Community Acquired Pneumonia (CAP) in Children in the New Vaccination Era

Abstract:

The introduction of Hâ Flu and Pneumococcal into the childhood immunisation programme has led to a significant reduction in the incidence of bacterial meningitis. The impact on childhood pneumonia is more difficult to quantify due to its multiple aetiology and its diagnostic challenges. Causation of pneumonia in children has to rely on indirect methods including blood cultures, and analysis of respiratory tract secretions.

Prospective studies are required in order to quantify the relative roles played by bacteria and viruses. Jain et al[1] have mounted an important, large, detailed causation analysis among 2354 children with radiological evidence of pneumonia. The chest x-rays showed consolidation (58%), infiltrate (51%), or an effusion (13%). The pathogen detection rate (expressed as number of cases per 10,000 children per year) was respiratory syncytial virus 4.6, human rhinovirus 4.1, human metapneumovirus 1.9, adenovirus 1.6, mycoplasma pneumoniae 1.4, influenza A or B 1.1, parainfluenzae virus 0.9, coronavirus 0.8, streptococcus pneumonia 0.5. The prominence of coronavirus was noted. It can act as a single pathogen or in combination with other organisms. The paper confirms that the vaccination programme has brought about a substantial reduction in cases of bacterial pneumonia. Viral causes of pneumonia have now increased in relative importance. The incidence of pneumonia was higher in younger children. Forty five per cent were under 2 years, 25% were 2-4 years, 18% were 5-9 years, and 12% were 10-17 years. Cough and fever were almost universal features while 75% had anorexia and 70% had dyspnea. Twenty one per cent needed PICU admission, 7% required ventilation, and 3 children (<1%) died. The Irish experience[2] is that the pneumococcal vaccine has greatly reduced invasive pneumococcal disease (IPD) in children. There has been a 91% decline in infection due to PCV7 serotype, 44% decline due to PCV 13-17. The benefits were concentrated in the under twoâ s.

The World Health Organisation (WHO) states that tachypnea and retractions are the most accurate signs for the clinical diagnosis of pneumonia in children. It defines tachypnea as > 60 breaths/min in babies less than 2 months, >50 breaths/min in babies 2-12 months, >40 breaths/min in children 1-5 years, and >20 breaths/min in children over 5 years. Cough may not be an initial feature because the alveoli have few cough receptors[3]. Coughing becomes more prominent when the infection starts to irritate the cough receptors in the airways. Pointers towards a bacterial pneumonia include WBC >15x10^9/L and a CRP >30-60mgs/L. Blood cultures are positive in only 10% of children with pneumonia. Bacteria isolated from the nasopharynx are difficult to interpret because they may simply reflect the normal upper respiratory flora. Obtaining suitable sputum samples is difficult because young children under 5 years swallow sputum. A suitable sputum sample is one with <10 epithelial cells and >25 polymorphonuclear leucocytes.

Some children can present with atypical features particularly abdominal pain. Abdominal pain can be the presentation in children with basilar pneumonia and accounts for nearly 2% of cases. Grunting when present is a worrying sign, and is indicative of severe disease and impending respiratory failure.

Oxygen saturation should always be measured in children with respiratory distress. An oxygen saturation <96% is 3 times more likely in children with pneumonia. An oxygen saturation <92% is an indication of severity and the need to administer oxygen. The indications for transfer to intensive care are- failure to keep oxygen saturation >92% with an inspired oxygen concentration >60%, rising respiratory and pulse rate, apnoea or slow, irregular breathing, and shock.

Influenza A and B have emerged as important causes of pneumonia in children of all age groups particularly in those over 5 years. â Flu vaccination is recommended for children with chronic disorders. The issue of flu vaccination for healthy children is a matter of debate. It is effective when there is a good match between the vaccine and the circulating influenza strains. When the match is good the protection can be over 70%, but when the match is poor the protection can be as low as 20%. A Cochrane review[4] concluded that vaccination is effective in preventing influenza in children over 2 years but there is lack of evidence about its efficacy in the under twos. Thus there is a paucity of data on influenza vaccination efficacy in children. Canadian data suggests universal â flu vaccination reduced hospital admissions, ED attendances, and GP visits. The US recommends â flu vaccination for all children over 6 months old.

The UK[5] experience regarding CAP has been similar to the US. Thompson and Harris[6] point out that in the pre-pneumococcal vaccine era the incidence of CAP was 33/10,000 in children under 5 years. Pneumococcal vaccination was introduced in 2007 and by 2008 the admission rate for CAP had reduced by 20%. In clinical practice it is commonly assumed that chest x-rays showing alveolar infiltration indicate a bacterial cause, while diffuse interstitial infiltrates are suggestive of atypical bacterial or viral infections. The data would suggest that there is overlap and that it is difficult to assign infective causation from the chest x-ray in isolation. A persisting fever despite antibiotic administration should raise the suspicion of an empyema. When an effusion is present and the child has a persistent pyrexia, the child should be referred for drainage[6].

CAP remains a major cause of morbidity in children leading to large numbers of hospital admissions annually. The epidemiology is changing with an increased preponderance of viral causes.

JFA Murphy

Editor

1. Jain S, Williams DJ, Arnold SR, et al. Community Acquired pneumonia requiring hospitalization among US children N Engl J Med 2015;372:835-45.

2. Barson WJ. Community acquired pneumonia in children: clinical features and diagnosis. 2015 www.uptodate.com

3. Cotter S. Impact of pneumococcal vaccine in Ireland. www.hpsc.ie/hpsc/A-Z/vaccine_preventable/pneumococcal disease.

4. Jefferson T, Rivetti A, et al. Vaccines for preventing influenza in healthy children 2012. Cochrane review.

5. Thomson A, Harris M. Community acquired pneumonia in children: whatâ s new? Thorax 2011;66:927-8

6. Harris M, Clark J, Coote N, Fletcher P et al. British Thoracic Society guidelines for the management of community acquired pneumonia in children: update 2011. Thorax 2011;66:1-23

Comments: