



Pneumonia in Children

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What is pneumonia ??

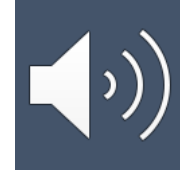


- Pneumonia is an acute infection of the pulmonary parenchyma.
- The term “**Lower Respiratory Tract Infection**” (LRTI) may include pneumonia, bronchiolitis and / or bronchitis.
- **Bronchopneumonia**: a patchy consolidation involving one or more lobes, usually involves the dependent lung zones (basal).



- **Interstitial pneumonia** : patchy or diffuse inflammation involving the interstitium is characterized by infiltration of lymphocytes and macrophages.
- **Congenital pneumonia**, presents within the first 24 hours after birth.

Epidemiology:



- According to WHO: about 150 million cases of pneumonia occur worldwide each year in children younger than 5 years.
- 20 million cases classified as sufficiently severe to require hospital admission.



➤ **Classifications:**

✓ **Anatomical:**

lobar or lobular, bronchopneumonia and interstitial pneumonia.

✓ **Etiology:**

Viral or Bacterial

Lobar Pneumonia



- Affecting one or more lobes, or part of a lobe of the lung.
- Bronchi not primarily affected and remain air filled -> air bronchograms; generally no volume loss
- Less common due to early treatment
- DDX: Aspiration and Pulmonary Embolus

