on all the latest developments in the field **Applied and Environmental Microbiology** ,1994 Trends in Helicobacter pylori Infection Bruna Maria Roesler,2014-04-03 *Helicobacter pylori* is a universally distributed bacterium which affects more than half of the world population The infection is associated with the development of various diseases of the upper gastrointestinal tract besides extradigestive diseases This book is a comprehensive overview of contributors on H pylori infection in several areas Its chapters were divided into sections concerning general aspects of H

pylori infection immunopathology and genetic diversity questions regarding possible routes of bacterium transmission the importance of the strains characteristics in the development of gastric cancer and the possibilities of prevention H pylori infection in children the possible association between its infection and extradigestive diseases and the principal therapeutic regimens of bacterium eradication considering the antimicrobial resistance      **E. Coli Infections** Luis Rodrigo, 2020-09-30 Gram negative Escherichia coli E coli bacteria are the most numerous commensal aerobic germs located in the human colon Diarrhea caused by E coli pathogenic strains is a major cause of death in developing countries especially the sub Saharan and South Asian areas Some strains cause diarrhea and all of them may produce an infectious disease This book includes ten chapters covering the main aspects of infections related to E coli their pathogenic mechanisms treatments and resistance to diverse antibiotics



## The Enigmatic Realm of **Frontiers In Antimicrobial Chemotherapy**: Unleashing the Language is Inner Magic

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