Infections of the respiratory system in childhood

The principles of diagnosis and treatment

Epidemiology

- Varied agents – Bacteria and viruses
- Clinical picture may vary with etiological agent
- May be present in normal people but may cause disease in only few.

INTRODUCTION

- Upper and lower respiratory tract separated at base of epiglottis
- Upper respiratory tract consists of airways from the nostrils to the vocal cords in the larynx, including the paranasal sinuses and the middle ear
- The lower respiratory tract covers the continuation of the airways from the trachea and bronchi to the bronchioles and the alveoli
- The children < 5 yrs of age get an average of three to six episodes of ARIs annually regardless of where they live or what their economic situation
- The severity of LRIs in children under five is worse in developing countries

Acute respiratory infections

- ARI RESPONSIBLE FOR 20% OF CHILDHOOD (< 5 YEARS) DEATHS (IN WHICH 90% FROM PNEUMONIA)
- ARI mortality highest in children
  - HIV-infected
  - Under 2 year of age
  - Malnourished
  - Weaned early
  - Poorly educated parents
  - Difficult access to healthcare
- Out-patients visits
  - 20-60%
- Admissions
  - 12-45%

Acute respiratory infections

- May cause the inflammation of respiratory tract anywhere from nose to alveoli.
- May be classified as –

AURI – Acute Upper Respiratory Infection

(common cold, pharyngitis, epiglottitis, & otitis media etc.)

or

ALRI – Acute Lower Respiratory Infection

(laryngitis, layngotracheitis, bronchitis, bronchiolitis & pneumonia)

UPPER RESPIRATORY TRACT INFECTIONS

- Diseases of the nose and sinuses:
  - RHINITIS (COMMON COLD OR CORYZA) - RHINOVIRUSES, ENTEROVIRUSES, CORONAVIRUSES
  - SINUSITIS- VIRAL/BACTERIAL
- ACUTE PHARYNGITIS
  - ADENOVIRUS, ENTEROVIRUS, RHINOVIRUS, GROUP A BETA HEMOOLYTIC STREPTOCOCCUS (older children)
- LARYNGITIS:
  - ACUTE INFECTIOUS LARYNGITIS- VIRAL/DIPTHERIA
  - CROUP
  - Inflammation of the larynx trachea and bronchi
  - ACUTE EPIGLOTTITIS (SUPRGLOTTITIS)
- EAR INFECTIONS (ACUTE OTITIS MEDIA)- VIRUSES, PNEUMOCOCCUS, HEMOPHILUS INFLUENZA, MORAXELLA CATARRHALIS
- TONSILLITIS
  - GROUP A BETA HEMOLYTIC STREPTOCOCCI, EBV

Common Cold- RHINITIS

- Children average 8 episodes per year, adults 3 episodes per year
- Etiologies :
  - Rhinoviruses 30 to 35%
  - Coronaviruses about 10%
  - Miscellaneous known viruses about 20%
  - Influenza and adenovirus-30%
  - Undiscovered viruses up to 35%
  - Group A streptococci 5% to 10%
- Parainfluenza was the first respiratory virus isolated (1955)
- Seasonal variation
  - Rhinovirus early fall
  - Coronavirus- winter

Cold

- Common symptoms are sore throat, running nose, nasal mucosa congestion, sneezing, sometimes accompanied by conjunctivitis, myalgias, fatigue
- Incubation period 12-72 hours
- Nasal obstruction, sneezing, scratchy throat
- Median duration 1 week but 25% can last 2 weeks
- Pharyngeal erythema is commoner with adenovirus than with rhino or coronavirus

Diagnosis and treatment

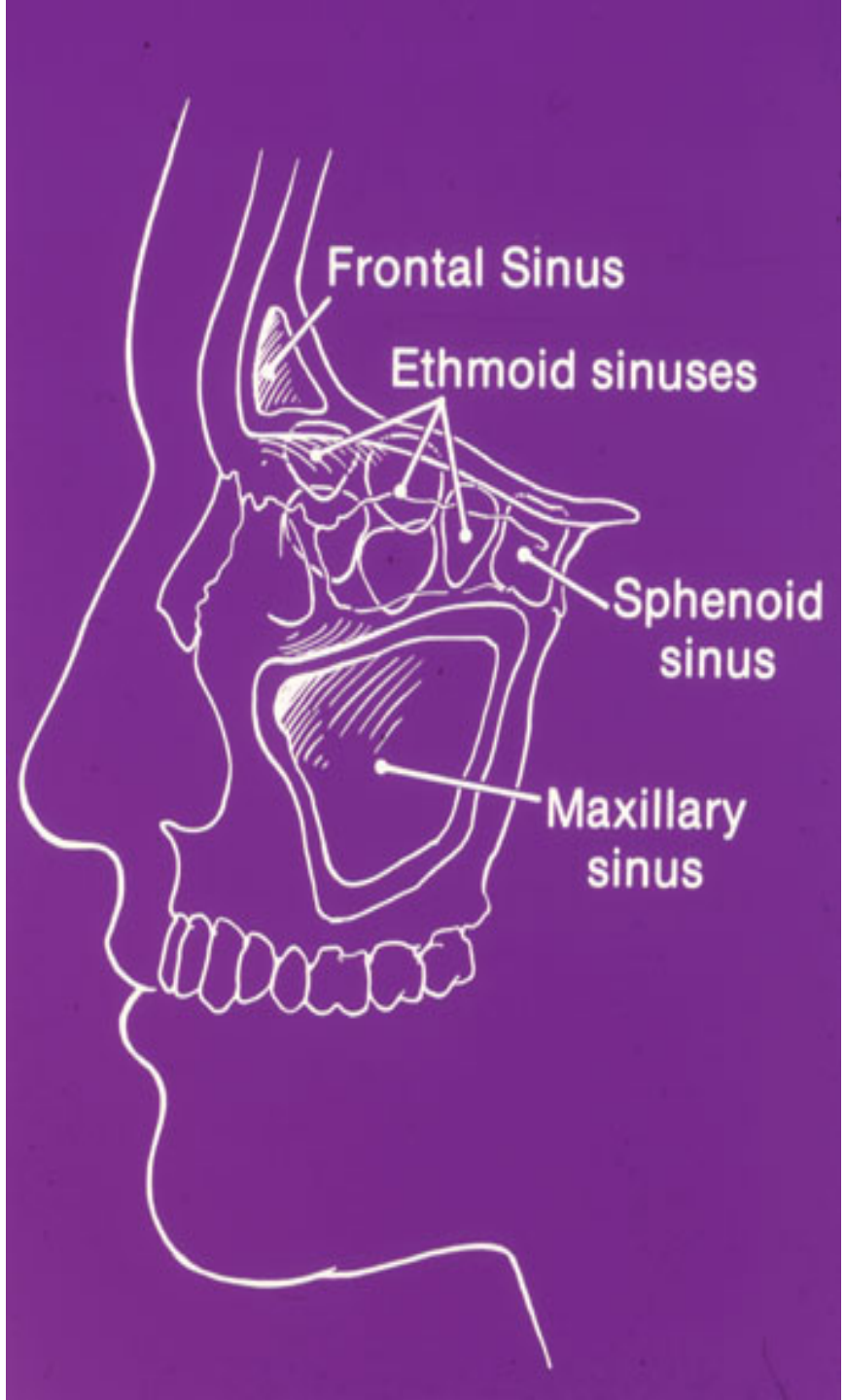
- Main challenge is to distinguish between uncomplicated cold and streptococcal pharyngitis or bacterial sinusitis
  - Good examination
- Marked exudate or pharyngeal erythema suggests
  - Streptococcal infection
  - Adenovirus
  - Diphtheria
- Rapid antigen tests for group A streptococcus
- Rapid techniques for influenza, RSV, parainfluenza

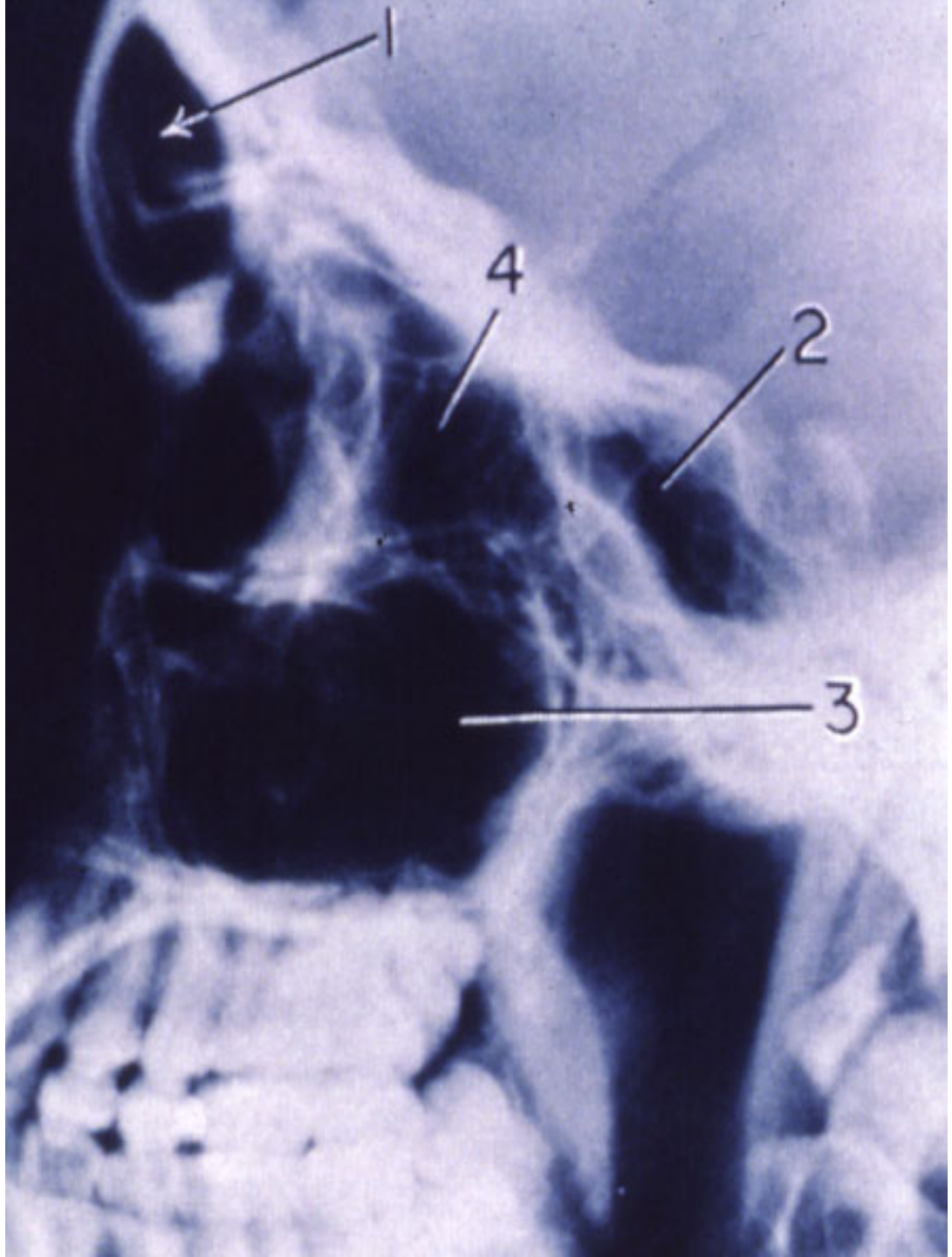
Cold- treatment

- Reduction of mucosal edema and excessive secretion of mucus:
  - proper hydration child
  - air hydration
  - nasal lavage with saline solution, seawater
  - suction of secretions in infants
  - decongestants (nasal sympathomimetics eg. xylometazoline, oxymetazoline) in older children

Sinusitis

- Community acquired bacterial sinusitis
  - *S.pneumoniae*
  - *H. influenzae*
  - *S. pyogenes*
- Nosocomial sinusitis
  - Seen in critically ill, mechanically ventilated
    - *S. aureus*
    - *Pseudomonas aeruginosa*
    - *Serratia marcescens*
  - fungal


Frontal Sinus
Ethmoid sinuses
Sphenoid sinus
Maxillary sinus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Sinusitis

- Acute - duration to 12 weeks
- Clinical diagnosis only
  - conservative treatment
  - Sinus x-ray if the suspected presence of fluid
- Chronic - duration> 12 weeks diagnosis: interview + imaging test
  - anatomical changes in the sinuses
  - CT, X-ray bays
  - invasive treatment

Acute sinusitis

- Clinical features
  - Sneezing
  - Nasal discharge
  - Facial pressure
  - Fever
  - Purulent drainage
  - Headache
- Sinus imaging not routinely recommended

Acute sinusitis: complications

- Maxillary: usually uncomplicated
- Ethmoid: cavernous sinus thrombosis-serious
- Frontal: osteomyelitis of frontal bone; cavernous sinus thrombosis; epidural, subdural, or intracerebral abscess; orbital extension
- Sphenoid: Rare, risk of to extension to internal carotid artery, cavernous sinuses, pituitary, optic nerves; common misdiagnoses include ophthalmic migraine, aseptic meningitis, trigeminal neuralgia, cavernous sinus thrombosis

Acute ethmoid sinusitis

- the earliest developing sinus inflammation
- possible in younger children, infants
- the severe symptoms progresses rapidly
- the inflammatory process in the orbital tissue (especially in infants)
- high risk of intracranial complications -CT
- absolutely necessary hospitalization, consultation ophthalmology

Acute maxillary sinusitis

- - Complication of acute infections upper respiratory tract, childhood infectious diseases, odontogenic
- - Over 5 - 6 years of age
- - Bilateral or unilateral
- - Headache, dilation, pain aggravated by tilting the head, cough, nasal purification

Acute frontal sinusitis

- - Usually coexists with inflammation of the maxillary and ethmoid sinuses, upper respiratory tract infection
- - Older children
- - Severe headache, pain in the projection of the sinuses, during tilting head

Symptomatic treatment:

- NSAIDs
- mucolytics
- Inhalations
- Drugs decongestants
- nasal lavage with saline solution
- Ensuring the comfort of the child (lying down with head held high, non-smoking environment),
- adequate hydration

Treatment

- In patients with mild or moderate course of acute sinusitis, lasting less than 7 -10 days applies vigilant observation
- The use of antibiotics is recommended when:
  - Orofacial pain, fever above 39 st C
  - No improvement after 7 -10 days
  - Signs of deterioration after initial clinical improvement
- Antibiotic 10 -14 days
  - I line therapy: amoxicillin
  - II line therapy: amoxicillin with clavulanic acid
  - in hypersensitivity reactions to penicillins- cefuroxime
  - In the case of immediate hypersensitivity to beta – lactams - macrolides: clarithromycin, azithromycin

Chronic sinusitis

- 1) Antibiotics min. 3 weeks.
- 2) Drugs decongestants (eg. Oxymetazoline nasal, oral pseudoephedrine)
- 3) Mucolytic
- 4) steroides (nasal, oral)
- 5) saline to nose

- 2) surgical treatment - correction of anatomical abnormalities: adenoidectomy, adenotonsilectomy, correction of nasal septum

Acute pharyngitis

- Inflammatory syndrome of the pharynx
  - Most cases are viral
  - Most important bacterial cause is Streptococcus pyogenes (15-20%)
- Presents with sore or scratchy throat
- In severe bacterial cases there may be odynophagia, fever, headache

Acute pharyngitis- diagnosis

Congestion of the throat mucosa

Vesicles

Enlarged lumps of the throat back

Pharyngitis usually coexists acute rhinitis

Symptomatic treatment:

- Antipyretics, analgesics
- cough suppressants
- Decongestant

Acute pharyngitis: physical examination

- Viral: edema and hyperemia of tonsils and pharyngeal mucosa- Rhinovirus, Coronavirus- cold symptoms
- Streptococcal: exudate and hemorrhage involving tonsils and pharyngeal walls
- Epstein-Barr virus (infectious mono): may also cause exudate, with nasopharyngeal lymphoid hyperplasia

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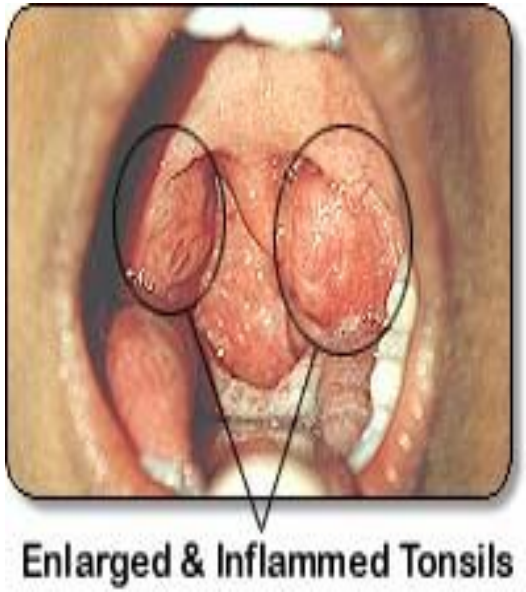
Cause	Symptoms
Rhinovirus, Coronavirus	Cold symptoms
Adenovirus	Pharyngeal erythema and exudate may mimic streptococcal pharyngitis Conjunctivitis (follicular) present in 30-50% of cases; commonly unilateral but bilateral in 25% of cases
Ebstein- Barr infection	Fever, swollen lymph nodes, swollen tonsils with exudation
Entero virus- e.g. Coxsackie virus (Herpangina)	Small, 1-2 mm vesicles on the soft palate, uvula, and anterior tonsillar pillars which rupture to form small white ulcers Vomiting Occurs mainly in children
HSV - 1	Severe, blisters, ulceration of the mucous membranes, pain, profuse salivation, lack of appetite

Tonsilitis

- Tonsillitis is caused by a variety of contagious viral and bacterial infections.
- It is spread by close contact with other individuals and occurs more during winter periods.
- The most common bacterium causing tonsillitis is streptococcus.



Streptococcal pharyngitis (tonsilitis)- symptoms

- sudden onset
- fever> 38.5 ° C, headache, malaise
- sore throat aggravated by swallowing
- often abdominal pain, nausea, vomiting
- the peak incidence: 5 - 15 years of age
- especially in winter, spring
- etiology: β- hemolytic streptococcus group A (Streptococcus pyogenes)
- includes the throat and tonsils (tonsillitis)
- sometimes- rush- Scarlet fever

Physical examination

- Enlarged, red tonsils with exudate foci
- looseness and redness of the throat
- hypertrophy of follicles back of the throat
- pain and swollen lymph glands in the neck front and submandibular
- petechiae on the palate

Streptococcal pharyngitis - diagnosis

- Symptoms and signs
- Physical examination
- Rapid test- Strep test
- ASO, throat swab culture

Treatment

- Fenoxymetylopenicilin po

  100 000 – 200 000 j.m./kg/24 h 2 x for 10 days (bw < 40 kg)

  2-3 mln j.m./ 24 h 2x for 10 dni (children bw>40kg)
- Benzylpenicylin benzathine im 1x
- 600 000 j.m. (children<40kg), 1,2 mln j.m. (children >40kg)
- Cefadroxil 30mg/kg 1x for 10 days (children <40kg)

