Pneumonia (Community Acquired) Guideline in Children

Emergency Medicine
Royal Hospital for Sick Children – Yorkhill
COULD THIS CHILD HAVE BRONCHIOLITIS, VIRAL INDUCED WHEEZE, CROUP, PERTUSSIS OR AN UPPER RESPIRATORY TRACT INFECTION? THEN THIS GUIDELINE DOES NOT APPLY

THIS GUIDELINE IS BASED ON CHILDREN WITHOUT EXISTING UNDERLYING PATHOLOGY (E.G. CYSTIC FIBROSIS SEE CF GUIDELINES). HAVE A LOW THRESHOLD FOR OBSERVATION, INVESTIGATION, TREATMENT AND ADMISSION IN CHILDREN WITH CO MORBIDITIES.

Community Acquired Pneumonia (CAP) can be defined clinically as the presence of signs and symptoms acute infection in the pulmonary parenchyma in a previously healthy child due to an infection which has been acquired outside hospital.

The following guideline is almost completely taken from the updated (2011) British Thoracic Society Guideline on community acquired pneumonia in children.

Children are regularly brought by their parents or are referred by primary care practitioners with symptoms and signs suggestive of pneumonia. Decisions we have to make include:

- What features of history and examination suggest pneumonia?
- What investigations, if any, are required?
- Which patients need admitted/ referred PICU?
- Who should get antibiotics and what sort should be prescribed?
- What complications of pneumonia should we be looking out for?
- What follow up if any should we recommend?

HISTORY AND CLINICAL FEATURES

The clinical features of CAP vary with the age of the child and tend not be very specific for diagnosis. Absence of rhino rhea or sore throat together with any combination of the following is more suggestive of pneumonia:

- Fever
- Tachypnoea
- Increased work of breathing
- Cough
- Chest pain
- Focal chest signs: crepitations or bronchial breathing

Age is a good predictor of the likely pathogens:

- Viruses alone are found as a cause in younger children in up to 50%.
- In older children, when a bacterial cause is found, it is most commonly strep pneumoniae followed by mycoplasma.

Bacterial pneumonia should be considered in children when there is persistent or repetitive fever >38.5oC together with chest recession and a raised respiratory rate.

A persistent, hacking cough can be seen with Mycoplasma

Abrupt onset of myalgias, arthralgia, headache, and fever suggest influenza or mycoplasm
• Is there any TB contact? Either direct contact with known cases or visitors from or travel to endemic areas. See appendix A

INVESTIGATIONS

X-RAY

• Chest radiography should not be considered a routine investigation in children thought to have community acquired pneumonia who are well enough to be discharged.
• Severe symptoms in children requiring admission would merit a chest x-ray
• Suspicion of complications such as pleural effusion would also be an indication for x-ray.
• A lateral x-ray should not be performed routinely.

OTHER INVESTIGATIONS

• Acute phase reactants are not of clinical utility in distinguishing viral from bacterial infections and should not be tested routinely.
• C reactive protein is not useful in the management of uncomplicated pneumonia and should not be measured routinely.
• Microbiological investigations should not be considered routinely in those with milder disease or those fit for discharge.
• Microbiological diagnosis should be attempted in children with severe pneumonia sufficient to require paediatric intensive care admission, or those with complications of CAP.
• Microbiological methods used should include:
  – Blood culture. Blood culture positivity is uncommon (<10%) of those with pneumococcal pneumonia.
  – Nasopharyngeal secretions and/or nasal swabs for viral detection by PCR and/or immunofluorescence.
  – Acute and convalescent serology for respiratory viruses, Mycoplasma and Chlamydia.

SEVERITY ASSESSMENT

• Auscultation revealing absent breath sounds with a dull percussion note should raise the possibility of a pneumonia complicated by effusion and should trigger a cxr.

• Patients whose oxygen saturation is 92% while breathing air should be treated with oxygen given by nasal cannulae, or face mask to maintain oxygen saturation >92%
### Pneumonia (community acquired)

<table>
<thead>
<tr>
<th>infants</th>
<th>Mild to moderate</th>
<th>Severe</th>
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<tbody>
<tr>
<td>Temperature &lt;38.5 C</td>
<td>Temperature &gt;38.5 C</td>
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<tr>
<td>Respiratory rate &lt;50 breaths/min</td>
<td>Respiratory rate &gt;70 breaths/min</td>
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<tr>
<td>Mild recession</td>
<td>Intermittent apnoea Grunting respiration</td>
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<tr>
<td>Taking full feeds</td>
<td>Not feeding</td>
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<tr>
<td>Tachycardia</td>
<td>Capillary refill time &gt;2 s</td>
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<th>older children</th>
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<th>Severe</th>
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<tr>
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<td>Temperature &gt;38.5 C</td>
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<tr>
<td>Respiratory rate &lt;50 breaths/min</td>
<td>Severe difficulty in breathing</td>
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<tr>
<td>Mild breathlessness</td>
<td>Signs of dehydration Tachycardia Capillary refill time &gt;2 s</td>
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</tr>
<tr>
<td>No vomiting</td>
<td>Sa02 &lt; 92% or cyanosed</td>
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### What are the indications for transfer to intensive care?

- When the pneumonia is so severe that the child is developing severe respiratory failure requiring assisted ventilation.
- A pneumonia complicated by septicaemia.

