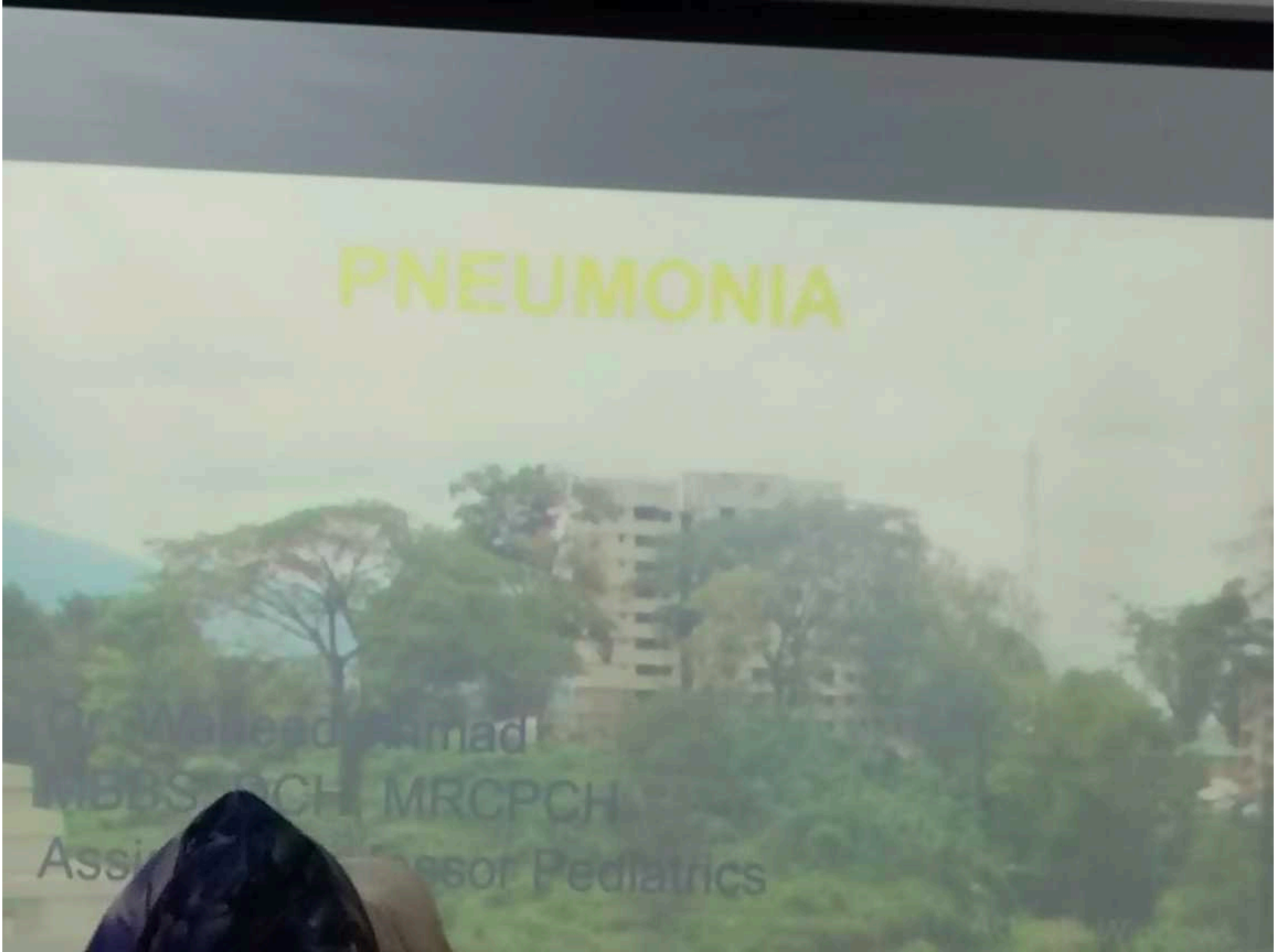
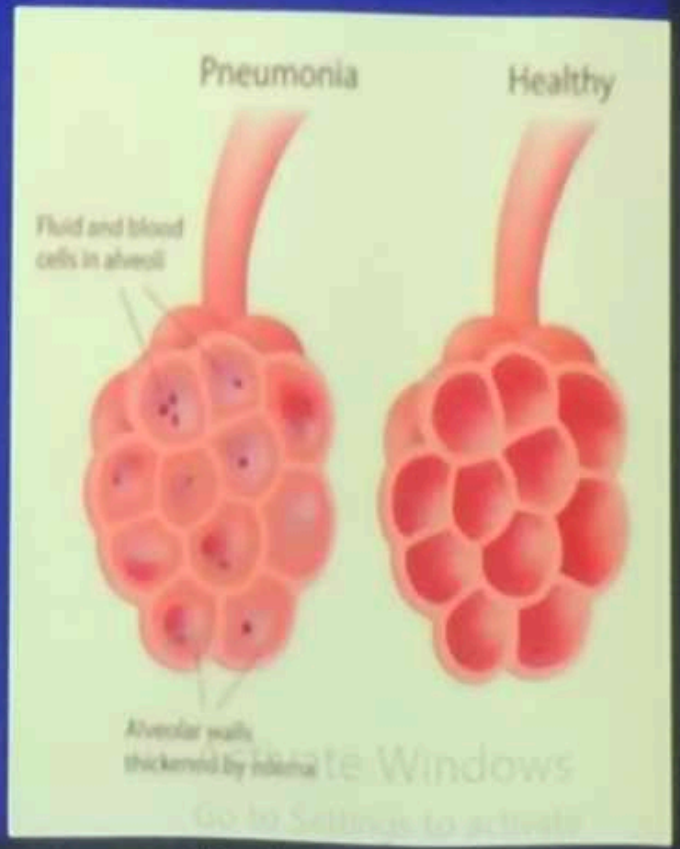

PNEUMONIA

DEFINITION

- "Inflammation and consolidation of lung tissue due to an infectious agent"

- COSOLIDATION = 'Inflammatory induration of a normally aerated lung due to the presence of cellular exudative in alveoli'



Factors that predispose to Pneumonia

Reduced host defences against bacteria

- Reduced immune defences (e.g. corticosteroid treatment, diabetes, malignancy)
- Reduced cough reflex (e.g. post-operative)
- Disordered mucociliary clearance (e.g. anaesthetic agents, cystic fibrosis)
- Bulbar or vocal cord palsy