Lobar Pneumonia



Pathogens

S. pneumoniae

Others

S. aureus

H. influenzae

Fungal



Round Pneumonia

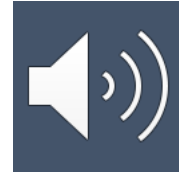
S. pneumoniae

Klebsiella

Any pneumonia in
children

Atypical Measles

Bronchopneumonia



Primarily affects bronchi and adjacent alveoli -> multifocal patchy opacities

Volume loss may be present as bronchi filled with exudate



Pathogens

S. aureus

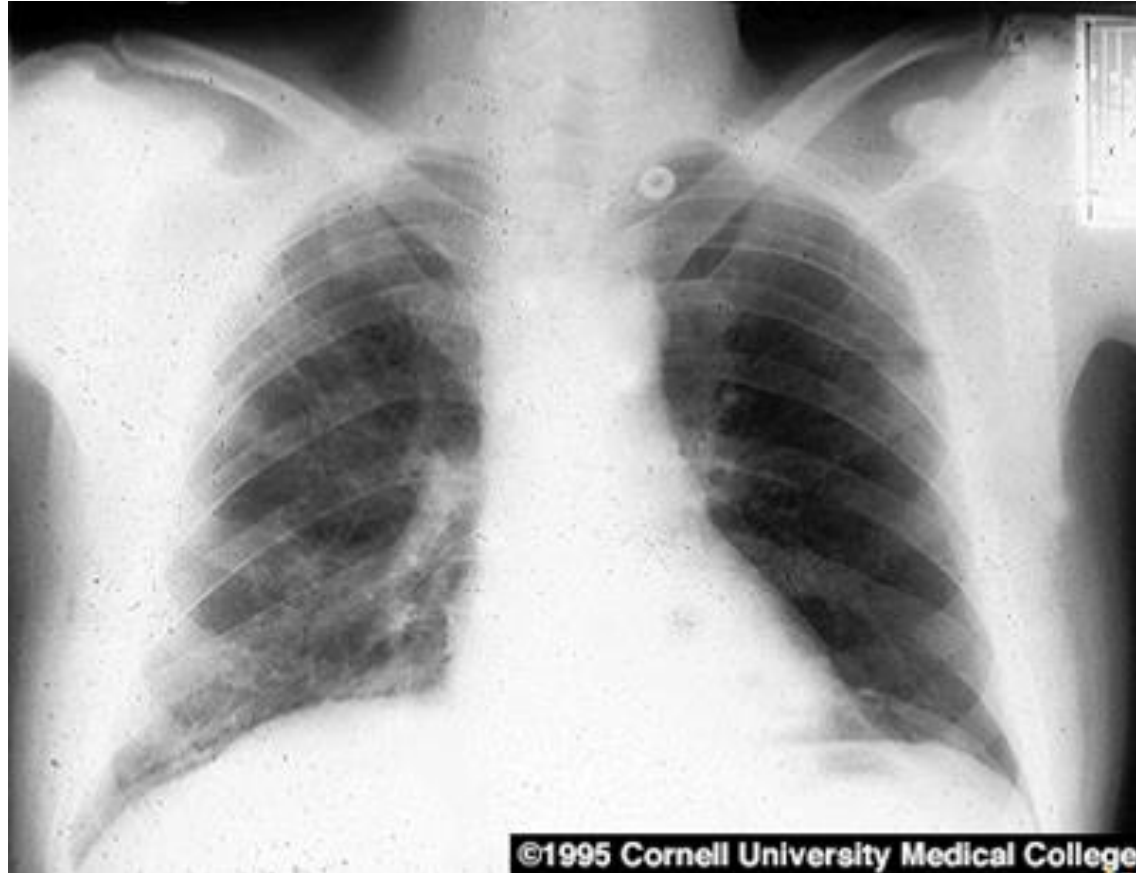
S. pneumoniae

Gram

negatives

Mycoplasma

Mycoplasma



Among the most common lower respiratory infections worldwide.

Ages 5-20 yrs

Gradual onset of headache, malaise, fever, sore throat, and cough



Cavitary lesions- pneumatocele



Can occur in 50% of Children

Pathogens

S. aureus

S. pneumoniae

H. influenzae

Gram negative
TB & fungal



✓ *Etiology:*

Viral: RSV, Influenza, parainfluenza or adenovirus.



Bacterial:

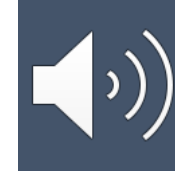
- *1st 2 months*: the common agents include: *klebsiella, E. Coli and staphylococci.*
- *3months- 3 years*: *S pneumonia, H influenza and staphylococci.*
- *After 3 years*: common bacteria include *S pneumonia and staphylococci.*
- *Atypical organism*: *Chlamydia sps and Mycoplasma.*
- *Pneumocystis carinii*: causes pneumonia in immunocompromized children.



Clinical Features:

- **Onset:** May be insidious starting with URTI or may be acute with high fever, dyspnea and respiratory distress.
- Can present with acute abdominal pain, referred from the pleura.
- **O/E:** signs of respiratory distress:
 - Flaring of alae nasi
 - retraction of lower chest and intercostal spaces.

Signs of Respiratory Distress



1. Tachypnea, respiratory rate, breaths/min (WHO definition)

Age 0–2 months: >60

Age 2–12 months: >50

Age 1–5 Years: >40

Age >5 Years: >20

2. Dyspnea

3. Retractions (suprasternal, intercostals, or subcostal)

4. Grunting

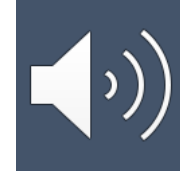
5. Nasal flaring

6. Apnea

7. Altered mental status

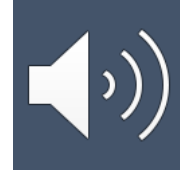
8. Pulse oximetry measurement ,90% on room air

O/E:

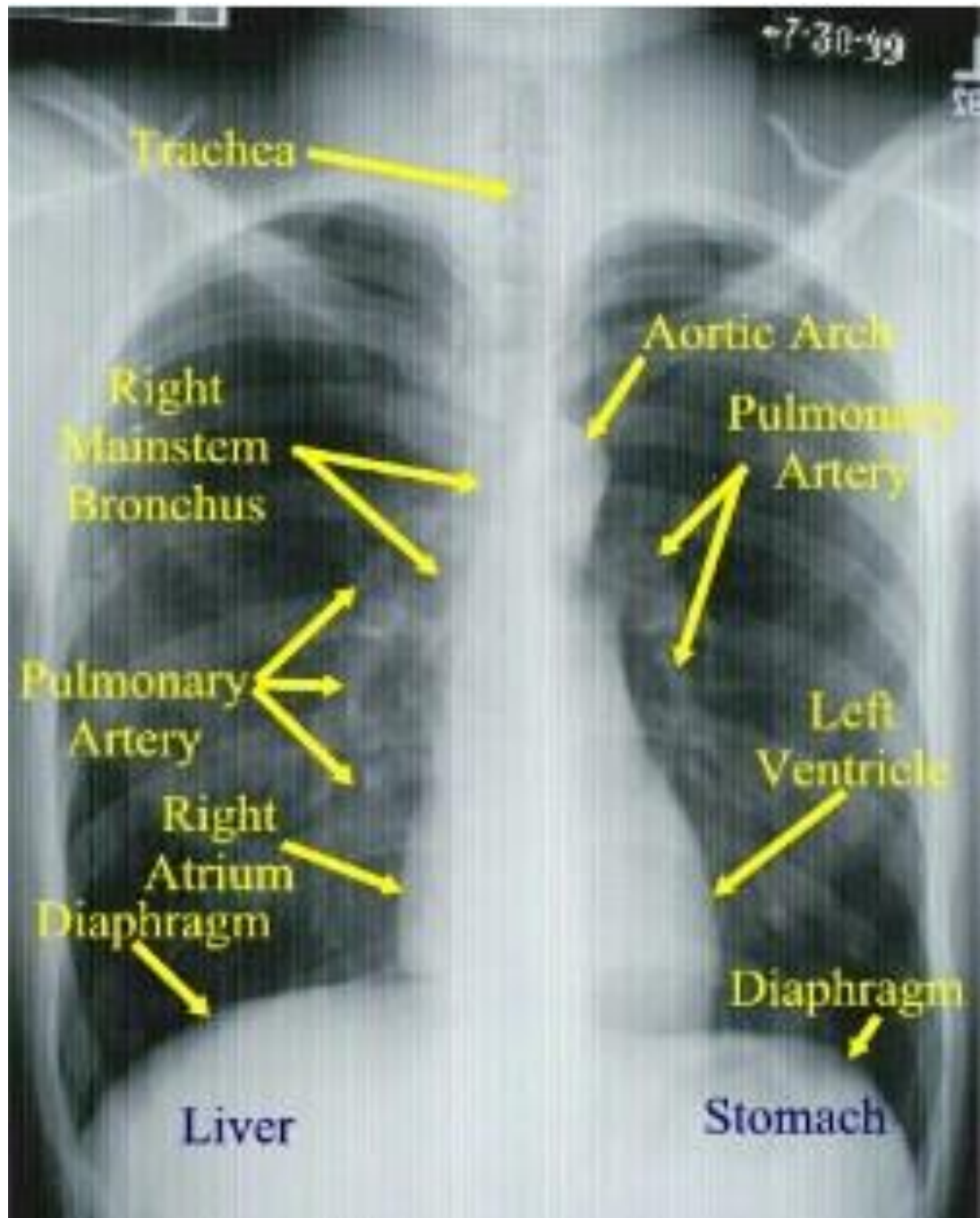


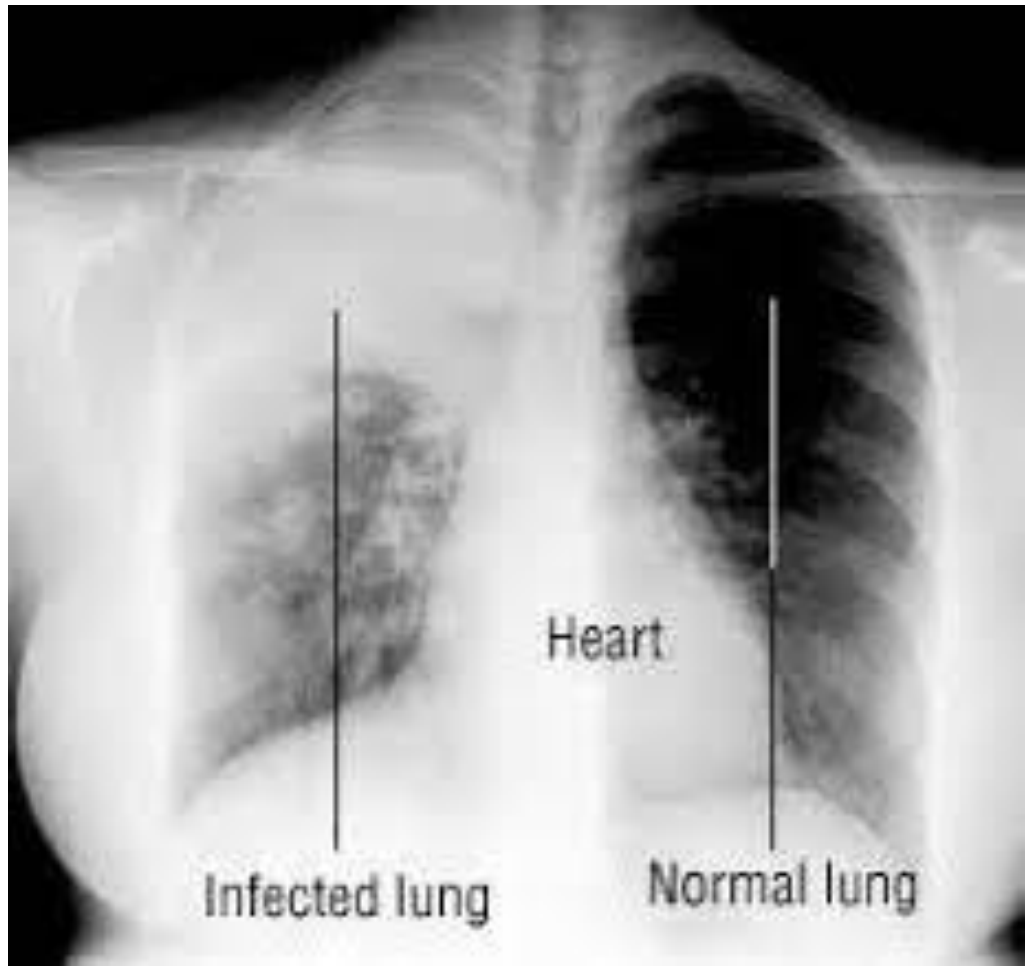
- Signs of consolidation: bronchial breathing
Increased tactile vocal fremitus
dull percussion note.

