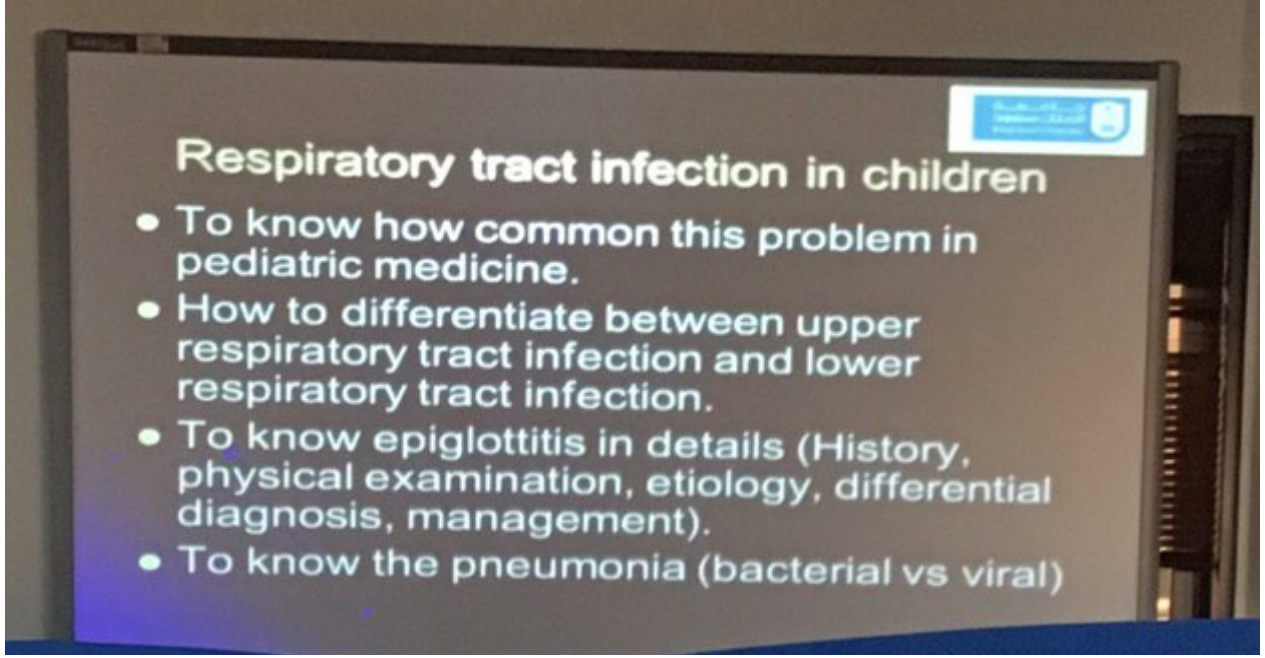
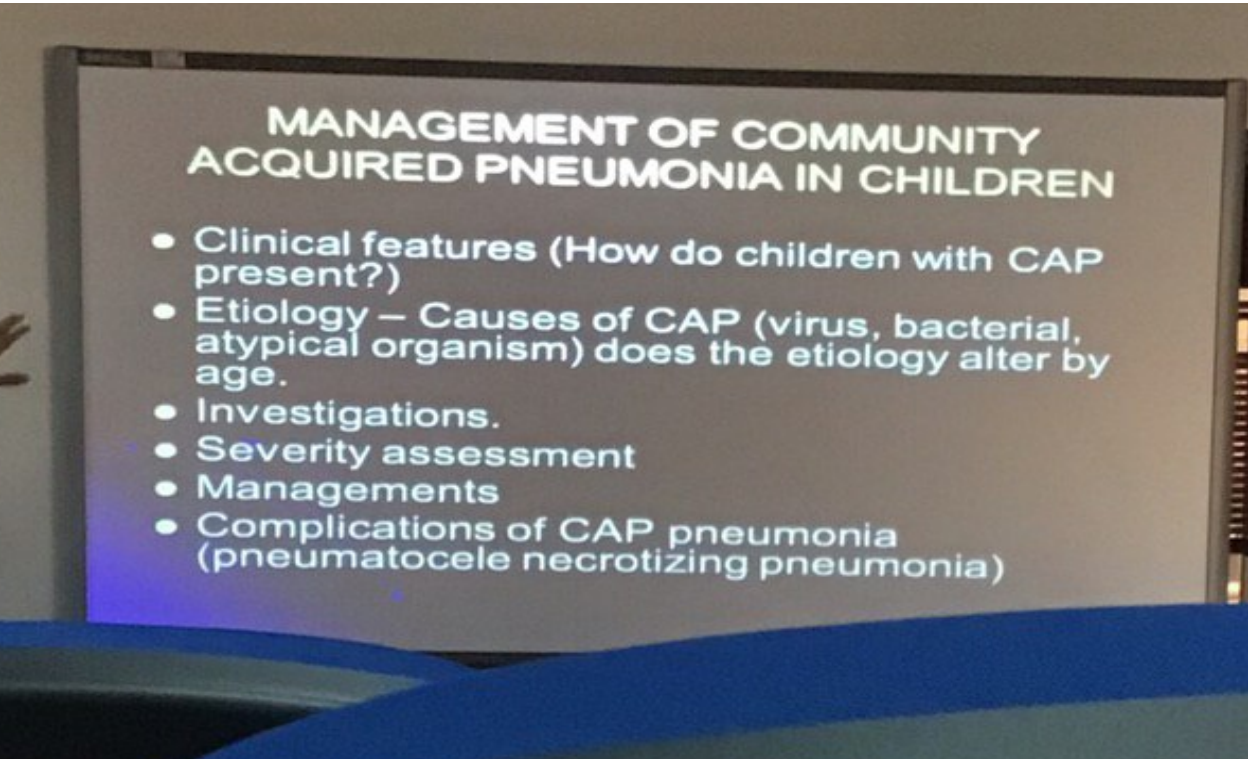
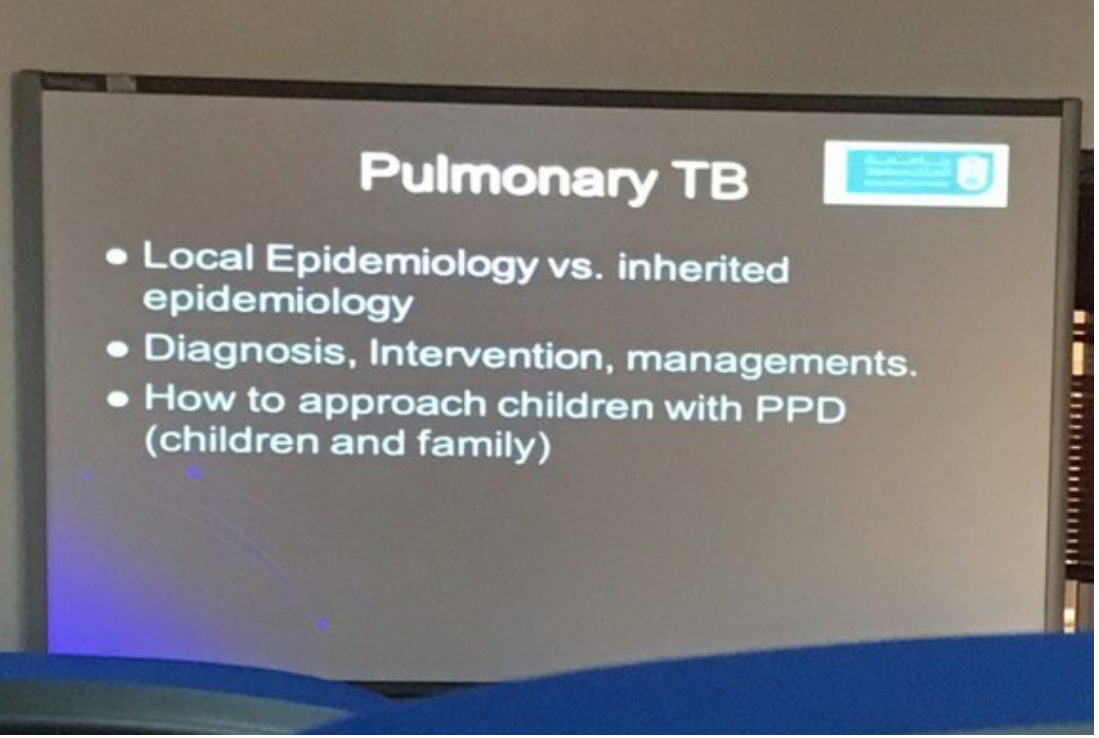


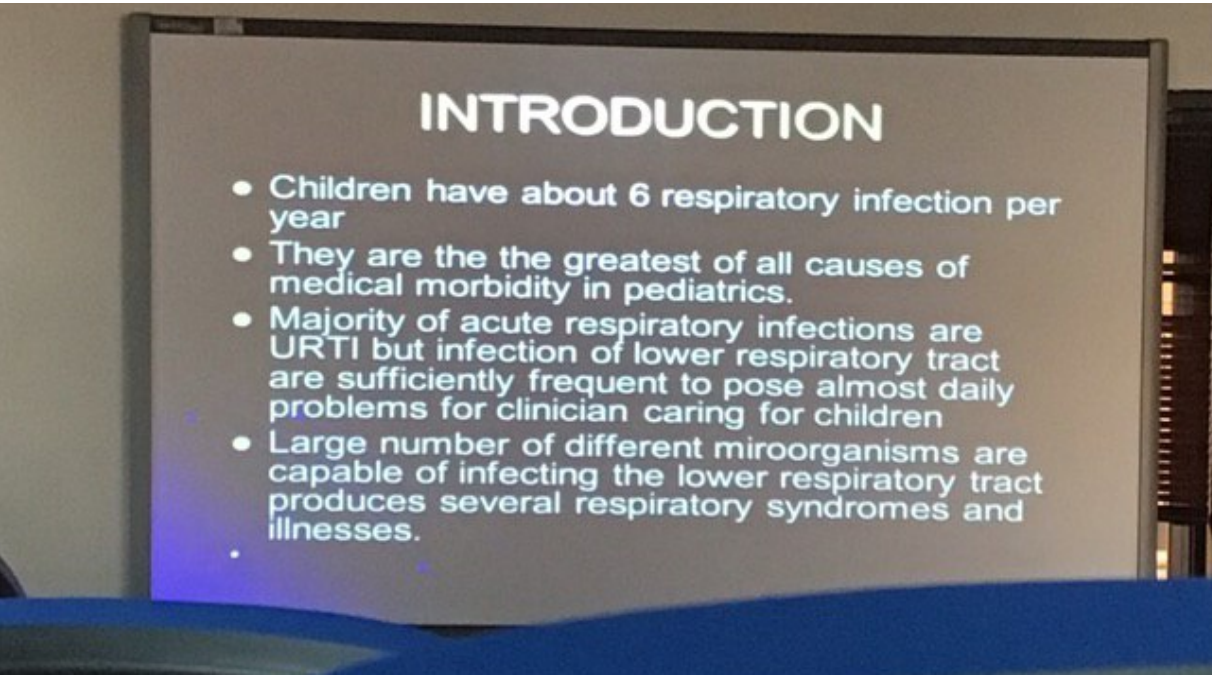
Objectives



Objectives

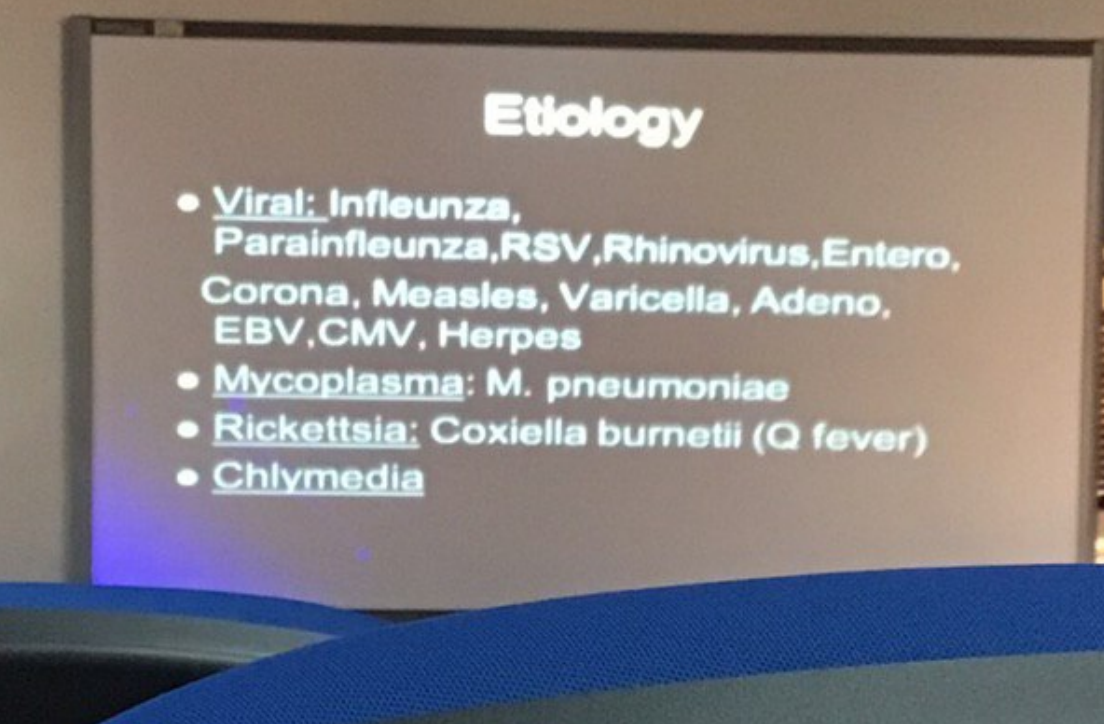


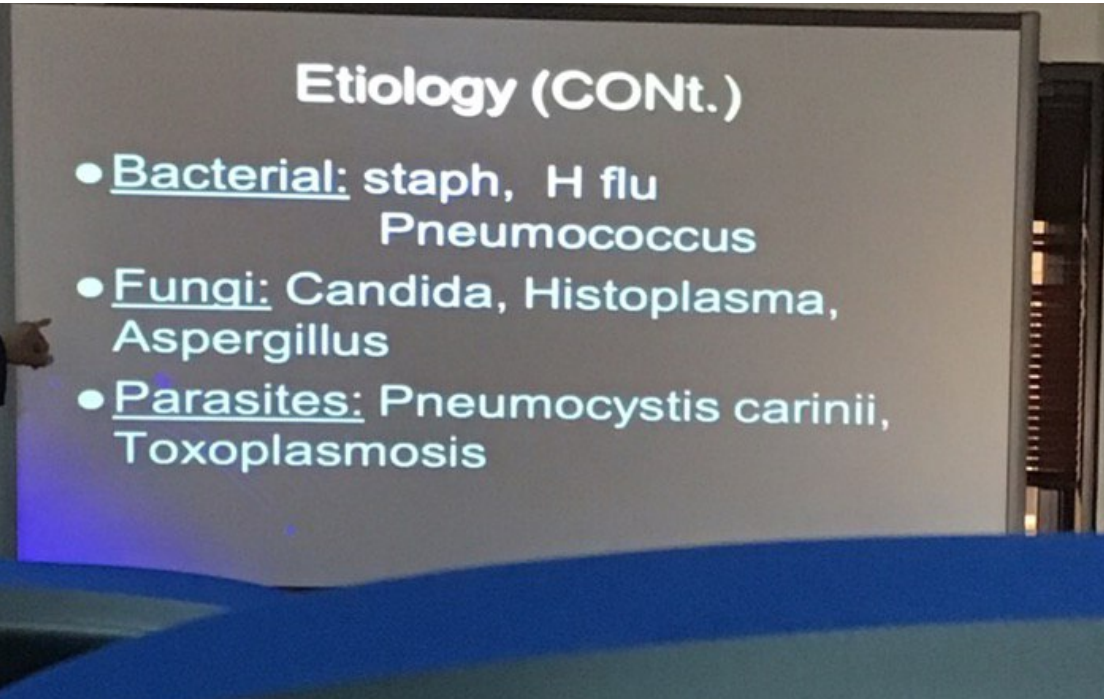
Objectives



Children who have RTI more than 6 times a year
→ their immunity need to be investigated

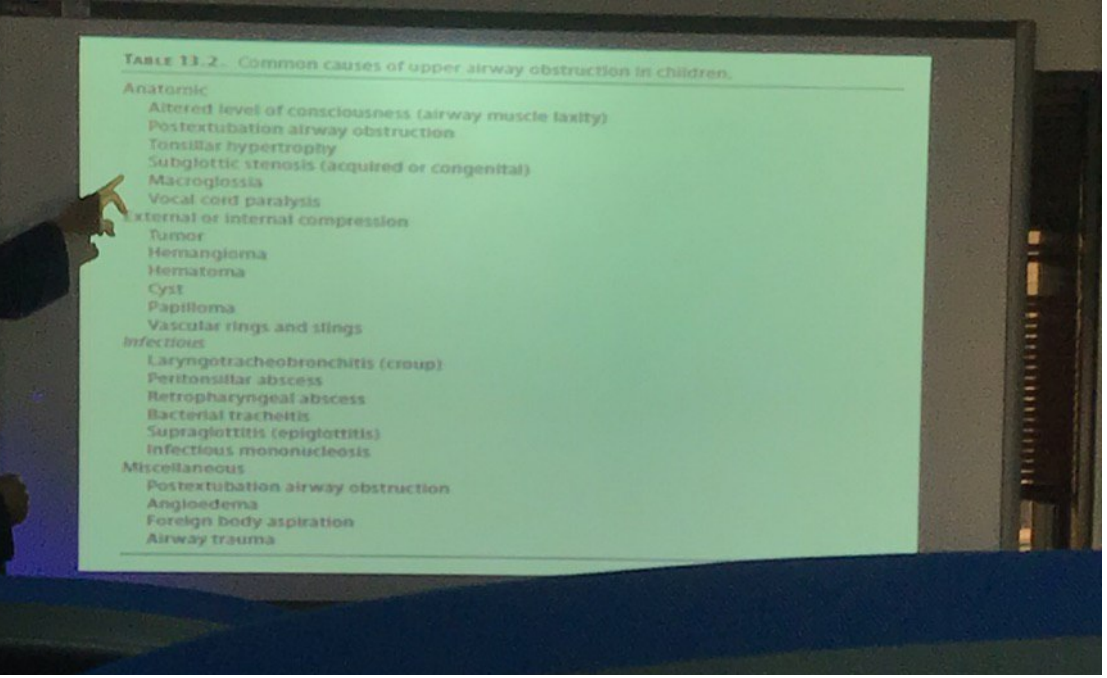
Upper RTI more than lower RTI but cause less burden on children and their families



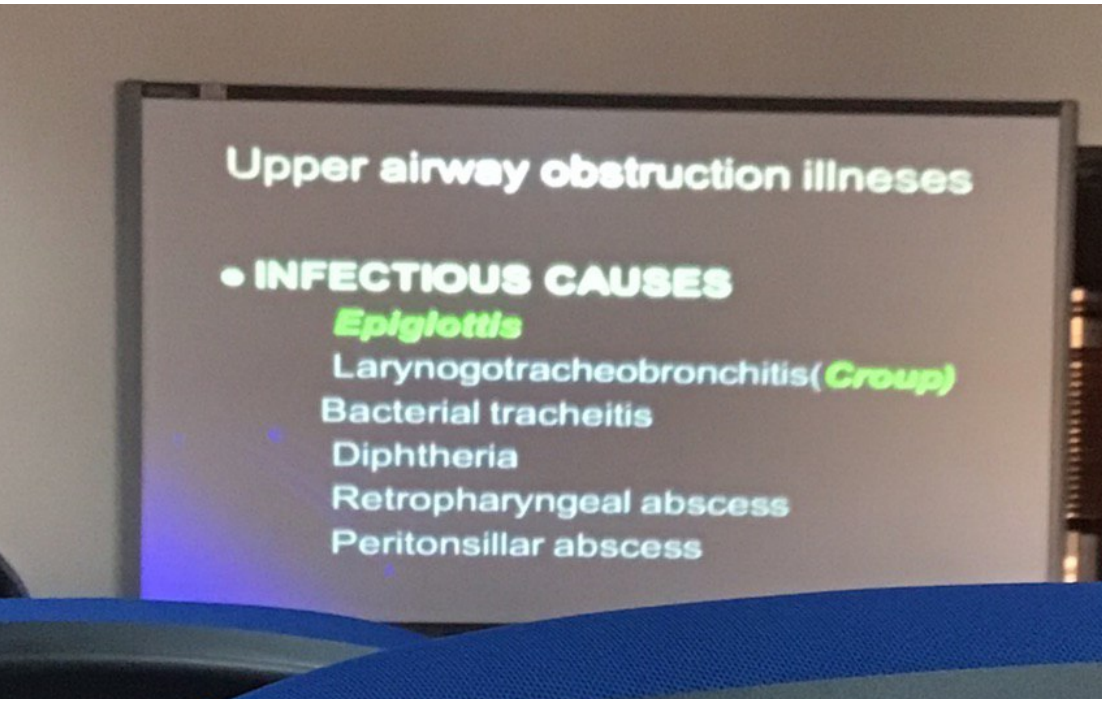


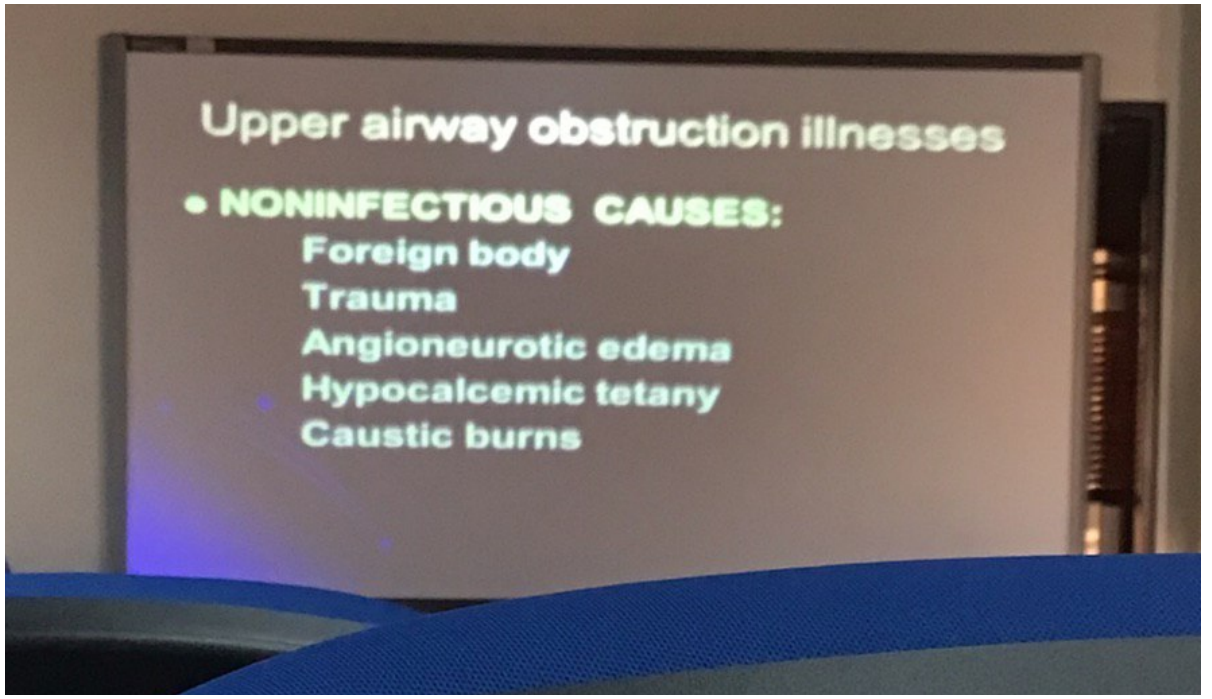
Q fever is very **rare** but you should think about it when you have child with persistent fever

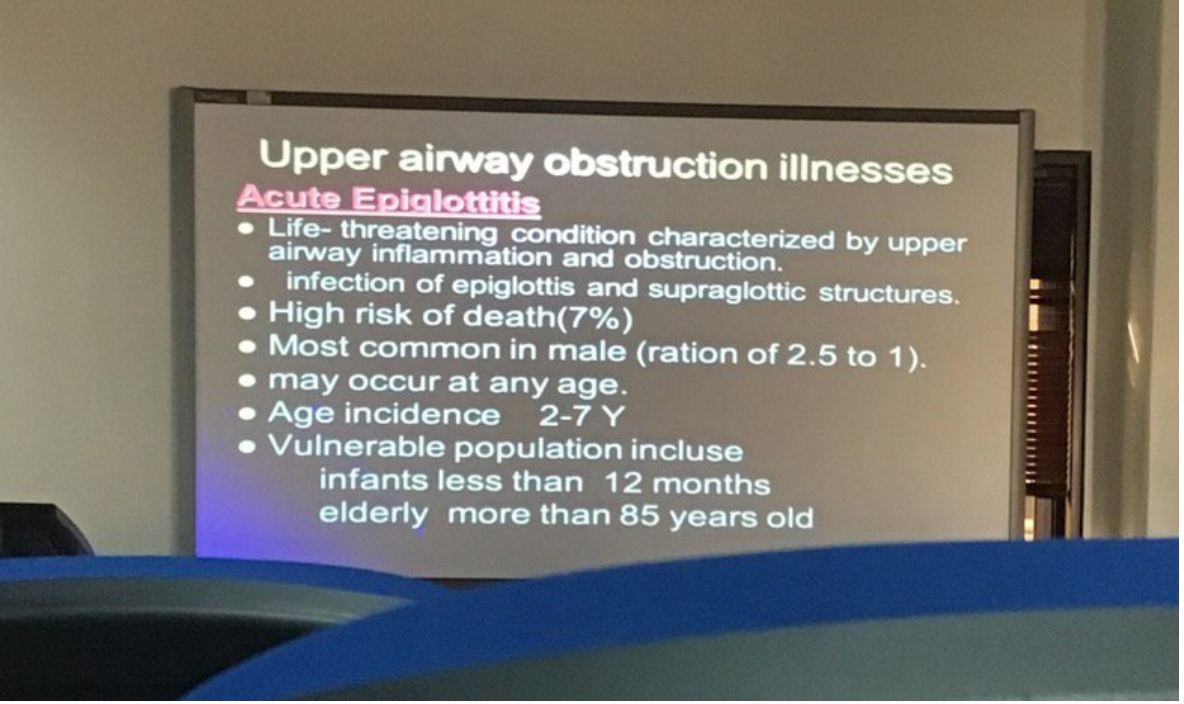
Fungi and parasites affect only immunocompromised children (like child with leukemia, child who's taking steroid for nephrotic syndrome..etc.)



