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GENERAL ARTICLE

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* NOTE: Many trade names of the vaccines are included in the text for the sake of clarity.

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ANTIMICROBIALS - I

OVERVIEW OF ANTIBIOTICS

***Dhanya Dharmapalan**

Abstract: *Antibiotics are used for treating bacterial infections. They are classified based on origin (synthetic or natural), mechanism of action, type of action (bacteriostatic or bactericidal) and spectrum (narrow or broad). Majority of antibiotics used in clinical practice such as cephalosporins, carbapenems, fluoroquinolones have broad spectrum of activity. Broad spectrum antibiotics have disadvantages of alteration of host microbiome and selection of resistance. To overcome the problem of antibiotic resistance, antibiotic surveillance and antibiotic stewardship measures were recognized as a policy by the World health Organization, as a component of which a new classification of antibiotics called as Access, Watch, Reserve (AWaRe) was introduced. This classification helps in guiding the selection of antibiotic and prevention of their abuse and overuse.*

Keywords: *Antibiotics, Spectrum, Access Watch Reserve Classification.*

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Points to Remember

- ***First generation cephalosporins have narrow spectrum and possess strong activity against Gram positive bacteria.***
- ***Beta lactam / beta-lactamase inhibitors cross the blood brain barrier sub-optimally and hence should not be used in treating meningitis.***
- ***Moxifloxacin and Levofloxacin should be reserved for use in multidrug resistant TB.***
- ***Recent evidence suggest a similar efficacy for bacteriostatic and bactericidal antibiotics in treating infections.***
- ***Narrow spectrum antibiotics should always be chosen over broad spectrum antibiotics whenever causative infection is identified.***
- ***AWaRe classification of antibiotics by the WHO comprises of three categories - Access, Watch and Reserve, mainly based on the antibiotic resistance threshold.***
- ***Antibiotic use as first and second line agents for common infections, needs to be improved from the 'Access' category of AWaRe Classification.***

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ANTIMICROBIALS - I

PHARMACODYNAMICS AND PHARMACOKINETICS OF ANTIMICROBIAL THERAPY - CLINICAL APPLICATION

***Bhupendra Kumar Gupta**
****Sudhir Mishra**

Abstract: *Emergence of antimicrobial resistance and poor clinical outcome consequently, are mostly because of inappropriate drug choice and suboptimal dosing. Strategies for better clinical outcomes include selection of an appropriate antibiotic and optimization of antimicrobial dosing regimen. Hence, one must primarily understand the antimicrobial pharmacodynamics and pharmacokinetics of a particular drug to decide on the dosing regimen. Pharmacodynamics denotes the mechanism of action of the drug such as a drug's molecular, biochemical and physiologic effects. Pharmacokinetics deals with absorption, distribution, metabolism and excretion of the drug simplified and abbreviated as ADME.*

Keywords: *Pharmacodynamics, Pharmacokinetics, Minimal inhibitory concentration, Antimicrobial resistance.*

Points to Remember

- ***Antimicrobial therapy for the treatment of infection not only require appropriate choice of antimicrobial agent but also appropriate dosing regimen, route and duration. To decide this, site of infection, type of bacteria and age of patients are other important variables.***
- ***Dose optimization of antimicrobial agent requires understanding of pharmacokinetic and pharmacodynamic properties.***
- ***Antimicrobial efficacy of concentration dependent antimicrobial agents (e.g. aminoglycoside, quinolones) depends on the peak concentration (C max) to MIC ratio.***
- ***Antimicrobial efficacy of time dependent antimicrobial agents (e.g. β-lactam, vancomycin) depends on the percentage of time that free plasma concentration of antimicrobial agent is maintained above MIC.***
- ***Dose adjustment is required in certain situations, renal impairment being the most important of them.***