Diagnosis:



- **CXR:** confirms the diagnosis and may indicate a complication such as pleural effusion or empyema.
- **Viral pneumonia:** hyperinflation with bilateral interstitial infiltrates and peribronchial cuffing.
- **Pneumococcal pneumonia:** confluent lobar consolidation.
- **Staphylococci:** Cause pneumatocele as well.



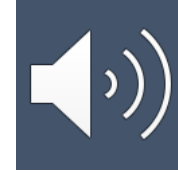


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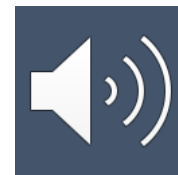
Bloods:



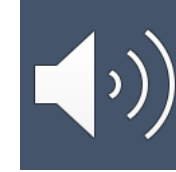
- **Peripheral WBC count:** differentiates viral from bacterial.
- *Viral pneumonia:* WBC count can be NL or elevated but not higher than 20,000 with lymphocytosis.
- *Bacterial pneumonia:* is often associated with an elevated WBC count 15,000 – 40,000 with neutrophilia.

- **Blood CX:** should not be routinely performed in nontoxic, fully immunized children.
- should be obtained in children who fail to demonstrate clinical improvement and in those who have progressive symptoms or clinical deterioration after initiation of antibiotic therapy

- **CRP and ESR**

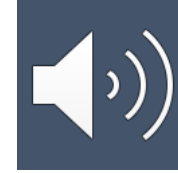


Others



- Viral culture, PCR or antigen isolation in respiratory secretion (NPA).
- Bacterial: sputum culture , ?? Value in children.
- Mycoplasma: IgM titers.

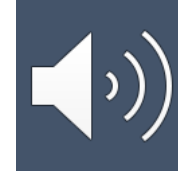
Complications Associated With Pneumonia



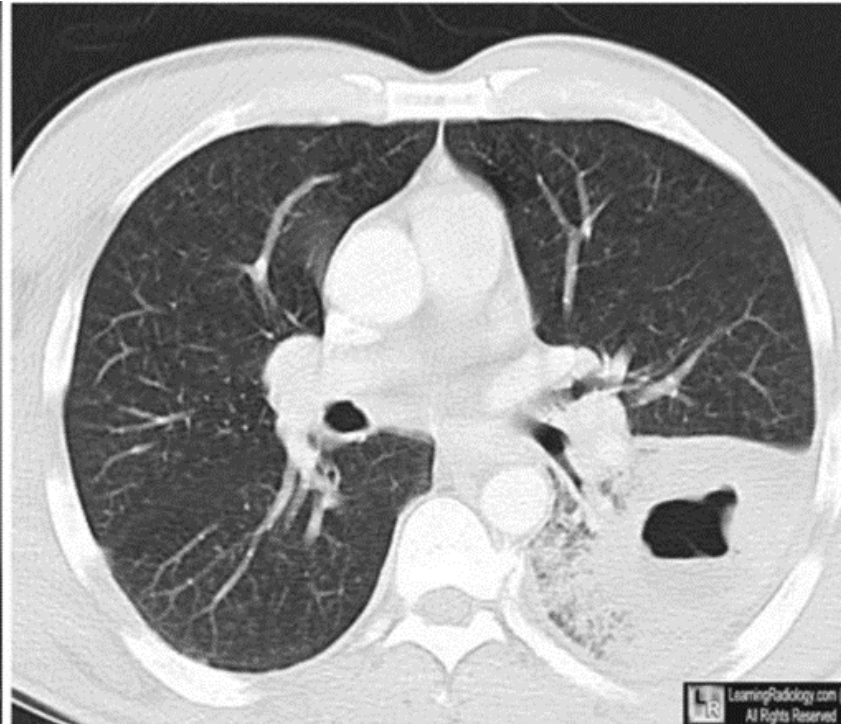
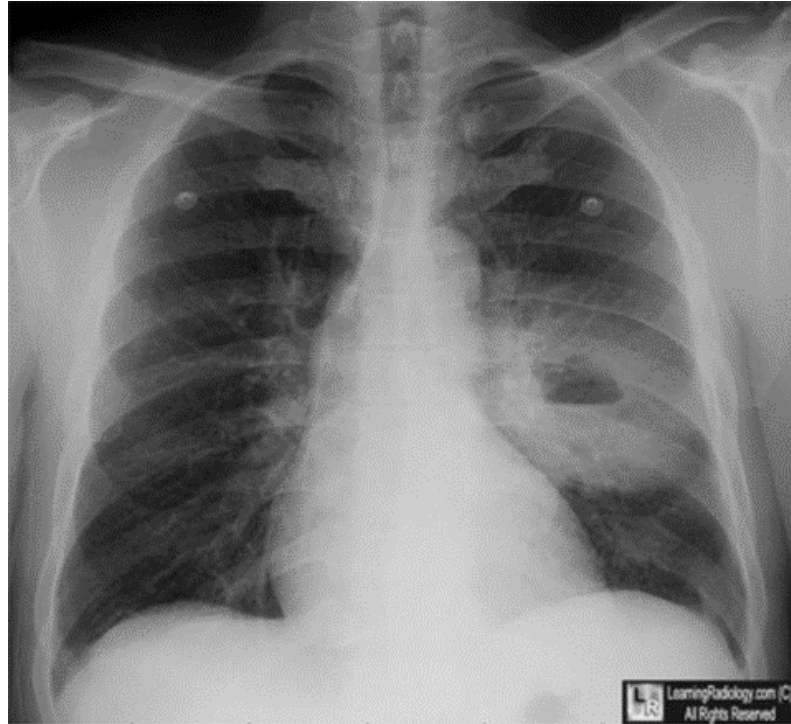
Pulmonary

