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Pneumonia Guidelines

Table of content

Definition Symptoms	Investigation Radiographic features Treatment	Management Plan	Severity Index	Severity Index
Page 1	Page 2	Page 3	Page 4	Page 4

Definition

Pneumonia is an infection of the lung parenchyma, in which consolidation of the affected part and a filling of the alveolar air spaces with exudate, inflammatory cells, and fibrin is characteristic.

Pneumonia is classified as community-acquired or hospital-acquired, based on different microbial causes and patient factors, which need different management strategies.

Community-acquired pneumonia

Defined as one of the most common infectious diseases and a major cause of mortality and morbidity worldwide. It can be caused by bacterial or viral organisms.

Pneumonia that is acquired outside hospital and Pneumonia that develops in a nursing home resident is included in this definition.

Hospital-acquired pneumonia

Pneumonia that develops 48 hours or more after hospital admission and that was not incubating at hospital admission. pneumonia that develops in hospital after intubation (ventilator-associated pneumonia) is included in this definition.

Symptoms & signs of Pneumonia

The signs and symptoms of pneumonia include:

Productive cough (green, yellow or even bloody mucus) with at least one other lower respiratory tract symptom as below:

1. Fever, sweating and shaking chills.
2. Shortness of breath
3. Rapid, shallow breathing

Pneumonia

4. Sharp or stabbing chest pain that gets worse with deep breath or cough.
5. Loss of appetite, low energy, and fatigue
6. Nausea and vomiting, especially in small children
7. Confusion, especially in older people.

Investigation

1. blood workup to confirm the infectious status which may include:
 - white-blood-cell count.
 - C-reactive protein level.
 - Procalcitonin (in case of sepsis).
2. chest x-ray
 - which considered first line investigation to confirm the diagnosis and to assess severity and complications.
3. C Tchest
 - For further assessment of complications. Also used in assessment of causes in recurrent (non-resolving) infection.

Radiographic features

A. Chest x-ray

characteristically show air bronchogram (air-filled bronchi running through pus-filled alveoli). See figure 1. Also, may detected pleural collection and cavitation.

B. CT chest

Signs of air space opacification and consolidation assessed more accurately. See figure 2. complications can be seen earlier than a chest x-ray (lung necrosis, cavitation and pleural effusion).

Treatment

In most cases, antibiotic therapy is all that is needed. This may be oral or intravenous. Give oral antibiotics first line if the person can take oral medicines, and the severity of their condition does not require intravenous antibiotics. The severity can be stratified with the Pneumonia Severity Index (PSI) See figure 3 or the more simplified CURB65-score See figure 4.

For people presenting with symptoms of lower respiratory tract infection in primary care, consider a point of care C-reactive protein test if after the diagnosis of pneumonia

has not been made and it is not clear whether antibiotics should be prescribed. Use the results of the C-reactive protein test to guide antibiotic prescribing in people without a clinical diagnosis of pneumonia as follows:

- Do not routinely offer antibiotic therapy if the C-reactive protein concentration is less than 20 mg/liter.
- Consider a delayed antibiotic prescription (if symptoms worsen) if the C-reactive protein concentration is between 20 mg/liter and 100 mg/liter.
- Offer antibiotic therapy if the C-reactive protein concentration is greater than 100 mg/liter.

Severe community-acquired pneumonia in children and young people

Features of severe community-acquired pneumonia in children and young people include difficulty breathing, oxygen saturation less than 90%, raised heart rate, grunting, very severe chest indrawing, inability to breastfeed or drink, lethargy and a reduced level of consciousness.

Safe discharge from hospital

Do not routinely discharge patients with community-acquired pneumonia if in the past 24 hours they have had 2 or more of the following findings:

1. Temperature higher than 37.5°C
2. Respiratory rate 24 breaths per minute or more
3. Heart rate over 100 beats per minute
4. Systolic blood pressure 90 mmhg or less
5. Oxygen saturation under 90% on room air
6. Abnormal mental status
7. Inability to eat without help.

Management Plan

- A. Community acquired pneumonia in adults:
 1. **Laboratory investigations:**
 - a. Microbiology tests:
 - Not indicated for mild cases.
 - For sever cases, below can be done:
 - Blood culture.
 - Urinary antigens for L. Pneumophila & S. Pneumonia.
 - For selected cases depending on epidemiology & risk factors, the below can be done:
 - sputum rapid molecular test for M. tuberculosis.
 - M. tuberculosis, nasopharyngeal swab for influenza viruses and SARS-CoV-2.

Pneumonia

- HIV testing in settings with high HIV prevalence and in case of recurrent and/or severe pneumonia.
- b. Other laboratory tests:
 - To determine disease severity:
 - blood urea nitrogen.
 - White blood cell count.
 - To Differentiate bacterial and viral:
 - CRP and/or Procalcitonin.

Note: Blood PH & gases can be done only in severe cases.

2. Radiology investigation:

Chest X-ray not necessary in mild cases. Radiologic appearance cannot be used to accurately predict pathogens.

3. Medication treatment:

a. Mild to moderate cases:

First choice:

- Amoxicillin 1 g q8h Oral or
- Phenoxymethylpenicillin (as potassium) 500 mg (800 000 IU) q6h Oral.

Second choice:

- Amoxicillin + clavulanic acid 875 mg+125 mg q8h Oral or
- Doxycycline 100 mg q12h Oral.

b. Severe cases:

First choice:

- Cefotaxime 2 g q8h IV/IM or
- Ceftriaxone 2g q24h IV (1g q24hIM).
- IFCURB-65 \geq 2, Clarithromycin 500 mg q12h ORAL (or IV).