Common causes of upper airway obstruction in children can be divided as anatomical, external & internal obstruction, infectious and miscellaneous

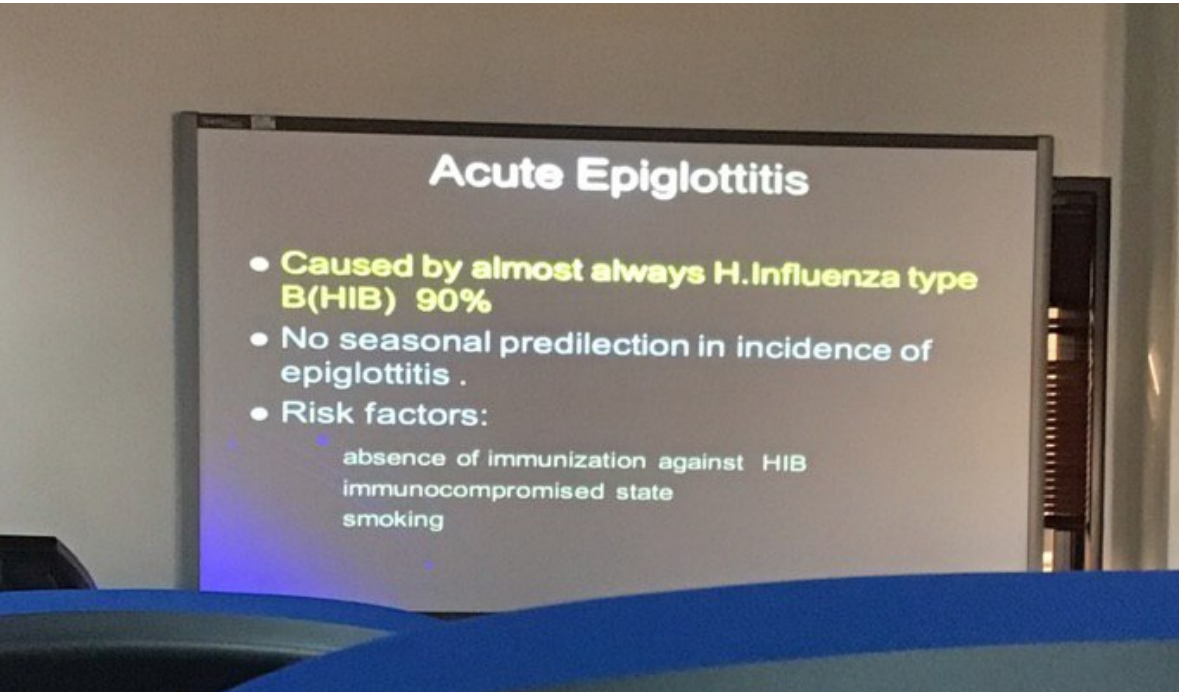


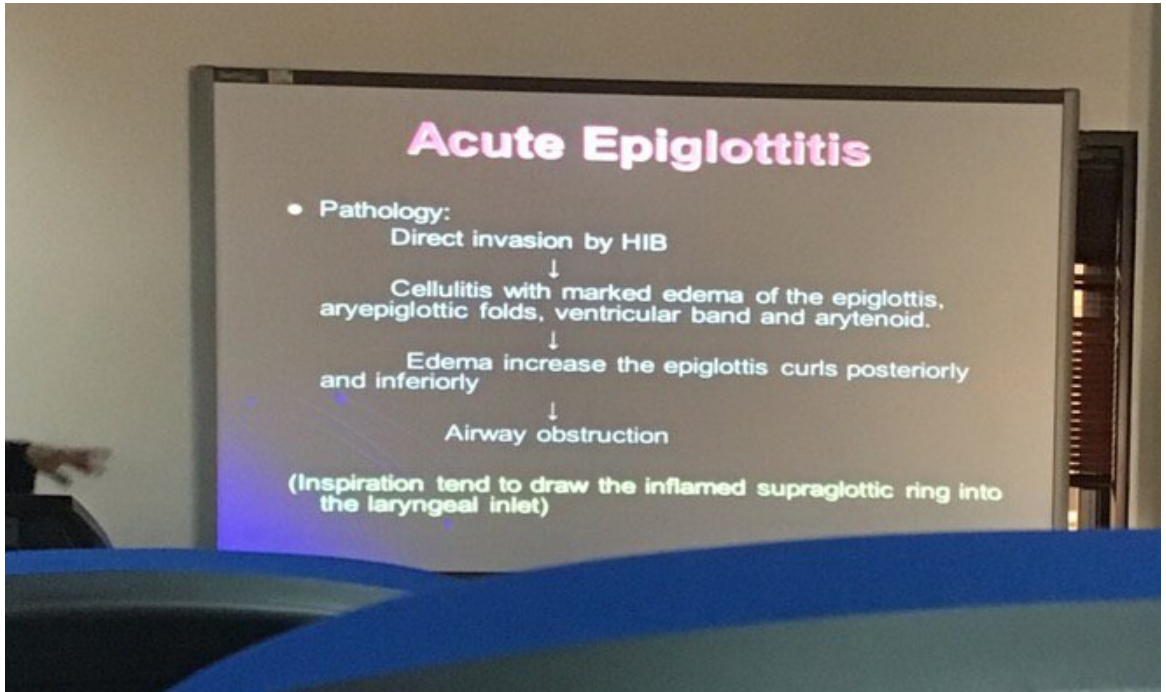


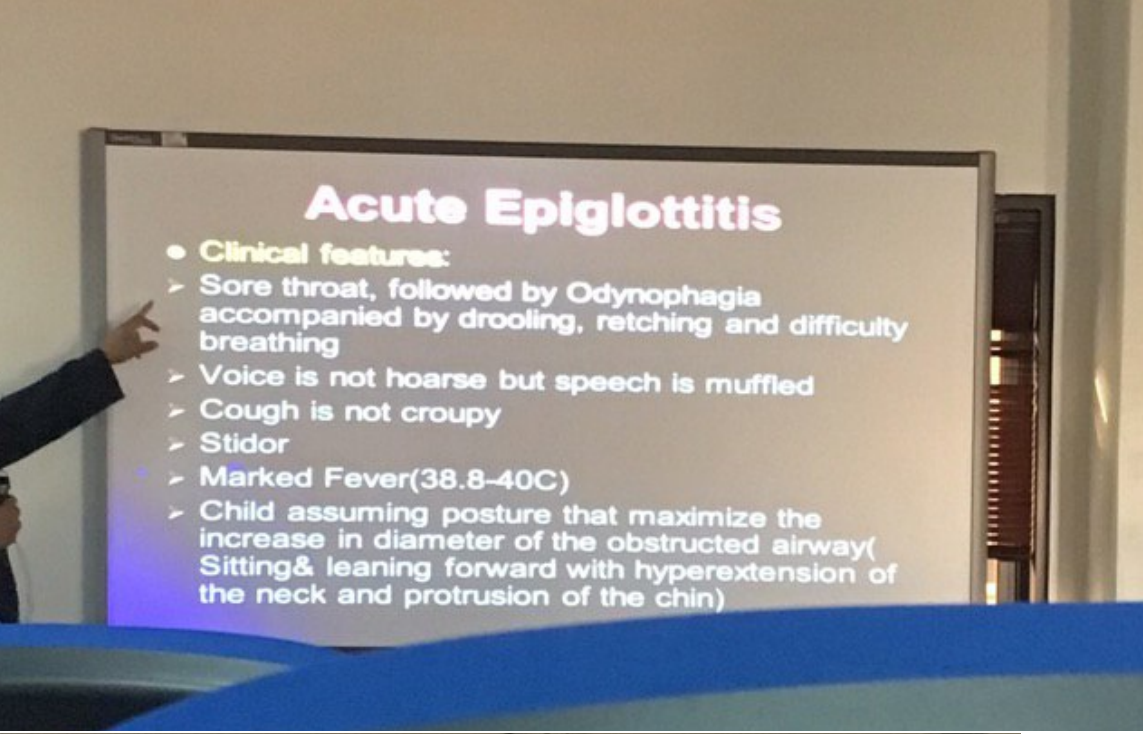


Nowadays, we're rarely seen Acute epiglottitis except atypical epiglottitis due to influenza B vaccine

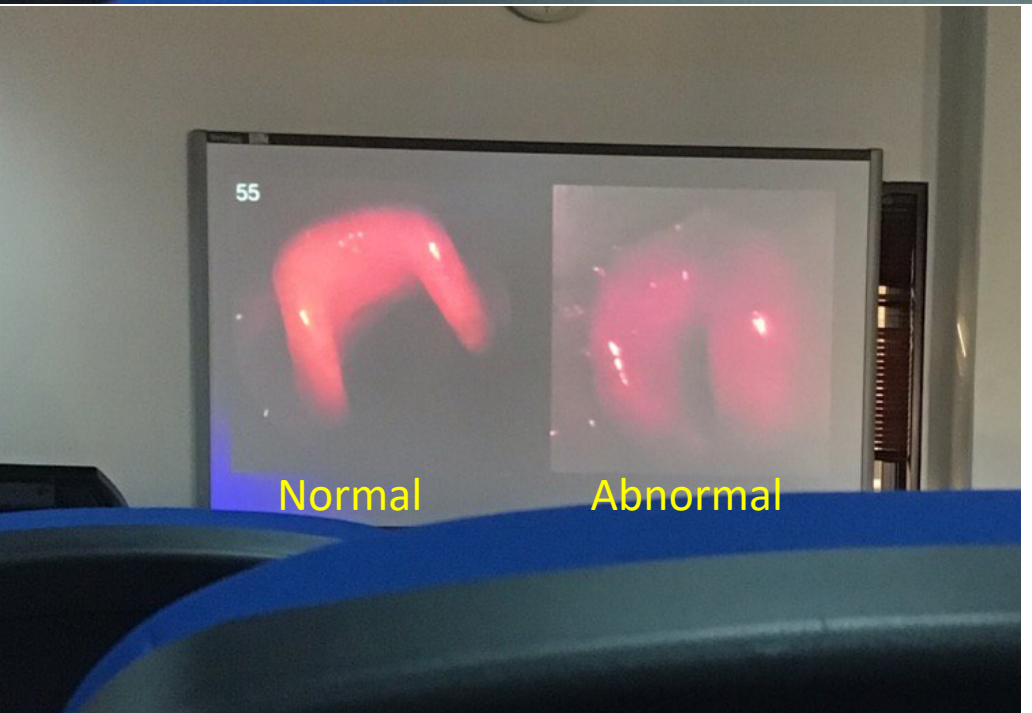
Atypical epiglottitis does not present with the classical picture of epiglottitis and happens to children who have not taken all doses of HiB vaccine



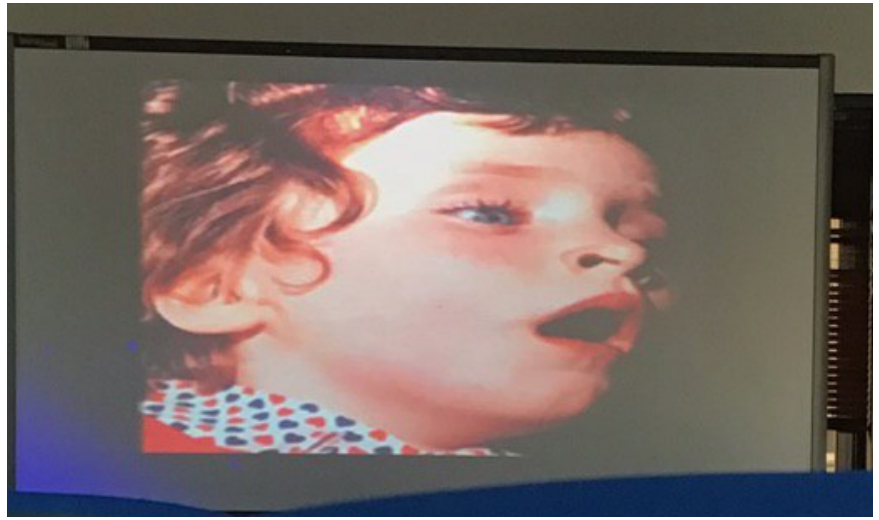


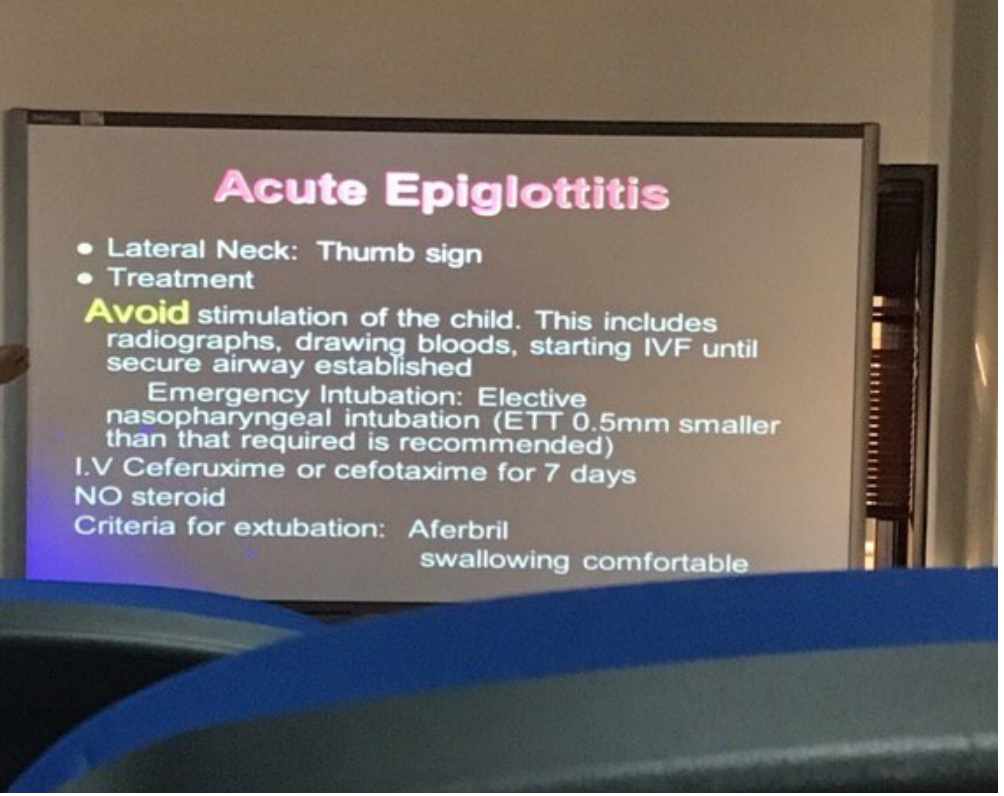


Voice **is not** hoarse but speech is muffled (MCQ)

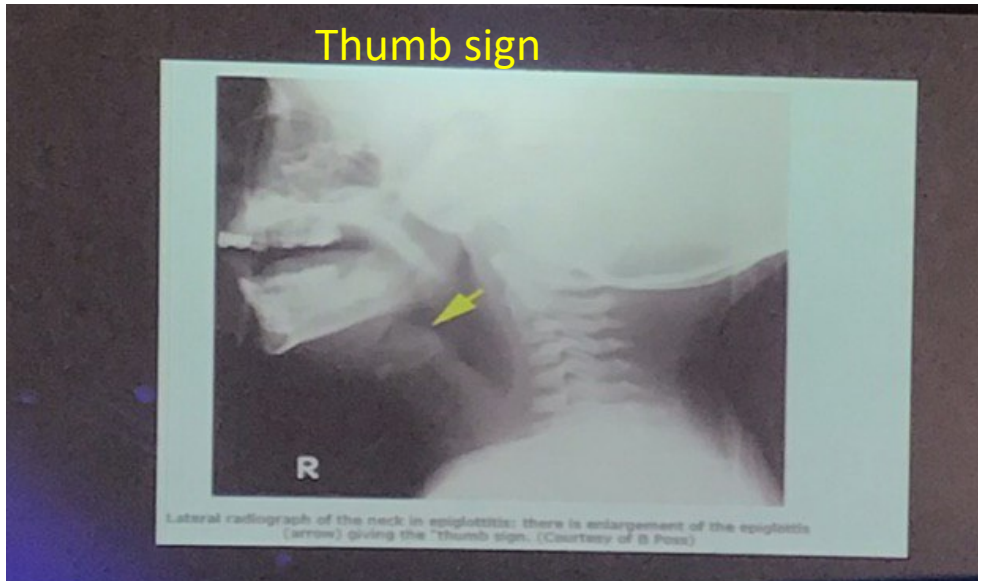


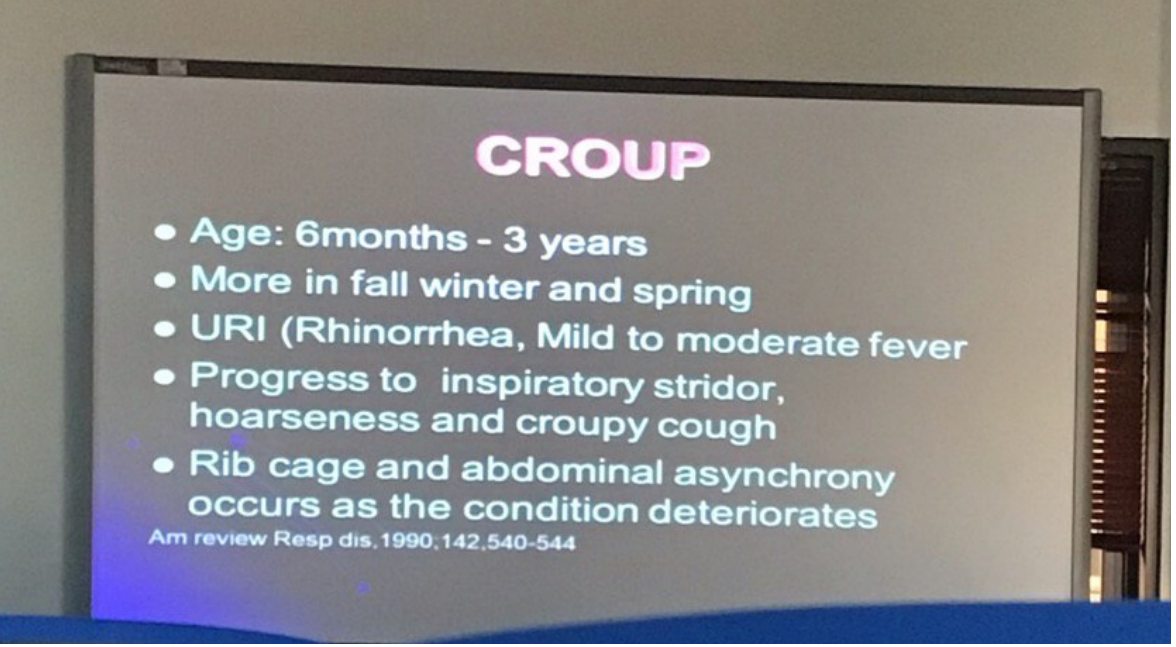
Classical picture of child with acute epiglottitis