### Key features that suggest a child requires transfer includes:

- Failure to maintain oxygen saturation >92% in high flow oxygen
- Shock.
- Rising respiratory and pulse rate with clinical evidence of severe respiratory distress and exhaustion, with or without a raised arterial carbon dioxide tension.
- Recurrent apnoea or slow irregular breathing.
MANAGEMENT

- Nasogastric tubes may compromise breathing. If use cannot be avoided, the smallest tube should be passed down the smallest nostril.
- Chest physiotherapy is not beneficial and should not be performed in children with pneumonia.

Antibiotic management

- All children with a clinical diagnosis of pneumonia should receive antibiotics as bacterial and viral pneumonia cannot reliably be distinguished from each other.
- Children aged <2 years presenting with mild symptoms of lower respiratory tract infection do not usually have pneumonia and need not be treated with antibiotics but should be reviewed if symptoms persist. A history of conjugate pneumococcal vaccination is reassuring.
- In pneumonia associated with influenza, co-amoxiclav is recommended (may be staph).
- Antibiotics administered orally are safe and effective for children presenting with even severe CAP and are recommended.

- **Recommended Oral antibiotics for CAP** see “**Empirical Antibiotic Therapy in Children**” guideline

<table>
<thead>
<tr>
<th>AGE</th>
<th>AMOXICILLIN FOR 7 DAYS</th>
<th>AZITHROMYCIN FOR 3 DAYS IF TRUE PENICILLIN ALLERGY</th>
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<td>&gt; 5</td>
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- **Recommended iv antibiotics for CAP**
  - Cefuroxime, if septic add gentamicin (if suspicious of atypical pneumonia add clarithromycin).

- Intravenous antibiotics should be used in the treatment of pneumonia in children when the child is unable to tolerate oral fluids or absorb oral antibiotics (e.g. because of vomiting) or presents with signs of septicaemia or complicated pneumonia.

Advice for a child with CAP who does not require hospital admission comprises advising parents and carers about:

- Management of fever
  - Use of antipyretics
  - Avoidance of tepid sponging
- Preventing dehydration
  - Identifying signs of deterioration
  - Identifying signs of other serious illness
- How to access further healthcare.

(Over-the-counter remedies: No over-the-counter cough medicines have been found to be effective in pneumonia)
COMPLICATIONS

Children with CAP in the community who attended the department should be reassessed if they are not responding to treatment, e.g. persistence of fever 48 hours after initiation of treatment, increased work of breathing or if the child is becoming distressed or agitated.

Pleural Effusions/Emphyema

May develop in 1% of patients with CAP and incidence of empyema is increasing. A clinician should consider empyema when a child presents with a persistent fever beyond 7 days or a persisting fever despite adequate antibiotic treatment for 48 hours. A chest x-ray will show fluid in the pleural space +/- ultrasound and respiratory team referral to decide on if and mode of pleural drainage employed.

Lung Abscess

Rare but important complication may be suggested by CXR. Certain groups of patients such as those with congenital cysts, sequestrations, bronchiectasis, neurological disorders and Immunodeficiency are thought to be more prone. Referral to respiratory team and CT chest will be necessary.

Septicaemia and metastatic infection

Children may have pneumonia but also show signs of sepsis (these children usually need PICU). Metastatic infection can rarely occur as a result of the septicaemia associated with pneumonia e.g. osteomyelitis or septic arthritis should be considered, particularly with S aureus infections.

Haemolytic uraemic syndrome

S pneumoniae is a rare cause of haemolytic uraemic syndrome. Will be suggested by pallor, severe anaemia and anuria.

Complications associated with Mycoplasma pneumonia

Various complications in association with M pneumoniae have been reported. Rashes are common, the Stevens Johnson syndrome occurs rarely, and haemolytic anaemia, polyarthritis, pancreatitis, hepatitis, pericarditis, myocarditis and neurological complications including encephalitis, aseptic meningitis, transverse myelitis and acute psychosis have all been reported.
**FOLLOW UP**
Follow-up radiography is not required in those who were previously healthy and who are recovering well, but should be considered in those with a round pneumonia, collapse on CXR if it was done or persisting symptoms/signs are present.

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**APPENDIX A**

- Pulmonary Tuberculosis is considered separately from community acquired pneumonia. It is a rare presentation to the department.

- A study in 2005 comparing children who had pulmonary TB with those who had persistent (>2/52) respiratory symptoms presenting to a healthcare facility showed:
  - **Persistent, non-remitting cough** was reported in 15/16 (93.8%) children with tuberculosis and in 2/135 (1.5%) children without tuberculosis, indicating a specificity of 98.5% (135/137).
  - **Persistent fatigue of recent onset** was also sensitive (13/16, 81.3%) and specific (134/135, 99.3%).
  - **Persistent fever and/or chest pain** were exclusively reported in children with tuberculosis, but were present in only 4/16 (25.0%) children without tuberculosis.

**Around 50% of children with TB have been reported to have no symptoms**

- Suspicion should also be raised in a patient with weight loss, cough and fever who does not respond to antibiotic therapy for acute respiratory disease.

- Contact with known cases or visitors from or travel to endemic areas in children with respiratory symptoms and or signs would be an indication for a CXR.

- Remember to ask about and check for marks of BCG vaccination.

Any patient with X-ray changes suggestive of TB should be referred to the TB clinic the next week for further investigation. Contact Christine Kerr via Email christine.kerr@glasgow.ac.uk copy the Email to Dr James Paton who runs the clinic too please James.Paton@glasgow.ac.uk. Let them know the patients details, date of attendance and reason for referral.