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Fifth Decade of Publication

Pediatric DRUG Directory



10TH EDITION

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Foreword
Upendra Kinjawadekar

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Chapter

Rational Drug Therapy

INTRODUCTION

The phrase, "rational drug therapy", denotes drug treatment on sensible and sound reasoning. In other words, it denotes right drug, right child, right reason, right dose, right route, right time and right documentation. Some countries have a monitoring approach, *Rational Drug Therapy Program (RDTP)* that is dedicated to rational, safe, cost-effective, and patient outcome-oriented drug treatment. Understandably, irrationality in drug therapy may result from:

- Use of an unnecessary drug
- Wrong choice of drug
- Inappropriate dosage and route of administration
- Poor prescribing.

Factors contributing to irrational drug therapy include:

- Inappropriate model prescriber
- Undue pressures
- Unfair practices
- Personal ambitions and life goals
- Myths.

it comes to the abuse of antimicrobial agents leading to increasing antimicrobial resistance (AMR) of varying degrees and magnitudes. This trend was particularly observed during the years 2020–2022 [the era of peak waves of coronavirus

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disease 2019 (COVID-19)] when antibiotic misuse reached new heights. Currently, AMR ranks among the 10 top global public health problems. The seriousness of the problem compelled the World Health Organization (WHO) to declare 7th, April 2011 as the World Health Day with the theme "Antimicrobial Resistance: No Action Today, No Cure Tomorrow". On ongoing basis, the WHO observes worldwide the *World Antimicrobial Awareness Week* in November every year. The coordinated approach by all nations of the world is paramount to fight the AMR, especially that against multidrug resistant bacterial pathogens (superbugs). Antimicrobial stewardship and development of newer antibiotics are also important to fight the AMR and its morbid impacts on health and economy.

GENERAL

The following considerations are important in regard to rational antibiotic therapy:

- Variation in etiologic pathogens among age groups
- Microbiologic diagnosis (isolation of the pathogen from sterile body site) with sensitivity testing which should logically determine the choice of an antimicrobial agent. In its absence, clinical diagnosis with projection of the most likely pathogen(s) may determine the choice of antibiotic(s) which is, at beat, empirical
- Age-appropriate antibiotic dose, dosing frequency and route of administration
- Toxicity of the drug(s) likely to be effective
- Immunologic status since immunocompromised status may render the child more susceptible to microbes that are considered benign in immunocompetent children

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- Likelihood of central nervous system (CNS) involvement in certain infections (e.g., *Haemophilus influenzae* type B, *Pneumococcus* and *Meningococcus*) pointing to more aggressive antimicrobial therapy
- Presence of a foreign body enhances the risk of bacterial infection
- Pattern of antimicrobial resistance in the community occurring through several modifications of the bacterial genome such as:
  - Enzyme inactivation of the antibiotic
  - Reduced cell membrane permeability to intracellularly active antibiotics
  - Efflux of antibiotic out of the bacteria
  - Protection or alteration of the antibiotic target site
  - Excessive production of the target site
  - Passing the antimicrobial site of action.

  As a reflection of the route of administration, drug absorp-

and drug–drug interactions (altering enzymatic inactivation of an antibiotic or causing antimicrobial synergism or antagonism), serum levels of antibiotic. Target serum levels appropriate for different antibiotics are available.

SPECIAL SITUATIONS

Neonates

Empirical antimicrobial selection should take into consideration the fact that likely pathogens are typically acquired around the time of delivery and, therefore, from the maternal birth passage, e.g., *Escherichia coli,* Group B *Streptococcus (GBS), and Listeria monocytogenes*. Since these pathogens may cause meningitis, therapy must include antibiotic(s)

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that crosses (cross) the blood–brain barrier (BBB) and, thereby, covers CNS infection in case meningitis remains on the card.

Infants and Children

The pathogens relevant in infants and toddlers include *Haemophilus influenzae type B (Hib), Streptococcus pneumoniae, Meningococcus, and Staphylococcus aureus.*

Among older children, additional pathogens include *Moraxella catarrhalis*, nontypeable strains of *H. influenzae, Mycoplasma pneumoniae,* Group A *Streptococcus (GAS), Enterococcus,* and *Salmonella*.