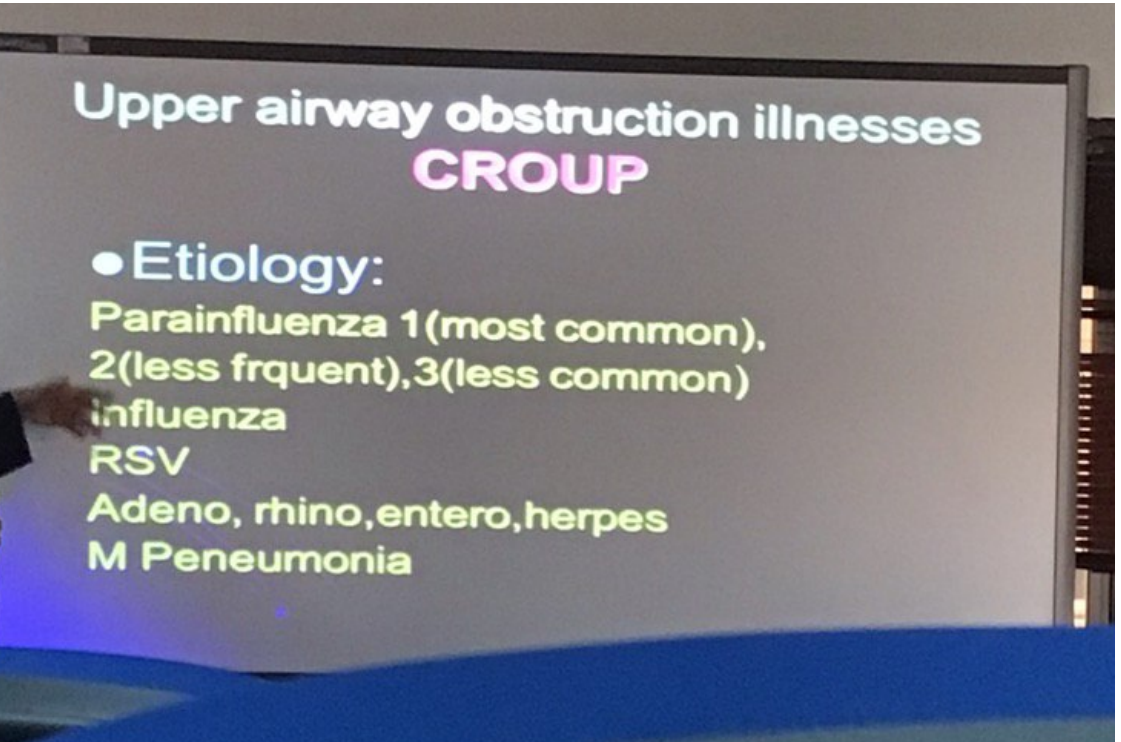


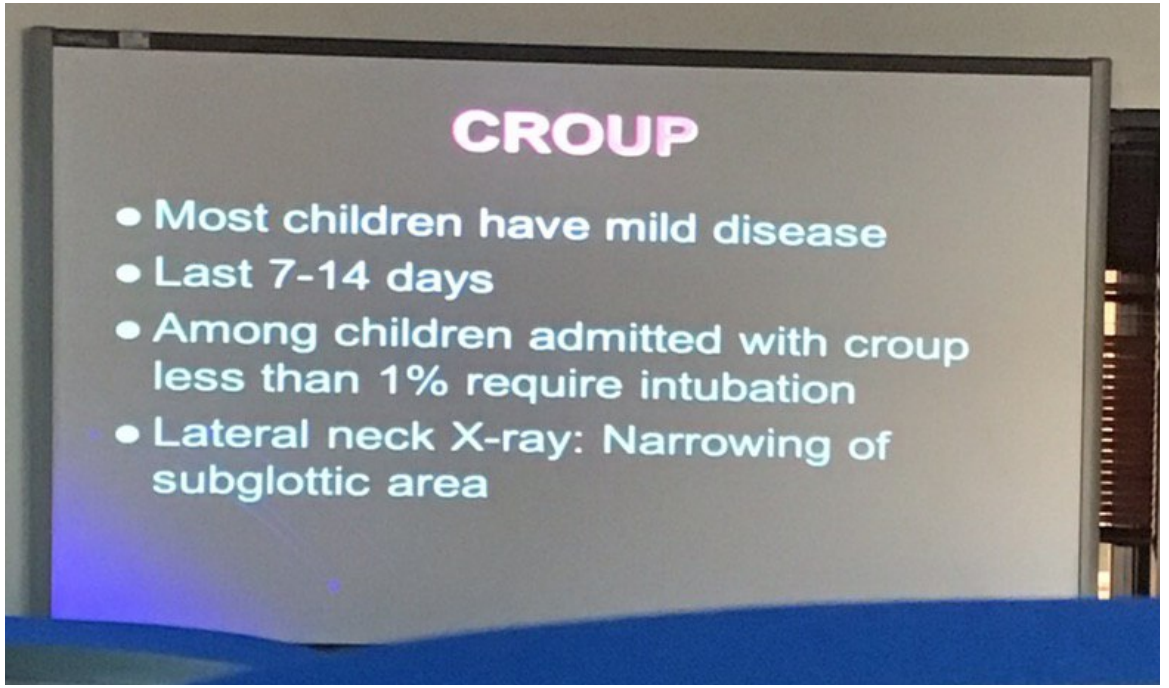
- It’s clinical diagnoses (no need for X-ray)
- 1st step you should secure the airway
- Don’t do emergency intubation (it should be elective)
- Better to do nasopharyngeal intubation with **0.5 mm smaller** than that required for the age
- Give IV antibiotic for 7 days
- **NO steroid**

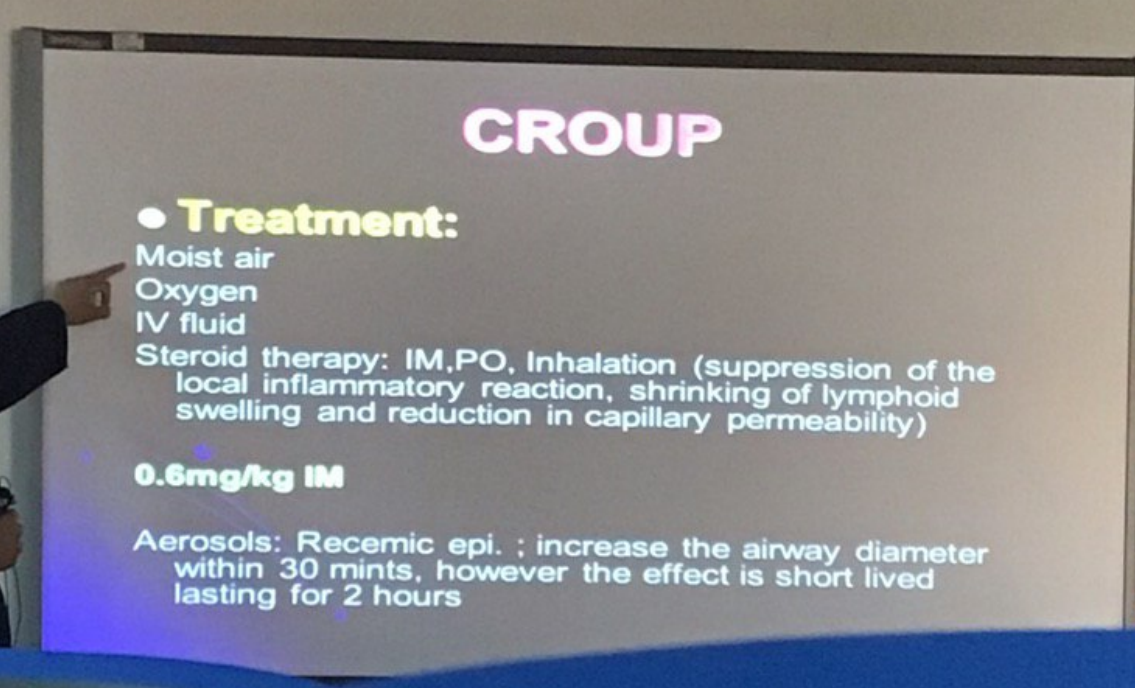




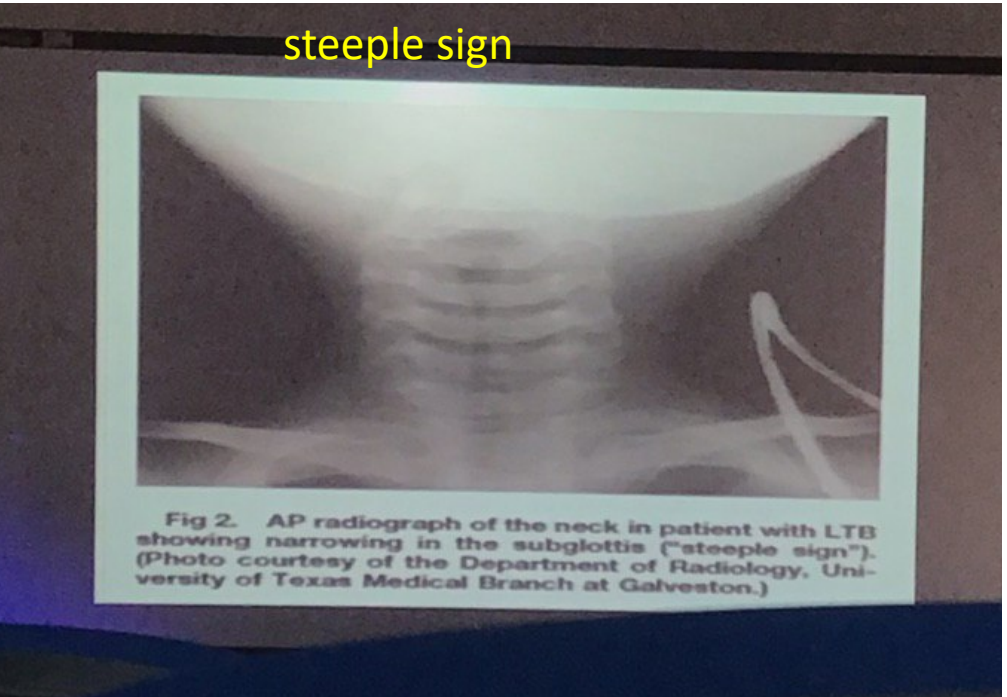
Start as symptoms of URI then progress to inspiratory stridor , hoarseness and croupy cough then breath with asynchrony of rib cage and abdomen movement (bending respiratory failure) →send the child to PICU



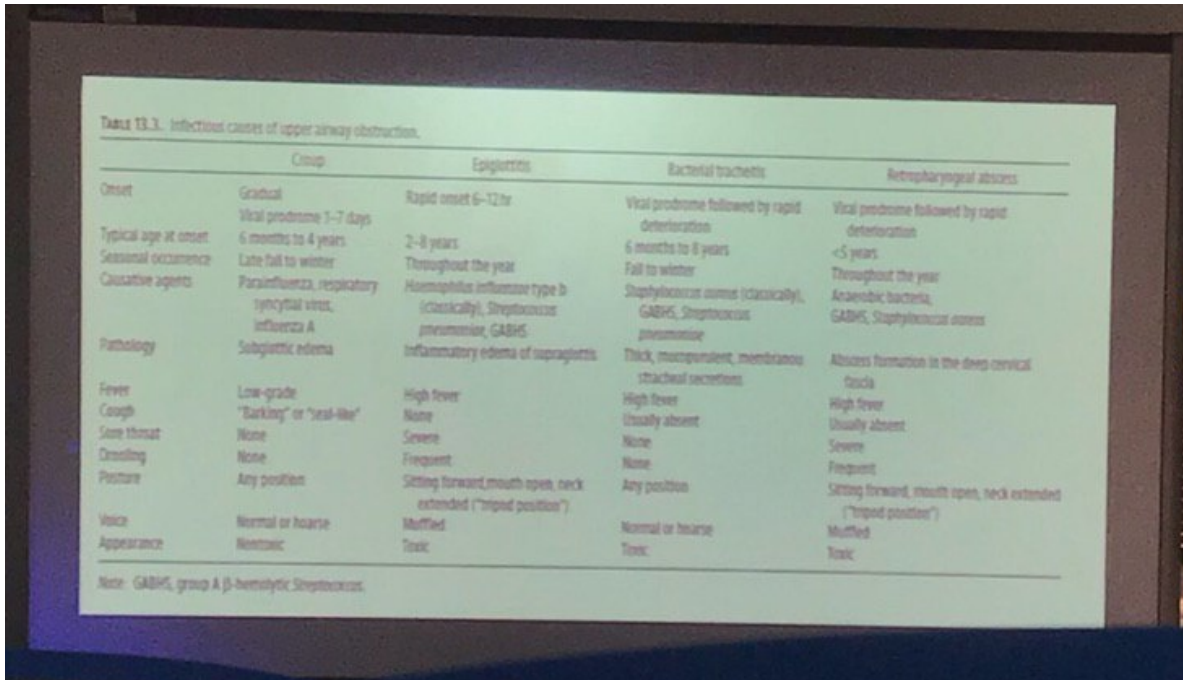




Steroid is the mainstay therapy any form will benefit the patient but we always give 0.6 mg/kg intramuscular
We may also give racemic epi, but we should monitor the child for two hours for rebound construction.



You have only to compare between croup and epiglottitis



Middle East Respiratory Syndrome Coronavirus (MERS-CoV)

- What is Middle East respiratory syndrome (MERS)?

MERS is a coronavirus (named for the crown-like projections on the virus surface).

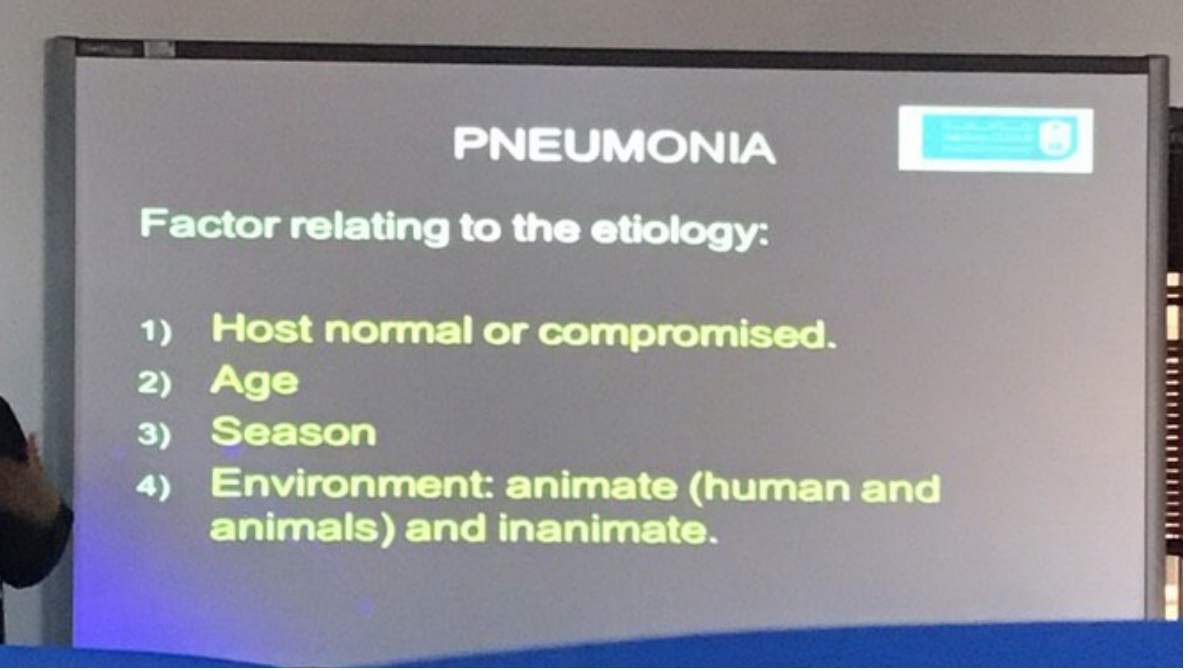
- Coronaviruses are very common and usually cause colds and mild upper respiratory infections but can also cause severe illness like the 2003 SARS-CoV.
- MERS is related to but is not the same as SARS.
- First identified– late 2012 in Saudi Arabia

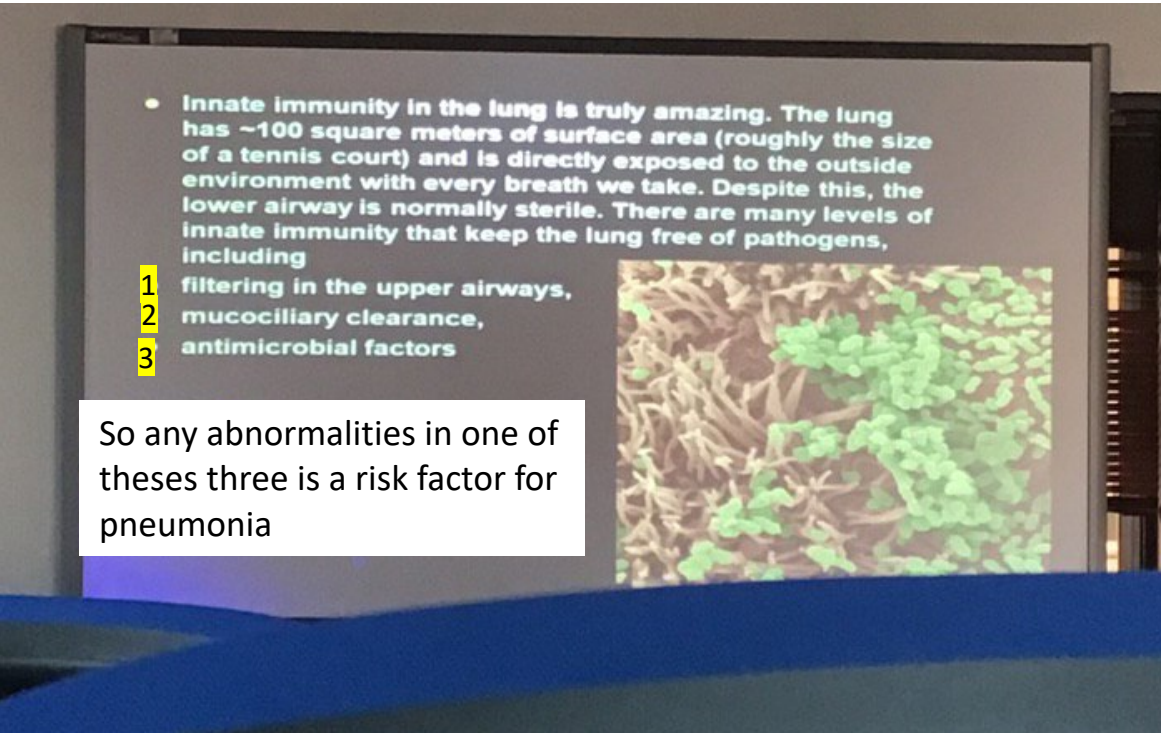
Signs and Symptoms of MERS

- Fever > 38C (100.4F)
- Cough
- Shortness of breath
- Malaise
- Vomiting
- Diarrhea
- Pneumonia
- Incubation period about 5.2 days but can range up to 14 days.
- Symptoms range from mild – severe.
- Mean age: 56

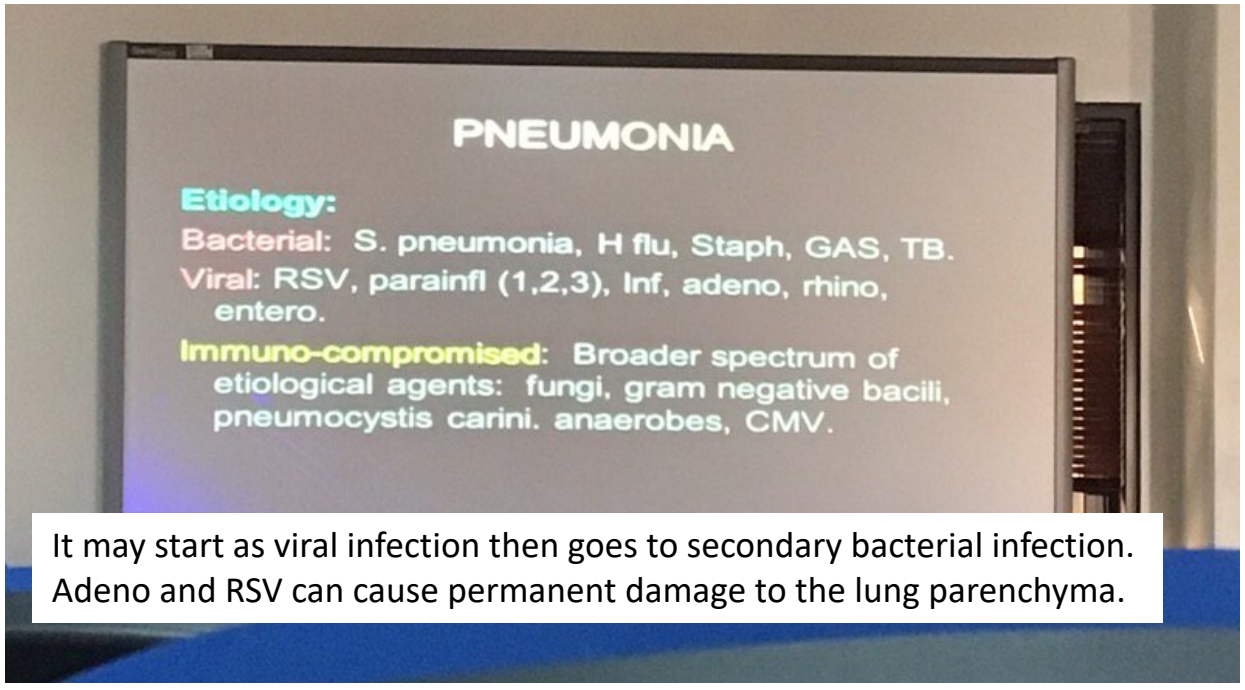
Ongoing Concerns

- Exact route of transmission is still unclear.
- High attack-rate.
- No definitive treatment yet.
- Documented nosocomial transmission from patient to patient and from patient to healthcare workers.
- Few definitive lab tests and surveillance tools available

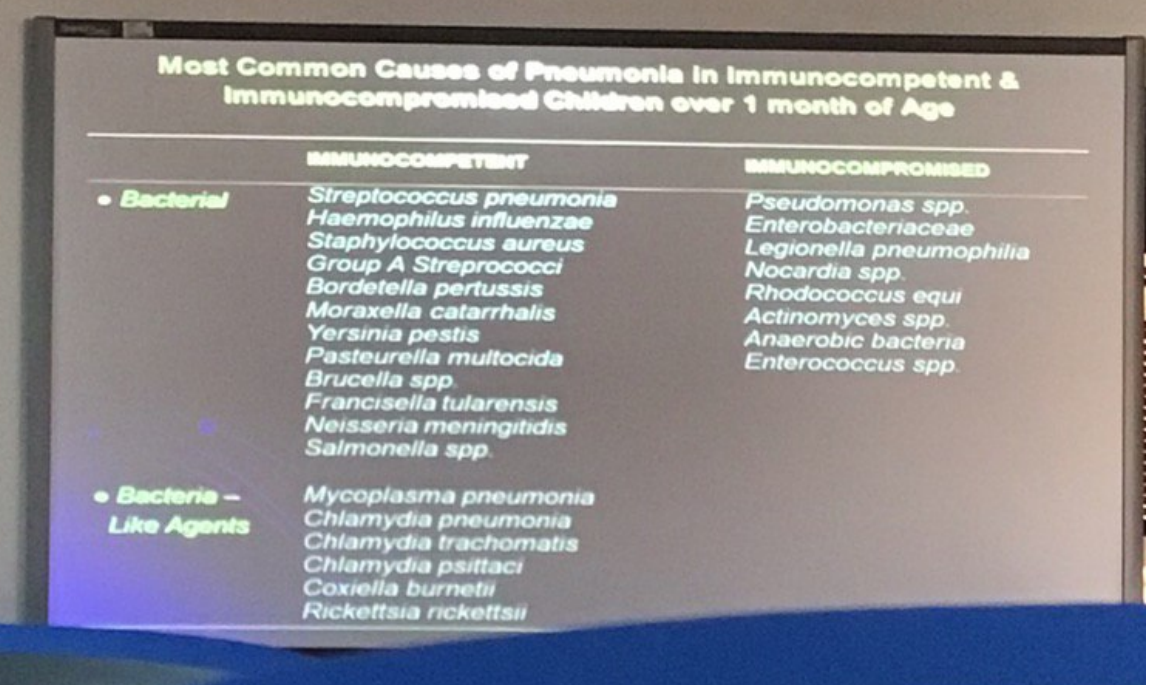


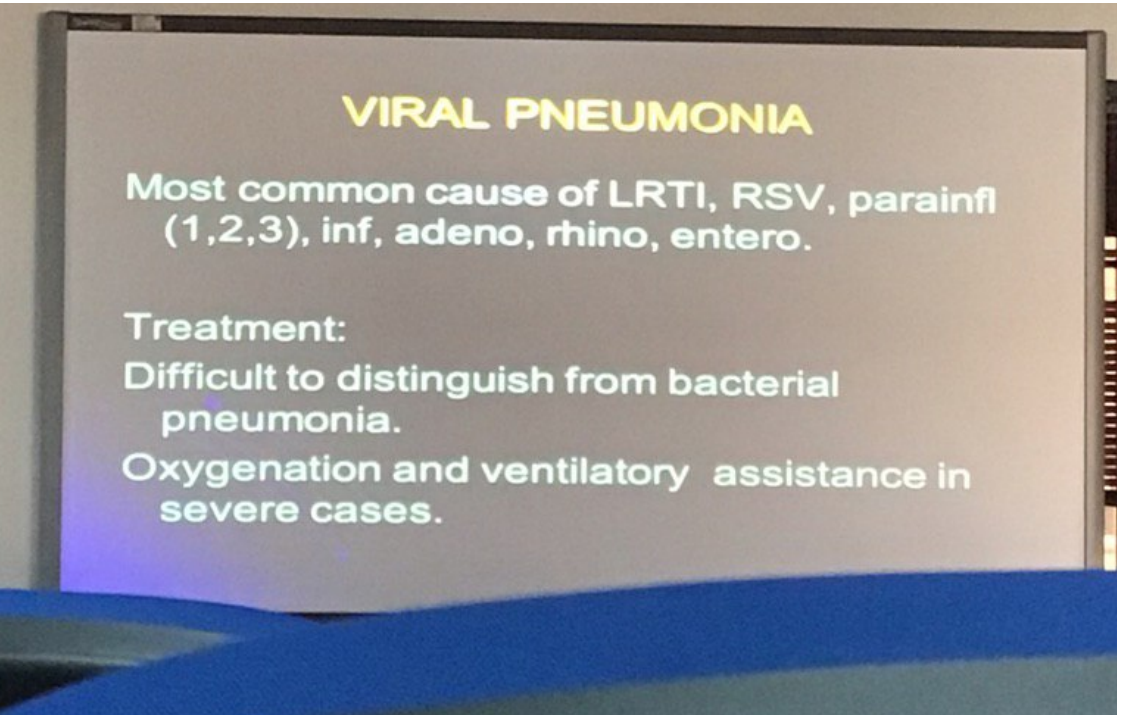


So any abnormalities in one of theses three is a risk factor for pneumonia



It may start as viral infection then goes to secondary bacterial infection. Adeno and RSV can cause permanent damage to the lung parenchyma.