  1g 1x dz for 10 dni (children >40kg)
- macrolides: clarithromycin, azithromycin

In cases of frequent recurrence: clindamycin or amoxicillin clavulanate

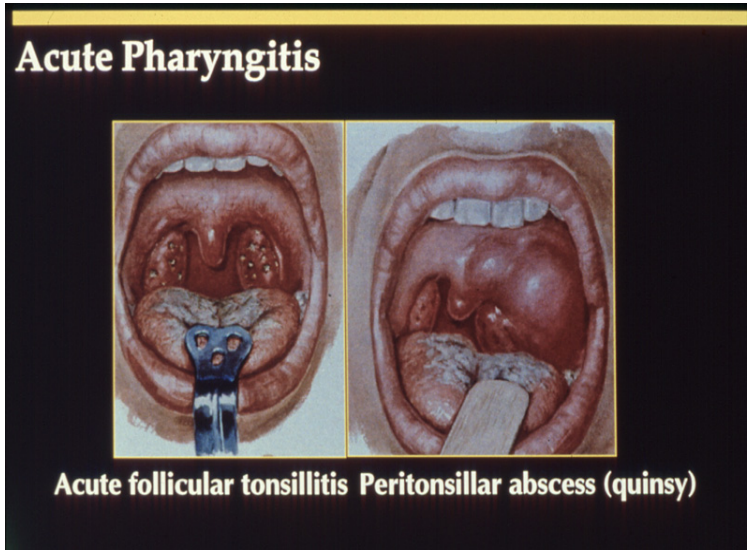
Complication after tonisilitis

- Systemic:
  - Acute rheumatic fever (heart, joints, skin, CNS)
  - Acute post-streptococcal glomerulonephritis
  - Myocarditis

- Local:
    - Peritonsillar abscess (a few days after the re-angina fever, sore throat on one side)
    - Recurrent pharyngitis, otitis media, sinusitis

Vincent's angina and Quinsy

- Vincent's angina: anaerobic pharyngitis (exudate; foul odor to breath)
- Ludwig's angina- potentially life-threatening, rapidly expanding, diffuse inflammation of the submandibular and sublingual spaces, dental origin
- Quinsy: peritonsillitis/peritonsillar abscess. Medial displacement of the tonsil; often spread of infection to carotid sheath

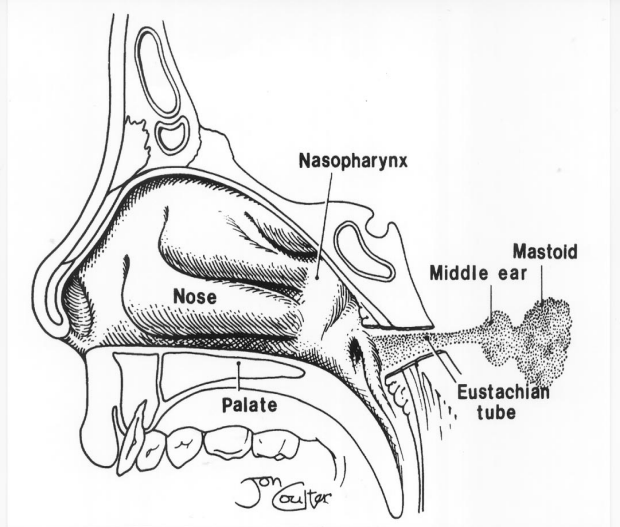


Acute otitis media

- *S. pneumoniae* and *H. influenzae* the leading causes in all age groups)
- *Moraxella catarrhalis*: 10% of cases
- Some cases may be viral (RSV, influenza, enteroviruses)
- *Mycoplasma pneumoniae*: inflammation of the tympanic membrane

Acute otitis media

- The most common consequence of a prolonged infection of the nasopharynx under favorable anatomical conditions:
  - Dysfunction of the Eustachian tube
  - Hypertrophy tonsils
  - Adenoid hypertrophy
- Critical role of Eustachian tube as conduit between nasopharynx, middle ear, and mastoid air cells
- Children have shorter, wider Eustachian tubes than adults



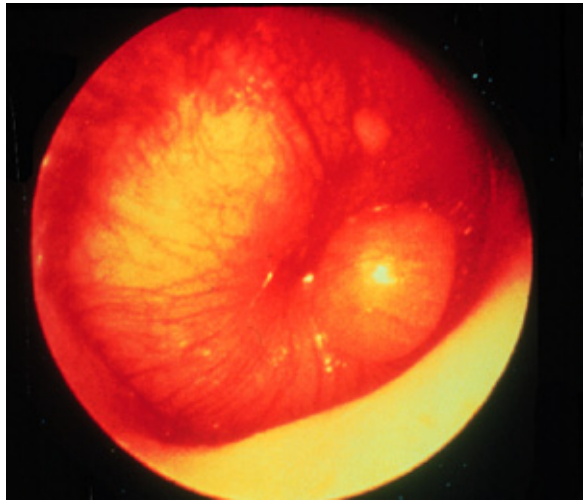
Symptoms

- ear pain (throbbing)
- hearing problems
- coexisting symptoms of catarrhal infections
- aversion to food (infants)
- irritability
- in children <3 years of age nonspecific symptoms: anxiety, vomiting, slight fever / fever, crying at night, conjunctivitis, poor appetite, rubbing the ear

Otoscopic examination

Acute otitis media- signs the eardrum is:

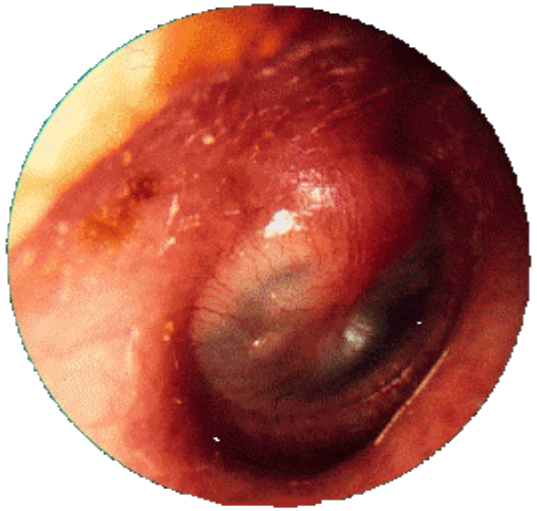
- bulging
- cloudiness
- redness



Otitis media with effusion

Otitis media with effusion (OME) - serous otitis media (SOM) or secretory otitis media (SOM)

- Presence of fluid in the middle ear
- The fluid may take weeks to resolve



Differential diagnosis- AOM

- inflammation of the cervical lymph nodes
- pharyngitis and tonsillitis
- mumps
- diseases of the teeth, temporomandibular joint
- boil in the external auditory meatus
- foreign body in the ear canal

AOM- complications

- mastoiditis
- meningitis
- venous sinuses thrombosis
- brain abscess
- VII nerve palsy
- labyrinthitis
- recurrent otitis media
- loss of hearing !!!

Treatment

- Acute otitis media with pain in the initial period should be treated with ibuprofen or acetaminophen.