Factors that predispose to Pneumonia

Aspiration of nasopharyngeal or gastric secretions

- Immobility or reduced conscious level, cerebral palsy patients.
- Vomiting, dysphagia, achalasia or severe reflux
- Nasogastric intubation

Bacteria introduced into lower respiratory tract

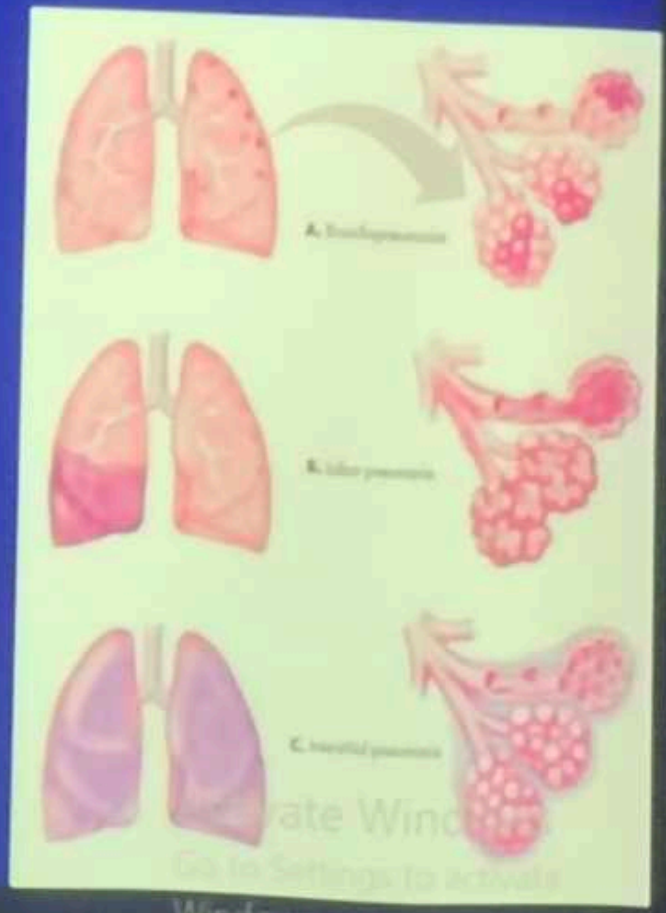
- Endotracheal intubation/tracheostomy
- Infected ventilators/nebulisers/bronchoscopes
- Dental or sinus infection

ANATOMICAL CLASSIFICATION

1. **Bronchopneumonia** affects the lungs in patches around bronchi

1. **Lobar pneumonia** is an infection that only involves a single lobe, or section, of a lung.

1. **Interstitial pneumonia** involves the areas in between the alveoli



CLINICAL CLASSIFICATION

Community Acquired - Typical/Atypical/Aspiration

Nosocomial- HAP,VAP,HCAP

Pneumonia in Immunocompromised host

Community Acquired Pneumonia (CAP)

DEFINITION:

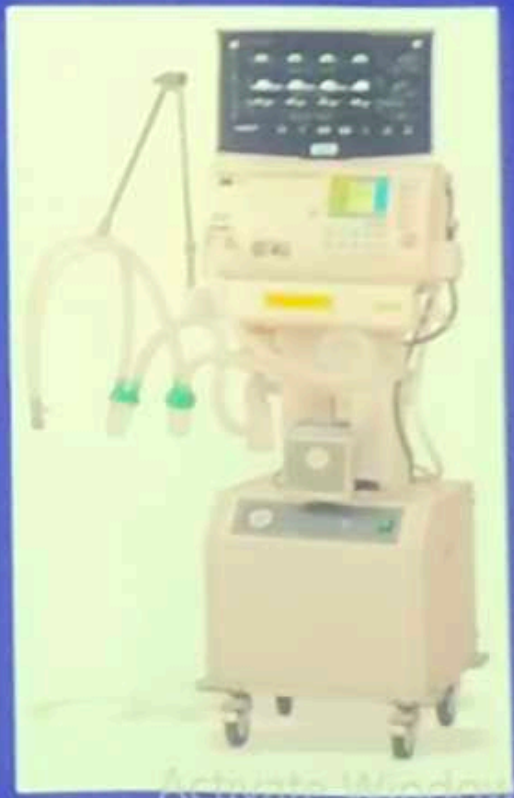
- In a patient not hospitalized or residing in Local facility prior to admission

Hospital Acquired pneumonia - HAP

- HAP is defined as pneumonia that occurs 48 hours or more after admission, which was not incubating at the time of admission.

Ventilator Associated Pneumonia- VAP

- VAP refers to pneumonia that arises more than 48–72 hours after endotracheal intubation .



Health Care Associated Pneumonia HCAP

HCAP includes any patient

- Who was hospitalized in an acute care hospital for 2 or more days within 90 days of the infection
- Resided in a nursing home or long-term care facility
- Received recent i.v antibiotic therapy, chemotherapy, or wound care within the past 30 days of the current infection
- Attended a hospital or hemodialysis clinic

ATYPICAL PNEUMONIA - Why 'Atypical'?

Clinically

- Subacute onset
- Fever less common or intense
- Minimal sputum

Microbiologically

- Sputum does not reveal a predominant microbial etiology on routine smears (Gram's stain, Ziehl-Neelsen) or cultures

ATYPICAL PNEUMONIA - Why 'Atypical'?

