ARCHIVES OF DISEASE IN CHILDHOOD

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Leading articles

Community acquired pneumonia

We live in an era when medical practice is increasingly regulated by guidelines and protocols. Ideally, such guidance should be evidence based, and in particular it is generally recommended that advice on medical treatment should be based on the results of adequately powered, double blind, placebo controlled trials or, some would say, better still, a meta-analysis of several such trials. Unfortunately, evidence of this standard is often lacking, and many guidelines amount to little more than the opinions of the authors.

This is not to say that opinion based guidelines are valueless—the opinions of experienced clinicians may be better than no opinion at all. Thus, a significant proportion of the advice contained in the first edition of the British Thoracic Society Guidelines on asthma management[1] was opinion, rather than evidence based, yet its publication was followed by a fall in childhood asthma admissions. This fall might have reflected some unknown benign environmental influence, but was much more likely to have resulted from improved management of asthma in the community as the guidelines gradually changed clinical practice. Moreover, guidelines that indicate areas where supporting evidence is lacking can point the way to future research. The publication of the asthma guidelines was followed by various papers presenting evidence that had hitherto been lacking, for instance in relation to the use of intravenous aminophylline in acute asthma.[2]

This month sees the publication in our sister journal *Thorax* of a new set of Guidelines,[3] this time on the management of community acquired pneumonia in children. In preparing these Guidelines, the authors have followed a well trodden path. An extensive literature review was followed by close scrutiny of apparently relevant papers. Those of us who have sat on guideline working parties will appreciate how this process, which can involve the review of thousands of titles, can produce little or no evidence to underpin commonly accepted practices and treatments, and indeed can uncover clear evidence that accepted dogma is wrong.

The Guidelines

These Guidelines are necessarily long. Extensive literature had to be reviewed, and the evidence for the recommendations had to be presented. The interested reader should therefore refer to the original. What follows is an attempt to summarise the more important recommendations, and to draw particular attention to those that seek to change current practice.

CLINICAL DIAGNOSIS

Most recent studies of the clinical features of pneumonia have come from developing countries, to determine the signs that are most reliable for use by relatively untrained health workers. In these studies, tachypnoea has been a consistently useful sign of pneumonia—readers of the *Archives* will recall the recent paper describing its predictive value in children of all ages.[4] Moreover, the severity of the tachypnoea is related to the severity of the illness, although of course pneumonia can occur in the absence of tachypnoea.[5] Auscultatory signs have rather lower specificity, and much poorer reproducibility between observers. The Guidelines therefore emphasise the importance of tachypnoea in the diagnosis of childhood pneumonia, defined according to the usual WHO criteria:

- In children <2 months: >60 breaths/minute
- In children 2–12 months: >50 breaths/minute
- In children >12 months: >40 breaths/minute.

AETIOLOGICAL DIAGNOSIS

Virus infection, especially respiratory syncytial virus infection, is more common in younger children. In older children, *Streptococcus pneumoniae* remains the most common bacterial pathogen identified, followed by mycoplasma and chlamydia.

The results of acute phase reactants (blood count, C reactive protein, erythrocyte sedimentation rate) are widely distributed in both bacterial and viral pneumonia, and cannot be relied on for aetiological diagnosis. In the absence of sputum culture, indirect methods of identifying causal bacteria lack both sensitivity and specificity. Nasopharyngeal bacterial culture is useless, but upper respiratory tract secretions are useful in virological diagnosis. Bacterial serological tests are unreliable, with the exception of paired *Mycoplasma pneumoniae* titres, although the necessary delay in performing these tests reduces their usefulness in guiding treatment. The Guidelines give clear advice on the investigation of pneumonia:

- Blood cultures should be performed in all children suspected of having bacterial pneumonia, although this will be positive in <10% of cases
- Acute serum should be saved and a convalescent sample taken in cases where a microbiological diagnosis was not reached during the acute illness
- Nasopharyngeal aspirates from all children under the age of 18 months should be sent for viral antigen detection (for example, immunofluorescence), with or without viral culture
- When significant pleural fluid is present, it should be aspirated for diagnostic purposes. It should be sent for microscopy and culture and a specimen sent for bacterial detection.

The best guide to distinguishing bacterial from viral pneumonia is clinical acumen, and the Guidelines present two well validated clinical observations that should reduce inappropriate antibiotic use in toddlers, while identifying those children who do need antibiotics:

- In the preschool child, if wheeze is present, primary bacterial pneumonia is unlikely
- Bacterial pneumonia tends to be associated with pyrexia, dyspnoea, and tachypnoea; bacterial pneumonia should be considered in children up to 3 years of age with a temperature >38.5°C along with chest recession and respiratory rate >50 per minute.