- Immediate antibiotic treatment is recommended :

1. In children under 6 months of age
2. In children with a high fever and vomiting
3. In children under 2 years of age with bilateral otitis media
4. In patients with leakage from the ear

Treatment

- Amoxicillin 75 - 90 mg / kg / day in 2 doses (< 40kg), 1500 - 2000 mg every 12 hours (> 40kg), treatment time 10 days in children < 2 r.ż 5 days in children > 2r.ż.
- Second-line antibiotics : amoxicillin with clavulanic acid, cefuroxime axetil, cefaclor , ceftriaxone
- In the case of allergy to penicillin : macrolides

Larynx diseases

- Acute diffuse inflammation of the larynx (laryngitis acuta diffusa)
- Acute inflammation of the epiglottis (epiglottitis acuta)
- Acute croup (laryngitis acuta subglottica)
- Acute inflammation of the larynx , trachea and bronchi (laryngotracheobronchitis)
- Acute malignant inflammation of the larynx , trachea and bronchi (laryngotracheobronchitis maligna)

Larynx disease signs

- Without stenosis of the larynx :
- hoarseness
- aphonia
- barking cough

- With narrowing of the larynx
- hoarseness
- aphonia
- Inspiratory stridor
- Laryngeal dyspnea (inspiratory , inspiratory - expiratory)
- work of accessory muscles

ACUTE EPIGLOTTITIS

- Life-threating infection
- Occurs mostly in winters
- Peak incidence :- 1 – 6 years
- Male affected more
- Bacterial infection (Hemophilus influenza type b)
- Concomitant bacteremia, pneumonia, otitis media, arthritis and other invasive infections caused by H.influenza type b may be present

ACUTE EPIGLOTTITIS

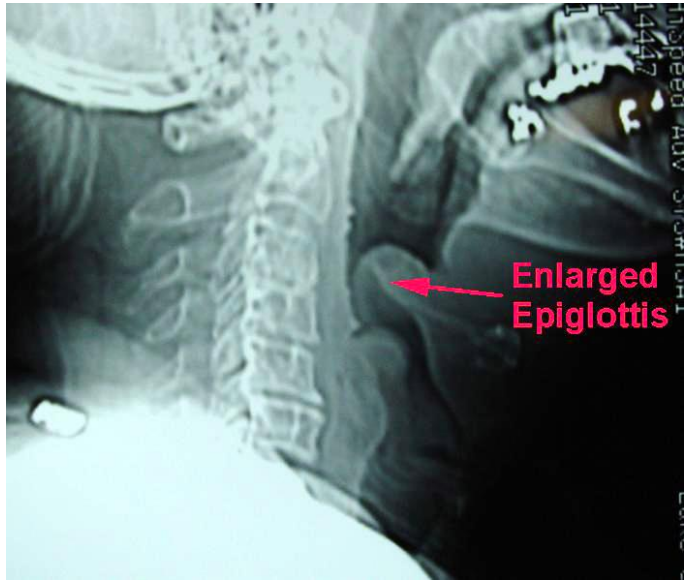
- **Clinical features**
  - High fever, sore throat, dyspnea, rapidly progressing respiratory obstruction
  - Patient may become toxic, difficult swallowing, laboured breathing, drooling, hyperextended neck
  - Cyanosis, coma, death
  - Stridor is a late finding

EXAMINATION

- Do not examine the throat
- Assessment of severity
  - Degree of stridor
  - Respiratory rate
  - Heart rate
  - Level of consciousness
  - Pulse oximetry

ACUTE EPIGLOTTITIS

- DIAGNOSIS:
  - “CHERRY RED”APPEARANCE OF EPIGLOTTIS ON LARYNGOSCOPY
  - THUMB SIGN ON LATERAL NECK RADIOGRAPH



TREATMENT - ACUTE EPIGLOTTITIS

- NEED TO BE MANAGED WITH ENDOTRACHEAL INTUBATION
- HELP FROM ANAESTHETIST
- BLOOD CULTURES
- FLUID AND ELECTROLYTE SUPPORT
- INTRAVENOUS AMPLICILLIN 100 mg/kg/day OR CEFTRIAXONE 100 mg/kg/day .
- OTHER OPTIONS
  - (CEFUROXIME OR CEFOTAXIME) TOTAL TREATMENT :-7-10 DAYS
- RIFAMPICIN PROPHYLAXIS TO CLOSE CONTACTS

Laryngitis acuta subglottica (VIRAL CROUP)

- VIRAL INFECTION LEADING TO MUCOSAL INFLAMMATION OF THE GLOTTIC AND SUBGLOTTIC REGIONS
- COMMONLY DUE TO INFLUENZA (TYPE A), PARAINFLUENZA(1, 2, 3) AND RSV
- AGE :- 6 MONTHS – 6 YEARS

CLINICAL FEATURES

- INITIAL :- RUNNING NOSE, MILD COUGH, FEVER(LOW GRADE)
- LATER (24-48 HOURS) :-
  - BARKING COUGH
  - HOARSENESS OF VOICE
  - NOISY BREATHING (MAINLY ON INSPIRATION)
- SYMPTOMS WORSEN AT NIGHT AND ON LYING DOWN
- CHILDREN PREFER TO BE HELD UPRIGHT OR SIT IN BED
- SYMPTOMS RESOLVE WITHIN A WEEK

EXAMINATION

- HOARSE VOICE
- NORMAL TO MODERATELY INFLAMMED PHARYNX
- SLIGHTLY INCREASED RESP RATE WITH PROLONGED INSPIRATION AND INSPIRATORY STRIDOR
- DIAGNOSIS
  - MAINLY A CLINICAL DIAGNOSIS

Treatment

- TREATMENT
  - MOIST OR HUMIDIFIED AIR
  - COLD NEBULISATION – 0,9 NaCl
  - LOW TEMPERATURE 18-20 st C
  - Treatment of fever
  - Fluids
  - STEROIDS
    - REDUCE THE SEVERITY AND DURATION / NEED FOR ENDOTRACHEAL INTUBATION
    - dexametazon 0,15 - 0,6 mg/kg mc im. lub iv.)
  - NEBULIZED ADRENALINE (EPINEPHRINE) 5mg

Acute diffuse inflammation of the larynx

- In most cases- adults , school children and older children
- Etiology – viral, misuse of voice, other irritants substances
- Symptoms : hoarseness , dry cough , scratching , burning in the throat, shortness of breath in younger children
- Accompanying symptoms : runny nose , conjunctivitis
- Treatment - symptomatic : Saving voice , nebulisation with saline, mucolytics

LOWER RESPIRATORY TRACT INFECTIONS

- BRONCHITIS
- BRONCHIOLITIS
- PNEUMONIA

BRONCHITIS ACUTA

- Cause
  - Viral -*Parainfluenzae, Adenovirus, RSV, Rhinovirus*
  - Bacteria
    - Primary*: Bordetella pertusis, Mycoplasma pneumoniae*
    - Secondary to viral infection*: H.influenzae, S.pneumoniae, S.aureus*
- Symptoms:
  - dry cough preceded by inflammation of the URTI (2 -3 days)
  - dry cough, then wet cough
  - short-term fever or feverless
  - vomiting
  - expiratory dyspnea
  - coughing up to several weeks

