The First-Line Treatment Of Community Acquired Pneumonia should be Penicillin.

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Community-acquired pneumonia (CAP) is a significant cause of childhood morbidity and mortality worldwide. Viral etiology is most common in young children and decreases with age. Streptococcus pneumoniae is the single most common bacterial cause across all age groups. *Haemophilus influenzae, Staphylococcus aureus* and *Moraxella catarrhalis* are less commonly identified as causative organisms. Atypical organisms present similarly across all age groups and may be more common than previously recognized. The use of new diagnostic methods such as immunological techniques and polymerase chain reaction has proven invaluable for specific diagnosis and epidemiological investigation, showing adequate sensitivity, specificity and promptness of results, with the aim of guiding therapy properly. Therefore, it is not possible to differentiate between viral and bacterial pneumonia by chest radiography or inflammatory markers, so the clinician has to treat this group of children empirically with antibiotics.

Bacterial pneumonia, although less common than viral pneumonia, requires antibiotic treatment. There is no standard diagnostic test for an etiologic agent in childhood pneumonia. Young children often cannot produce sputum, and tracheal aspirate or lung biopsies are not practical or necessary for the routine evaluation of pneumonia. The management of children with pneumonia is generally based on the age of the patient and the clinical presentation. Initial antibacterial therapy for CAP is usually empirical, as culture and antibacterial sensitivity test results are rarely available at initial diagnosis. Any agent selected for empirical therapy should have good activity against the pathogens commonly associated with CAP, a favorable tolerability profile, and be administered in a simple dosage regimen for good compliance. Because *S. pneumoniae* is the most common bacterial cause of pneumonia and its associated complications, current guidelines for antibacterial of CAM recommend that the initial treatment will be directed to eradicate this microorganism.
Narrow-spectrum antibiotics are advocated in the first instance. Inappropriate use of antibiotics can result in treatment failure and adverse drug reactions, and contribute to emerging pathogen resistance. Consideration of a drug's pharmacodynamic and pharmacokinetic properties is also important. Agents with low maximum plasma or tissue concentrations and long half-lives may be more likely to expose bacteria to resistance-selective concentrations. The strategy of administration is also important; low doses of beta-lactams and long treatment duration are risk factors for the carriage of pneumococci non-susceptible to penicillin, whereas short-course, high-dose therapy minimises this risk. Convenience and tolerability are also essential considerations in paediatrics.

For non-severe pneumonia, oral amoxicillin is the antibacterial of choice with low failure rates reported. Randomized controlled trials in children in the developing and in the developed countries showed that in previously well children oral amoxicillin and IV benzyl penicillin have equivalent efficacy for the treatment of pneumonia. Both were successful in curing children with CAP.

Pneumococcal isolates not susceptible to penicillins and third-generation cephalosporins have been well described in vitro, and rates between 10% and 40% have been reported from worldwide surveillance. There is significant geographical variation, with high rates in Spain, France and parts of south-east Asia and the USA. Furthermore, macrolide resistance is also a problem in some communities. The main mechanism of resistance is via the alteration of penicillin-binding proteins, which can be overcome by achieving adequate local drug levels; i.e. it is a decreased sensitivity rather than an absolute resistance. There is as yet no evidence of clinical treatment failure of infections outside the central nervous system using high-dose penicillin. Since most pneumococci remain sensitive to high-dose penicillin-based antibacterials amoxicillin or penicillin remains the antibiotic of choice in pneumococcal pneumonia.

The emergence and spread of resistance to commonly used antibiotics has challenged the management of CAP. Multiple sets of CAP guidelines have been published to address the continued changes in this complex disease. Severely ill children are traditionally treated with parenteral antibacterials. It has been shown that penicillin resistant pneumococci were not associated with more severe disease. The most common complications in CAP are parapneumonic effusions and empyema. It has
been shown that penicillin resistance is not a factor in outcome from invasive Streptococcus pneumoniae community-acquired pneumonia.

Pneumococcal macrolide resistance is mediated via alteration of the 50S ribosomal binding site, thereby preventing binding and the subsequent inhibition of bacterial protein synthesis. A second mechanism is via the presence of efflux pumps for the antibiotic. It is often associated with penicillin non-susceptibility. Rates of usage and resistance of the newer macrolides have substantially increased over recent times and vary by geographical region. There are reports of treatment failure of pneumococcal disease using macrolides alone; thus, this approach is not recommended.

If parenteral therapy is required and pneumococcus is the likely pathogen, benzylpenicillin or an aminopenicillin can be used. Broader-spectrum agents have no additional benefit. For the severely unwell, toxic child with or without effusions, where rarer pathogens are a possibility, or in the rare scenario of high pneumococcal penicillin resistance (mean inhibitory concentration >2 mg/l), therapy should include a third-generation cephalosporin (e.g. ceftriaxone) with a macrolide if atypical agents are potential pathogens, or a penicillinase-resistant beta-lactam (e.g. oxacillin) or vancomycin if *Staphylococcus aureus* or MRSA infection is likely. However, treating all children with CAM with these antibiotics may change the micrflora of pneumonia causing bacteria and increase the rate of infections with other less common and more resistant microorganisms.

References