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ANTIMICROBIALS - I

SIDE EFFECTS OF ANTIMICROBIALS AND PREVENTIVE STRATEGIES

***Bindusha S**
****Santhosh Kumar A**

Abstract: *Antibiotics though life-saving drugs, may have side effects varying in severity from trivial to life-threatening. The side effects include local irritant effects, systemic toxicity, drug hypersensitivity reactions, drug interactions and intestinal dysbiosis. Intestinal dysbiosis has widespread and long lasting effects in a person including the risk of development of diseases with immunological basis, including asthma, allergic diseases and diabetes mellitus. Antibiotics are considered as societal drugs, their side effects are not restricted only to the treated individual as their use is an important modifiable factor that can result in the development of drug resistant bacteria and therapeutic failure.*

Keywords: *Side effects, Drug resistance, Antimicrobial stewardship programme, Drug hypersensitivity reactions, Drug interactions, Intestinal dysbiosis.*

Points to Remember

- ***The side effects of antibiotics are not restricted to the person who consumed the drug, the effect also extends to the society by the development of drug resistance.***
- ***Systemic side effect can affect every organ system leading to serious consequences.***
- ***Though hypersensitivity reactions are rare, sometimes they may be life threatening.***
- ***Inappropriate use of antibiotics is the major cause for development of drug resistance which will lead to deleterious consequences in the individual and the society at large.***
- ***Antibiotics are lifesaving drugs and side effects are unavoidable. But there are strategies to prevent or limit the side effects.***
- ***Rational antibiotic prescription practices and antibiotic stewardship programs are the only measures to curtail the rapidly increasing menace of drug resistance.***

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ANTIMICROBIALS - I

ANTIMICROBIALS FOR PERINATAL AND NEONATAL INFECTIONS

***Suman Rao PN**
****Swapnik Kandepi**

Abstract: *Antimicrobials are the most commonly used therapeutics in the neonatal intensive care units, as neonatal sepsis is the third leading cause of neonatal mortality. The signs of neonatal sepsis are non-specific and accurate diagnostic tests are not available immediately. With dynamic neonatal pharmacokinetics, attention to the dose and frequency of the antimicrobials are important. With increasing antibiotic resistance, the search for an ideal empiric antibiotic is still on. This review will include the antimicrobials most commonly used in the management of perinatal and neonatal infections.*

Keywords: *Neonatal sepsis, Management, Infection, Perinatal infection.*

Points to Remember

- ***Antimicrobials are the most frequently used therapeutic agents in neonates.***
- ***Empiric antibiotic therapy for neonatal sepsis should be based on local antibiograms.***
- ***Empiric therapy should be of sufficiently narrow spectrum and from the "Access category" of "WHO AWaRe antibiotics".***
- ***Antifungal and antiviral therapy are warranted in a select group of neonates.***

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ANTIMICROBIALS - I

CHOICE OF ANTI-STAPHYLOCOCCAL THERAPY

***Upendra S Kinjawadekar**
****Rajendra Vaidya**

Abstract: *Staphylococcus aureus is considered to be the most virulent amongst all staphylococci. It is known to elude antimicrobial therapy by adopting various strategies posing therapeutic dilemmas for clinicians, particularly in intensive care settings. The coagulase negative staphylococci like S. Hemolyticus, S. Saprophyticus, S. Epidermidis are relatively less pathogenic unless indwelling devices are present. When complicated or invasive S. aureus infection is suspected, blood culture and culture of sample from potential source are essential before starting empirical treatment due to the increased prevalence of methicillin resistant staphylococcus aureus. Disruption of skin, immune compromised conditions, malnutrition, burns, scabies or post varicella lesions are more prone for S. aureus infections.*

Keywords: *Staphylococcus aureus, Methicillin sensitive staphylococcus aureus, Methicillin resistant staphylococcus aureus, Coagulase negative staphylococcus.*

