The current medical practice involves use of a wide range of antibiotics for treating infections. The excessive and irrational use of antibiotics for mild illness has resulted in the emergence of a large number of resistant organisms especially which are resistant to a lot of commonly used antibiotics. Time and again practitioners are made aware of this emerging situation, and as days progress we will be devoid of all the available drugs as new antibiotic inventions are not keeping pace. This is a very scary and difficult scenario when it comes to the treatment of patients with nosocomial infections, patients with underlying immunodeficiency, and patients in critical care units. As we are left with very few new antibiotic options, the need of hour is to bring in the old and forgotten antibiotics in new forms and new roles.

This is a very important step at this juncture through which we can keep the new and expensive antibiotics as reserve and also prevent the development of drug resistance.

Older antibiotics went behind curtains mainly because of reasons, such as side effects, palatability, difficulty in route of administration, and advent of more effective agents. Before using it in clinical settings, older antibiotics safety and efficacy should be reevaluated to optimize therapy.

The most advanced revived antibiotic now commonly used in present clinical practice is colistin. Other antibiotics, such as nitrofurantoin, doxycycline, etc., are also currently used for various gram-positive and gram-negative infections which are resistant to new drugs.

**Colistin (Polymyxin E)**

Colistin also known as polymyxin E came into clinical use in the 1950s and soon because of the neurotoxic and nephrotoxic side effects and the availability of other drugs with less side effects it went out of clinical usage. Recently, the focus on colistin has resurfaced because of its bactericidal effect on gram-negative bacteria majority of which are resistant to multiple antibiotics.

**Spectrum of Action**

Mainly bactericidal activity against major pathogenic gram-negative bacteria which are mainly involved in infections in immunocompromised, critical care settings, and patients with underlying chronic diseases like Enterobacteriaceae including extended spectrum beta-lactamase (ESBL) and carapenemase producing strains, such as *Klebsiella pneumoniae*, *Acinetobacter baumannii*, and *Pseudomonas aeruginosa*. Antibacterial spectrum also includes other bacteria, such as *Escherichia coli*, *Shigella*, *Salmonella*, *Bordetella*, *Haemophilus influenzae*, etc.

**Indications**

Number of multicentric studies have proven efficacy and guarded safety of colistin in children, infants, and neonates mainly for highly resistant gram-negative infections which are resistant
to multiple drugs or in critical care settings where adequate clinical progress is not seen and proven culture sensitive infections. Initially, colistin found use mainly in post burn care patients and in those with cystic fibrosis. Main infections where it has found use include severe sepsis, ventilator-associated infections, meningitis, intra-abdominal infections, etc. It is always used as combination therapy even intrathecal use has been proved to be efficacious in newborns, etc. Role of colistin in critically ill children and nosocomial infection also proved it to be effective. Inhaled colistin has also found a place in gram-negative lung infections and mechanically ventilated patients.

**Polymyxin B**

**Spectrum of Action**

Polymyxin B is also used for resistant infections by Enterobacteriaceae, Pseudomonas, Klebsiella, and E. coli. Mainly in nosocomial infections and infection in critical care settings. Multidrug-resistant gram-negative bacilli with high rates of carbapenem resistance is leading to increasing use of polymyxin B as the only drug to combat against these infections in critically ill children.

**Side Effects**

Nephrotoxicity and neurotoxicity are dose and duration dependent. Dosage adjustment need to be made in children with renal impairment. With proper titration of doses and monitoring of renal function, the side effects can be minimized. The nephrotoxicity induced by colistin was proved to be reversible according to certain studies and to a less extent neurotoxicity.

**Nitrofurantoin**

Even though nitrofurantoin came into clinical practice in 1952, it was not used widely because of gastrointestinal side effects. After the macrocrystalline form came, side effects were less and safety profile improved.

**Spectrum of Activity**

Nitrofurantoin has a broad spectrum of antibacterial action ranging from gram-negative bacteria, such as E. coli, Klebsiella, Enterobacter, Shigella, Salmonella, etc., to gram-positive organisms, such as Staphylococcus aureus, group Streptococcus, etc. The most important feature is that ESBL producing E. coli is also sensitive to nitrofurantoin, so it is mainly indicated for the treatment of lower urinary tract infections due to the increase in ESBL producing E. coli emerging as a major pathogen in urinary tract infections. It also finds use in recurrent and treatment resistant infections which shows culture sensitivity. The disadvantage is that of the poor palatability almost making the drug non-compliant in children.

**Trimethoprim–Sulfamethoxazole**

Trimethoprim–sulfamethoxazole is a two-drug fixed combination antibiotic individually either of them are bacteriostatic together has a very broad spectrum of action against gram-positive bacteria including some methillin-resistant Staphylococcus aureus (MRSA) and gram-negative bacteria like Enterobacter. The drug combination was introduced in 1969. The drug is also effective against Toxoplasma gondii isospora and Pneumocystis jiroveci. Due to the two-drug combination resistance development to drug is less. The main advantage of the drug was good oral availability and cost effectiveness and disadvantage was the allergic reaction in susceptible patients.

**Teicoplanin**

Glycopeptide group of antibiotics came into clinical use since 1978. It requires more research in children.

**Spectrum of Activity**

Action mainly against gram-positive organisms, active against both methillin-resistant and methillin-sensitive S. aureus, S. pneumoniae, enterococci, Listeria, Corynebacterium, Clostridium, and anaerobic gram-positive cocci. Oral absorption is poor. Indicated for the prevention of bacterial endocarditis in the presence of penicillin allergies. Also clinically used in catheter-related infections, cerebrospinal fluid (CSF), shunt infection resistant, bone and soft tissue infection. Mainly reserved for the patients with neutropenia along with beta-lactam and aminoglycosides. Advantages when compared to vancomycin are single daily dosage, intramuscular administration, etc. Side effects are mainly rashes, drug-related fever, and dosage adjustment to be made in renal impairment.
**Fosfomycin**

Fosfomycin has a broad spectrum of action and excellent safety profile with little or limited research in pediatrics. The drug is noted to have very good dissemination into tissues like bones.

**Spectrum of Activity**

Antibacterial spectrum include MRSA, multidrug-resistant gram-negative bacteria (carbapenem-resistant Enterobacteriaceae), *Staphylococcus epidermidis*, *Listeria*, and resistant *Pneumococcus*. Fosfomycin is currently being researched for community-acquired lower urinary tract infections in pediatrics.

**References**