Most Common Causes of Pneumonia in Immunocompetent & Immunocompromised Children over 1 month of Age
IMMUNOCOMPETENT
IMMUNOCOMPROMISED
• Bacterial
Streptococcus pneumonia
Haemophilus influenzae
Staphylococcus aureus
Group A Streprococci
Bordetella pertussis
Moraxella catarrhalis
Yersinia pestis
Pasteurella multocida
Brucella spp.
Francisella tularensis
Neisseria meningitidis
Salmonella spp.
Pseudomonas spp.
Enterobacteriaceae
Legionella pneumophilia
Nocardia spp.
Rhodococcus equi
Actinomyces spp.
Anaerobic bacteria
Enterococcus spp.
• Bacteria – Like Agents
Mycoplasma pneumonia
Chlamydia pneumonia
Chlamydia trachomatis
Chlamydia psittaci
Coxiella burnetii
Rickettsia rickettsii


VIRAL PNEUMONIA
Most common cause of LRTI, RSV, parainfl (1,2,3), inf, adeno, rhino, entero.
Treatment:
Difficult to distinguish from bacterial pneumonia.
Oxygenation and ventilatory assistance in severe cases.

Clinical case

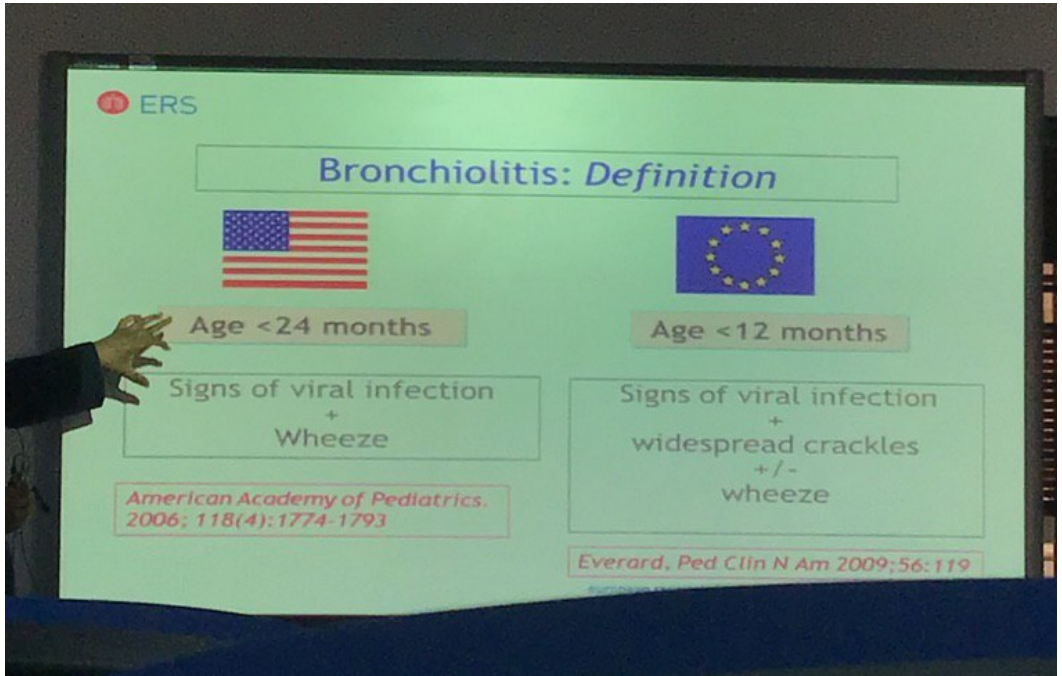
January.....ahmed 1 months.....

- An older brother with an upper respiratory tract infection
- 3 days of rhinorrhoea and cough accompanied by low grade fever.
- Admitted to the Emergency Department for an episode of apnoea with mild respiratory distress with retractions and reduced oral intake of fluid (<50%)in the last 12 hrs

CLINICAL DEFINITION

The diagnosis of bronchiolitis is a clinical one based on typical history and findings on physical examination. Clinicians in different countries use different criteria to diagnose acute bronchiolitis.

A consensus guidelines panel reported a 90% consensus on the definition of bronchiolitis as a seasonal viral illness characterized by fever, nasal discharge and dry, wheezy cough.
On examination there are fine respiratory crackles and/ on high pitched expiratory wheeze.



BRONCHIOLITIS

Lower respiratory tract infection in children < 24 months of age.

It involves large and small airways tracheobronchitis, bronchiolitis and alveolar and interstitial lung involvement (pneumonia).

Etiology:

Viral: RSV; adenovirus (3,7,21), influenza; parainfluenza (3); rhinovirus; mumps.

Others: Mycoplasma pneumoniae.

RSV season?

- Ubiquitous throughout the world
- Seasonal outbreaks
  - Temperate Northern hemisphere: November to April, peak January or February
  - Temperate Southern hemisphere: May to September, peak May, June or July
  - Tropical Climates: rainy season
  - In Saudi Arabia RSV appears in November and the seasonal peak occurs during Jan. &Feb.

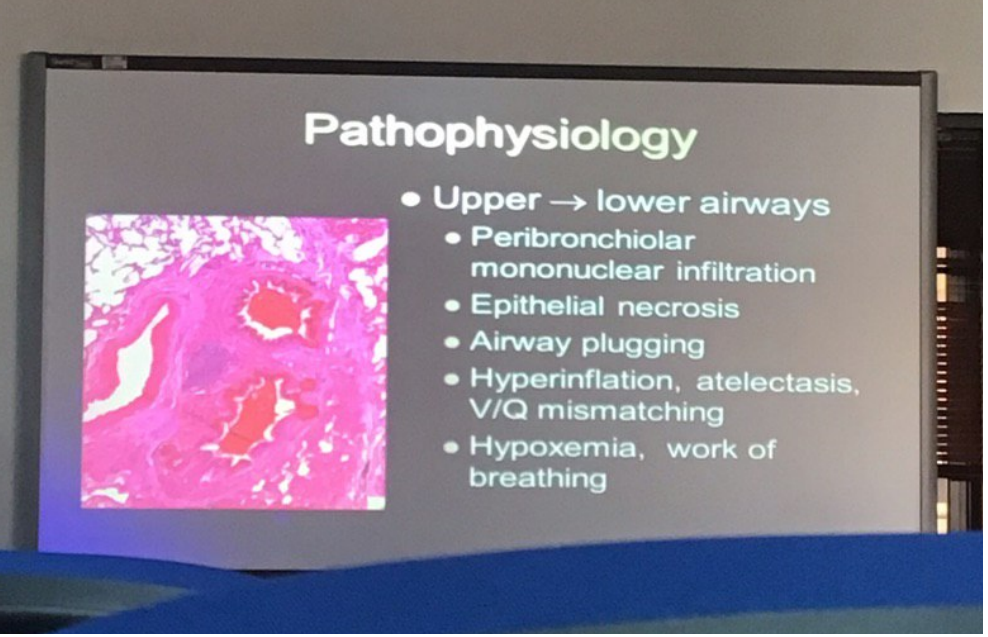
BRONCHIOLITIS (cont.)

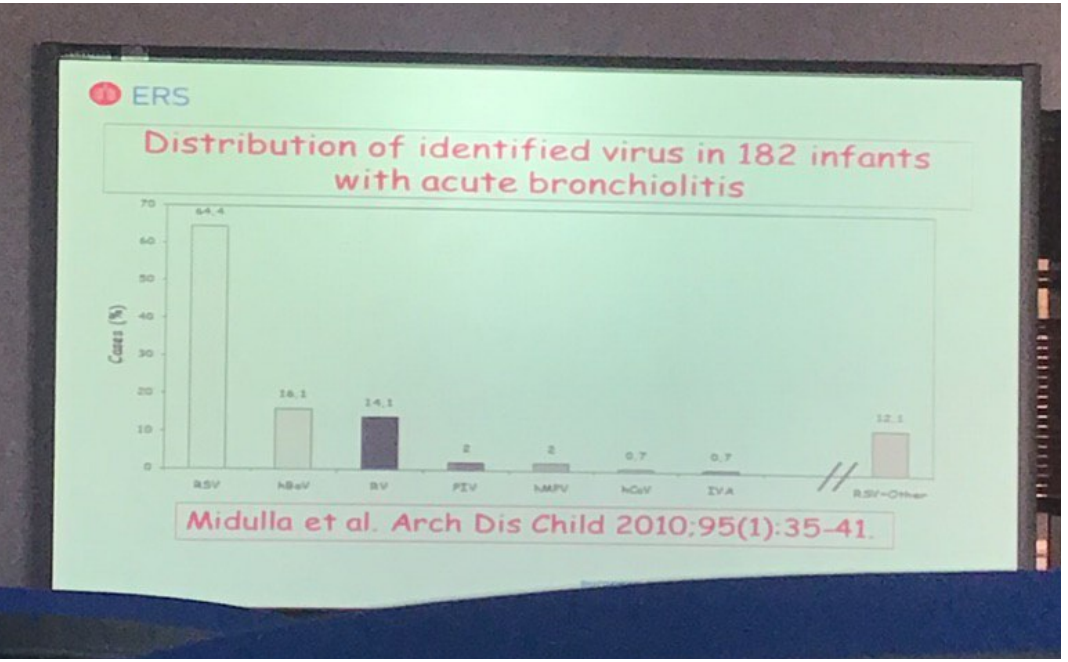
C/P: Usually in mid-winter.

Fever, rhinitis, cough, dyspnea poor feeding and vomiting.

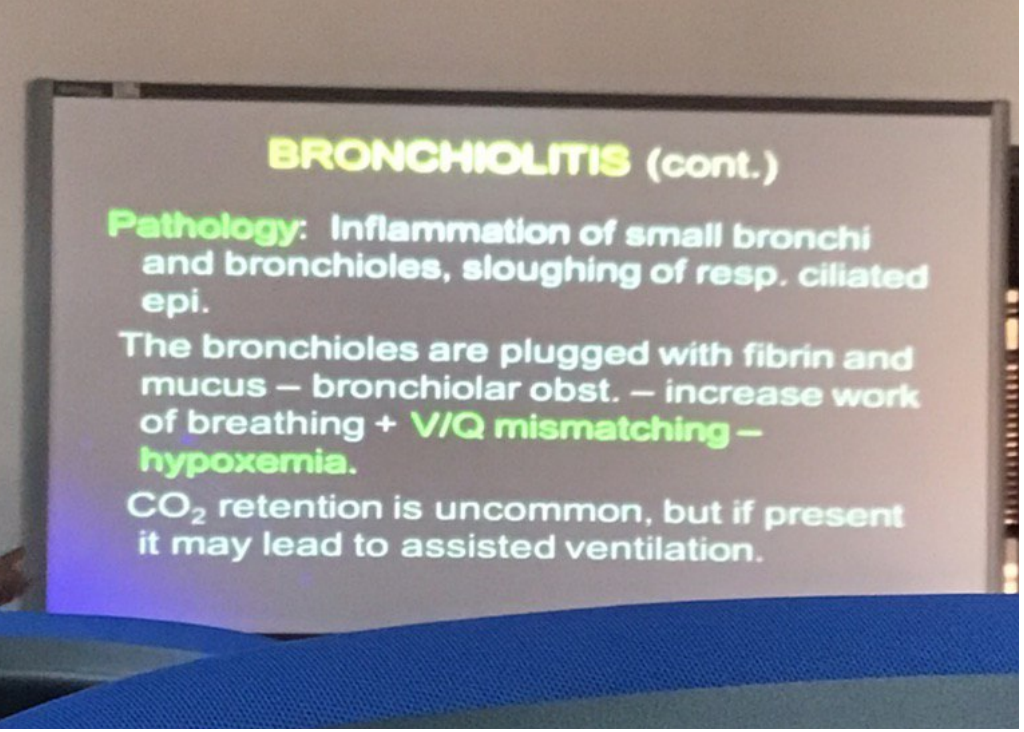
P/E: tachypnea, chest retractions and wheezing. Mild conj. and otitis media.

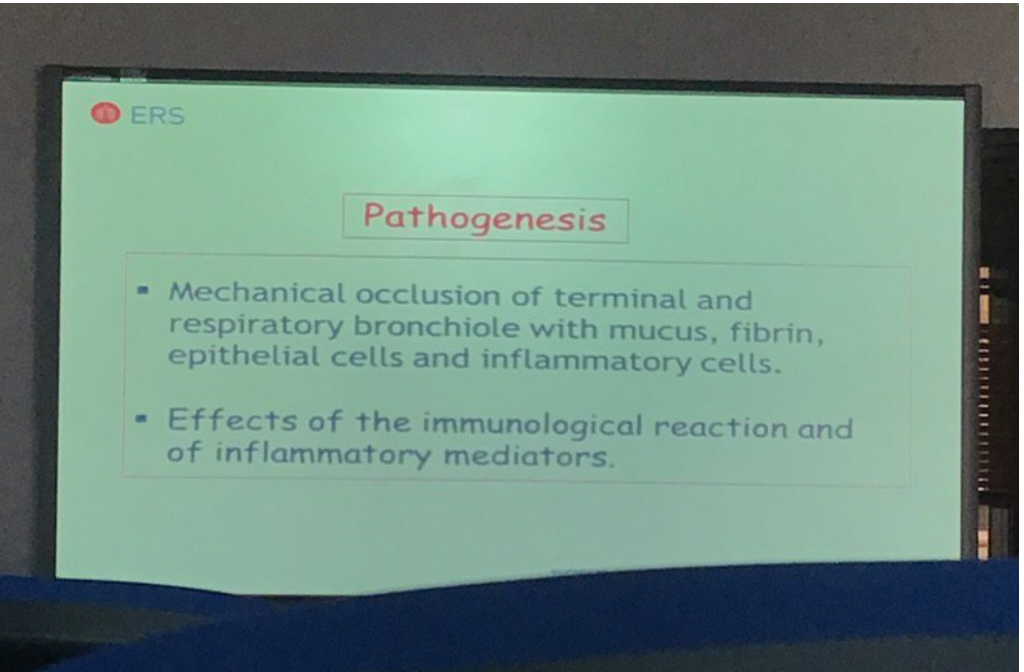
CXR: non-specific, air trapping, atelectasis, and consolidation.



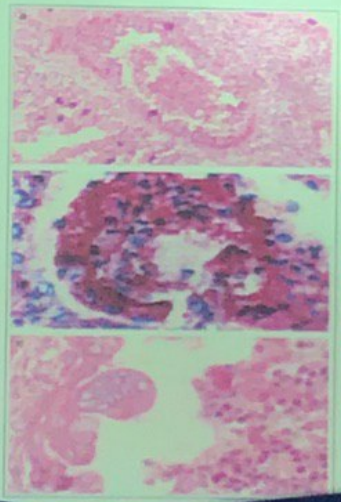


RSV is the most common causative organism


BRONCHIOLITIS (cont.)
Pathology: Inflammation of small bronchi and bronchioles, sloughing of resp. ciliated epi.
The bronchioles are plugged with fibrin and mucus – bronchiolar obst. – increase work of breathing + V/Q mismatching – hypoxemia.
CO_2 retention is uncommon, but if present it may lead to assisted ventilation.


ERS
Pathogenesis
Mechanical occlusion of terminal and respiratory bronchiole with mucus, fibrin, epithelial cells and inflammatory cells.
Effects of the immunological reaction and of inflammatory mediators.

ERS



Medium-size airway with intraluminal dead epithelium, inflammatory cells and amorphous debris

Intraluminal debris includes mucus, fibrin, epithelial cells and inflammatory cells.

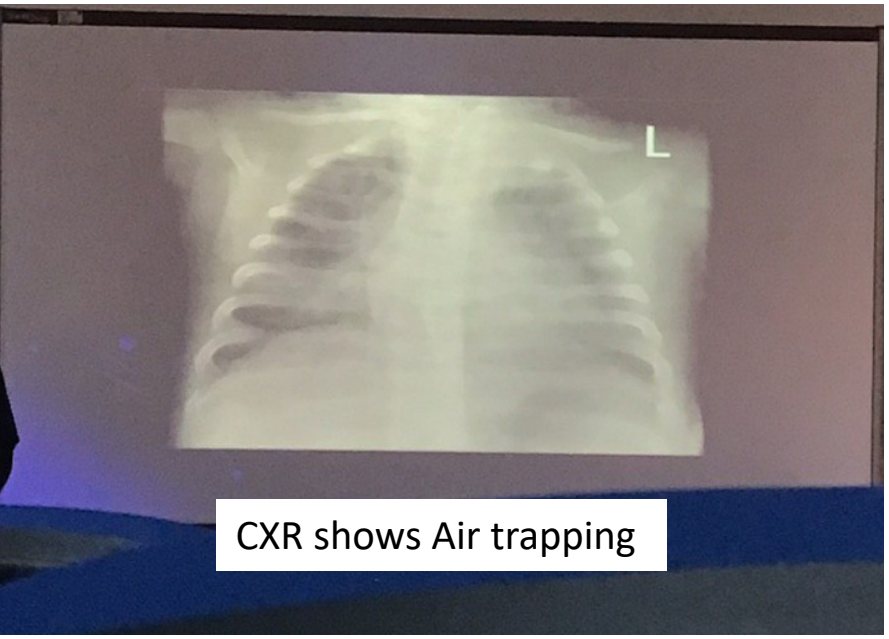
Intrabronchiolar syncytia adjacent to intraluminal cellular debris

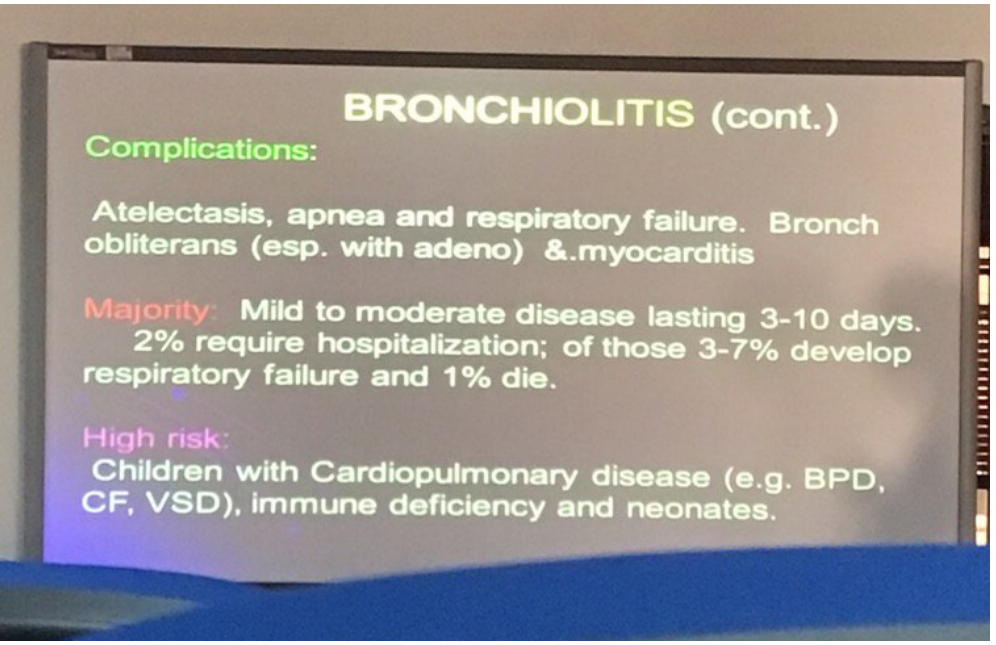
Modern Pathology 2007; 20:108-119

ERS

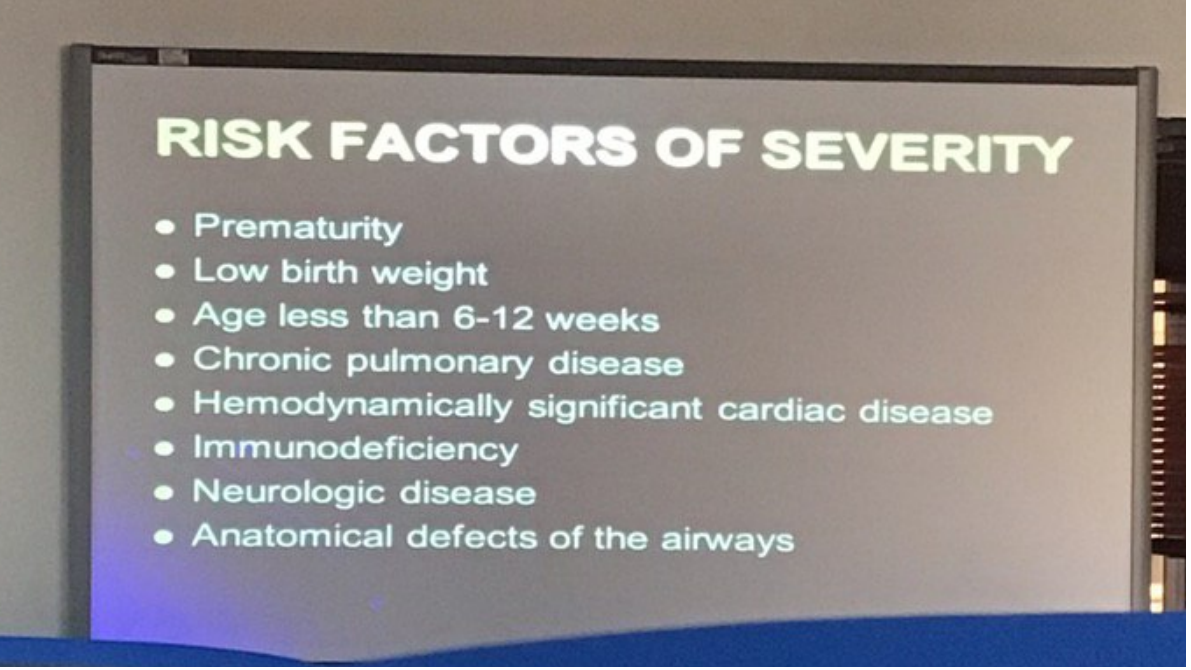
Bronchiolitis: *clinical manifestations*