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Points to Remember

- ***Staphylococcus aureus coagulase positive is considered the most virulent amongst all gram-positive genus staphylococci.***
- ***Blood culture and sample from potential focus of infection are a must in suspected moderate/severe staphylococcal infections.***
- ***Surface cultures should be avoided as it reflects contamination rather than true infection.***
- ***MSSA is a S.aureus isolate with an oxacillin MIC ≤ 2 mcg/mL whereas MRSA is S.aureus isolate with an oxacillin MIC≥ 4 mcg/mL.***
- ***Antibiotic choice will differ while treating MSSA or MRSA infections and understanding the local prevalence of MRSA as well as inducible clindamycin resistance is essential.***

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ANTIMICROBIALS - I

ANTITUBERCULOUS THERAPY-CURRENT PRACTICE

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Abstract: *Tuberculosis affects all age groups. Treatment for tuberculosis has been standardized having a 2 months intensive phase with four first line drugs followed by a 4 months continuation phase with three first line drugs given daily. Adjunctive steroids are useful in central nervous system disease and pericardial involvement. Adverse reactions to drugs, though uncommon, need to be looked for and managed appropriately. Standard regimens for treatment of resistant tuberculosis in India follow World Health Organization guideline. When there is an infectious pulmonary tuberculosis patient in the family, tuberculosis preventive treatment has to be given to all family members irrespective of age after ruling out active tuberculosis. All children after completion of treatment need to be followed up for two years.*

Keywords: *Children, Treatment, Tuberculosis, Resistant, Preventive therapy.*

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Points to Remember

- ***Only one treatment schedule is recommended (2HRZE/4HRE) for all newly diagnosed TB whether microbiologically confirmed or clinically diagnosed.***
- ***Continuation phase can be extended in neurological, skeletal and disseminated TB.***
- ***Children must always be followed up for 2 years after completion of treatment for TB.***
- ***Drug resistant TB in children is to be treated with shorter or longer regimen based on extent of disease and severity.***
- ***All household contacts of adult index pulmonary TB patients have to be given TB preventive treatment after ruling out active disease, regimen being different for drug sensitive and drug resistant strains.***

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ANTIMICROBIALS - I

ANTIMALARIAL DRUG THERAPY

***Ritabrata Kundu**
****Aniruddha Ghosh**

Abstract: *Malaria is a major worldwide problem and a public health problem of developing countries like India. It is caused by intracellular Plasmodium protozoa transmitted to humans by the bite of female Anopheles mosquitos. Malaria is caused by four species of the genus P.vivax, P.falciparum, P.ovale, P.malariae and the fifth species P.knowlesi primarily an animal pathogen reported to cause malaria in South-East Asia especially, Borneo. The diagnosis is confirmed by identification of the organism in stained peripheral blood smear and treated by antimalarial drugs as per the situation.*

Keywords: *Plasmodium infection, Treatment, Prophylaxis, Antimalarials.*

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Points to Remember

- ***Treatment regimens have been decided keeping the drug resistance pattern in that particular geographic area.***
- ***For uncomplicated vivax malaria chloroquine plus primaquine is effective.***
- ***Antimalarial drug combinations are now the recommended modality of treatment for P.falciparum infection.***
- ***The following ACTs are presently use, Artesunate (AS) + Sulfadoxine-Pyrimethamine (SP), Artesunate + Mefloquine (MQ), Artemether + Lumefantrine.***
- ***Artemether + Lumefantrine is the only form available as oral preparation and is well tolerated and effective against multidrug-resistant falciparum malaria.***

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ANTIMICROBIALS - I

RATIONAL ANTIMICROBIAL THERAPY IN OFFICE PRACTICE

***Palaniraman R**

Abstract: *The most common drug prescribed by a pediatrician in office practice other than paracetamol, is an antibiotic. Ninety percent of infections seen in office practice are viral in origin. Therefore, hardly 10% of children need antibiotics. Simple, safe, first line narrow spectrum antibiotics are more than enough to treat common community acquired bacterial infections. Irrational antibiotic use may contribute to increased incidence of community acquired resistant infections, increase in complications due to partial treatment and increase in cost of treatment.*