Second Choice:

- Amoxicillin + clavulanic acid 1 g+200 mg q8h IV (or 1 g + 200 mg q6h).
- IF CURB-65 \geq 2, Clarithromycin 500 mg q12h ORAL (or IV).

B. Community acquired pneumonia in children:

1. Laboratory investigations:

Please refer to the Laboratory investigations in adults.

2. Radiology investigations:

Please refer to the Radiology investigations in adults.

3. Medication treatment:

a. Mild to moderate cases:

- Amoxicillin 80-90 mg/kg/day
- ORAL- Oral weight bands:

3-<6kg	250mg q12h
6-<10kg	375mg q12h
10-<15kg	500mg q12h
15-<20kg	750mg q12h
\geq 20kg	500mg q8h or 1 g q12h

b. Severe cases:

First choice:

- Amoxicillin 50 mg/kg/dose IV/IM \leq 1wk of life: q12h.
>1wk of life: q8h.
- Or Ampicillin 50 mg/kg/dose IV/IM \leq 1wk of life: q12h.
>1wk of life: q8h.
- Or Benzylpenicillin 30 mg/kg/dose (50 000 IU/kg/dose) q8h.
- Combined with Gentamicin IV/IM

Neonates: 5 mg/kg/dose q24h.

Children: 7.5 mg/kg/dose q24h.

◦ Second choice (If NO Clinical Response to First Choice after 48-72hours):

- Cefotaxime 50 mg/kg/dose q8h IV/IM or
- Ceftriaxone 80 mg/kg/dose q24h IV/IM.

4. Severity Assessment and Consideration:

• Children with pneumonia Should be treated with oral amoxicillin at home with home care advice.

• Pneumonia is diagnosed on either:

◦ Fast breathing (respiratory rate > 50 breaths/minute in children aged 2-11 months; resp rate > 40 breaths/min in children aged 1-5 years).

◦ Chest indrawing.

• Children with severe pneumonia (or a child with pneumonia who cannot tolerate oral antibiotics) Should be admitted to hospital and treated with intravenous antibiotics.

• Severe pneumonia is characterized by:

- Signs of pneumonia:
- Fast breathing (+/- chest indrawing).
- A general danger sign:
- Inability to breastfeed or drink.
- Convulsions.
- Lethargy or reduced level of consciousness.

ICD codes

CPT code	Description
J12	Category for Viral pneumonia
J13	Pneumonia due to Streptococcus pneumoniae
J14	Pneumonia due to Hemophilus influenzae
J15	category for Bacterial pneumonia
J18.0	Bronchopneumonia, unspecified organism
J18.1	Lobar pneumonia, unspecified organism
J18.9	Pneumonia, unspecified organism

Pneumonia

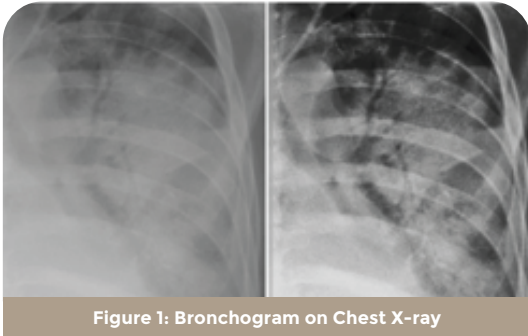


Figure 1: Bronchogram on Chest X-ray

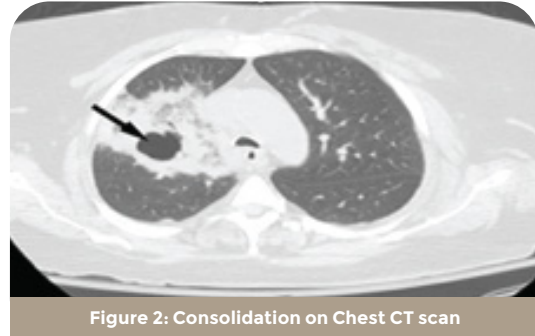


Figure 2: Consolidation on Chest CT scan

PSI PNEUMONIA SEVERITY INDEX

FINE MJ ET AL: A PREDICTION RULE TO IDENTIFY LOW-RISK PATIENTS WITH COMMUNITY ACQUIRED PNEUMONIA. NEJM 1997;336:243

Demographics	Co-morbidities	Physical exam / vital signs	Demographics
Age (1 Point per year) Male Yr Female Yr - 10 Nursing home residency +10	Neoplasia +30 Liver disease +20 CHF +10 Cerebrovascular disease +10 Renel disease +10	Mental confusion +20 Respiratory rate +20 SBP +20 Temperature +15 Tachycardia +15	Arterial pH +30 BUN +20 Sodium +20 Glucose +10 Hematocrit +10 Pleural effusion +10 Oxygenation +10



Risk class (Points)	Mortality (%)	Recommended site of care
I (<50)	0.1	Outpatient
II (51-70)	0.6	Outpatient
III (71-90)	2.8	Outpatient or brief inpatient
IV (91 - 130)	8.2	Inpatient
V (>130)	29.2	Inpatient

as a site-of-care tool. BUN, blood urea nitrogen; CHF, chronic heart failure; SBP, systolic blood pressure.

Figure 3: PSI (Pulmonary Severity Index)

Pneumonia

CURB-65	Clinical Feature	Points
C	Confusion	1
U	Urea > 7mmol/L	1
R	RR ≥ 30	1
B	SBP ≤ 90 mm Hg OR DBP ≤ 60 mm Hg	1
65	Age > 65	1

CURB-65 Score	Risk Group	30-day mortality	Management
0-1	1	1.5%	Low risk, Consider home treatment
2	2	9.2%	Probably admission vs close outpatient management
3-5	3	22%	Admission, manage as severe

Figure 4: CURB65- score

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