The management of community-acquired pneumonia in children

A review of key guidelines by Dr E Amukoye

Introduction

Lower respiratory disease, usually pneumonia, is the cause of 20% of all paediatric mortality worldwide. Worldwide, pneumonia is the dominant cause of death in children.

The widely accepted estimate that the condition causes close to 2 million of the 10.5 million child deaths every year, based on data from many sources, is probably conservative. It also omits about 1 million neonatal deaths that are believed to be due to sepsis or pneumonia.

Management guidelines

The management guidelines for treatment of childhood pneumonia can significantly reduce overall pneumonia-specific mortality in children under 5 years; Sazawal and colleagues showed that pneumonia-specific mortality was reduced by 42% in this age group.

The diagnosis and management recommended here do not rule out integrated management of childhood illness (IMCI) guidelines. The diagnosis of pneumonia follows the steps taught in medical schools, and includes history taking, examination, and investigation.

Diagnosis of pneumonia

History taking

This should include:

- age of the child;
- season of the year;
- any underlying disease;
- any microorganisms currently circulating in the community;
- child's immunisation status, such as vaccines for measles, *Streptococcus pneumoniae,* and influenza virus if the child has an indication for these vaccines;
- exposure to tuberculosis.

Physical examination

The child should be examined for signs of respiratory illness and fever. Signs of respiratory illness are cough, increased respiratory rate, flaring of the nasal alae, grunting, in-drawing, and cyanosis.

The respiratory rate is best determined over a full 60-second period and inconsistencies require repeated observations. Respiratory patterns and rates in children are frequently modified by periodic behavioural and physiological factors. It is advisable to count the respiration before touching the child.

Important signs of pneumonia in a child less than 5 years of age are:

- nasal flaring (age <12 months);
- oxygen saturation less than 94%;
- tachypnoea;
- retractions.

The child may not have pneumonia if there is an absence of tachypnoea alone, or absence of all other signs of respiratory illness.

Tachypnoea may not be present in a child with pronounced retractions or other signs of increased labouring in breathing. The World Health Organization (WHO) defines pneumonia as tachypnoea above the threshold shown below in Table 1 and cough. If there is also in-drawing it becomes severe pneumonia; the presence of signs of severe illness such as cyanosis, convulsions, impaired consciousness, or inability to breastfeed children under 12 months old is classified as very severe pneumonia.

The severity of pneumonia should be assessed based on overall clinical appearance and behaviour, including an assessment of the child's degree of alertness and willingness to feed. Subcostal retractions and other evidence of increased work in breathing increase the likelihood of a more severe form of pneumonia.

A small proportion of patients under 5 years of age may present without signs of respiratory illness. In acutely ill and febrile children, pneumonia can present as pain referred to the abdomen or as fever without a source, and chest X-rays may be the only method of diagnosis.

Chest X-rays

These should not be done routinely but only in the following situations:

- for atypical clinical findings;

Table 1 World Health Organization age-specific criteria for tachypnoea

Age	Approximate normal respiratory rates (breaths/min)	Tachypnoea threshold (breaths/min)
2–12 months	25–40	50
1–5 years	20–30	40
≥5 years	15–25	20

Dr Evans Amukoye, Kenya Medical Research Institute, Centre for Respiratory Disease, Nairobi, Kenya.
Email: crde@todays.co.ke

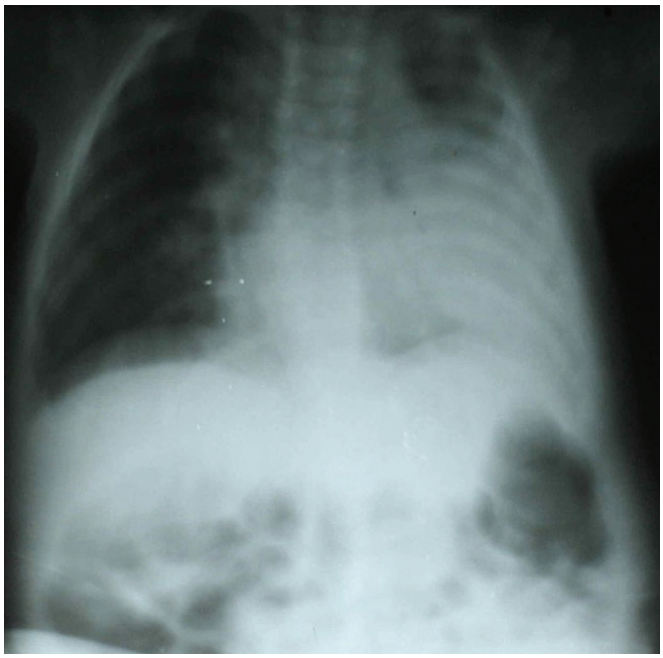

Figure 1 X-ray of pneumonia in a young child

- where complications, such as a pleural effusion are suspected.
- where pneumonia is not responding to antimicrobials.