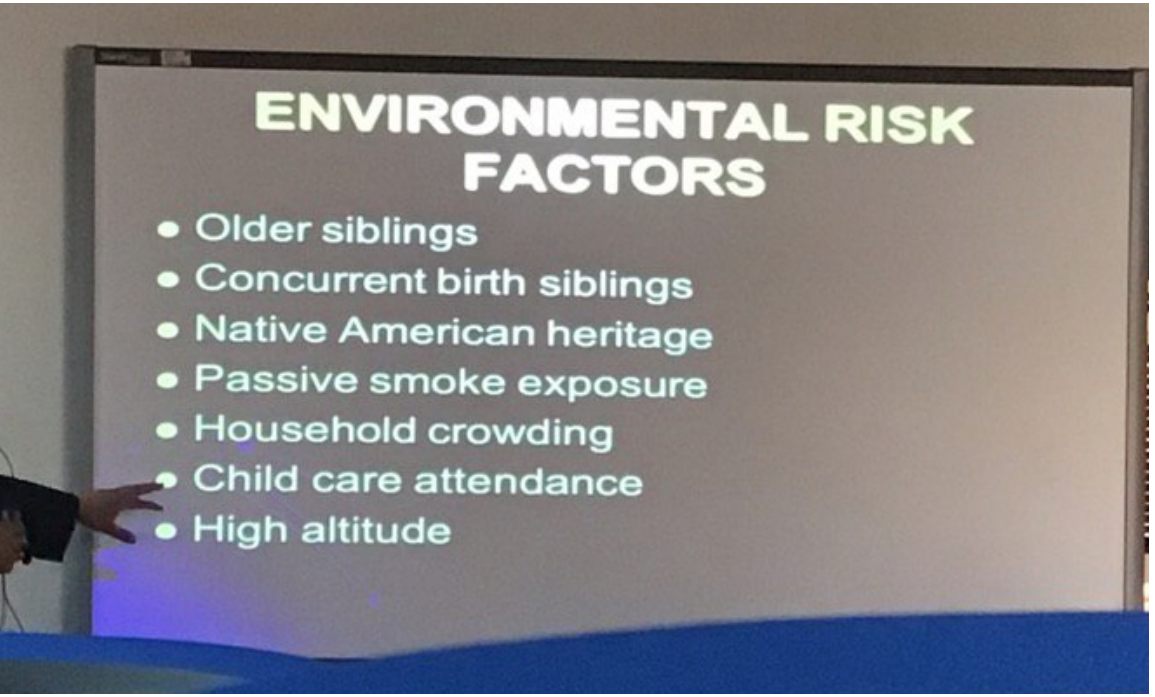
- Exposure to children or adults with a respiratory viral infection.
- The initial symptoms are rhinorrhoea, cough and sometimes low grade fever. In 18% of cases the first clinical symptom could be episodes of apnoea.
- With the relief of fever the child manifests tachypnoea, retractions, nasal flaring, rales and hypoxemia
- Dehydration and metabolic acidosis.
- Syndrome of inappropriate secretion of antidiuretic hormone is common with severe respiratory distress.
- It is a dynamic disease and its clinical characteristics can quickly change

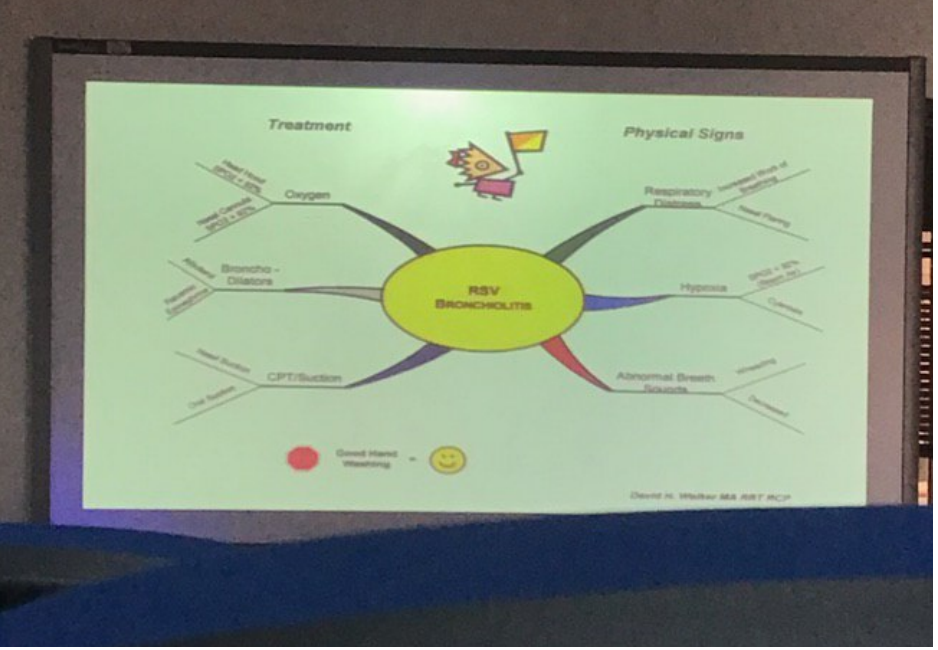




Tachypnea → muscle fatigue → apnea


RISK FACTORS OF SEVERITY
Prematurity
Low birth weight
Age less than 6-12 weeks
Chronic pulmonary disease
Hemodynamically significant cardiac disease
Immunodeficiency
Neurologic disease
Anatomical defects of the airways

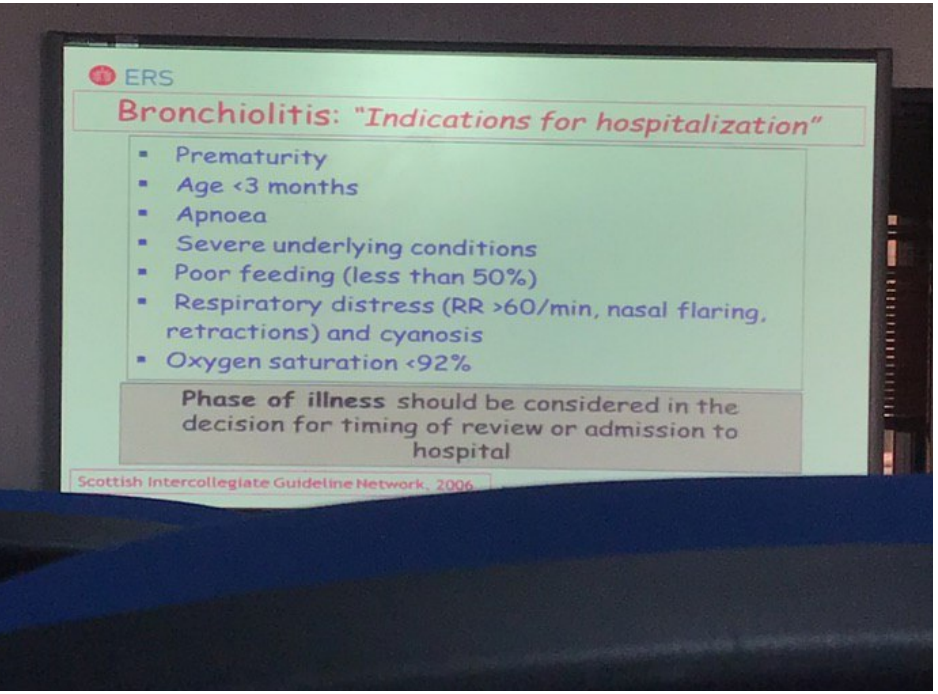

ENVIRONMENTAL RISK FACTORS
Older siblings
Concurrent birth siblings
Native American heritage
Passive smoke exposure
Household crowding
Child care attendance
High altitude

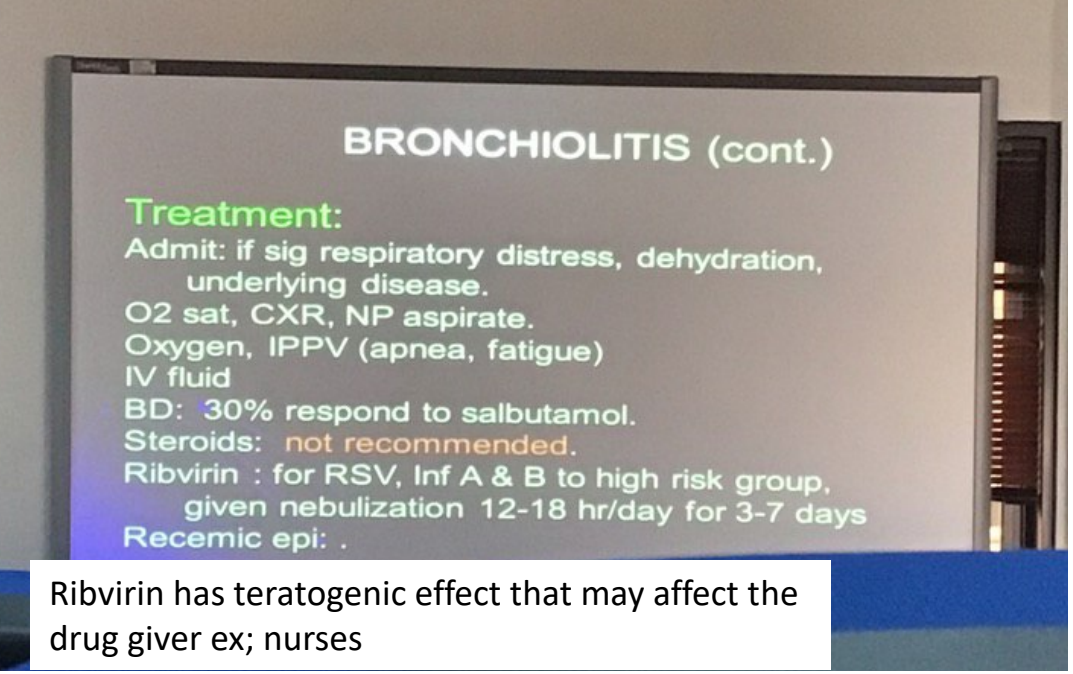


RSV bronchiolitis

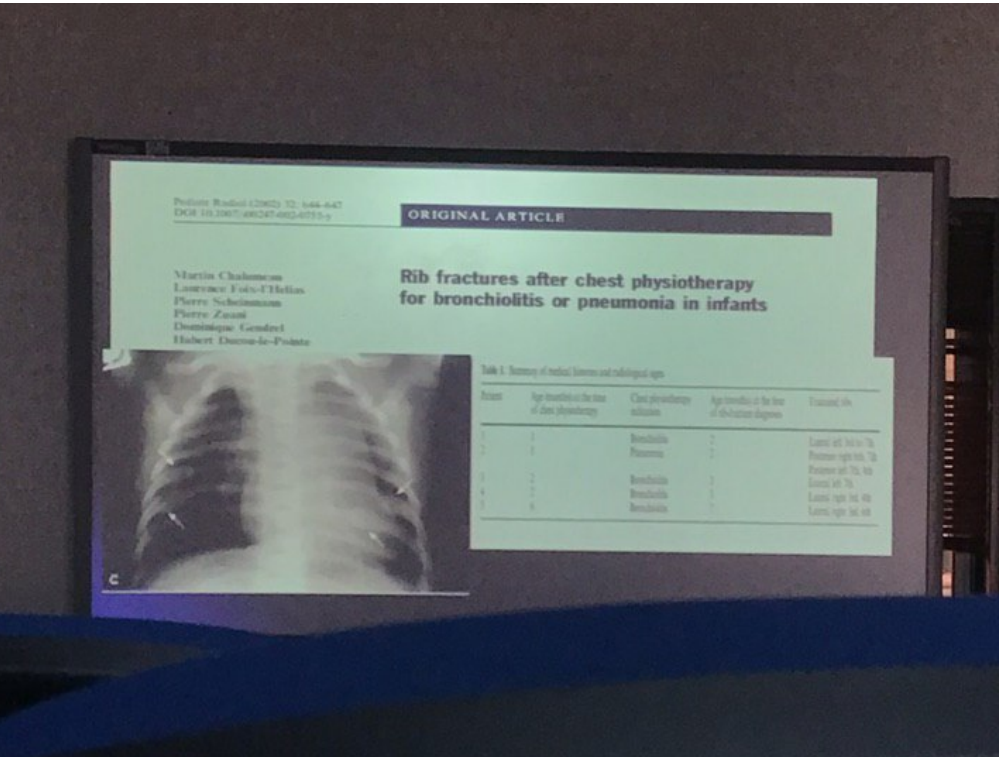
Sings: respiratory distress, hypoxia and abnormal breathing.

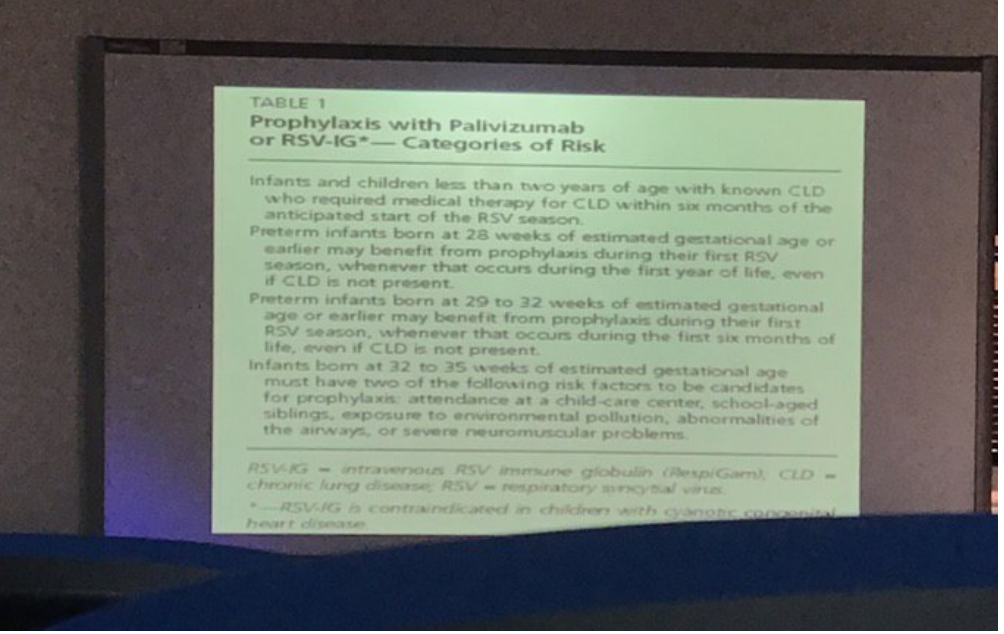
Treatment: oxygen, bronchodilator and chest physiotherapy / suction



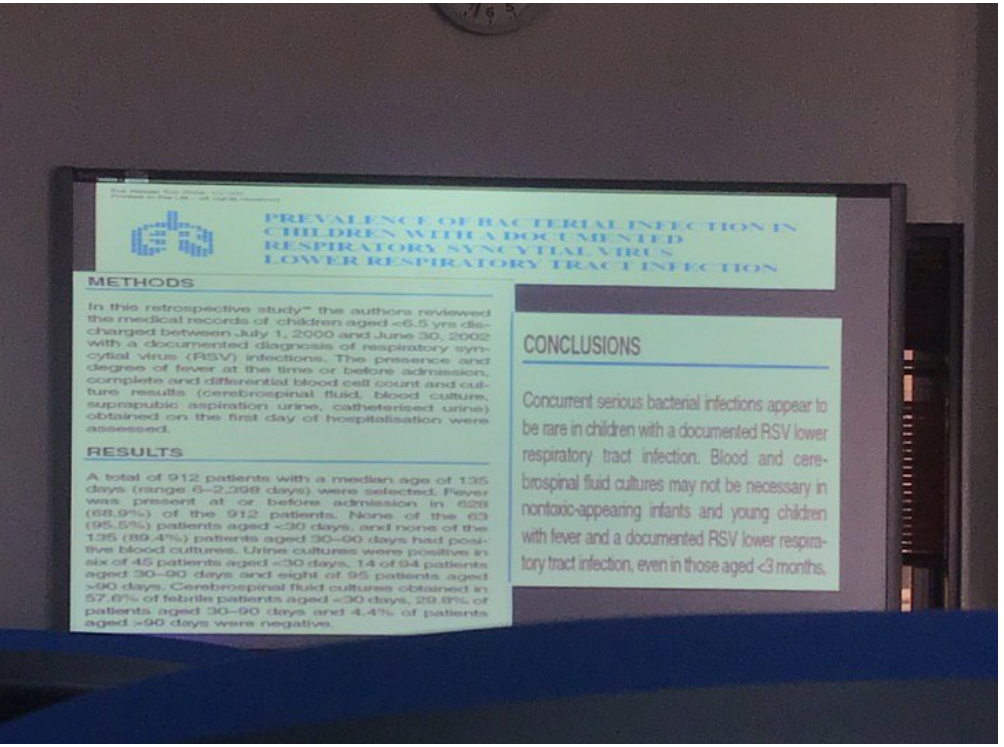


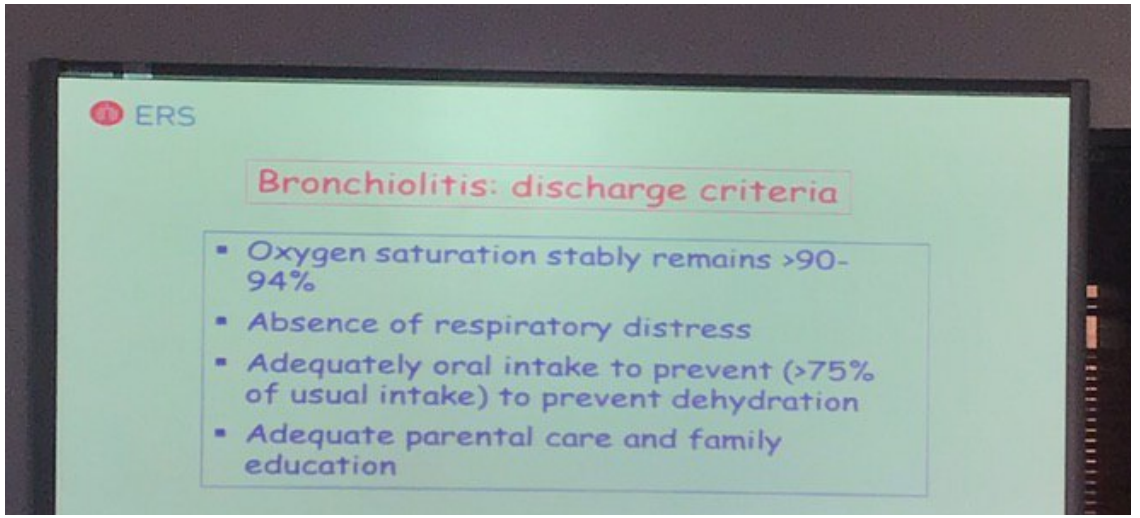
Ribvirin has teratogenic effect that may affect the drug giver ex; nurses



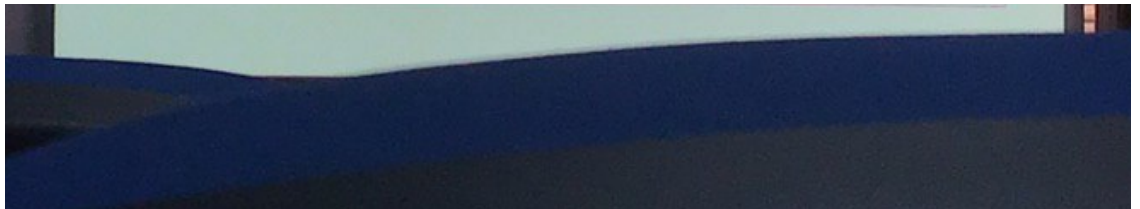


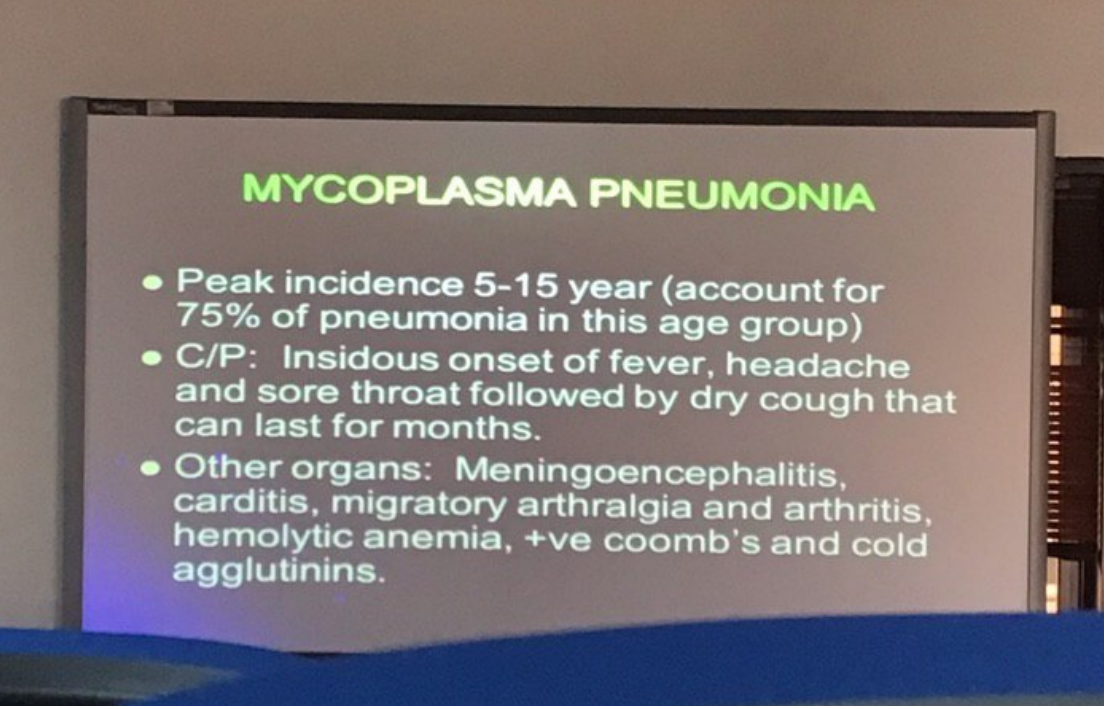
Palivizumab (monoclonal antibody) for high risk babies
e.g.; preterm babies , baby with congenital heart disease, cystic fibrosis and immunodeficiency.

