



Antibiotic Therapy for Severe Infections in Infants and Children

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Annotation: The terms antimicrobial, antibiotic, and anti-infective encompass a wide variety of pharmaceutical agents that include antibacterial, antifungal, antiviral, and antiparasitic drugs. Of these, antibacterial agents are by far the most commonly used and thus are the focus of this article, although similar principles apply to the other agents as well.

Key words: *antibiotic, cephalosporin, [Haemophilus influenzae](#), parenteral, chloramphenicol, tetracycline.*

In infants and children, drug absorption, distribution, metabolism, and excretion may differ considerably from these factors in adults; thus, differences also exist in therapeutic efficacy and toxicity of various antibiotics. Because of known toxicity, certain drugs—such as [chloramphenicol](#) in high doses, the [sulfonamides](#), and tetracycline—should not be used in neonates. Antibiotic therapy should be modified in neonates because of biologic immaturity of organs important for the termination of drug action. Because of poor conjugation, inactivation, or excretion, the serum concentrations of many antibiotics may be higher and more prolonged in neonates than in older infants. Thus, the dosages of many antibiotics must be lower and the intervals between administration must be longer. The appearance of strains of ampicillin-resistant [Haemophilus influenzae](#), the slow development of resistance to [chloramphenicol](#) among gram-negative and gram-positive bacteria, and the development of improved analytic methods to measure chloramphenicol have all resulted in the use of this drug in select cases of serious infection in children beyond the neonatal age. Third-generation [cephalosporins](#) have an important role in empiric [treatment](#) of [pediatric bacterial meningitis](#) because of their ability to penetrate the [central nervous system](#) and their effectiveness against ampicillin- or chloramphenicol-resistant [Haemophilus](#) strains and against many gram-negative bacteria in the [Enterobacteriaceae](#) group.

CONSIDERATIONS IN DETERMINING DOSAGE AND THE RISK OF ADVERSE EFFECTS

For severe infections in children, antibiotics should be administered parenterally to ensure high blood and tissue concentrations. The dosage should be carefully adjusted on the basis of several additional factors, including the severity of the illness and the age and maturity of the infant. Measurement of antibiotic concentrations in the serum

THE PROBLEM OF HAEMOPHILUS INFLUENZAE

Infections due to *H. influenzae* occur most often in patients between the ages of about 3 months and 4 to 5 years because children in this age group often lack protective antipolyribosephosphate antibody. Because of the appearance of increasing numbers of ampicillin-resistant *H. influenzae* type b organisms, the Committee on Infectious Diseases of the American Academy of Pediatrics recommends that initial management of children with confirmed or suspected severe infections (such as meningitis,



FIRST- AND SECOND-GENERATION CEPHALOSPORINS

The cephalosporin group of antibiotics is discussed in detail elsewhere in this symposium. In this article, we provide some comments about the use of these agents in children. In general, first-generation cephalosporins have not been first-line drugs for the treatment of infections in children, although they have often been useful agents for some patients. Members of the first-generation family of these drugs, such as cefazolin, have excellent activity against *Staphylococcus aureus*,

THIRD-GENERATION CEPHALOSPORINS

The third-generation cephalosporins have now been available for several years. Their release has been accompanied by substantial advertising by the pharmaceutical industry, and the confusing similarities among the various names of the drugs can be bewildering to many physicians. In general, their similarities far outweigh their differences. They have activity against a broad spectrum of gram-negative organisms, including encapsulated β -lactamase-producing *H. influenzae*. They are inactive

USE OF CHLORAMPHENICOL

Although many microorganisms are susceptible to chloramphenicol, the use of this antibiotic should be restricted to certain serious infections because of the potential associated toxicity. When appropriately used, chloramphenicol has several favorable characteristics: the drug diffuses well into body fluids (for example, cerebrospinal fluid) and is therefore useful in the treatment of meningitis, the diffusion of chloramphenicol into tissues of the central nervous system is superior to that

PROBLEMS ASSOCIATED WITH TETRACYCLINE THERAPY

Tetracyclines should not be used in pediatric patients unless no alternative, less toxic drug is available. For children, tetracycline is not a drug of choice except for a few clinical situations, such as rickettsial infections, brucellosis, and psittacosis. It may be useful for the treatment of urinary tract infections in older children who are allergic to other more commonly used antimicrobial agents, such as ampicillin, sulfonamides, and nitrofurantoin.

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