RADIOLOGICAL DIAGNOSIS

The radiological signs of pneumonia overlap with those of collapse, but radiological consolidation does suggest a bacterial cause. Nevertheless, there is good evidence that chest radiography has no effect on the outcome of the illness.[6] The case for performing a chest *x* ray as part of the investigation of a febrile child with no respiratory signs is dubious, although I suspect that most of us will continue to do so. The Guidelines suggest:

- If clinical signs are present, *x* ray examination is not necessary to diagnose pneumonia
- In children in whom clinical recovery has been satisfactory, repeat *x* ray examination serves no useful purpose.

INVESTIGATION IN THE COMMUNITY

Here the advice is simple and to the point:

- There is no indication for any tests in a child with suspected pneumonia in the community.

INDICATIONS FOR ADMISSION TO HOSPITAL

This section will be of particular interest to doctors in primary care, and to paediatric staff in accident and emergency departments. The key indication for admission is hypoxaemia (Sao_2 ⩽92% in air), and with the development of cooperatives for the provision of emergency care in general practice, it should be easier to apply this criterion, as pulse oximetry gradually becomes available in the community. Other indications include:

- The inability of the family to provide appropriate care
- In infants, respiratory rate >70/min, dyspnoea, intermittent apnoea, grunting, and feeding difficulty
- In older children, respiratory rate >50/min, dyspnoea, grunting, and signs of dehydration.

INDICATIONS FOR TRANSFER TO PAEDIATRIC INTENSITVE CARE UNIT (PICU)

Hypoxaemia is a good indicator of the severity of pneumonia, and pulse oximetry should therefore be performed on every child deemed ill enough to be admitted. Transfer to PICU should be considered when:

- There is failure to maintain Sao_2 >92% in Fio_2 >0.6
- The patient is shocked
- There are rising respiratory and pulse rates with clinical evidence of severe respiratory distress and exhaustion with or without raised $Paco_2$
- There is recurrent apnoea or slow irregular breathing.

MANAGEMENT OF PNEUMONIA

General care is important, and attention must be paid to oxygenation, nutrition, and hydration. Patients with pneumonia must be monitored carefully. Unnecessary interventions must also be avoided:

- Physiotherapy has no part to play in the management of community acquired pneumonia.

The use of intravenous antibiotics for pneumonia has increased considerably over the years, for reasons that are not immediately clear, and the authors of the Guidelines could find no evidence to support this practice. The Guidelines greatly simplify antibiotic treatment:

- Young children presenting with mild symptoms of lower respiratory tract infection need not be treated with antibiotics
- Antibiotics administered orally are safe and effective for children presenting with community acquired pneumonia
- Intravenous antibiotics should be used when the child is unable to absorb oral antibiotics, and in severe cases
- Amoxycillin is the first choice oral antibiotic for children <5 years
- Because mycoplasma pneumonia is more common in older children, macrolide antibiotics may be used as first line empirical treatment in children aged 5 years and above.

The Guidelines also include recommendations on complications and failure to respond to treatment, beyond the scope of this brief review.

Summary

These Guidelines will be welcomed by primary care doctors for the simplicity of their approach to the management of pneumonia in the community, by paediatric house staff who will be performing fewer investigations and setting up fewer intravenous lines, by physiotherapists who will no longer have to argue that they have nothing to contribute to the management of pneumonia, by radiographers and radiologists who will have fewer *x* rays to take and report, by paediatric consultants who will no longer have to decide policy on the hoof, and most of all by patients whose treatment will be simpler, more appropriate, and less prone to produce side effects. By indicating clearly the quality of the evidence on which each recommendation is based, this document will also act as a stimulus for further research into such aspects of management as community care and the indications for hospital admission, for transfer to PICU, and for switching antibiotic therapy from the intravenous to the oral route.

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1 British Thoracic Society, British Paediatric Association, Royal College of Physicians of London, *et al.* Guidelines on the management of asthma. *Thorax* 1993;**48**:S1–24.
2 Yung M, South M. Randomised controlled trial of aminophylline for severe acute asthma. *Arch Dis Child* 1998;**79**:405–10.
3 The BTS guidelines for the management of community acquired pneumonia in adults. *Thorax* 2001;**56**(Suppl IV).
4 Palafox M, Guiscafre H, Reyes H, *et al*. Diagnostic value of tachypnoea in pneumonia defined radiologically. *Arch Dis Child* 2000;**82**:41–5.
5 Cherian T, John TJ, Simoes E, *et al*. Evaluation of simple clinical signs for the diagnosis of acute lower respiratory tract infection. *Lancet* 1988;**2**: 125–8.
6 Swingler GH, Hussey GD, Zwarenstein M. Randomised controlled trial of clinical outcome after chest radiography in ambulatory acute lower-respiratory infection in children. *Lance*t 1998;**351**:404–8.