Keywords: *Antimicrobials, Children, Outpatients, Office practice, Narrow spectrum antibiotics.*

Points to Remember

- ***Majority of infections seen in office practice are viral. Only 10% or less are of bacterial etiology like acute otitis media, dysentery, skin and soft tissue infection etc.***
- ***In short, amoxycillin is the drug of choice for respiratory infections, cefixime for gastrointestinal and genitourinary infections, cephalosporins (1st generation) for skin and soft tissue infections and doxycyline for scrub typhus.***
- ***Antibiotic resistance in community acquired UTI and skin infections are on the rise.***
- ***Rational antibiotic therapy should be based on the available scientific evidence.***

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ANTIMICROBIALS - I

PROPHYLACTIC ANTIMICROBIALS

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Abstract: *Prophylactic use of antimicrobials is the use of an antimicrobial agent to prevent infection. The focus of this review is on everyday situations in which a general pediatrician may have to use prophylactic antimicrobials such as preventing recurrent urinary tract infections, recurrent otitis media, surgical site infections, infective endocarditis, rheumatic fever, malaria in travellers and for contacts of highly contagious diseases.Special situations like immunodeficiency disorders, post-transplant state, pediatric hemato-oncology and intensive care settings are distinct entities and have not been addressed in this article in detail.*

Keywords: *Infection, Children, Chemoprophylaxis, Antimicrobial, Prophylaxis.*

Points to Remember

- ***Antimicrobials should be used for prophylaxis only when there is a clear indication and the benefits outweigh the risk.***
- ***Active infection should be ruled out before initiating prophylaxis.***
- ***The importance of non- pharmacological measures, vaccination and infection control should always be borne in mind as they are superior, safer and more effective in prevention of infections.***
- ***Attention must be paid for side effects while using certain drugs for prophylaxis such as azithromycin.***
- ***The guidelines should be periodically reviewed in the background of emerging evidence and regional antimicrobial resistance patterns.***
- ***Monitoring for adverse effects of the drugs used long term is essential.***

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ANTIMICROBIALS - I

NEWER ANTIBIOTICS

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Abstract: *Antibiotics have revolutionised medical practice and their over zealous use has resulted in increased incidences of emerging resistant organisms. As newer molecules were identified especially for Gram negative organisms, many clinical trials were conducted. However, only few trials included children between 0 and 18 of age. Newer beta lactamase inhibitors were also recognized and they are first generation beta lactamase inhibitors with beta lactum rings, the second generation beta lactamase inhibitors with diaxabicyclooctane molecules and third generation beta lactamase are boronic acid compounds. Liberal and indiscriminate use of antibiotics have resulted in emergence of antibiotic resistance in the bacteriae with newer mechanisms, which in turn led on to higher medical costs and the increased mortality. Hence, there is a need for newer antibiotics and this article deals with antibiotics found in the last two decades and their uses.*

Keywords: *Antibiotics, Beta lactamase inhibitors, Synthetic aminoglycoside, Tetracyclines, Siderophore, Plazomycin, Ervacycline, Cefiderocol, Glycopeptides, Oxazolidinones.*

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Points to Remember

- ***Microbiological identification of infections should be the norm and newer drugs should not be used empirically.***
- ***Excellent new drugs are available for ESBL producers.***
- ***In India, carbapenamase producers are predominantly NDM and OXA-48 and to target this mechanism of resistance, more effective drugs are needed.***
- ***Majority of the trials were conducted only in adults hence more data on the pharmacokinetics / pharmacodynamics of drugs are needed in children including newborns.***
- ***Newer antibiotics should be reserved only for infections where there are limited therapeutic options.***