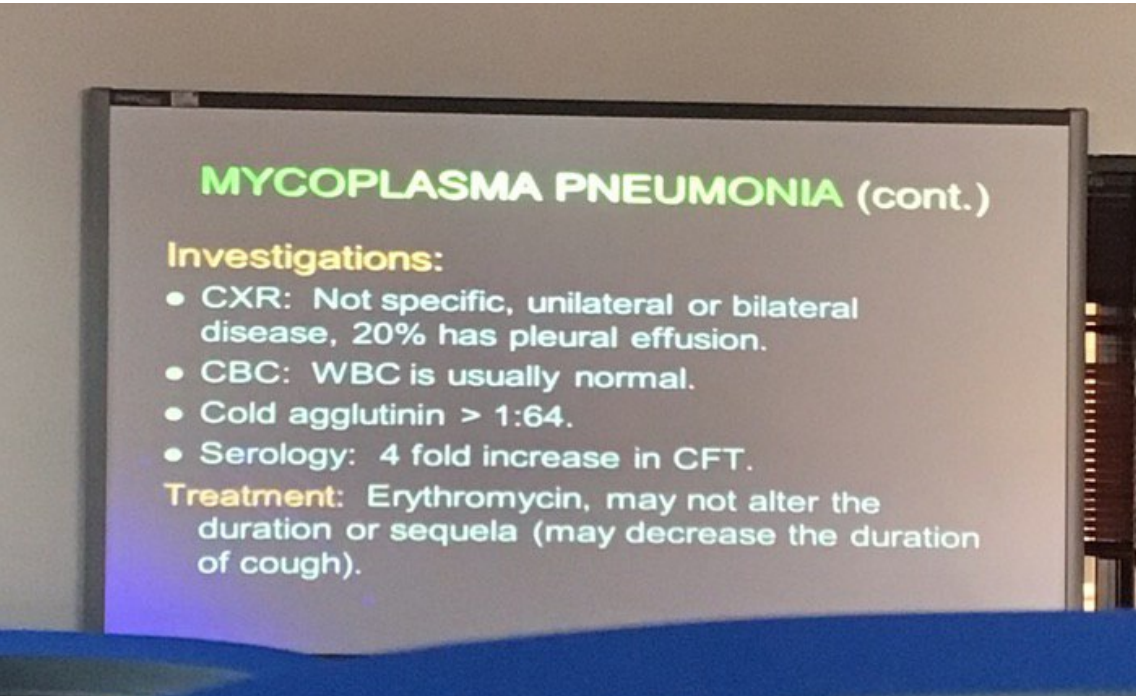


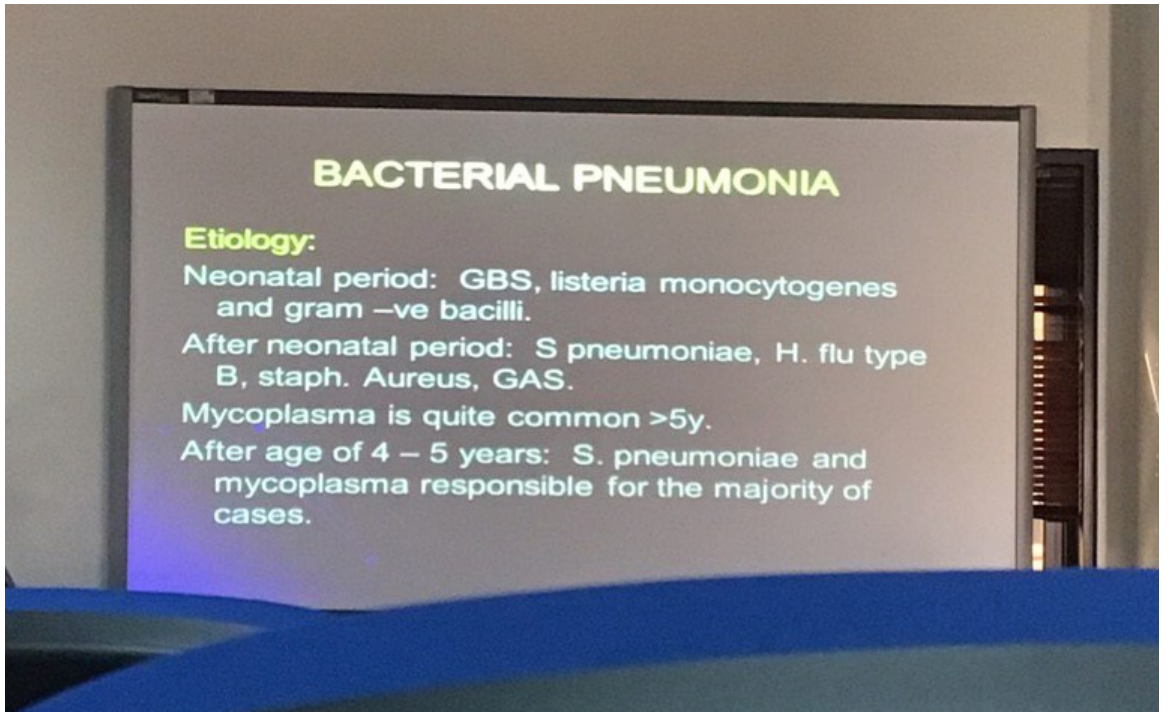


Never ever discharge patient if oral intake less than 50% of usual intake



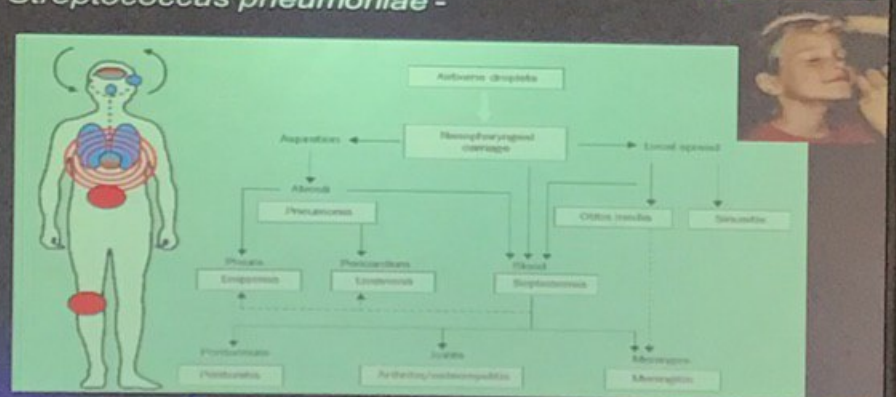

MYCOPLASMA PNEUMONIA
• Peak incidence 5-15 year (account for 75% of pneumonia in this age group)
• C/P: Insidous onset of fever, headache and sore throat followed by dry cough that can last for months.
• Other organs: Meningoencephalitis, carditis, migratory arthralgia and arthritis, hemolytic anemia, +ve coomb's and cold agglutinins.


MYCOPLASMA PNEUMONIA (cont.)
Investigations:
• CXR: Not specific, unilateral or bilateral disease, 20% has pleural effusion.
• CBC: WBC is usually normal.
• Cold agglutinin > 1:64.
• Serology: 4 fold increase in CFT.
Treatment: Erythromycin, may not alter the duration or sequela (may decrease the duration of cough).


BACTERIAL PNEUMONIA
Etiology:
Neonatal period: GBS, listeria monocytogenes and gram –ve bacilli.
After neonatal period: S pneumoniae, H. flu type B, staph. Aureus, GAS.
Mycoplasma is quite common >5y.
After age of 4 – 5 years: S. pneumoniae and mycoplasma responsible for the majority of cases.

Bacterial adhesion and invasion:

- Streptococcus pneumoniae -



BACTERIAL PNEUMONIA (cont.)

Pathology:

Normally the resp. tract is **sterile** below the vocal cords. Pneumonia result from asp. Of pathogen to lower resp. tract. Concurrent viral infection aid this process (present in 30-50% of cases) esp. RSV, measles and influenza.

BACTERIAL PNEUMONIA (cont.)

C/P: Fever, chills, cough, chest and abdominal Pain.
Younger infants less specific symptom and signs

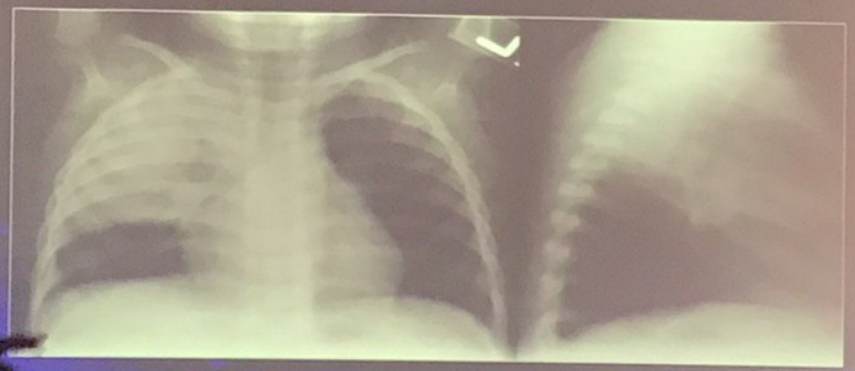
Diagnosis:

CBC – dif, cold agglutinin
CXR
Blood culture, sputum in older children

Treatment:

1) Adequate oxygenation.
2) Depends on severity and age. Ampi or amoxacillin (10-30% of H flu are resistance) cefuroxime 75-100mg/kg/day
3) Older child: Pen or macrolides =>erythro (clarythromycine or zithromax)

RUL



What are the indications for transfer to intensive care?

There are two main scenarios when a child is likely to need admission to an intensive care unit:
(1)When the pneumonia is so severe that the child is developing severe respiratory failure requiring assisted ventilation;
(2) A pneumonia complicated by septicaemia.
Key features that suggest a child requires transfer include:

- ✓Failure to maintain oxygen saturation >92% in fractional inspired oxygen of >0.6
- ✓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.

What are the indications for referral and admission to hospital?

- Significant tachycardia for level of fever (values to define tachycardia vary with age and with temperature
- Prolonged central capillary refill time >2 s
- Difficulty in breathing;
- Intermittent apnoea, grunting;
- Not feeding;
- Chronic conditions (eg, congenital heart disease, chronic lung disease of prematurity, chronic respiratory conditions leading to infection such as cystic fibrosis, bronchiectasis, immune deficiency).

Features of severe disease in an older child include:

- Oxygen saturation <92%, cyanosis
- Respiratory rate >50 breaths/min
- Significant tachycardia for level of fever (values to define Tachycardia vary with age and with temperature
- Prolonged central capillary refill time >2 s
- Difficulty in breathing; grunting
- Signs of dehydration
- chronic conditions (eg, congenital heart disease, chronic lung disease of prematurity, chronic respiratory conditions leading to infection such as cystic fibrosis, bronchiectasis, immune deficiency).

BACTERIAL PNEUMONIA (cont.)

Complications:

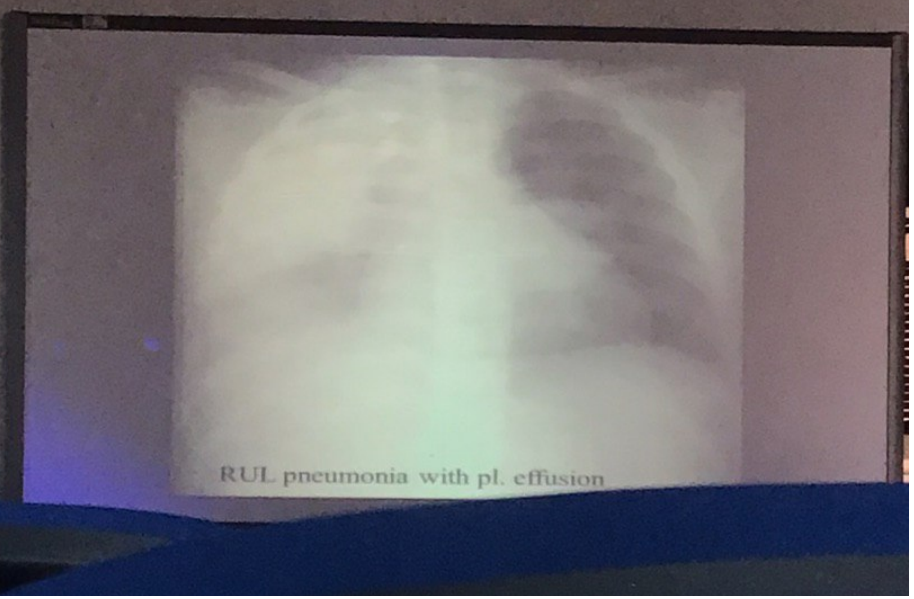
1) **Parapneumonic effusion:**

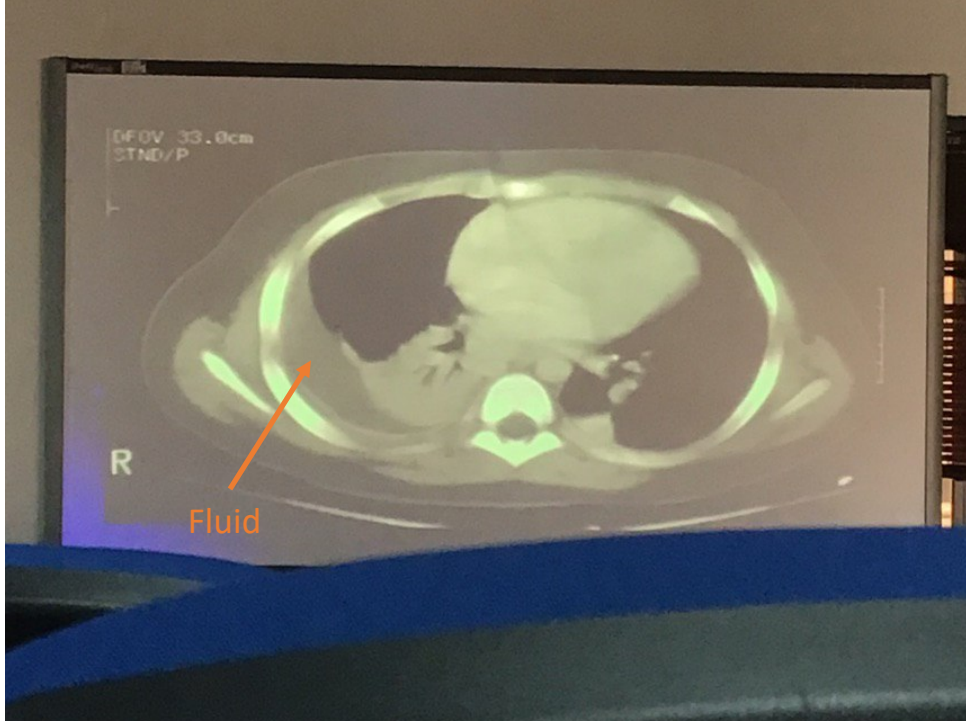
Esp. with S. aureus, H flu, S pneumoniae. Can be thin transudate or thick exudates (empyema)

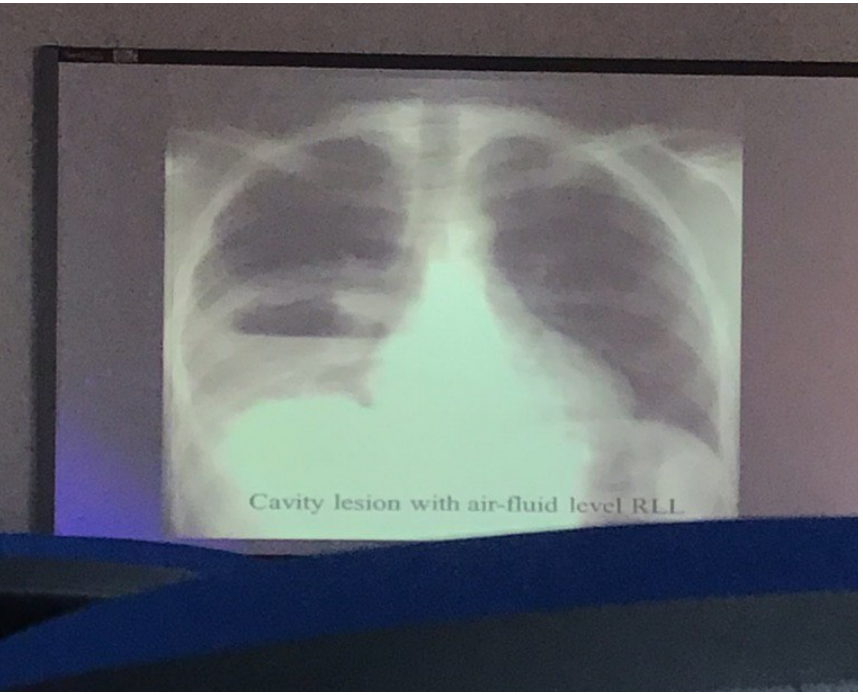
Send pl fluid for cell count, glucose, protein, pH, LDH and culture.

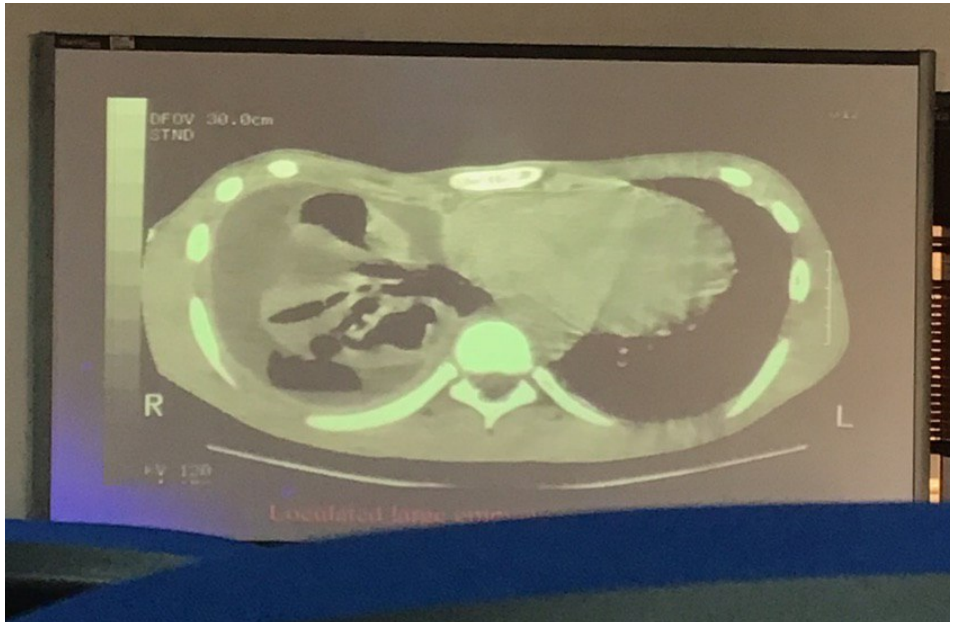
Empyema WBC > 15,000/mm3, protein >3 g/dl, pH <7.2

Management: ABX + drainage, recovery is slow, fever continue for 1 – 2 weeks.