Radiologically

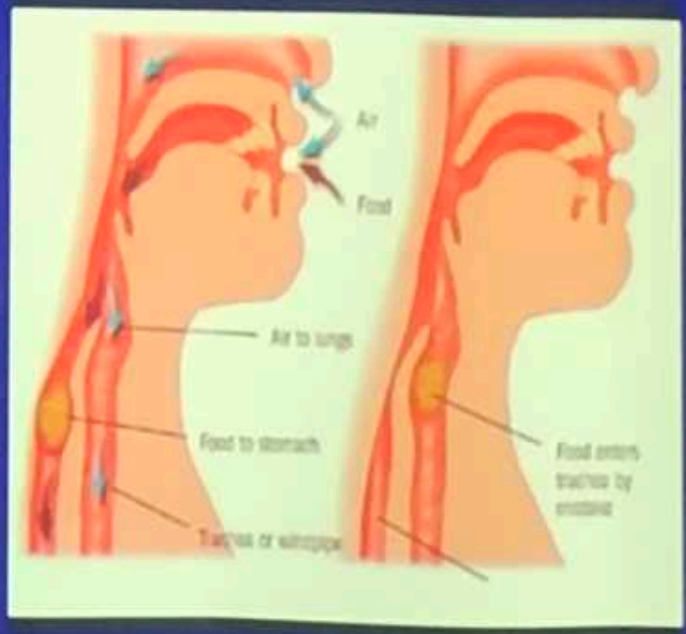
- Patchy infiltrates or
- Interstitial pattern

Haemogram

- Peripheral leukocytosis are less common or intense

Aspiration pneumonia

- Overt episode of aspiration or bronchial obstruction by a foreign body.
- Seen in - alcoholism, nocturnal esophageal reflux, a prolonged session in the dental chair, epilepsy
- Usually Anaerobes



Etiology

Bacterial
Viral
mycobacterial
Fungal
parasitic

PNEUMONIA - COMMON PATHOGENS

Age Group	Common Pathogens (in Order of Frequency)
Newborn	Group B *Streptococci* Gram-negative bacilli *Listeria monocytogenes* Herpes Simplex Cytomegalovirus Rubella
1-3 months	*Chlamydia trachomatis* Respiratory Syncytial virus Other respiratory viruses
3-12 months	Respiratory Syncytial virus Other respiratory viruses *Streptococcus pneumoniae*

PNEUMONIA - COMMON PATHOGENS

Age Group	Common Pathogens (in Order of Frequency)
2-5 years	Respiratory Viruses *Streptococcus pneumoniae* *Haemophilus influenzae* *Mycoplasma pneumoniae* *Chlamydia pneumoniae*
5-18 years	*Mycoplasma pneumoniae* *Streptococcus pneumoniae* *Chlamydia pneumoniae* *Haemophilus influenzae* Influenza viruses A and B Adenoviruses Other respiratory viruses

Frank Tintinalli E et al. (2004). *Emergency Medicine, A Comprehensive Study Guide, Sixth Edition.* American College of Emergency Physicians. (pp. 784-789). McGraw-Hill. Toronto, ON.

GENERAL SYMPTOMS

- High grade fever
- Cough-productive
- Pleuritic chest pain
- Breathlessness

GENERAL SYMPTOMS

- High grade fever
- Cough-productive
- Pleuritic chest pain
- Breathlessness

Additional symptoms

- Sharp or stabbing chest pain
- Headache
- Excessive sweating and clammy skin
- Loss of appetite and fatigue
- Confusion, especially in older people
-

General Signs

- Febrile
- Tachypnoea
- Tachycardia
- Cyanosis-central
- Hypotension
- Altered sensorium
- Use of accessory muscles of respiration
- Confusion- advanced cases

