

## Infections of the Respiratory System – Dr. Dier

### Including:

- Viral infections
- Bacterial infections, pneumonia lung abscess and empyema
- Pulmonary tuberculosis
- Fungal infections
- Parasitic infections

### Involving:

- Upper respiratory tract infections
- Lower respiratory infections

### Upper respiratory tract infections

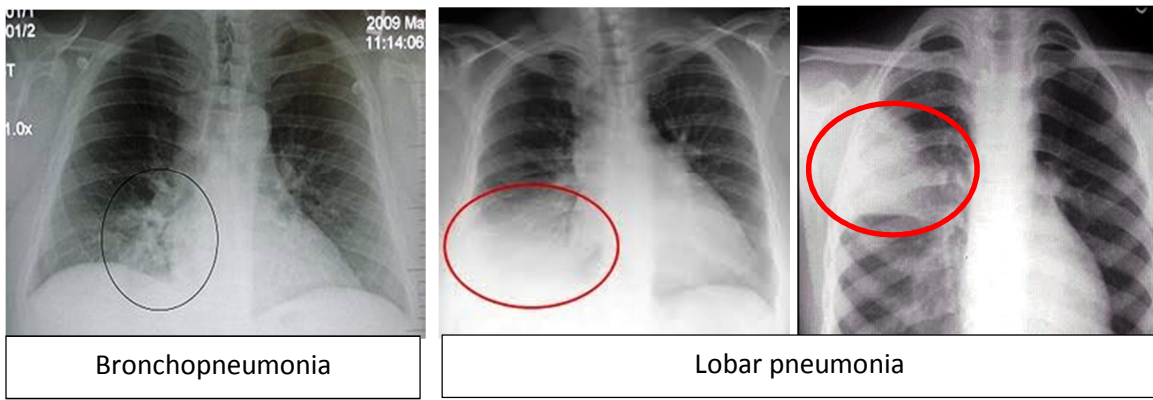
Infection	Clinical Features	Complications	Management
<b>Coryza (common cold)</b> <b>Acute pharyngitis</b> <b>Sinusitis</b> <b>Acute epiglottitis</b>	<p>.....</p> <p>.....</p> <p>.....</p>	<p>.....</p> <p>.....</p> <p>.....</p>	<p>.....</p> <p>.....</p> <p>.....</p>
<b>Acute laryngo-tracheobronchitis (croup)*</b>	<p>Sudden paroxysms of cough accompanied by stridor and breathlessness. Contraction of accessory muscles and indrawing of intercostal spaces.</p>	<p>Death from asphyxia. Superinfection with bacteria, especially <i>Strep. pneumoniae</i> and <i>Staph. aureus</i>.</p>	<p>Steam inhalations and humidified air/high concentrations of oxygen. Endotracheal intubation or tracheostomy may be required to relieve laryngeal obstruction and allow clearing secretions. Intravenous co-amoxiclav for serious illness. Maintain adequate hydration</p>
<b>Acute bronchitis and tracheitis</b>	<p>Often follows acute coryza. Initial dry, painful cough with retrosternal discomfort in tracheitis. Chest tightness, wheeze and breathlessness if bronchitis develops. Sputum is initially scanty, then becomes mucopurulent, more copious and, in tracheitis, often blood-stained. Acute bronchitis may be associated with a pyrexia</p>	<p>Bronchopneumonia. Exacerbation of asthma or COPD which, if severe, may result in type II respiratory failure</p>	<p>Specific treatment rarely necessary in previously healthy individuals. Amoxicillin 250 mg 8-hourly should be given to those developing bronchopneumonia. Cough may be eased by pholcodine 5-10 mg 6-8-hourly. In COPD and asthma, aggressive treatment of exacerbations may be required</p>
<b>Influenza</b>	<p>Sudden onset of pyrexia with generalised aching, headache, anorexia, nausea and vomiting, and harsh unproductive cough. Most recover within 3-5 days, but may be followed by 'post-viral syndrome' with debility that persists for weeks. Diagnosis: clinical or by virus isolation, fluorescent antibody techniques or serological tests for specific antibodies</p>	<p>Tracheitis, bronchitis, bronchiolitis and bronchopneumonia. Secondary bacterial invasion. Rarely, toxic cardiomyopathy (may cause sudden death), encephalitis, demyelinating encephalopathy and peripheral neuropathy</p>	<p>Bed rest. Paracetamol 0.5-1 g 4-6-hourly. Pholcodine 5-10 mg 6-8-hourly for cough. Specific treatment for pneumonia may be necessary. Antiviral agents (e.g. zanamivir) reduce the rate of viral replication and may be effective when used as an adjunct to vaccination. Antiviral resistance is a potential problem</p>

