Title	Community Acquired Pneumonia in Children
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Community acquired pneumonia (CAP) in childhood

CAP can be defined as the presence of signs and symptoms of pneumonia (fever, cough, tachypnoea) in a previously healthy child due to an infection acquired outside hospital.

Key points:

1	Viral & bacterial pneumonia are indistinguishable clinically.
2	Children being discharged home do not need any investigations.
3	Antibiotics should be given if the diagnosis is clear, especially in children > 2yrs.
4	7 days of oral Amoxicillin is recommended, even in severe pneumonia.
5	IV antibiotics should only be used if oral will not be tolerated, or the child has septicaemia, empyema, abscess or necrosis.
6	If the child is feverish or unwell 48 hours after starting treatment, they must be re-evaluated for complications.

Exceptions to the guideline:

- Infants < 6 months of age.
- Severe pneumonia.
- Pneumonia secondary to bronchiolitis.
- Underlying cardiac / respiratory condition or immunocompromise.
- Unwell child: eg shock, septicaemia.

Clinical features:

- Fever, tachypnoea, difficulty breathing, cough, wheeze or chest pain.
- There are no distinguishing features between bacterial and viral pneumonia.
- Bacterial pneumonia should be considered in children with persistent fever > 38.5^0 with chest recession and tachypnoea.

Aetiology:

- Viruses account for about half of all cases of CAP, more in children < 2 years of age.
- One third of cases represent mixed infection (viruses + bacteria).
- *Strep. pneumoniae* = commonest bacterial cause.
- *Mycoplasma* is an important pathogen in all children (including pre-school).
- *Group A streptococci* & *Staph. aureus* are more likely than pneumococcal pneumonia to progress to empyema or ICU admission.

Investigations:

- Children who do not require admission to hospital should have no investigations.
- CRP, WCC & CXR do not reliably distinguish between viral and bacterial pneumonia.
- Blood culture should be taken if IV therapy is required.
- Throat swab / NPA should not be done routinely in mild-moderate CAP.
- Microbiological diagnosis should be attempted only in severe CAP requiring ICU.

Severity assessment:

Mild-moderate	Severe
Temperature < 38.5 RR < 50 Mild recession Taking full feeds, no vomiting	Temperature > 38.5 Tachycardia RR > 70 in infants, > 50 in older children Sats < 92% Severe difficulty breathing: recession, grunting, nasal flaring Apnoea, cyanosis Not feeding Signs of dehydration, CRT > 2 secs

Indications for admission to hospital:

- Severe disease.
- Underlying risk factors eg prematurity, cardiac or respiratory conditions, immunocompromise.
- Ability of parents / carers to manage the illness at home, and distance of home from hospital.
- Weak cry and abnormal response to parental stimulation.
- Complications eg pleural effusion.

Management

General measures:

- Antipyretics
- Oxygen to maintain sats > 92%.
- Fluids: enteral if tolerated, NG unless severely unwell. IV otherwise, with baseline & daily U&Es.
- Identify deterioration or other serious illness.
- How to access further healthcare & when to do so, ie safety net. Written or verbal information.

Antibiotics: Decisions:

1. Whether to treat with antibiotics.
2. Which antibiotic and by which route.
3. When to change to oral if IV is started.
4. Duration of treatment.

Antibiotic resistance is uncommon in the UK & the clinical impact is not currently significant.

- Children with a clear diagnosis of pneumonia should receive antibiotics as it is not possible to distinguish between viral & bacterial causes.
- Children < 2 yrs with mild symptoms of LRTI should not receive antibiotics, but need to be reviewed if symptoms persist. Pneumococcal immunisation increases confidence in this decision.

- Amoxicillin is recommended as first choice for all children with pneumonia. It is effective against most bacterial pathogens, is well-tolerated & cheap.
- Alternatives are Co-amoxiclav, Cefaclor, Erythromycin, Azithromycin & Clarithromycin.
- Macrolides can be added at any age if there is no response to 1st line therapy.
- Macrolides should be used if Mycoplasma or Chlamydia pneumonia is suspected.
- In pneumonia associated with influenza, Co-amoxiclav is recommended.

- Oral antibiotics are safe and effective for all children, even in severe CAP.

- IV antibiotics should be only be used :
  - when the child cannot tolerate oral fluids or absorption is in doubt (eg vomiting)
  - septicaemia
  - complications of pneumonia eg empyema, abscess, necrosis

  Amoxicillin is 1st choice. Co-amoxiclav, Cefotaxime, Cefuroxime, ceftriaxone are alternatives.

- There is no evidence for timing of IV to oral switch, consider when child is improving.

Complications & failure to improve:

If child remains feverish or unwell after 48 hours, re-evaluation is necessary. Ask:

- Is the patient on appropriate drug treatment at an adequate dosage?
- Is there a lung complication eg empyema or abscess?
- Does the patient have co-existent disease eg cystic fibrosis or immunocompromise?

Complications:

- Pleural effusions & empyema: ~1% of all CAP, up to 40% of those admitted to hospital.
- Necrotising pneumonia: predisposing factors: congenital cysts & sequestrations, bronchiectasis, neurological disorders & immunodeficiency, certain pneumococcal serotypes. CXR will raise suspicion of necrosis or abscess, & should be confirmed by CT. Prolonged IV antibiotics are required until fever settles.

- Septicaemia & metastatic infection: likely to require HDU/ICU care. Osteomyelitis or septic arthritis should be considered with staph. aureus infection.
- Haemolytic uraemic syndrome: consider if pallor, profound anaemia & anuria.
- Milder complications e.g. prolonged cough, abnormal chest shape & asthma have been reported.

Specific complications:

- *Staph aureus*: pneumatoceles, occasionally leading to pneumothorax. Detection of *S.aureus* warrants immunological investigation.
- *Mycoplasma*: rashes are most common. Rarely Stevens-Johnson syndrome, haemolytic anaemia, polyarthritis, pancreatitis, hepatitis, pericarditis, myocarditis, encephalitis, aseptic meningitis & acute psychosis.
- *Strep. pneumoniae*: empyema, necrosis, abscesses.

Indications for transfer to ICU:

- Respiratory failure requiring ventilatory support.
- Pneumonia complicated by septicaemia.
- Sats <92% in FiO2 > 60%.
- Rising RR& HR with severe respiratory distress & exhaustion.
- Recurrent apnoea or slow irregular breathing.

When should the child be reassessed?

Inform parents of features that suggest inadequate treatment & require medical review:

- Fever: high swinging or persistent fever (should start to settle within 48hrs of treatment).
- Effort of breathing: increased work of breathing and raised RR.
- Effect of breathing: the child is agitated & distressed.

In hospital: as above, plus vital signs.

- Agitation may be a sign of hypoxia.
- Look for signs of overwhelming infection & septicaemia.
- Examine for development of effusion / empyema, suggested by prolonged fever.

Follow-up:

- Follow-up CXRs are not necessary in previously healthy children who are recovering well. They should be considered in those with round pneumonia, collapse or persistent symptoms.
- Children with severe pneumonia, empyema or lung abscess should be followed up until they have recovered completely and CXR is near normal due to risk of fibrosis & bronchiectasis

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Reference:

British Thoracic Society guideline for community acquired pneumonia in childhood. *Thorax* 2011;66(Supp 2):ii1-23.