BRONCHITIS ACUTA

Clinical examination

- Lungs hyperinflation/ distention
- percussion- hyper-resonant sound, lungs limits are lower,
- ascultation: wheezing, rales, medium and coarse cracles,
- dyspnea features: tachypnea, respiratory effort, prolonged expiratory phase

Additional examination

- only necessary in severe or persistent cases
- Chest X-ray - without pulomonary consolidation, distension peripheral parts of the lungs
- gas analysis
- measurement of oxygen saturation
- Tests for Chlamydia pneumoniae, Mycoplasma, RSV

BRONCHITIS ACUTA -TREATMENT

- humidity, low temperature, proper hydration
- antipyretics
- symptoms of obstruction - nebulized bronchodilators
- bacterial superinfection - empiric antibiotic- amoxicillin; alternatively - cefuroxime, amoxicillin with clavulanic acid, macrolide

BRONCHIOLITIS

- One of the most common diseases in infants and young children; typically <2 years of age (most infants> 6 months of age)
- Inflammatory disease of the bronchioles
- Peak age of onset : 6 months
- Sometimes severe course of life-threatening respiratory failure
- Most common agent : RSV- respiratory syncytial virus,
- Other- parainfluenza virus, influenza, adenovirus, metapneumoviruses
- Male : female :- 2:1
- Occurs mostly in autumn/spring
- transmission by droplets and by direct contact

CLINICAL FEATURES

- Two phases:

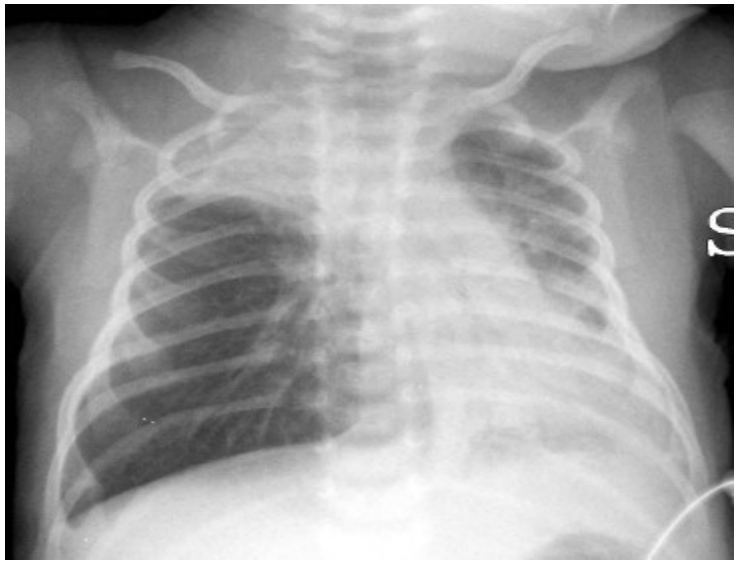
1. 2-3 days of inflammation URTI
2. Rapid deterioration of general condition:
   - Dyspnea- insipratory-expiratory, respiratory cyanosis,
   - Dry, paroxysmal cough, sometimes causing vomiting
   - Loud, wheezing breath
   - Irritability, feeding difficulty
   - Episodes of apnoea

EXAMINATION FINDINGS IN BRONCHIOLITIS

- Rapid shallow breathing (60-80/min)
- Central cyanosis / pallor
- Use of accessory muscles of respiration
  - Subcostal /intercostal recessions, Flaring of alae nasi
- Expiratory wheeze / grunting
- Prolonged expiration, tachypnoe
- Hyper-resonant percussion notes
- Chest hyperinflation
- Auscultation: fine crackles at the top of the inhalation and exhalation beginning, wheezing, silence over the lungs !!! (extreme hyperinflation)

BRONCHIOLITIS

- Chest X-ray
  - Hyperinflation, increased lucency and increased bronchovascular markings and mild infiltrates
- arterial blood gas (hypercapnia, hypoxemia, acidosis)
- complete blood count, CRP
- Pulse oximetry
- Nasopharyngeal swabs (viral culture)
- Viral antibody tests



A chest X-ray demonstrating lung hyperinflation with a flattened diaphragm and bilateral atelectasis in the right apical and left basal regions in a 16-day-old infant with severe bronchiolitis

BRONCHIOLITIS

- **COMPLICATIONS**
  - Pneumonia
  - Pneumothorax
  - Dehydration
  - Respiratory acidosis
  - Respiratory failure
  - Heart failure
  - Prolonged apneic spells → death

BRONCHIOLITIS - treatment

- Mainly supportive -humidify the air, appropriate placement of the child, assisted evacuation of secretions from the nose
- Nebulisations hypertonic 3% sodium chloride solution
- nebulized adrenaline
- Oxygen inhalation (achieve O2 >92%)
- If tachypneic, limit the oral feeds and use a ng tube for feeding
- Parenteral fluids to limit dehydration
- Correct resp acidosis and electrolyte imbalance
- Mechanical ventilation (severe resp distress or apnoea)

- Not routinely recomended: β-agonists, anticholinergics, Ribavirin, steroids
- Not used routinely: Immunoglobulin anti - RSV

PNEUMONIA

Inflammation of the lung parenchyma and is associated with the consolidation of the alveolar spaces

