

health  
**technology**  
assessment



EXECUTIVE  
SUMMARY

**RATIONAL  
ANTIBIOTIC  
UTILISATION IN  
SELECTED  
PAEDIATRIC  
CONDITIONS**

**HEALTH TECHNOLOGY ASSESSMENT UNIT  
MEDICAL DEVELOPMENT DIVISION  
MINISTRY OF HEALTH  
MOH/PAK**

## EXECUTIVE SUMMARY

The wide use of antibiotics has been associated with increasing antimicrobial resistance, both in the community and hospital settings. Multi-resistant organisms such as extended spectrum beta lactamase (ESBL)-producing *Klebsiella pneumoniae* and *Escherichia coli*, Glycopeptide-resistant *Staphylococcus aureus*, Vancomycin-resistant *Enterococcus* (VRE) and also multi-resistant *Acinetobacter* (including Carbapenem-resistant isolates) have appeared worldwide, although the prevalence varies in different countries.

Patient care is threatened by treatment failures arising from infection of organisms leading to morbidity and potential mortality. The treatment of these infections is hampered by the lack of efficacious antibiotics, especially for multi-resistant gram-negative organisms like *Acinetobacter* and *Pseudomonas aeruginosa*. Furthermore, widespread abuse and overuse of antibiotics result in potential drug toxicities leading to increased complications as well as increased healthcare costs.

The objective is to determine the safety, effectiveness, and cost implications of rational antibiotic utilisation in selected pediatric conditions like Febrile Neutropenia, Encephalitis/ Encephalopathy / Meningitis, Pneumonia, Sepsis in Children, and Neonatal Sepsis

For Febrile neutropenia, there is sufficient evidence to recommend the use of either monotherapy or combination therapy antibiotics, using a third or fourth generation Cephalosporin, and Beta-lactam agent and an Aminoglycoside respectively. However, there is scanty data regarding utility of empiric antifungal therapy and no good evidence to support the practice of routine antiviral therapy in neutropenic children with cancer and so routine antifungal or antiviral therapy at the onset of febrile neutropenia is not recommended. There is limited data regarding cost-effectiveness of different antibiotic regimens in the treatment of febrile neutropenia.

As for Meningitis and Encephalitis, there is sufficient evidence of the effectiveness of third generation Cephalosporins to treat *Haemophilus influenzae meningitis type b* and *Streptococcus meningitis*. There is evidence of Dexamethasone used with antibiotics reduces hearing loss in *Haemophilus influenzae meningitis*. However, there is no evidence of effectiveness of antibiotics in viral encephalitis, except the use of Acyclovir in *Herpes encephalitis*.

In community acquired pneumonia, there is inadequate data on the effectiveness of various different antibiotics but there is some evidence to recommend the use of Azithromycin, Amoxicillin Clavulanate, Erythromycin and Cefuroxime, in the outpatient treatment of pneumonia. There was insufficient evidence on adverse effects and costing, there is inadequate data to support. The macrolides may have a role in the older child and for the inpatient treatment of *Pseudomonas* Community Acquired Pneumonia the Penicillin group of drugs may be used.

In treatment of sepsis in children, there is no evidence to support the use of specific antibiotics, although the commonly used antibiotics were found to be Cefuroxime, Metronidazole, Gentamycin and Ampicillin. It was found that there is good evidence to support the use of Polyclonal Intravenous Immunoglobulin as adjuvant treatment for sepsis and septic shock.

There is evidence to recommend the use of Ampicillin, Aminoglycosides, Cephalosporins and Vancomycin in the treatment of neonatal sepsis, there is inconclusive evidence on the appropriate duration of antibiotics. Penicillin is recommended for Group B Streptococcus, while Liposomal Amphotericin B is recommended in Candidiasis, Gentamycin can be given on a once daily dose where indicated. Vancomycin, Penicillin and Teicoplanin can be used for prophylaxis. However, there is insufficient evidence on the use of prophylaxis in specific conditions and antibiotics of choice in specific conditions. There is also insufficient evidence, to support the use of antiviral agents in various conditions, except for evidence of effectiveness of Acyclovir in Herpes simplex infection and neonatal *Varicella* infection. Insufficient evidence was also obtained on and regards to safety and cost effectiveness of antibiotics in neonates.