## Pneumonia

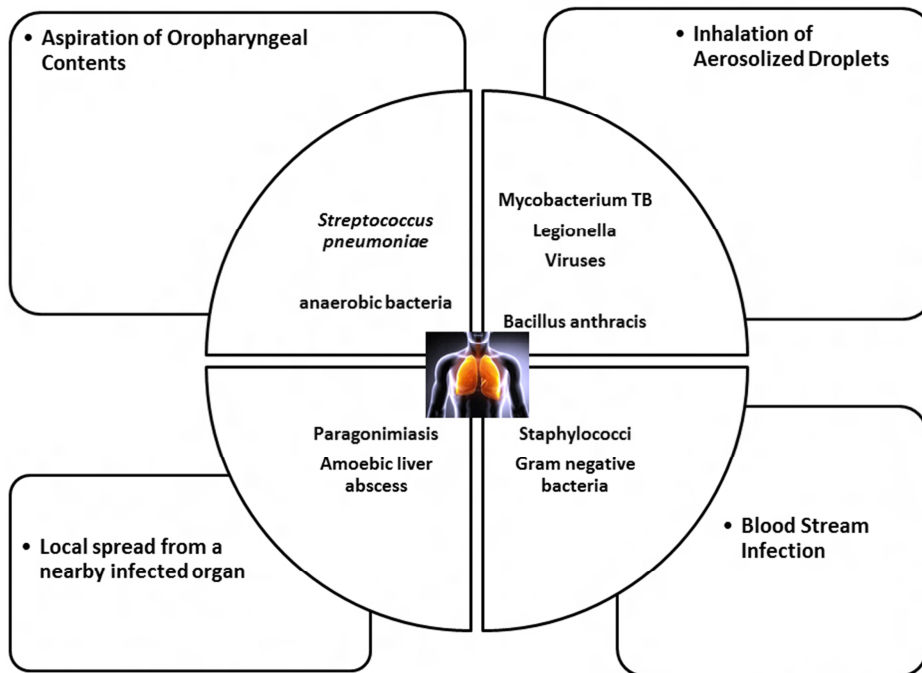
- Pneumonia is defined as an acute respiratory illness associated with recently developed radiological pulmonary shadowing which may be: segmental, lobar or multilobar.
- The context in which pneumonia develops is highly suggestive of the likely organism(s) involved; ===== +Pathobiology, therefore, pneumonias are usually classified as community- or hospital-acquired, or those occurring in immunocompromised hosts

### Also classified as

- Lobar pneumonia is a radiological and pathological term referring to homogeneous consolidation of one or more lung lobes, often with associated pleural inflammation;
- Bronchopneumonia refers to more patchy alveolar consolidation associated with bronchial and bronchiolar inflammation often affecting both lower lobes.



## Pathobiology



- Normal/altered flora of upper airways..... ..microaspiration versus gross aspiration
- Inhalation ..... Virulent infective agents in small aerosolized particles < 1 um
- Defense mechanism ..... .. Local alveolar reaction
- Single pathogen versus polymicrobial.

## Community-acquired pneumonia (CAP)

- Pneumonia in those who live independently in the community.....
- *However, patients who have previously been hospitalized for at least 2 days within the 90 days before infection, patients from nursing homes who received intravenous antibiotic therapy, chemotherapy, or wound care within the past 30 days, and patients from hemodialysis centers are considered to have health care-associated pneumonia and are therefore excluded from the case definition of community-acquired pneumonia.*
- The incidence varies with age, being much higher in the very young and very old, in whom the mortality rates are also much higher.
- Most cases are spread by droplet infection and occur in previously healthy individuals but several factors may impair the effectiveness of local defenses and predispose to CAP.