The use of X-rays should be restricted as above because chest X-rays do not usually alter management decisions, and cannot not determine aetiology nor improve outcomes.

Investigations

Laboratory investigations are usually not necessary but can be done to rule out other conditions such as malaria. They can also be used to determine prognosis as children with evidence of other organ failures such as high urea, liver enzymes, or low haemoglobin have a poorer outcome. Blood cultures are not done routinely as the yield is very low but they may be helpful for patients with more severe, resistant, or other unusual forms of pneumonia. Their utility is, however, limited when antibiotics are administered prior to obtaining the specimen. The likelihood of a bacterial cause generally increases in a child with fever above 39ºC and white blood cell count (WBC) above 15000/mm^3, especially if it is above 20000/mm^3.

Treatment

The choice of antibiotic in the treatment of pneumonia is based on the age of the patient and severity of illness. In children aged 60 days to 5 years, high-dose amoxicillin (80–90 mg/kg/day) is to be used for 7–10 days when a bacterial cause for CAP (community-acquired pneumonia) is likely. This treatment will cover *S pneumoniae*, the most common aetiology for CAP for children in this age range. The dose depends on the sensitivity in a particular geographical region; a lower dose could suffice in some regions. For patients admitted for pneumonia, a combination of benzylpenicillin and gentamycin for severe pneumonia, alternatively chloramphenicol can be used. Children with severe malnutrition and neonates should be treated as having severe pneumonia even with mild disease.

For children aged 5 years and older, a macrolide should be used to treat CAP. This treatment will cover *Mycoplasma pneumoniae* and *Chlamydia pneumoniae*, the most common aetiologies of CAP for children in this age group. A macrolide may also cover *S pneumoniae*, the most common bacterial cause of CAP in all age groups. Treatment duration is 7 to 10 days, although a 5-day course of erythromycin, clarithromycin, or azithromycin may be used

Criteria for admission

Children should be admitted if they have the following:

- failed antibiotic treatment;
- a respiratory rate over 70/min or (where pulse oximeter is available) oxygen saturation consistently less than 91%;
- severely dehydrated or convulsing;
- inability to hydrate themselves orally;
- severe or very severe pneumonia;
- in the opinion of the doctor or the family, it is unsafe to send the child home.

A child not following the expected clinical course should be evaluated to exclude the following:

- alternative diagnosis;
- cardiac disease;
- pneumonia due to other organism such as tuberculosis, viral;
- HIV infection (pneumocyctic jerovenci pneumonia; lymphocytic interstitial pneumonia, Karposis sarcoma).
- bronchiectasis, foreign body inhalation;
- asthma;
- malaria etc.
- wrong choice of antibiotics;
- resistant organisms;
- complications (pleural effusion, pneumothorax).

Prevention

Vaccine

Immunisations that prevent CAP should be given to all children as follows:

- pentavalent vaccine, measles;
- conjugated pneumococcal vaccine (PCV7, Prevnar®) – this is not generally available and where it is available it is very expensive. We need to encourage our governments to acquire the vaccine either directly or through GAVI (the Global Alliance for Vaccines and Immunisation);
- annual influenza vaccine is advised for all children between 6–23 months of age, and children aged ≥6 months with certain risk factors including, but not limited to, asthma, cardiac disease, sickle cell disease, HIV, and diabetes).

Other measures

- Nutrition: protein and energy malnutrition should be treated as in 50% of all deaths in African children malnutrition is an underlying factor. Exclusive breastfeeding for 6 months should be encouraged and supplements of vitamins and trace elements such as zinc and vitamins A and D given.
- Hygiene: hand washing should be carried out, especially when exposed to individuals with respiratory infections.
- Reduction of indoor biomass fuel exposure and passive smoke exposure.
- Limiting exposure to other children.

Conclusion

In summary, pneumonia is a major childhood killer in Africa but it can easily be diagnosed using simple clinical signs and symptoms, treated using simple drugs, and prevented by vaccination, good nutrition, and hygiene. The use of case management guidelines for the treatment of childhood pneumonia can significantly reduce overall and pneumonia-specific mortality in children under 5 years.

More information on this subject can be found on http://www.guideline.gov/summary/summary.aspx?ss=15&doc_id=9690&nbr=5199

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Erratum

In the September 2008 issue of the *African Journal of Respiratory Medicine*, we published an article, 'Multidrug-resistant tuberculosis at the National Hospital, Abuja, Nigeria. We would like to point out that the name L Lawson in the list of authors was included in error. It should have read E A Dosumu, K Osagie, and A Shuaib.
The Editor apologises for any misunderstanding caused.