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GENERAL ARTICLE

CAREER GUIDANCE FOR PEDIATRICIANS

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Abstract: *Pediatrics is one of the most sought after branches amongst medical undergraduates. That said, the struggles and difficulties of establishing oneself as a successful pediatrician, after postgraduation, is not child's play. Pediatricians, at various points in life, are left at crossroads, as they even try to shift focus away from Pediatrics, as their career, owing to various compelling circumstances. This article focuses on ways and means to better oneself as a pediatrician and also the spread of other career options available to them.*

Keywords: *Pediatrics practice, Subspecialities, Foreign assignments, Work-life balance.*

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Points to Remember

- ***Pediatrics, as such is a blessed work irrespective of the place or position.***
- ***Immediately after the MD or DNB pediatric i.e a second tier course pursuing a superspecialitiy course always compromise the life mile stones, which are more precious than the career.***
- ***Accepting any compulsory postings, though appear to be stressful, it has its own advantages.***
- ***Taking up a foreign assignment as job or postgraduate career depends on the country and one should weigh the pros and cons and also decide whether it is a short term or long term career.***
- ***Community practice is not a bad option provide one choose a right place where local support is available.***
- ***Whatever the career one choose, basic sacred qualities of a pediatrician can be always performed in all the situations.***
- ***Many of the pediatricians balance life mile stones and career options, giving priority to the first one.***

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DRUG PROFILE

THERAPY OF ACNE VULGARIS

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Abstract: *Acne vulgaris is common in adolescents though children may also be affected. Topical and systemic drugs are prescribed depending on the severity and stage of the disease in a given child. Pediatricians need to be aware of the various modalities of treatment and must be actively involved in the long drawn therapy. This article reviews the various options and recommendations.*

Keywords: *Acne vulgaris, Benzoylperoxide, Azelaic acid, Retinoids, Topical antibiotics.*

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Points to Remember

- ***Therapy of acne targets the four factors responsible for lesion formation: increased sebum production, hyperkeratinization, colonization by Propionibacterium acnes and the resultant inflammatory reaction.***
- ***Treatment goals include scar prevention, reduction of psychological morbidity and resolution of lesions.***
- ***Mild to moderate acne is treated with topical preparations, such as benzoyl peroxide, azelaic acid, retinoids and topical antibiotics.***
- ***Benzoyl peroxide is an over-the-counter bactericidal agent that does not lead to bacterial resistance.***
- ***Topical retinoids are effective in treating inflammatory and noninflammatory lesions by preventing comedones, reducing existing comedones and targeting inflammation.***
- ***Topical and oral antibiotics are effective, more so when combined with topical benzoyl peroxide and/ or retinoids which reduces the risk of bacterial resistance.***
- ***Moderate to severe inflammatory acne is treated with oral antibacterials, oral isotretinoin or Co-cyprindiol (cyproterone acetate with ethinylestradiol) an antiandrogenic drug.***
- ***Oral isotretinoin is approved for the treatment of severe recalcitrant acne - requires specialist intervention.***

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CASE REPORT

MALIGNANT INFANTILE OSTEOPETROSIS

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Abstract: *Malignant infantile osteopetrosis is a rare congenital disorder characterized by increased bone density due to defective resorption of bone by osteoclasts. Infantile malignant osteopetrosis usually presents in infancy with bone marrow failure leading to hematological abnormalities like pancytopenia and hepatosplenomegaly due to extramedullary hematopoiesis. Though it commonly presents in early infancy, it should be suspected even in neonates presenting with characteristic features.*

Keywords: *Osteopetrosis, Bone marrow, Osteoclast.*

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CASE REPORT

SPORADIC HEMIPLEGIC MIGRAINE IN A CHILD

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Abstract: *Hemiplegic migraine is a rare form of migraine with aura presenting with reversible weakness. In an emergency room setting with a child having headache and focal deficits it is a diagnostic challenge with an immediate need to rule out underlying life-threatening conditions. Identifying this easily treatable condition will avoid undue anxiety and unnecessary investigations.*

Keywords: *Hemiplegic migraine, Childhood headaches, Focal weakness.*

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