RUL pneumonia with pl. effusion


DFOV 33.0cm
STND/P
R
Fluid

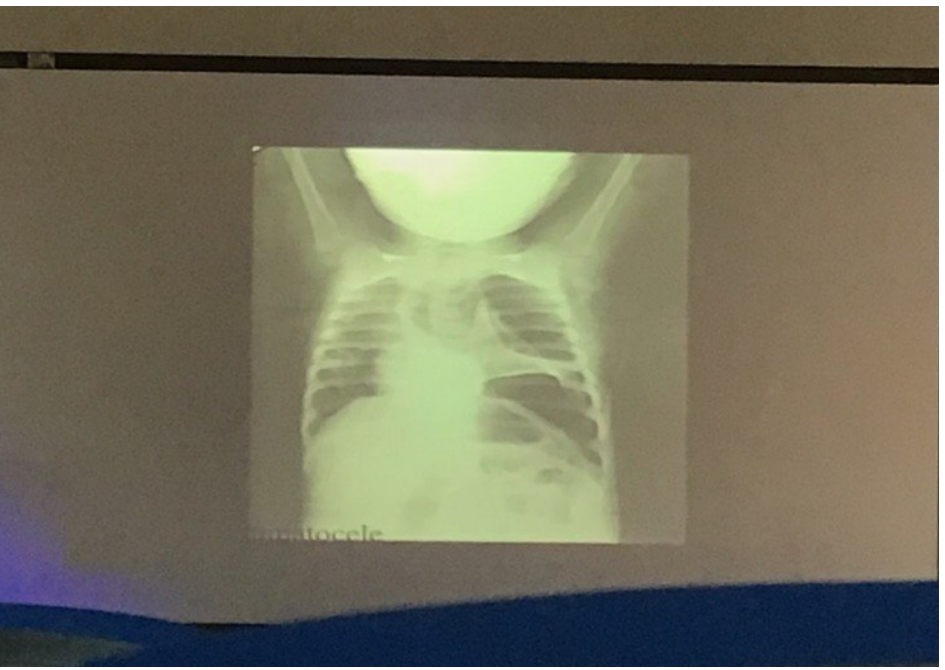

Cavity lesion with air-fluid level RLL

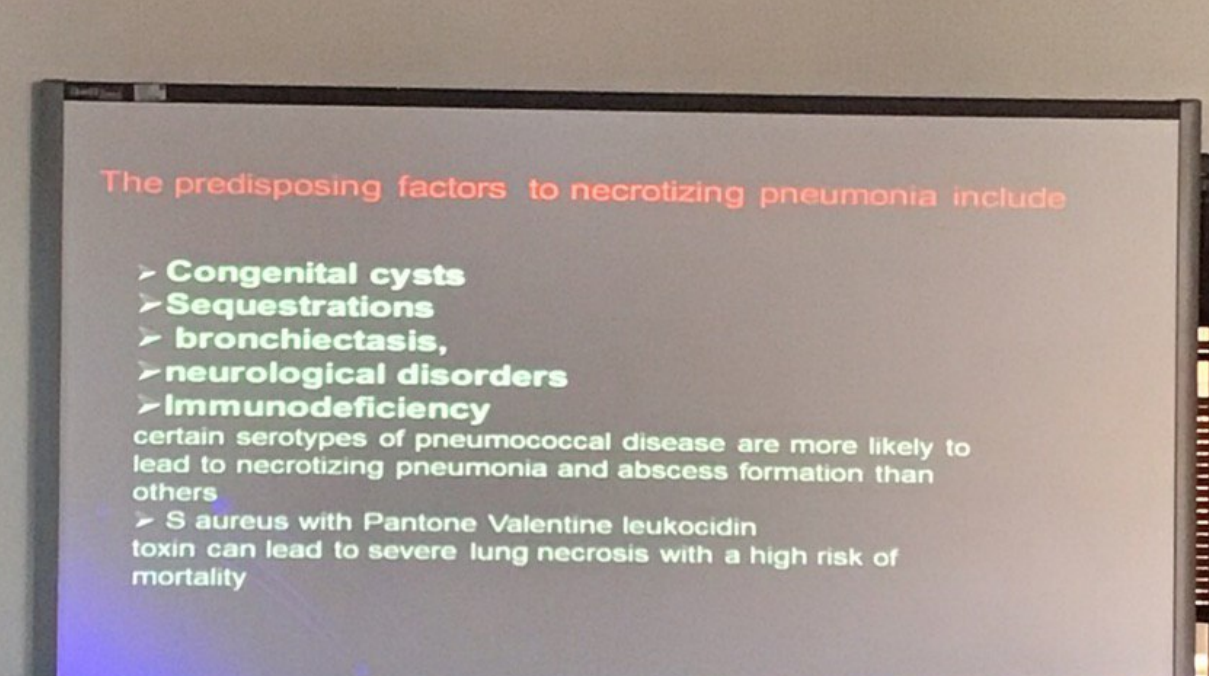

DFOV 30.0cm
STND
R
L

2) **Pneumatoceles: Thin wall** cavity, complicate 40% of staph pneumonia, unusual with other types. Usually asymptomatic unless rupture – pneumothorax or pyothorax. Resolve spontaneously within 3 months

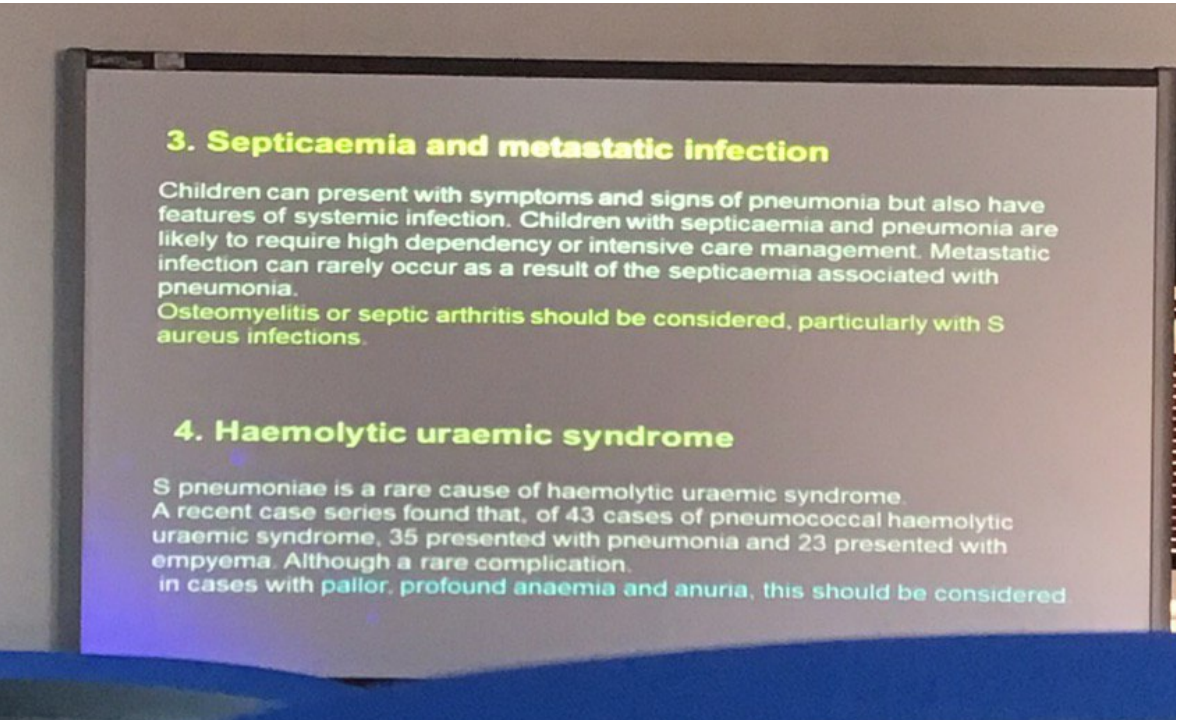
2) Lung abscess: Esp in aspiration pneumonia in mentally retarded children. Esp. in the dependent portion of the lung.
   - Growth: mixed anaerobic bacteria

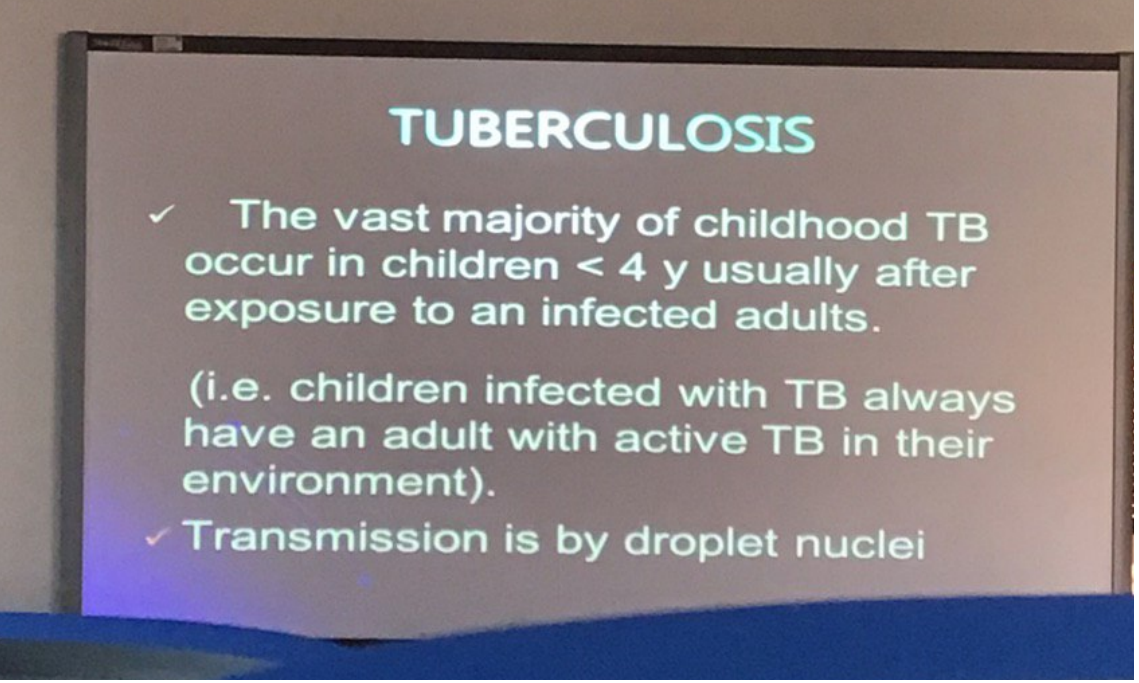
Treatment: Pen G, clinda or flagyl.

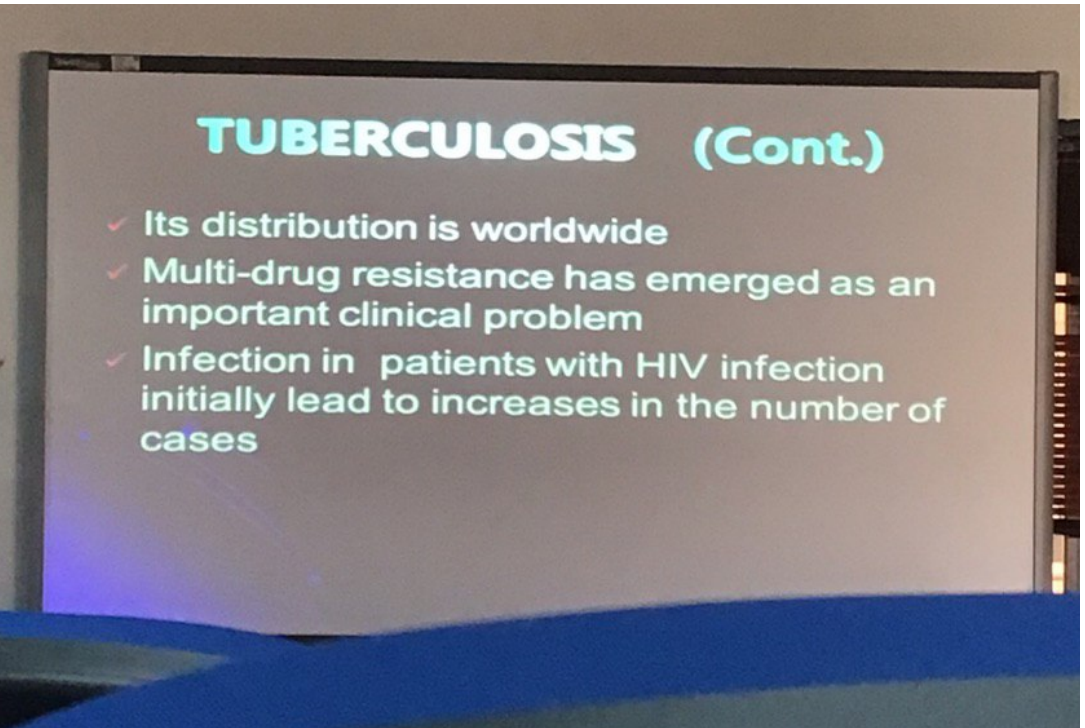


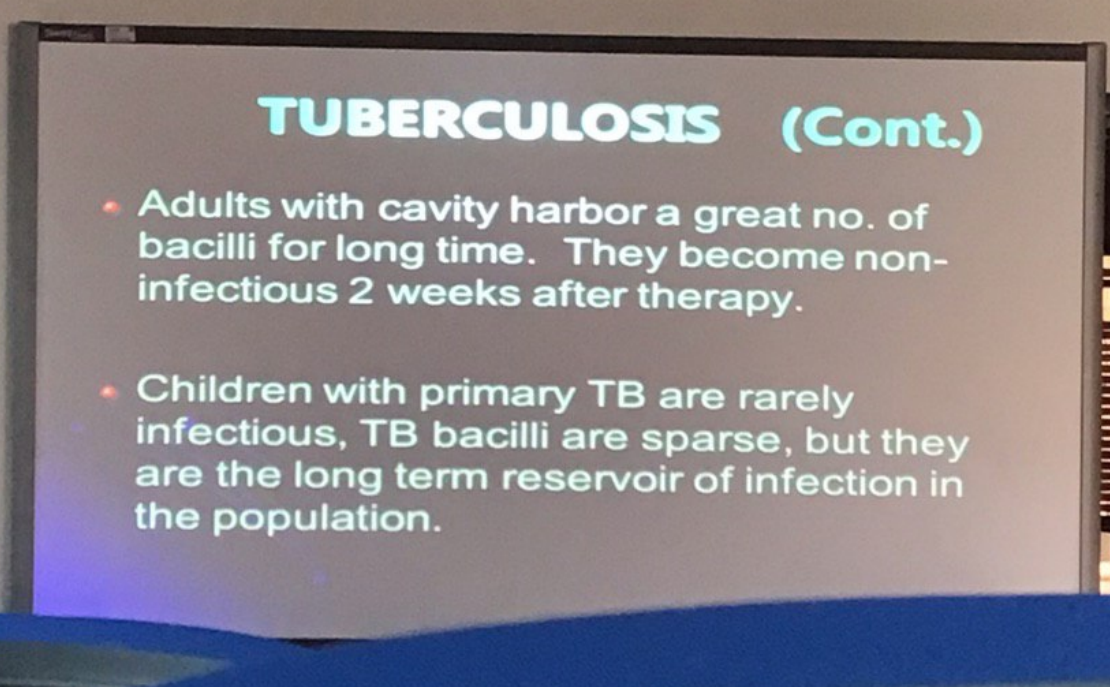


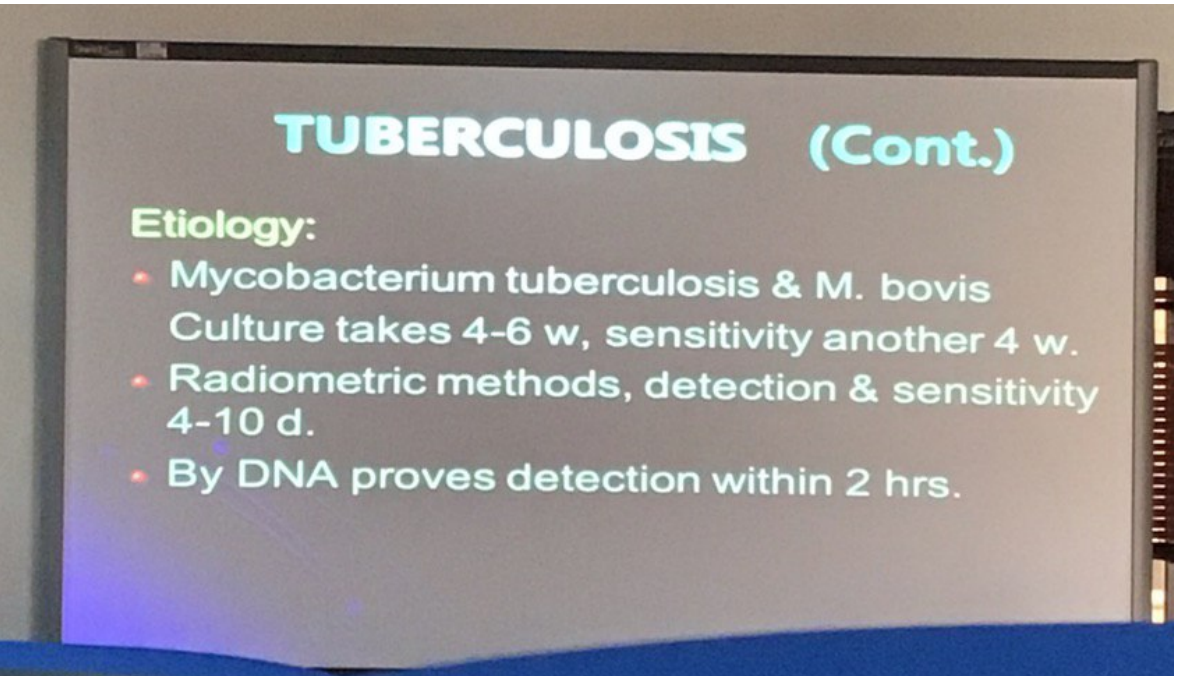
So we should follow the child who got pneumonia for one year

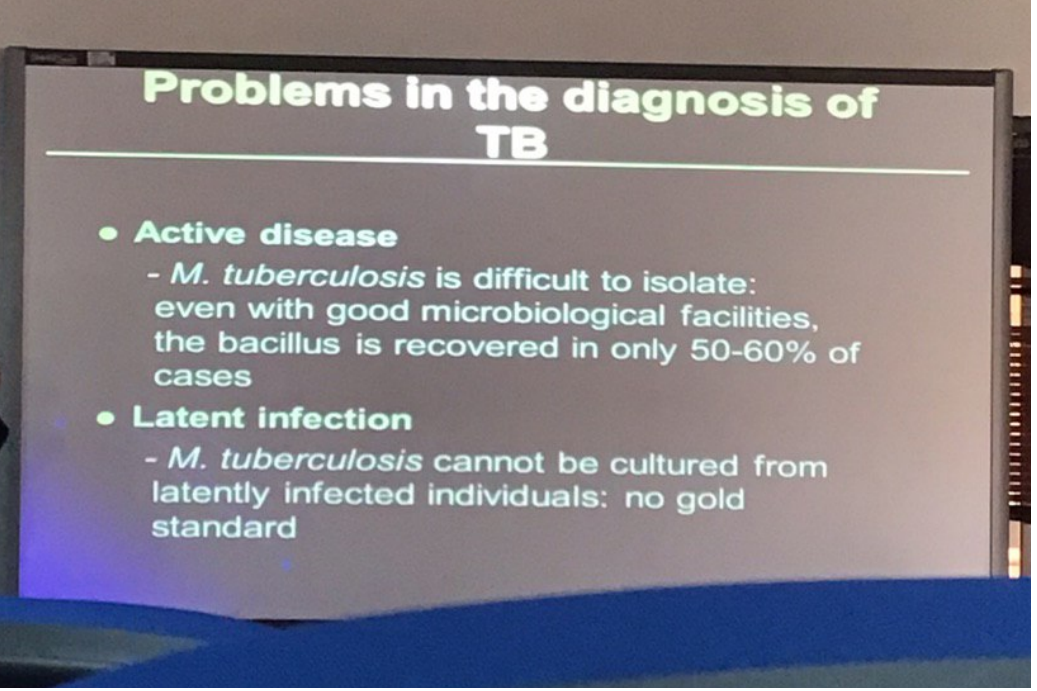


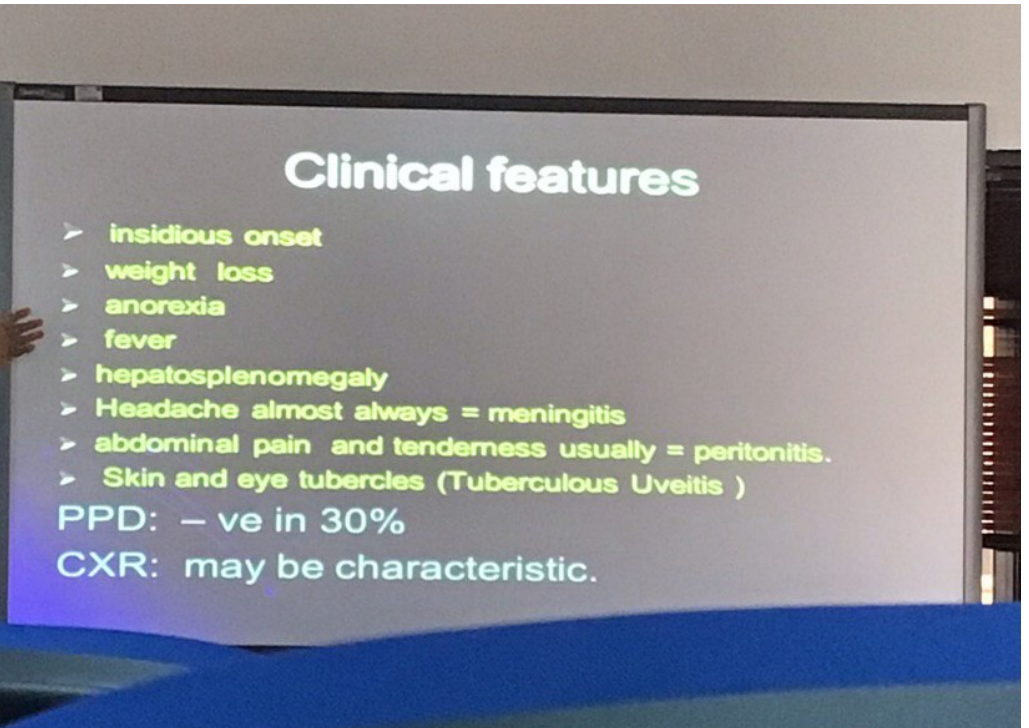

TUBERCULOSIS
The vast majority of childhood TB occur in children < 4 y usually after exposure to an infected adults.
(i.e. children infected with TB always have an adult with active TB in their environment).
Transmission is by droplet nuclei

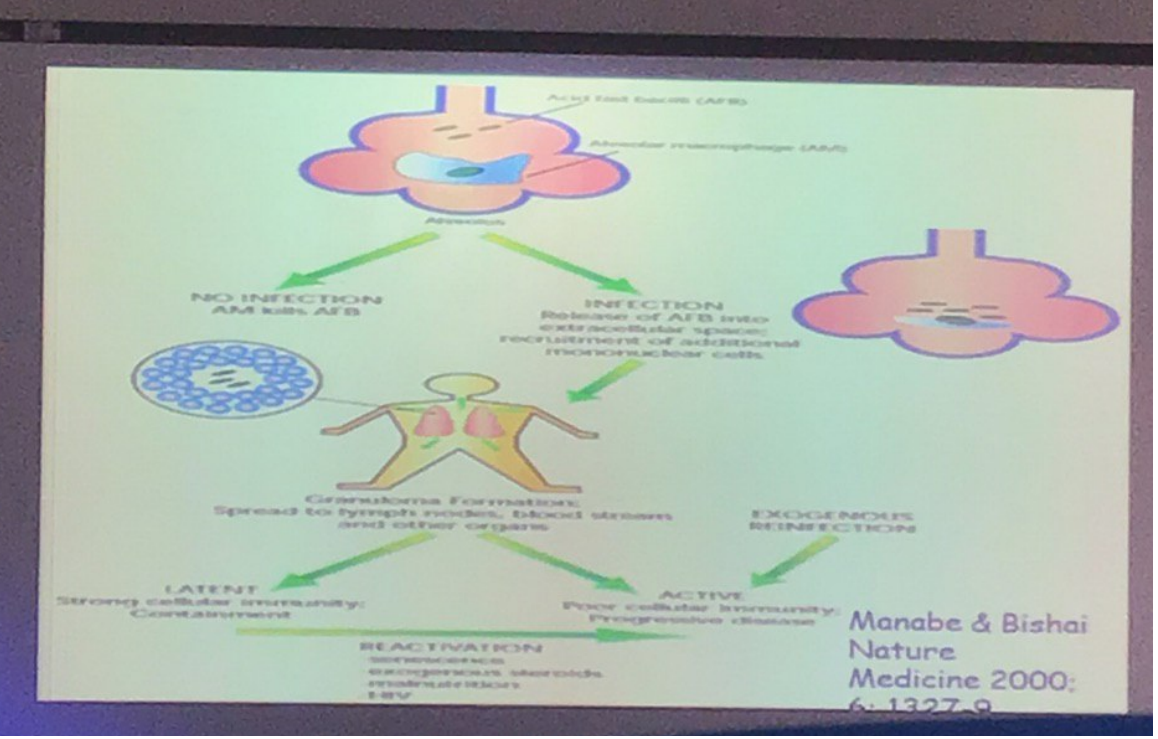

TUBERCULOSIS (Cont.)
Its distribution is worldwide
Multi-drug resistance has emerged as an important clinical problem
Infection in patients with HIV infection initially lead to increases in the number of cases

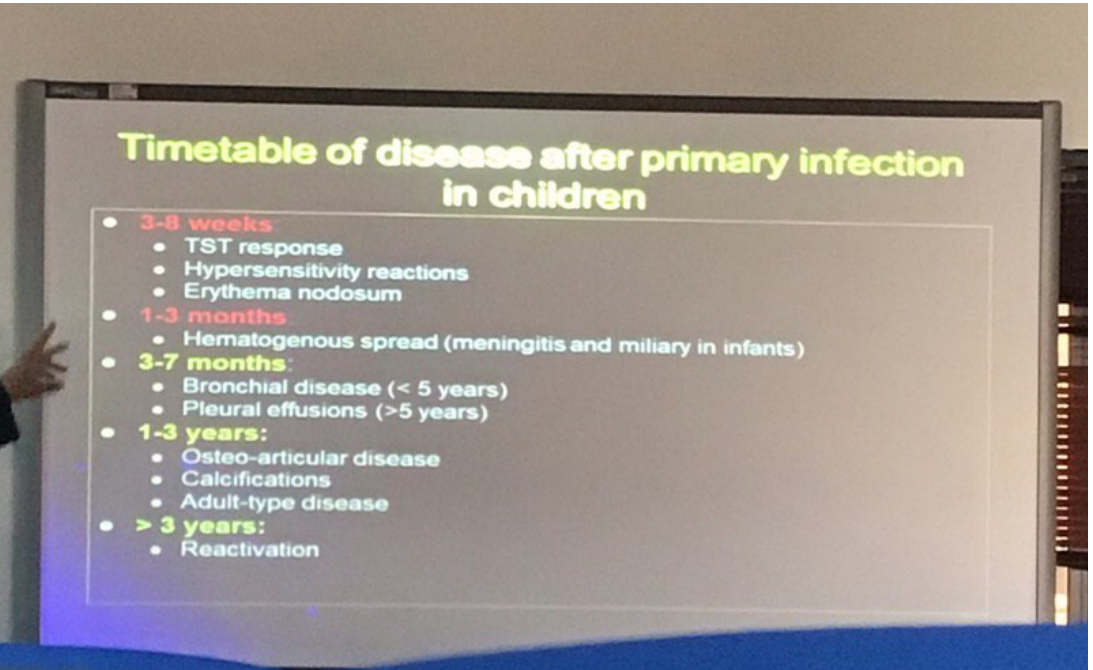

TUBERCULOSIS (Cont.)
Adults with cavity harbor a great no. of bacilli for long time. They become non-infectious 2 weeks after therapy.
Children with primary TB are rarely infectious, TB bacilli are sparse, but they are the long term reservoir of infection in the population.