Developed world

- Viral infections
  - Low morbidity and mortality

Developing world- common cause of death

- Bacteria and PCP in 65%

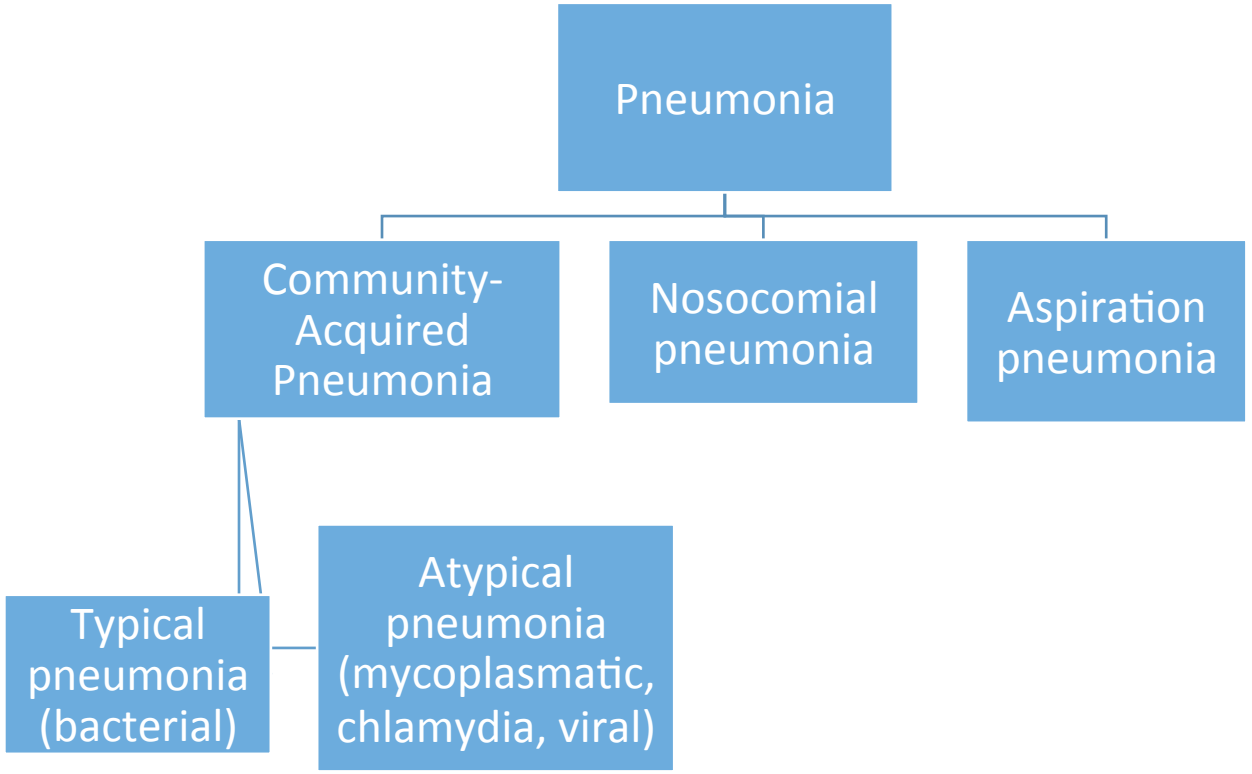
Etiology

- Vary according to
  - Age, immune status, where contracted
- Developed countries
    - Viruses: RSV, Adenovirus, Parainfluenza, Influenza
    - Mycoplasma pneumoniae and Chlamydia pneumoniae
    - Bacteria: 5-10%
- Developing countries
    - S. pneumoniae, H. influenzae, S aureus
    - Viruses 40%
    - Other: Mycoplasma, Chlamydia, Moraxella

ETIOLOGY ACCORDING TO AGE

AGE GROUP	CAUSATIVE ORGANISM
NEONATES	GROUP B STREPTOCOCCUS E.COLI KLEBSIELLA STAPH AUREUS
INFANTS	RSV, parainflenza, adenovirus, infleunza virus grypy, enterovirus, rhinovirus, HSV PNEUMOCOCCUS CHLAMYDIA H.INFLUENZA TYPE b
CHILDREN 1 TO 5 YRS	RESPIRATORY VIRUSES PNEUMOCOCCUS H.INFLUENZA TYPE b C.TRACHOMATIS M.PNEUMONIAE S.AUREUS GP A STREPTOCOCCUS
CHILDREN 5 TO 18 YRS	M.PNEUMONIAE PNEUMOCOCCUS C.PNEUMONIAE H.INFLUENZA TYPE b

Pneumonia


Pneumonia
Community-Acquired Pneumonia
Nosocomial pneumonia
Aspiration pneumonia
Typical pneumonia (bacterial)
Atypical pneumonia (mycoplasmatic, chlamydia, viral)

Pneumonia- diagnosis

✓ Fever
✓ Cough
✓ Dyspnea expiratory- inspiratory,
✓ Tachypnoe

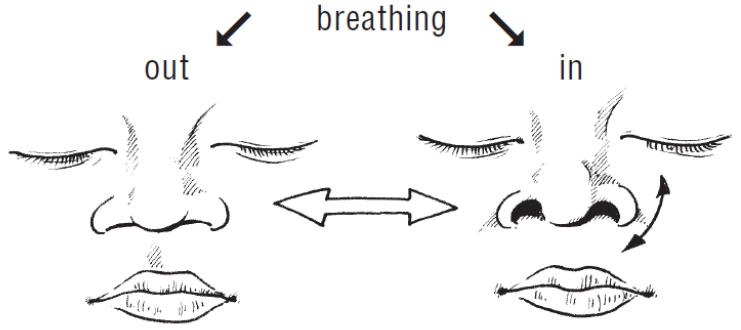
And …
+Typical sounds during auscultation
+ typical changes in X-ray

- The basis of diagnosis is a chest X-ray
- Lung consolidation of the one segmental lobe
- Interstitial changes

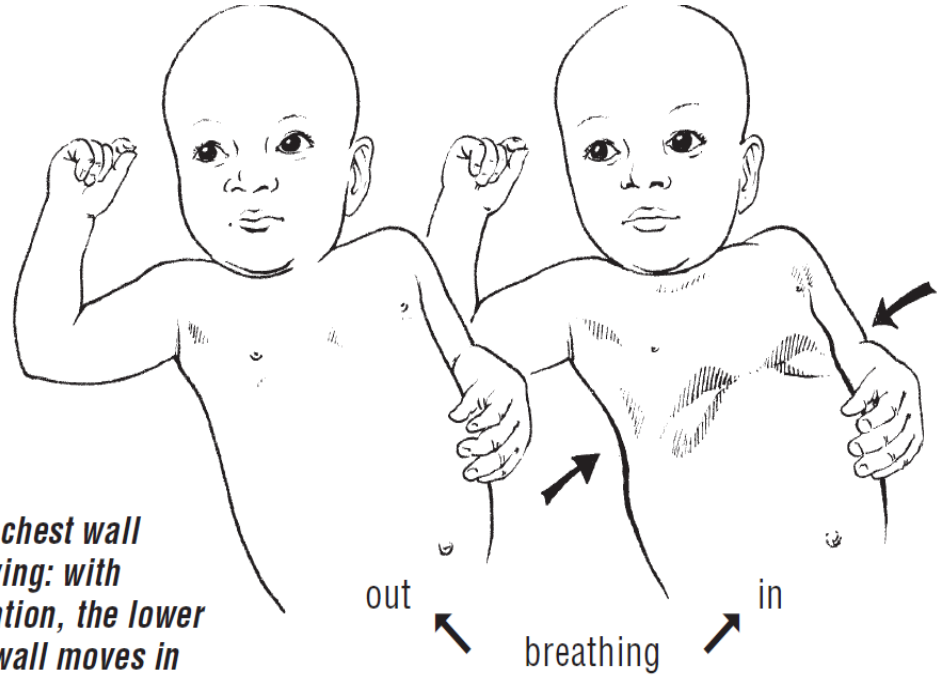
NOTE: in the early stages of the disease x-ray may be normal