SIGNS OF CONSOLIDATION

.Percussion-dull

.Bronchial Breath sounds

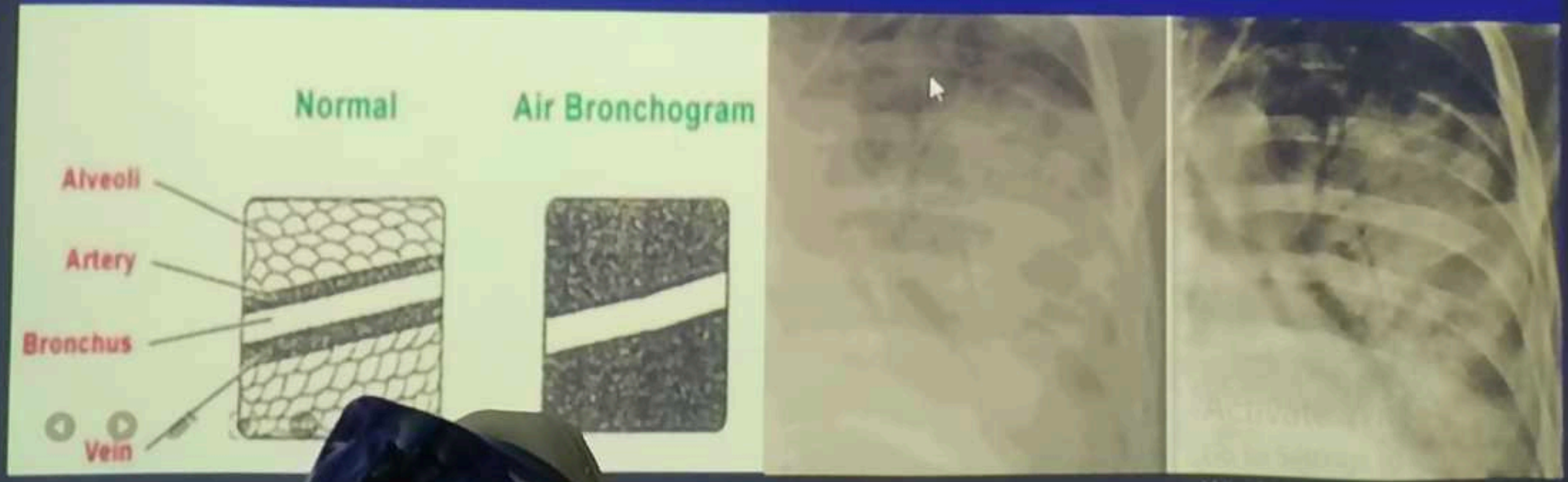
.Crackles

.Increased Vocal Fremitus & Resonance

.Pleural Rub

X Ray

Homogenous opacity with air bronchogram

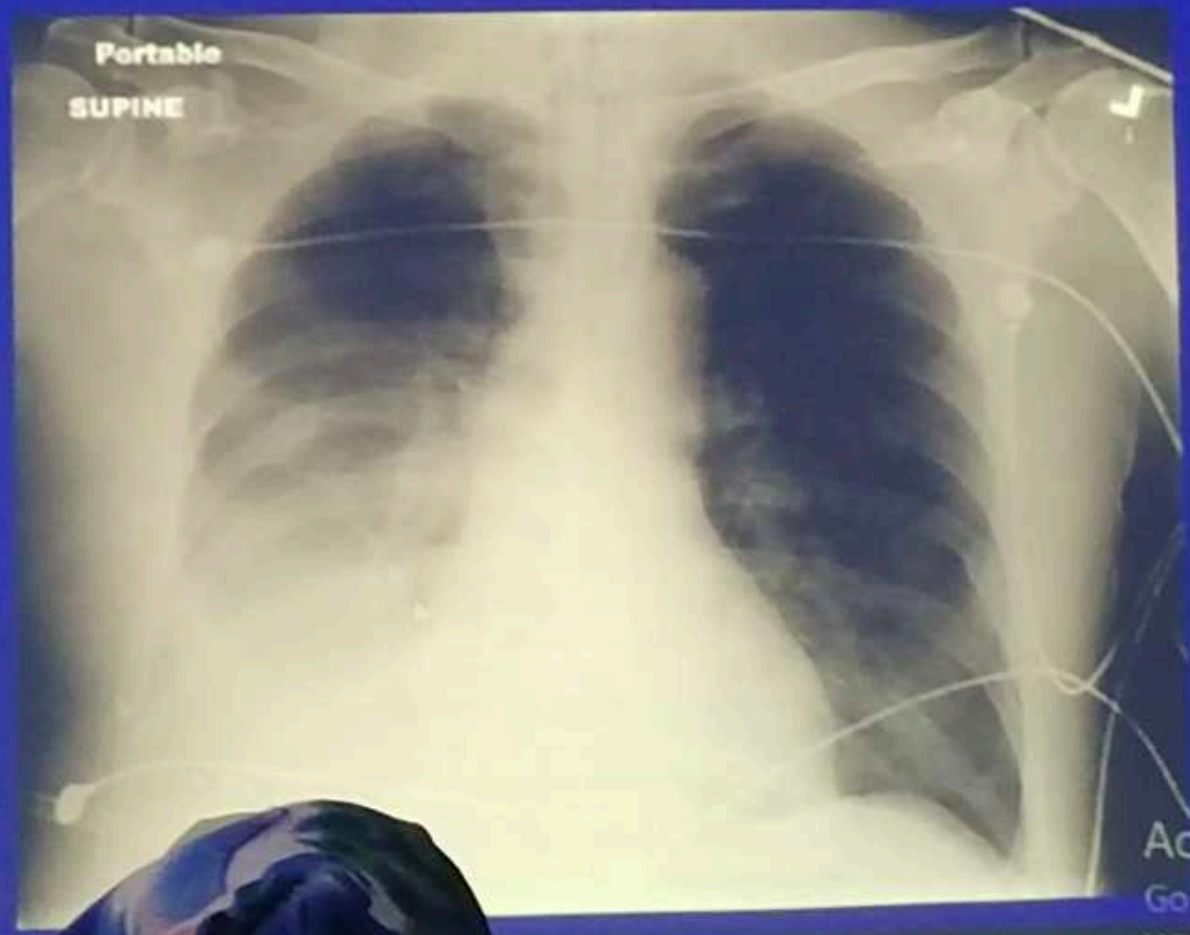


LOBAR PNEUMONIA

- Peripheral airspace consolidation pneumonia
- Without prominent involvement of the bronchial tree