TUBERCULOSIS (Cont.)
Etiology:
Mycobacterium tuberculosis & M. bovis
Culture takes 4-6 w, sensitivity another 4 w.
Radiometric methods, detection & sensitivity 4-10 d.
By DNA proves detection within 2 hrs.


Problems in the diagnosis of TB
Active disease
- M. tuberculosis is difficult to isolate: even with good microbiological facilities, the bacillus is recovered in only 50-60% of cases
Latent infection
- M. tuberculosis cannot be cultured from latently infected individuals: no gold standard


Clinical features
insidious onset
weight loss
anorexia
fever
hepatosplenomegaly
Headache almost always = meningitis
abdominal pain and tenderness usually = peritonitis.
Skin and eye tubercles (Tuberculous Uveitis)
PPD: – ve in 30%
CXR: may be characteristic.


NO INFECTION
AM kills AFB
INFECTION
EXOGENOUS
REINFECTION
LATENT
ACTIVE
REACTIVATION
Manabe & Bishai
Nature
Medicine 2000;

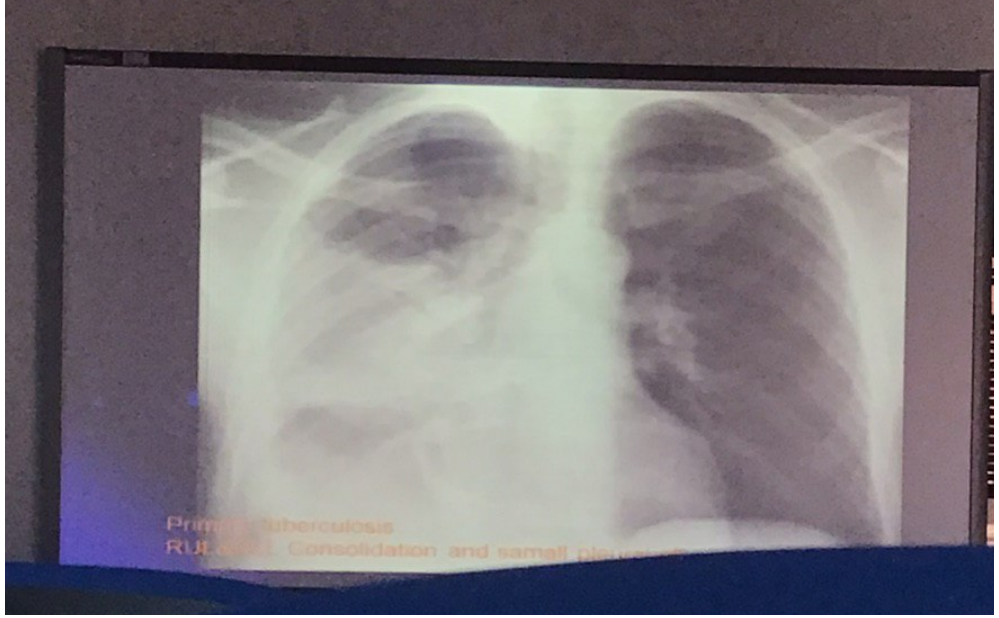

Timetable of disease after primary infection in children
3-8 weeks
TST response
Hypersensitivity reactions
Erythema nodosum
1-3 months
Hematogenous spread (meningitis and miliary in infants)
3-7 months
Bronchial disease (< 5 years)
Pleural effusions (>5 years)
1-3 years:
Osteo-articular disease
Calcifications
Adult-type disease
> 3 years:
Reactivation

Diagnosis of TB infection

- Diagnosis of latent TB infection relies on the Tuberculin Skin Test (TST)
- Poor specificity
  - False +: BCG vaccination, environmental mycobacterial exposure
  - False -: malnutrition
- Operational drawbacks + return visit

→ Need for a more rapid and accurate test for latent TB infection

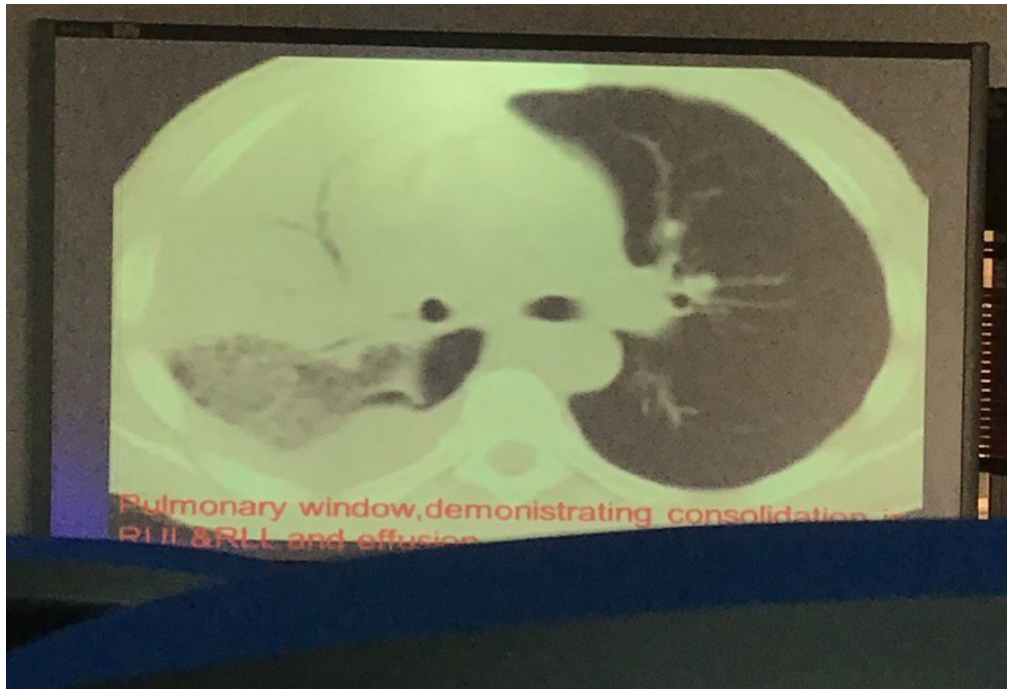
Think of TB for any patient that has been treated as pneumonia without improvement

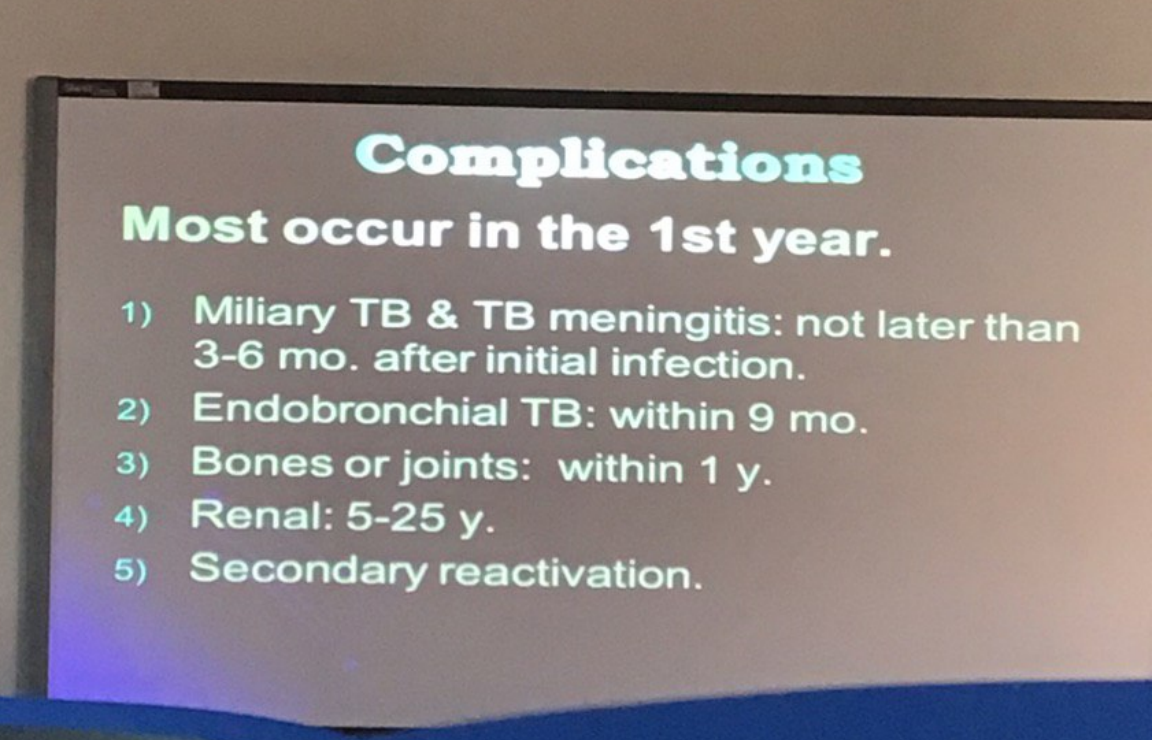


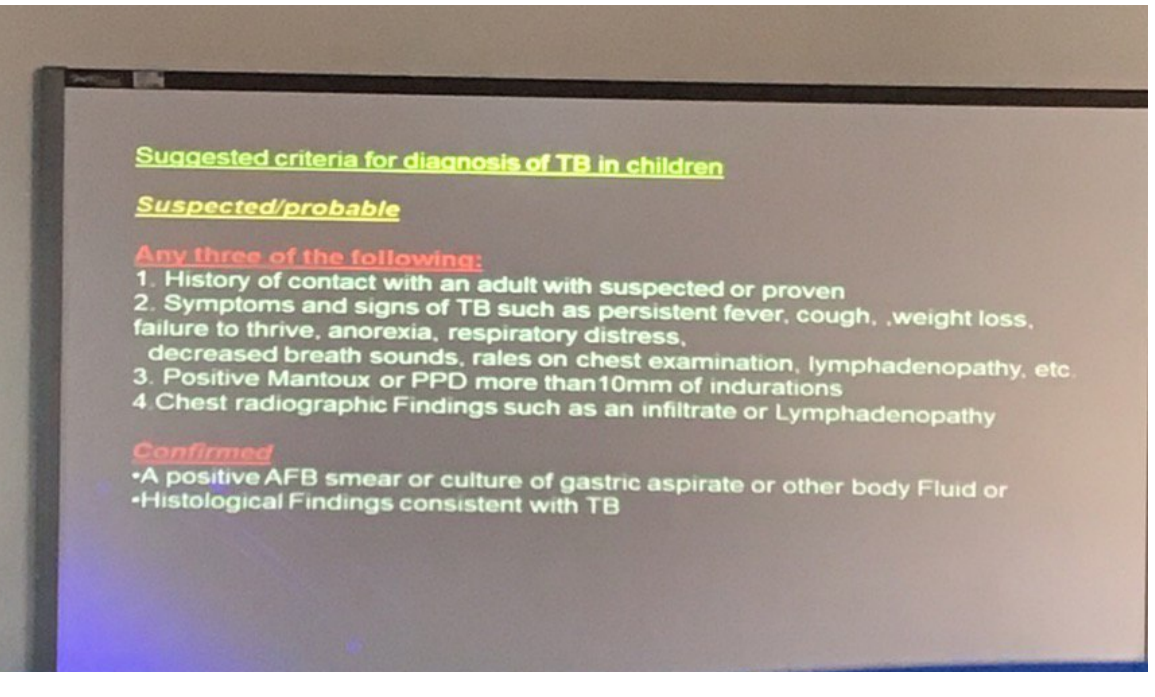
BCG

- BCG vaccination is effective against severe forms of TB (meningitis and miliairy TB)
- TB testing is not required before BCG vaccination in young children

  (Bothamley, BMJ 2 August 2003)
  - BCG can be used as a diagnostic test for TB (Koch phenomenon)
  - Complications are rare and are not more common in TB patients (10371 / 1.5 billion BCG)
- BCG vaccination is not recommended in HIV-positive children




Complications
Most occur in the 1st year.
1) Miliary TB & TB meningitis: not later than 3-6 mo. after initial infection.
2) Endobronchial TB: within 9 mo.
3) Bones or joints: within 1 y.
4) Renal: 5-25 y.
5) Secondary reactivation.


Suggested criteria for diagnosis of TB in children
Suspected/probable
Any three of the following:
1. History of contact with an adult with suspected or proven
2. Symptoms and signs of TB such as persistent fever, cough, ,weight loss, failure to thrive, anorexia, respiratory distress, decreased breath sounds, rales on chest examination, lymphadenopathy, etc.
3. Positive Mantoux or PPD more than10mm of indurations
4.Chest radiographic Findings such as an infiltrate or Lymphadenopathy
Confirmed
•A positive AFB smear or culture of gastric aspirate or other body Fluid or
•Histological Findings consistent with TB

Treatment

- **First line** : INH, rifampin, pyrazinamide ethambutol and streptomycin
- **Second line** : para-aminosalicylic acid, ethionamide, caperomycin, kanamycin and cylcoserine.

Treatment

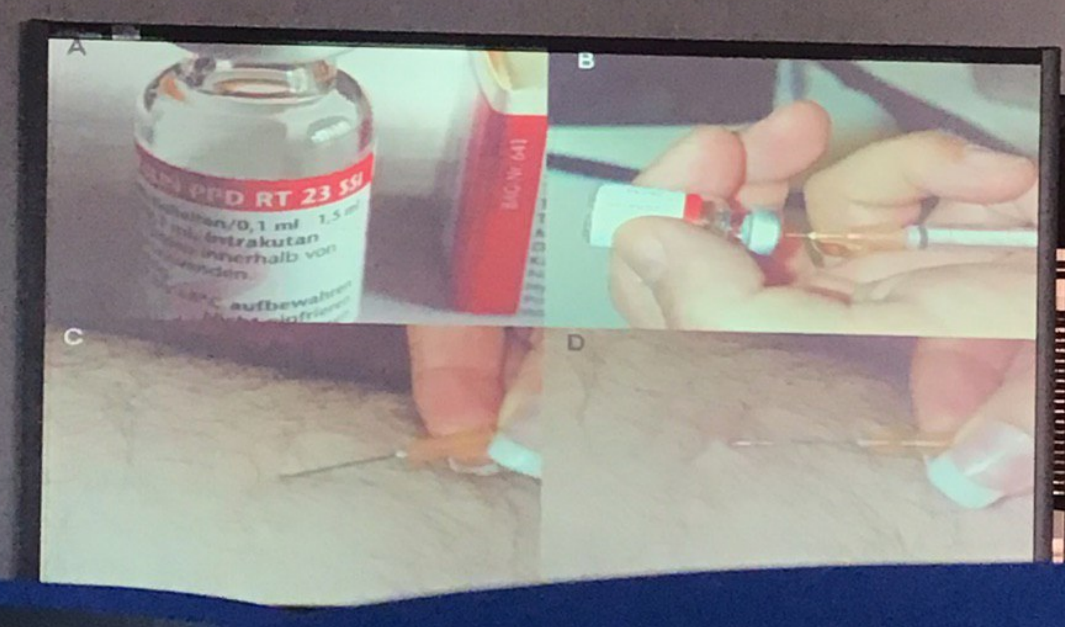
- INH + rifampin X 9 mos. will cure 98%.
- Shorter courses (6 mos.) using more drugs; INH, rifampin and pyrazinamide for 2 mos. followed by 4 mos. of INH and rifampin.
- ***The 9 mos. approach is the one recommended for children.***

Treatment

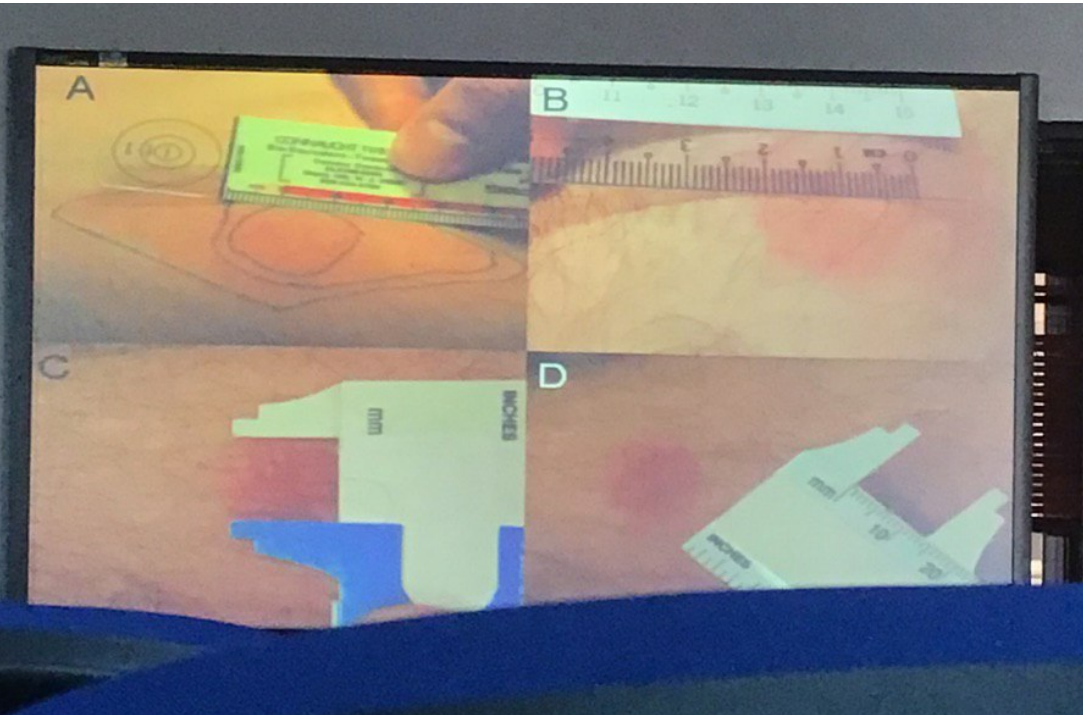
STEROIDS

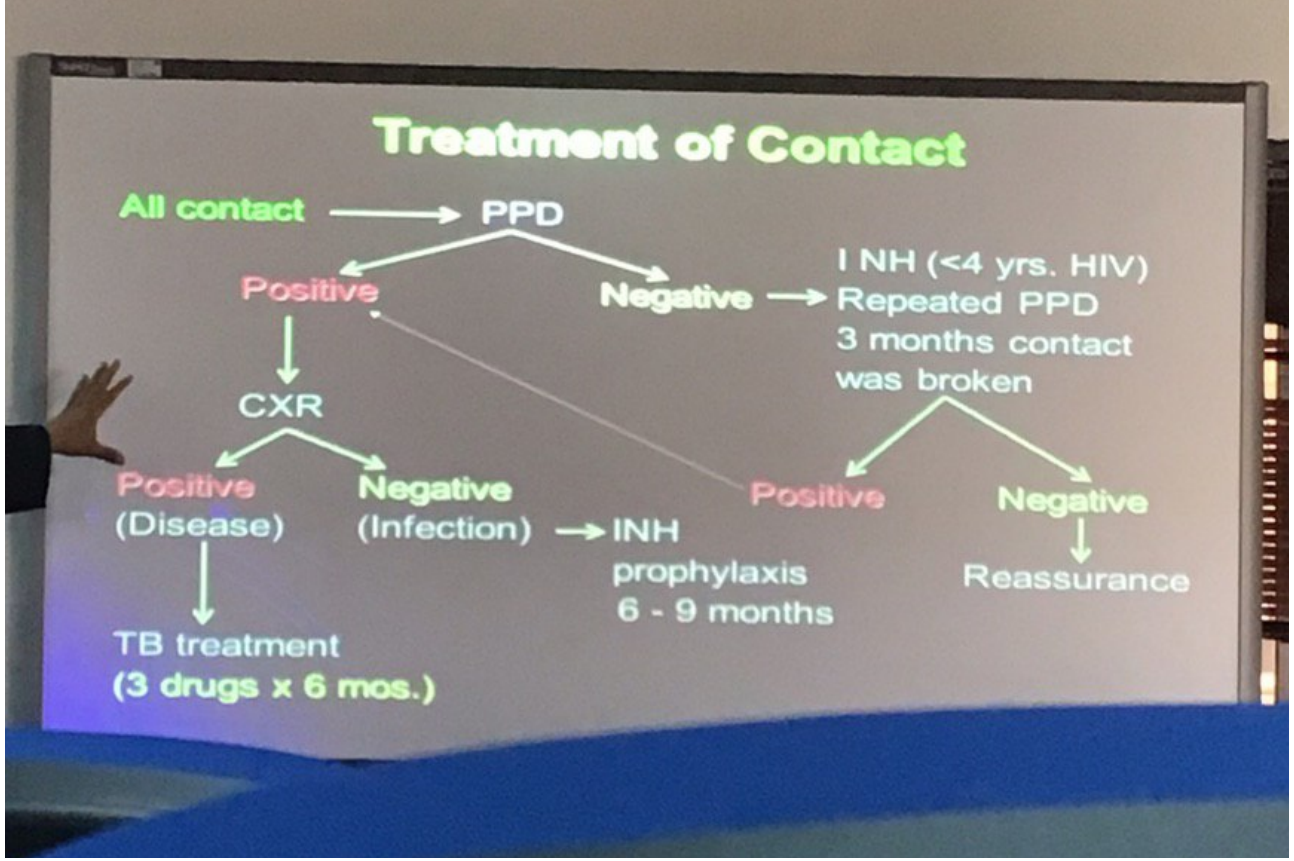
Use only with anti-TB med indicated in:

1) TB meningitis and increased ICP due to brainstem inflam and resultant HC.
2) Endobronchial TB → collapse or air trapping.
3) Miliary TB with pericarditis, pleural effusion or peritonitis.



Look for induration not the redness





If PPD –ve : For child less than 4 years give isoniazid for 3 months

If PPD and CXR are +ve → treatment for one year (6 months in Europe)