### Factors that predispose to pneumonia

- Cigarette smoking
- Upper respiratory tract infections and Recent influenza infection
- Alcohol
- Corticosteroid therapy
- Old age
- Pre-existing lung disease
- HIV
- Indoor air pollution

### Clinical features (Pneumonia usually presents as an acute illness)

- Pulmonary symptoms include breathlessness & cough, which at first is characteristically short, painful & dry, but later accompanied by the expectoration of mucopurulent sputum & the occasional patient may report hemoptysis.
- Pleuritic chest pain may be a presenting feature and on occasion may be referred to the shoulder or anterior abdominal wall.
- Systemic features such as fever, rigors, shivering and vomiting predominate. The appetite is usually lost and headache is common.
- Clinical signs reflect the nature of the inflammatory response. Proteinaceous fluid and inflammatory cells congest the airspaces, leading to consolidation of lung tissue (which takes on the appearance of liver on a cut surface).
- Physical evidence of consolidation: dullness to percussion, bronchial breath sounds; crackles, increased fremitus, and whispered pectoriloquy suggest bacterial pneumonia. Early in the course of pneumonia, however, the physical examination may be normal.

## Common clinical features of community-acquired pneumonia

### Streptococcus pneumoniae

- Most common cause. Affects all age groups, particularly young to middle-aged.
- Characteristically rapid onset, high fever and pleuritic chest pain;
- May be accompanied by herpes labialis, rigor and 'rusty' sputum.
- Bacteraemia more common in women and those with diabetes or COPD.

### Mycoplasma pneumoniae

- Children and young adults.
- Epidemics occur every 3-4 years, usually in autumn.
- May be febrile without raised pulse rate. !!!!
- Rare complications include haemolytic anaemia, Stevens-Johnson syndrome, erythema nodosum, myocarditis, pericarditis, meningoencephalitis, Guillain-Barré syndrome

## **Legionella pneumophila**

- Middle to old age mostly infected.
- Local epidemics around contaminated source, e.g. cooling systems in hotels, hospitals.
- Some features more common, e.g.: headache, confusion, malaise, myalgia, high fever and vomiting and diarrhea.
- Laboratory abnormalities include hyponatremia, elevated liver enzymes, hypoalbuminemia and elevated creatine kinase.
- Smoking, corticosteroids, diabetes, chronic kidney disease increase risk .

## **Staphylococcus aureus**

- Associated with debilitating illness and often preceded by influenza.
- Radiographic features include multilobar shadowing, cavitation, pneumatoceles and abscesses.
- Dissemination to other organs may cause osteomyelitis, endocarditis or brain abscesses.
- Mortality up to 30%

## **Klebsiella pneumoniae (Freidländer's bacillus)**

- More common in men, alcoholics, diabetics, elderly, hospitalised patients, and those with poor dental hygiene.
- Predilection for upper lobes and particularly liable to suppurate and form abscesses. May progress to pulmonary gangrene

## **Chlamydia pneumoniae**

- Young to middle-aged. Large-scale epidemics or sporadic; often mild, self-limiting disease.
- Headaches and a longer duration of symptoms before hospital admission. Usually diagnosed on serology

## **Haemophilus influenzae**

- More common in old age and those with underlying lung disease (COPD, bronchiectasis)

## **Actinomyces israelii**

- Mouth commensal.
- Cervicofacial, abdominal or pulmonary infection, empyema, chest wall sinuses, pus with sulphur granules

## **Primary viral pneumonias**

- **Influenza, parainfluenza, measles** may cause pneumonia commonly complicated by 2<sup>nd</sup>ary bacterial infection
- **Herpes simplex** may cause tracheobronchitis or pneumonia in the immunosuppressed
- **Varicella** may cause severe pneumonia. Heals with small nodules that calcify and become visible on chest X-ray
- **Cytomegalovirus (CMV)** Pneumonia may be a major problem in transplant recipients (particularly bone marrow) and those with AIDS
- **Coronavirus** (Urbani SARS-associated coronavirus) SARS (severe acute respiratory distress syndrome) should be suspected if a high fever (> 38°C), malaise, muscle aches, a dry cough and breathlessness follow within 10 days of travel to an area affected by an epidemic