RUL Consolidation

RLL Consolidation



BRONCHOPNEUMONIA

- Centrilobular and Peribronchiolar opacity pneumonia
- Tends to be multifocal Patchy in distribution rather than localized to any one lung region

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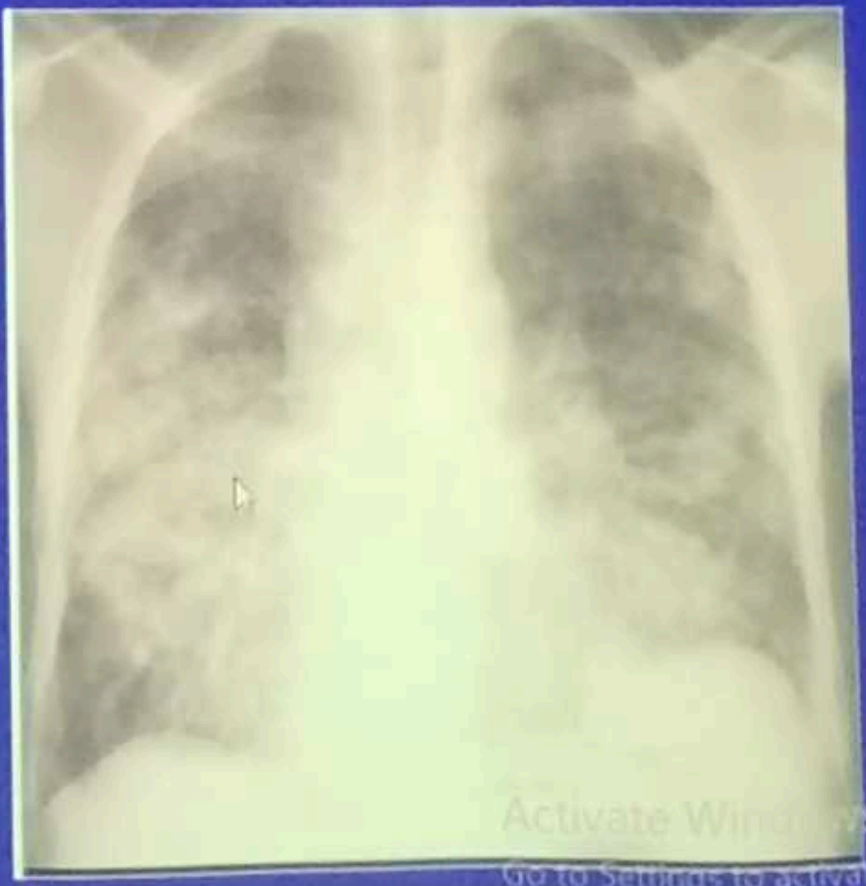
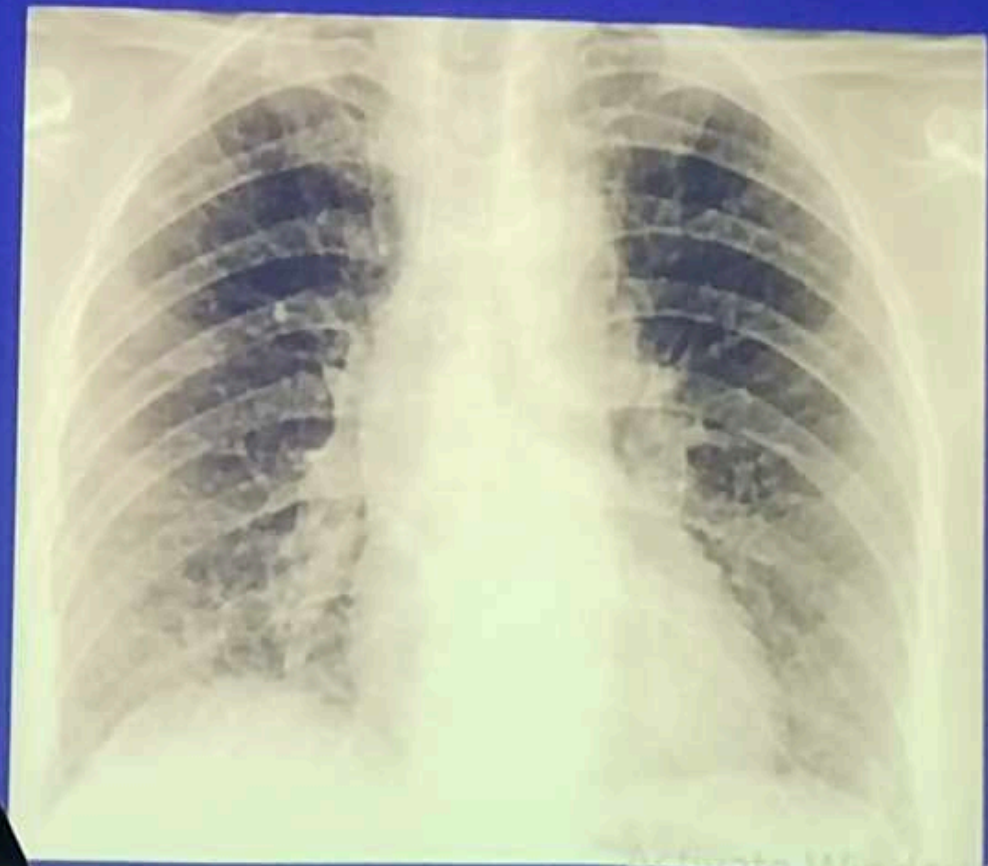


