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ACUTE RESPIRATORY INFECTIONS

The State of the Art and Prospects for Control

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ACUTE RESPIRATORY INFECTIONS

The State of the Art and Prospects for Control

Acute respiratory infections are the most common affliction of humans. While the great majority of these are mild and self-limited, the morbidity is enormous. The mortality in infections of the lower respiratory tract is also a very significant problem, especially in small children with chronic illnesses or cardiac defects and in children living in suboptimal socioeconomic conditions. This paper will give an overview of respiratory tract infections in children. Upper respiratory infections will be discussed briefly; lower respiratory infections will be discussed more thoroughly, including their etiology, clinical characteristics, diagnosis and control.

Acute upper respiratory infections (URI) are suffered by everyone at least once a year, frequently much more. Studies in middle-class families and in group day care has shown that children under five years of age have 6 to 8 respiratory infections per year. Most of these are caused by viruses. C. diphtheriae is a well recognized cause of URI; diphtheria is rare in the U. S. but still common in areas where children are not vaccinated adequately. The group A streptococcus is the only other bacterium that is a significant cause of URI. Rheumatic fever, which follows streptococcal pharyngitis, is disappearing in the U.S. but is still a problem in underdeveloped countries. Penicillin is the appropriate treatment or prophylaxis of streptococcal infections. M. pneumoniae, N. meningitidis and N. gonorrhoeae are unusual causes of URI. It has never been demonstrated that H. influenzae and S. pneumoniae are causes of uncomplicated URI

and Staphylococcus aureus and the Enterobacteriaceae cause URI only in unusual circumstances. Immunization against diphtheria, the use of amantadine to prevent influenza A virus infections and the proper management of streptococcal infections are the only effective preventive measure for general use today.

Lower respiratory infections (LRI) occur less frequently than LRI but are important because of their increased severity and occasional mortality. The clinical syndromes seen in children with LRI are croup, tracheobronchitis, bronchiolitis and pneumonia. Respiratory viruses and M. pneumoniae are the most frequent causes of these syndromes in the U.S. B. pertussis and M. tuberculosis are infrequent causes of LRI in the U. S. but important in some other parts of the world. Chlamydia trachomatis has been shown to be a cause of LRI in small children but its precise role is not clear. Legionella pneumophila has not been found to be a cause of significant childhood LRI. H. influenzae and S. pneumoniae are important causes of LRI but it has not been possible to evaluate their role precisely because they are carried by a high percentage of normal children and good antibody tests are not available for general use. H. influenzae and S. pneumoniae, as causes of LRI, are probably not as important in the U. S. as in areas where children are malnourished and live in crowded conditions. Groups A and B streptococci, Staphylococcus aureus, Enterobacteriaceae and Rickettsia are recognized but infrequent causes of LRI in special circumstances.

LRIs have been studied extensively in a pediatric practice in Chapel Hill, N. C. Important infecting agents include: respiratory syncytial virus, parainfluenza viruses types 1 and 3, M. pneumoniae, adenoviruses and the influenza viruses. The incidence of LRI is

inversely related to age. During the first year of life 20-25% of children were sick enough with an LRI to be taken to a pediatrician; the rate fell after that age to about 5% in the 9-15 year age group. Bronchiolitis occurred most commonly in the first 2 years of life; croup had a peak occurrence in the 2 year old and pneumonia in the three year old; tracheobronchitis was common in all age groups. All syndromes occurred more frequently in males.

The parainfluenza viruses, especially type 1, were the primary causes of croup in the fall and early winter. Respiratory syncytial virus occurred in the winter and spring and was a major cause of bronchiolitis and pneumonia in the young child. M. pneumoniae caused fall and winter outbreaks of pneumonia and tracheobronchitis in school-age children. Adenoviruses were found throughout the year and were associated more commonly with tracheobronchitis and bronchiolitis in young children. The influenza viruses occurred in the winter and spring and were associated frequently with tracheobronchitis. By using these associations the clinician can frequently predict the causative microorganism and thereby institute proper management. Identification of the specific etiology is required for an absolute diagnosis. This is hampered by a variety of factors, including the time required to accomplish this, its expense and the high technology required. This is an important area for consideration in planning studies of LRI in underdeveloped countries.

The role of the interaction between microorganisms in causing LRI or increasing the severity of LRI is not clear. It is well recognized that patients with influenza can have severe pneumonia due to a variety of bacteria but such interactions have not been well defined in other circumstances. This is also an important area for study in

populations where the mortality due to LRI is excessive.

Most children with bacterial LRI can be treated effectively with available antimicrobials. This situation does not hold for most viral LRI where antiviral agents are not available. Amantadine has been shown to reduce the severity of influenza A infections but not those due to influenza B. Ribovirin, an experimental antiviral, apparently is effective in treating severe infections due to influenza viruses A and B and respiratory syncytial virus.

Adequate preventive measures by way of vaccines are available against infections due to B. pertussis, M. tuberculosis and the influenza viruses. An oral, live adenovirus vaccine is available but does not contain strains which are found in childhood infections. An effective pneumococcal vaccine is also available but children under 2 years of age are not good antibody responders and some of the pneumococcal types found in childhood are not contained in the vaccine. Methods for controlling LRI by treatment or prevention are limited at the present time; this dictates the need for heavy emphasis on research to solve the unanswered problems which exist.