Danger Signs

- Sign of respiratory distress; nasal flaring & chest indrawing
- Younger than 2 months
- Decreased level of consciousness
- Stridor when calm
- Severe malnutrition
- Associated symptomatic HIV/AIDS



Nasal flaring: with inspiration, the side of the nostrils flares outwards



Lower chest wall indrawing: with inspiration, the lower chest wall moves in

Bacterial pneumonia -symptoms

- younger children often atypical symptoms:
  - fever> 38.5 st C, chills
  - anxiety
  - gastro – intestinal problems
  - tachypnoe> 50 / min.
  - without coughing early in the disease
- in older children (> 6 years of age) image of a typical, similar to that observed in adults:
  - cough, tachypnea
  - fever> 38.5 st C, chills
  - pain in the chest

Bacterial pneumonia

Clinical examination

- Percussion: the dull sound over the area of inflammation
- Tremor chest increased
- Auscultation:
- - fine cracles
- - Tightening of the follicular murmur
- - Murmur bronchial

Additional tests

- X-ray CHEST: density inflammatory: lobar, interstitial
- LABORATORY TESTS:
- - WBC (up to 15 - 40 thousand / mm3), the predominance of neutrophils or WBC <5 thousand / mm3 (bad prognosis)
- - Shift to the left in a smear of white blood cells, anemia in severe infections (eg. Staphylococcal)
- - Arterial blood gas pO2
- - ESR, CRP
- - Bacteria culture of sputum, (charge on top of the fever), pleural fluid

Atypical pneumonia

- The etiology of Mycoplasma pneumoniae, Chlamydophila pneumoniae
- school children
- insidious onset
- moderate fever
- joint pain, headache, cough, tiring, unproductive, wheezing,
- respiratory rate normal or increased
- characteristics of hyperinflation
- X-ray: interstitial infiltrates, pleural effusion, lymphadenopathy in the hilum lung
- Serological tests- antibodies

Viral pneumonia

- Etiology: RS virus, influenza, parainfluenza, adenovirus, measles, CMV,
- Pneumonia preceded by inflammation of the upper airways
- In older children mild, without complications. In infants and toddlers course may be severe and life-threatening.
- In the case of the etiology of RSV -> wheezing, shortness of breath
- Laboratory tests: leukocytosis with lymphocytosis
- X-ray: interstitial changes, hyperinflation

Treatment

- The cool, moist air
- Respiratory physiotherapy
- Adequate hydration
- Proceedings antipyretic (non-pharmacological method, drugs) and analgesic
- Antibiotic

- Antitussives, antihistamines - not recommended !!

Antibiotics

- Children 3 week - the third month of life - amoxicillin with clavulanate or cefuroxime
- In severe cases - cefotaxime or ceftriaxone in combination with cloxacillin.
- If the etiology is atypical - macrolide
- Children 3 months - 5 years old – ampicilin or amoxicillin
- Children 5 - 15 years old - amoxicillin or macrolide, for severe concomitant treatment -> macrolide and amoxicillin

- The duration of treatment 7 to 10 days when azitromicin 5 days
- In milder form of disease- 5 days

Prevention

- VACCINATIONS:
- vaccination against H. influenzae type B (vaccination required) (2mo, 3-4 mo, 5-6 mo, 16/18 mo)
- vaccination against S. pneumoniae (vaccination recommended)
- influenza vaccination (vaccination recommended once a year)

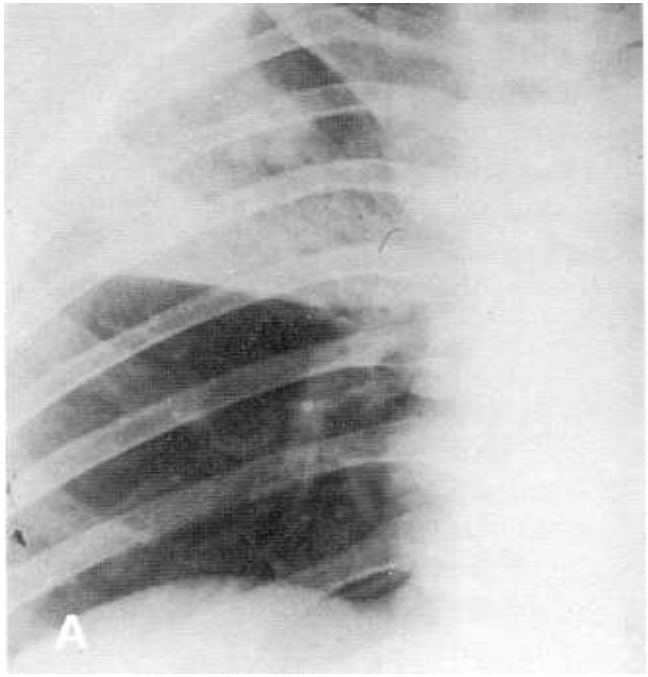
Radiology- chest X- ray

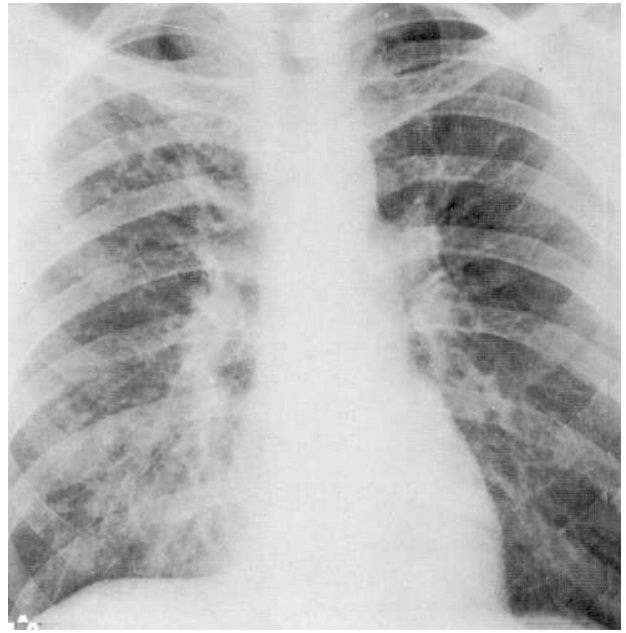
Bacterial

- Poorly demarcated alveolar opacities with air bronchograms
- Lobar or segmental
- Opacification

Viral

- Peripheral streaking, interstitial changes,
- air trapping





Radiology

- Clues to other specific organisms
  - Staphylococcus – areas of break-down
  - Klebsiella, anaerobes, H. influenza or TB –cavitating or expansile pneumonia
  - TB, S. aureus, H. influenza
    - pleural effusion and empyema