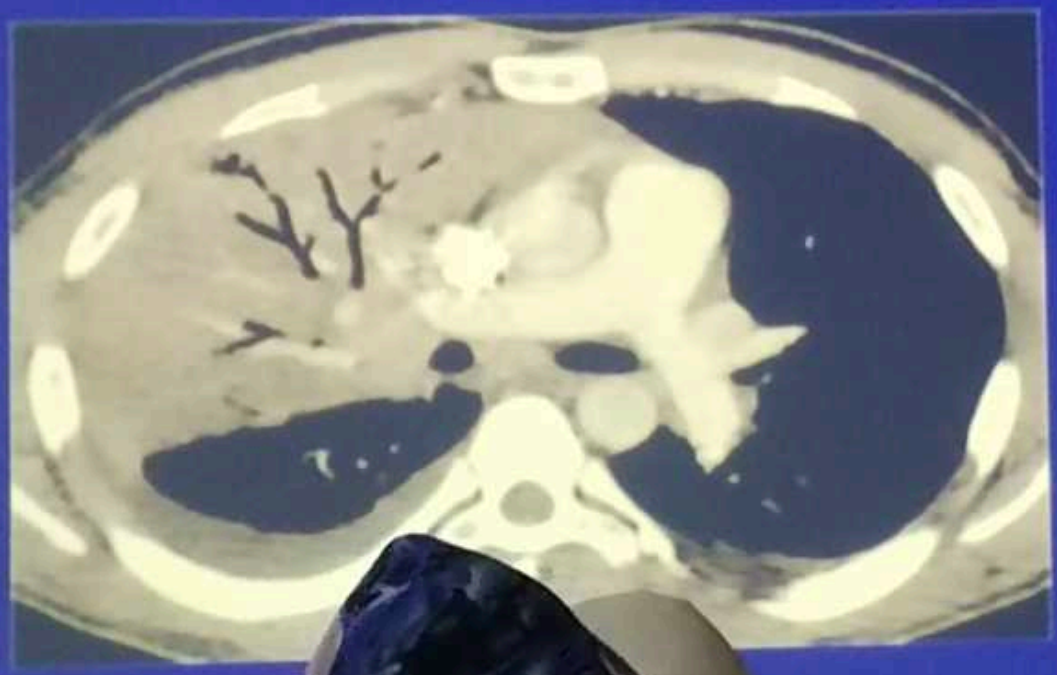
INTERSTITIAL PNEUMONIA

- Peribronchovascular Infiltrate
- Mycoplasma , viral



CT THORAX

Seldom used

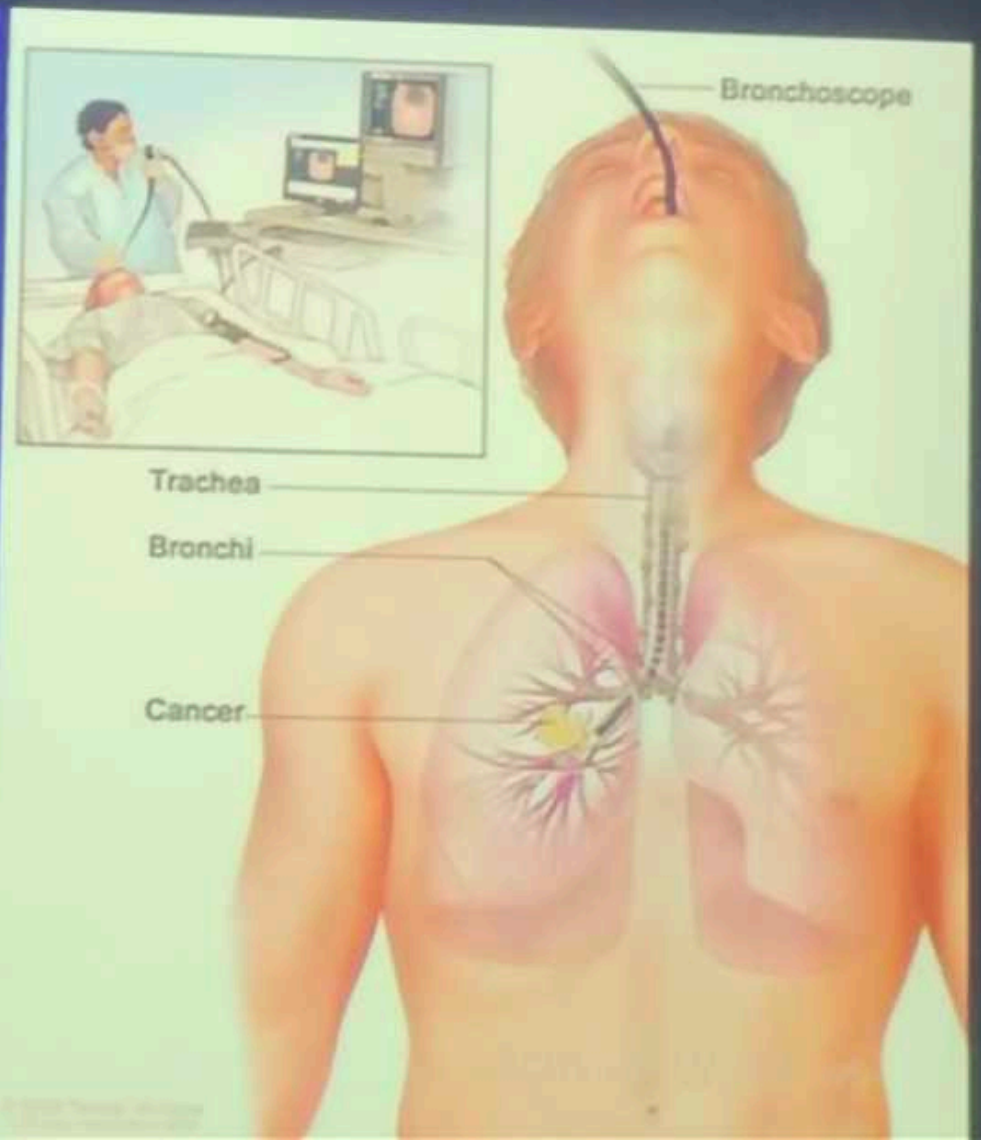


INVESTIGATIONS

- Complete white blood count
- Blood Sugar
- Electrolytes
- Creatinine
- Blood culture
- Sputum culture
- Oxygen saturation by pulse oximetry
- ABG
- USG Chest
- Montoux

INVASIVE

- Bronchoscopy
- Thoracoscopy
- Percutaneous aspiration/biopsy
- Open lung biopsy
- Pleural aspiration



ADMISSION CONSIDERATIONS

- If caregivers are unable to care for the child, or to commit to following a treatment plan, the child should be admitted to a health care facility.
- Any child less than three months of age.
- Failure of outpatient treatment (worsening or no response to treatment after 24 to 72 hours).
- Family lives in a remote area.

CRITERIA FOR INTENSIVE CARE

If intensive care is available consider the following:

- The patient is failing to maintain an oxygen saturation of > 92% in FiO_2 of > 0.6.
- The patient is in shock.
- There is a rising respiratory rate and rising pulse rate with clinical evidence of severe respiratory distress and exhaustion, with or without a raised arterial carbon dioxide tension ($PaCO_2$).
- There is recurrent apnea or slow irregular breathing.

TREATMENT – ORAL ANTIBIOTICS

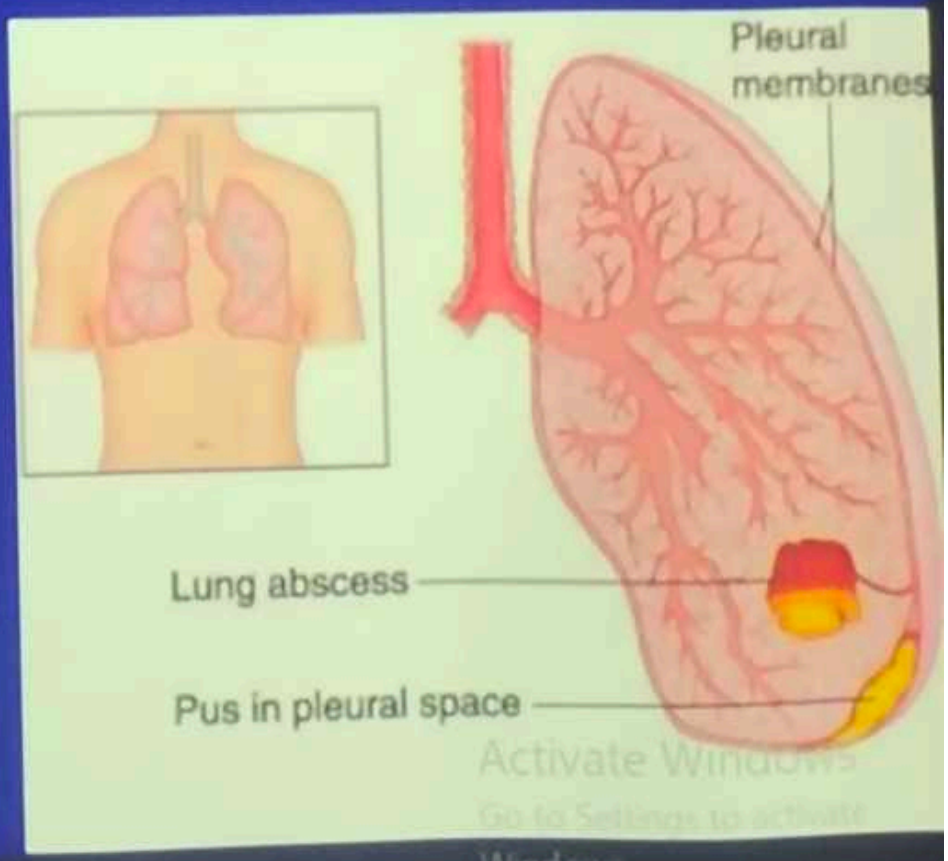
Common medications for treating pneumonia:

- Penicillins: **Amoxicillin, Amoxicillin-Clavulanate**
- Sulfonamides: Co-trimoxazole
- Macrolides: **Azithromycin, Clarithromycin, Erythromycin**
- 2nd generation Cephalosporins: **Cefaclor**
- **Dose according to child's weight**

Pneumonia complications

SLAPP HER *(please don't)*

.S - Septicaemia
.L - Lung abcess
.A - ARDS
.P - Para-pneumonic effusions
.P - Peumothorax
.H - Hypotension
.E - Empyema
.R - Respiratory failure



Pleural Effusion and Empyema

- Collection of fluid or pus in the pleural space
- Can occur as a complication of pneumonia, tuberculosis or surgical procedures (post-surgical empyema)
- *Staphylococcus aureus* is the single most common pathogen of empyema in infants < 2 years of age
- Other common nontuberculous causes of empyema include *H. influenzae* type B, *S. pyogenes*, *D. pneumoniae*, *E. coli*, *Klebsiella* sp, *Pseudomonas aeruginosa*.

Pleural Effusion and Empyema: Treatment

- General supportive measures:
  1. Bed rest
  2. Analgesia
  3. Fluid replacement
  4. Supplemental oxygen
  5. Lying on the affected side
- Choice of antimicrobial is based on bacterial epidemiology in the community, clinical data, pharmacologic properties of the drug.
- Repeated thoracentesis and eventually continuous chest tube drainage are indicated if rapid re-accumulation of effusion induces dyspnea

Pneumothorax

- An accumulation of air in the pleural spaces due to secondary to free communication of the pleural space with the atmosphere either from a chest wall defect through the parietal pleura or from alveolar rupture
- Can be secondary to infection with gas-producing microorganisms.

3 factors that determine the extent of alveolar rupture:

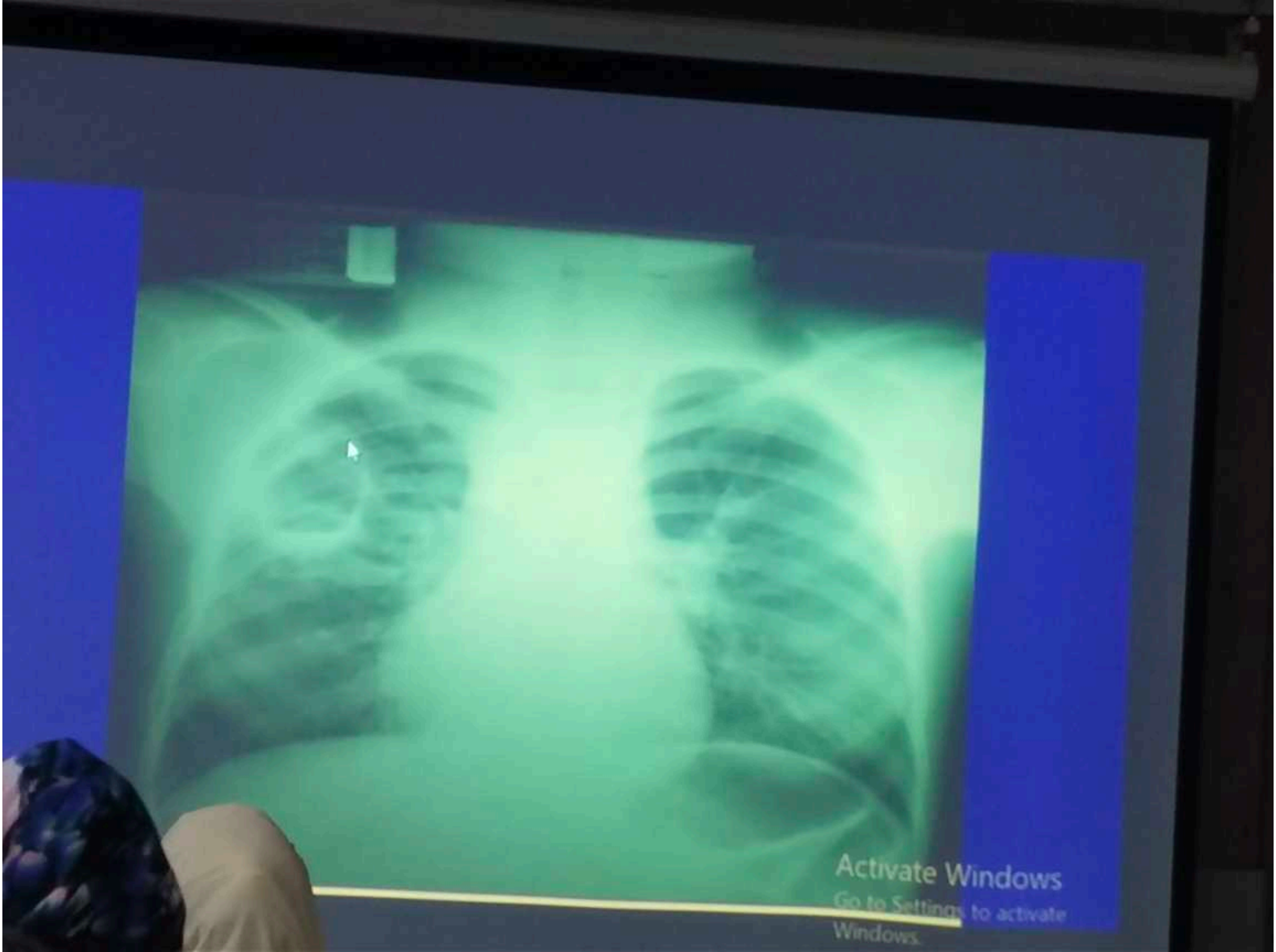
1. *Degree of transpulmonary pressure exerted*
2. *Duration of pressure applied*
3. *Ratio of inexpansible to expansible portion of the lung*

Pneumothorax

- Differential diagnosis include lung cyst, lobar emphysema, bullae,diaphragmatic hernia
- CXR is crucial in the confirmation of diagnosis
- Effective management requires early clinical recognition and prompt radiologic investigation
- Therapeutic management should take into account clinical severity, presence and nature of the underlying lung disease, precipitating event and history of recurrence

Lung Abscess

- A circumscribed, thick-walled cavity in the lung that contains purulent material resulting from suppuration and necrosis of the involved lung parenchyma.
- An unresolved area of pneumonia is the site in which an abscess develops most frequently.
- Pulmonary aspiration, diminished clearance mechanisms, embolic phenomena, hematogenous spread from septicemia, or local extension from oropharyngeal or abdominal processes contribute to abscess development.
- Abscess may develop indolently over a few weeks with tachypnea, cough and fever.