- Pleural effusion or empyema
- Pneumothorax
- Pneumatocele: often resolve spontaneously or may lead to pneumothorax
- Lung abscess
- Bronchopleural fistula
- Necrotizing pneumonia
- Acute respiratory failure

Pleural effusion

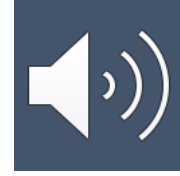


Lung abscess



Metastatic

- Meningitis
- Central nervous system abscess
- Pericarditis
- Endocarditis
- Osteomyelitis
- Septic arthritis Systemic



Systemic

- inflammatory response syndrome or sepsis
- Hemolytic uremic syndrome

Treatment: IDSA GUIDELINES

The Pediatric Infectious Diseases Society and the Infectious Diseases Society of America



- *When Does a Child or Infant With CAP Require Hospitalization?*
 - *Children and infants who have moderate to severe CAP:*
respiratory distress and hypoxemia (sustained saturation of peripheral oxygen [SpO₂] <90 % at sea level. (strong recommendation; high-quality evidence)
 - *Infants less than 3–6 months of age with suspected bacterial CAP* are likely to benefit from hospitalization. (strong recommendation; low-quality evidence)



Continue..

- Children and infants with suspected or documented CAP caused by a pathogen with increased virulence, such as community-associated methicillin-resistant *Staphylococcus aureus* (MRSA) should be hospitalized.

(strong recommendation; low-quality evidence)

- Children and infants for whom there is concern about careful observation at home or who are unable to comply with therapy or unable to be followed up should be hospitalized.

(strong recommendation; low-quality evidence)

In-Patient management



- Adequate Hydration
- Oxygenation
- Antipyretics and pain control
- Monitoring of :
 - . RR
 - . WOB
 - . Temperature
 - . HR
 - . Oxygen saturation

ANTI-INFECTIVE TREATMENT



□ Inpatient:

- *presumed bacterial pneumonia:*
 - Ampicillin or penicillin G
 - Alternatives: ceftriaxone or cefotaxime
 - Addition of vancomycin or clindamycin for suspected CA-MRSA

MX- inpatients



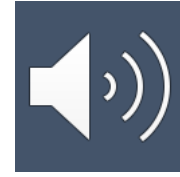
- *Presumed atypical pneumonia:*
 - Azithromycin (in addition to B-lactam, if diagnosis of atypical pneumonia is in doubt)
 - Alternatives: Clarithromycin or erythromycin

Outpatient TTT of pneumonia



- *Presumed bacterial pneumonia*
 - Amoxicillin orally (90 mg/kg/day) or amoxicillin clavulanate

- *Presumed atypical pneumonia*
 - Azithromycin, clarithromycin or erythromycin



THANK YOU