Immunocompromised Subjects

In immunocompromised states or in situations of prolonged hospital stay, such pathogens as *Pseudomonas aeruginosa, Klebsiella pneumoniae, Enterobacter (E. faecalis* and *E. faecium), Serratia, and E. coli* assume particular importance as opportunistic pathogens. Treatment of these infections becomes extremely difficult on account of antimicrobial resistance, including resistance to vancomycin.

Medical Devices-associated Infections

Indwelling medical devices (venous catheter, ventriculoperitoneal shunt, and stent) predispose to infection with *S. aureus* and *coagulase-negative Staphylococcus*. Management warrants not only appropriate antibiotic therapy but also removal/replacement of the offending (colonized) prosthetic gadget.

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Pediatric Drug Directory

The 10th edition of the *Pediatric Drug Directory* presents further revised, updated, and enlarged contents in keeping with the recent and ongoing advances and concepts, thereby boosting its usefulness. The reader-friendly book continues to be addressed to medical students (both undergraduates and postgraduates), residents, upcoming pediatric faculty, practicing pediatricians, family physicians, and general practitioners with pediatric clientage.

Outstanding Features

- Reader-friendly with simple and straightforward presentation and easy to carry in the pocket of the doctor's white apron
- Comprehensive, up-to-date, and state-of-art handbook on pediatric drug therapy, including neonatal and pediatric emergencies and immunization
- Empowered with the fundamentals of pediatric drug therapy in the very first section before embarking on salient details of various drugs that are listed in an alphabetic order in appropriate groups
- Emphasis on rational and safe drug therapy
- Large number of appendices that enhance the usefulness of the book
- Detailed table of contents and index that facilitate easy and quick retrieval of the requisite information.

Suraj Gupte hailing from the alumni of the Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh, occupies a pride of place as an outstanding pediatric educationist, researcher, innovator, and author of national and international standing. Besides receiving several prestigious awards and visiting fellowships/professorships, he has represented India in a multitude of international conferences, workshops, symposia, etc. globally as a Guest Speaker, Chairperson, Rapporteur, etc. Over and above the international series, Recent Advances in Pediatrics, he has authored/edited scores of world class child health books of high esteem. He has published/presented over 300 papers in national and international periodicals/forums. He has been on several academic task forces, and editorial boards of reputed pediatric periodicals as an Adviser, Editor, Member, and Peer-Reviewer. In the Indian Academy of Pediatrics (IAP) and its subspecialty chapters, he has held several important positions at national level. He was Adviser at the 5th International Congress of Tropical Pediatrics and National Executive member at the 8th Asian Congress of Pediatrics. At the International Nestle Nutrition Workshop held in Taiwan in 1989, he was the solo official representative of the IAP. In addition to Faculty Selection Expert for State and Union Public Service Commissions and also All India Institute of Medical Sciences, Dr Suraj Gupte is an Examiner in several reputed universities and apex institutions, including AIIMS (New Delhi), PGIMER (Chandigarh), SGPGIMS (Lucknow), SKIMS (Srinagar), IGNOU (New Delhi), and National Board of Examination. He figures in most of the national and international Who's Who volumes, including the *Marquis Who's Who,* a pre-eminent database of outstanding personalities and icons.

Novy Gupte is an Associate Professor, Department of Pharmacology, Army College of Medical Sciences, New Delhi, India, comes from the alumni of the Government Medical College, Jammu, Jammu and Kashmir, India. Besides presentations at conferences, she has published several articles in national and international journals and books. In addition to the *Pediatric Drug Directory,* she is a Co-author of *Perspectives in Influenza* and *Pediatric Infectious Diseases*. Major areas of her interests include pharmacotherapy, pharmacovigilance, and infectious diseases. Over and above brilliance in academics, she has excelled in extra-curriculars such as painting, swimming, and roller skating and has won a bagful of medals, trophies, and mementos.

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