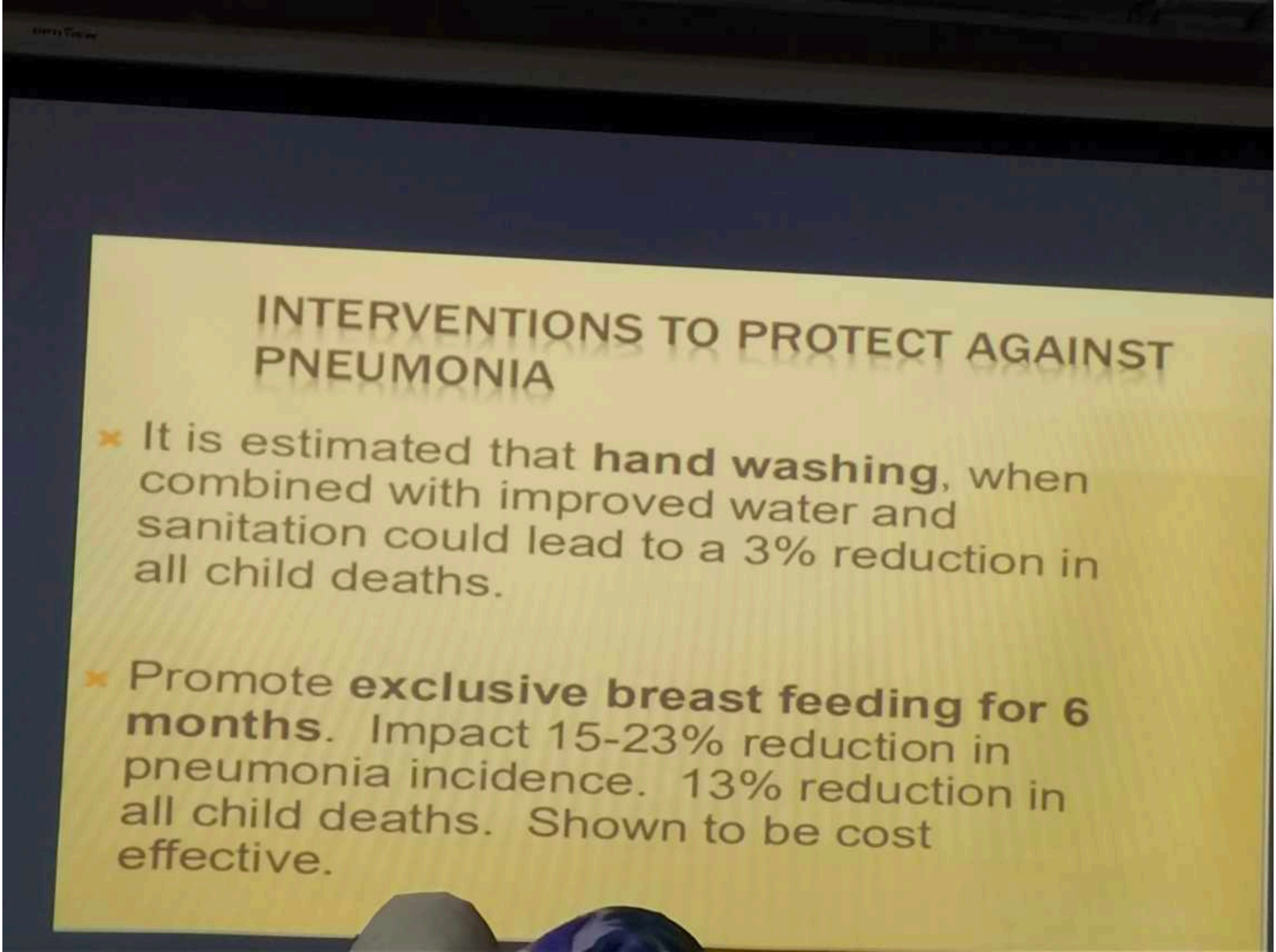

Activate Windows
Go to Settings to activate
Windows.

Lung Abscess: Surgical Treatment

- Surgical management is considered in cases of large lung abscess especially when associated with hemoptysis.
- Surgical management is indicated if there is clinical deterioration despite appropriate antibiotic therapy.

1. Drainage via bronchoscopy
2. Percutaneous tube drainage
3. Percutaneous needle aspiration
4. Lobectomy

Lobectomy or wedge resection should be reserved for massive expansion of the abscess associated with mediastinal shift and attendant symptoms.


INTERVENTIONS TO PROTECT AGAINST PNEUMONIA
It is estimated that **hand washing**, when combined with improved water and sanitation could lead to a 3% reduction in all child deaths.
Promote **exclusive breast feeding for 6 months**. Impact 15-23% reduction in pneumonia incidence. 13% reduction in all child deaths. Shown to be cost effective.

INTERVENTIONS TO PROTECT AGAINST PNEUMONIA

- **Adequate nutrition throughout the first five years of life**, including adequate micronutrient intake. Impact 6% reduction in all child deaths for adequate complementary feeding (age 6-23 months).

- **Reduce incidence of low birth weight**.

PUBLIC AWARENESS

- Tachypnea and respiratory distress are considered the most important signs in the diagnosis of pneumonia.
- Only 1 in 5 caregivers know that fast breathing and respiratory distress are a reason to seek care immediately.

PREVENTION STRATEGIES

- Vaccination against measles, Streptococcus pneumoniae, and Haemophilus influenzae type b
- Zinc supplementation
- Prevention of HIV in Children
- Co-trimoxazole prophylaxis for HIV-infected children

KEY POINTS

- Pneumonia is an acute infection of the pulmonary parenchyma
- Pneumonia kills more children under the age of five than any other illness.
- A diagnosis of pneumonia should be considered in all children with tachypnea and difficulty breathing.
- Common first-line antibiotics include amoxicillin and co-trimoxazole .