

Lecture – 1~7

Revision



Microbiology Team - 430

Done By:

Ghadeer Al-Wuhyad

Hanan Al-Rabiah

Khawla Al-Othman

Ibrahim Al-Faris

Hatim Al-Ansari

Hussam Al-Razqan

Mohammed Al-Kurbi

السلام عليكم ورحمة الله وبركاته

هذا الشغل عبارة عن مراجعة للمحاضرات التي تخص المايكرو بال Respiratory Block
 التيم ما يتحمل المسؤولية اذا فيه سؤال خارج هذي المذكرة ، هي عبارة عن مراجعة وتقريبا شبه شاملة
 فيها بالبداية المحاضرات بس حطيناها بشكل ثاني للدراسة ، اهم النقاط لكل محاضرة وكيسيز لكل وحده منهم
وان شاء الله مع الـ MCQs بنكون غطينا المطلوب للاختبار

بالنهاية : الشغل هذا اخذ منا وقت كثير ومجهود كبير
 كل اللي نبغاه هو الدعاء وان شاء الله ما تنسوننا فيه

Topic	Page No.
Tuberculosis	2-6
Health Care Associated Pneumonia	7
Viral Infection Of The Upper Respiratory Tract	8-9
Upper Respiratory Tract Infection	10
Bacteria causing pneumonia	11-15
Respiratory Fungal Infection 1	16-17
Respiratory Fungal Infection 2	18
Summary & Main Points	19-22
Cases	23-28

Tuberculosis

Mycobacterium tuberculosis complex:

- 1- **M.tuberculosis** (Human type)
- 2- M. bovis (Bovine type)
- 3- M. Africanum
- 4- BCG strains

All Mycobacterium tuberculosis Complex cause tuberculosis

-Chronic disease affects all age group, **caused by Mycobacterium tuberculosis complex.**

-Affects the lungs, other organs can be affected.

Transmission:

- Mainly through inhalation of **airborne droplet in** pulmonary diseases case, rarely through GIT & skin.
- **Reservoir:** pt with open TB.

TB

Pathogenesis of TB:

-Acquired by airborne droplet, reaches the alveolar macrophages and able to survive there.

- This starts CMI.

- Granuloma formed and organism lives in dormant state (latent TB infection).

- Disease results due to destructive effect of CMI.

Genus Mycobacteria:

-Slim, rod shaped, non-motile, do not form spores.

-**Do not stain by Gram stain.** (Has waxy coat.).

-Contain high lipid conc. (Mycolic acid) in the cell wall which resists staining so it is called **Acid Fast Bacilli (AFB)**.

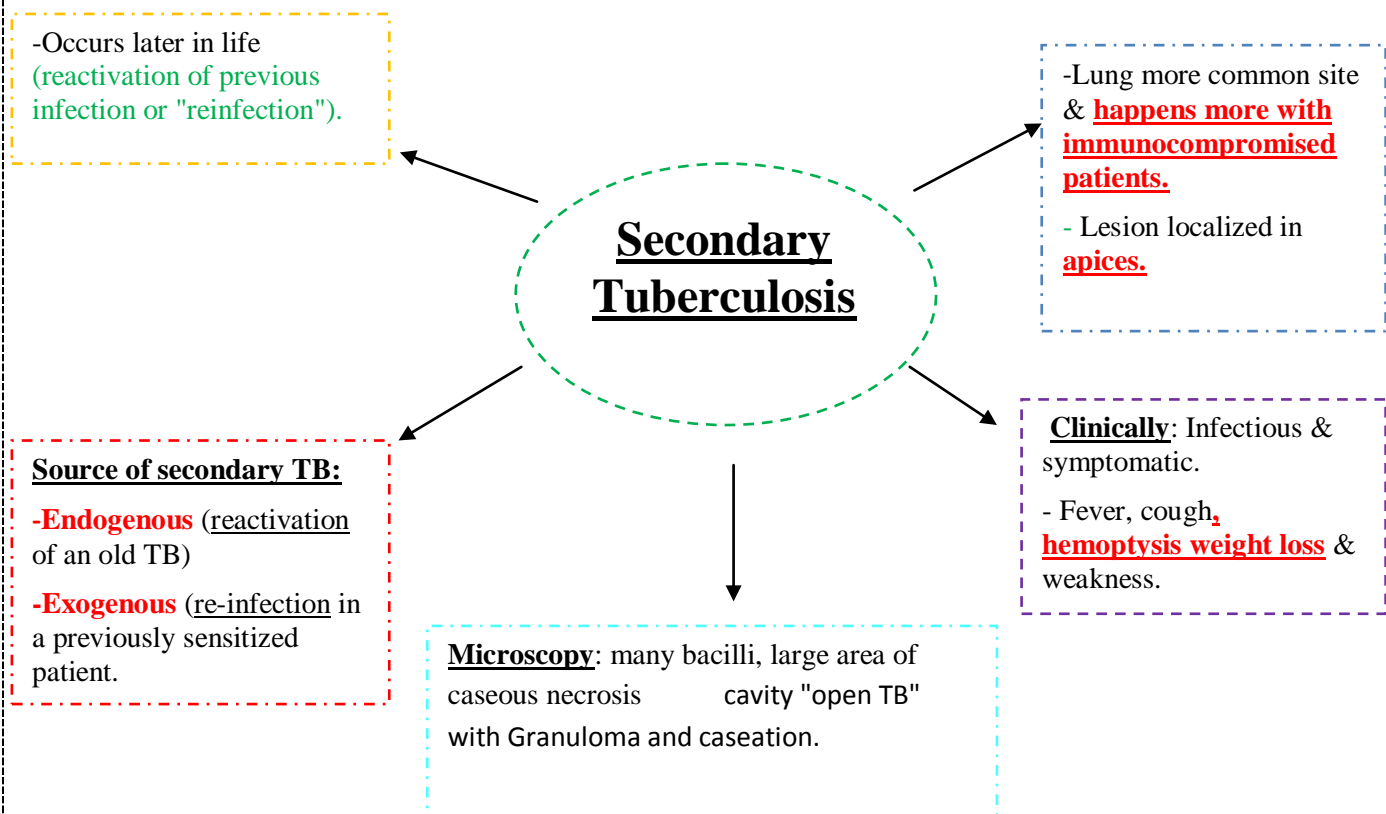
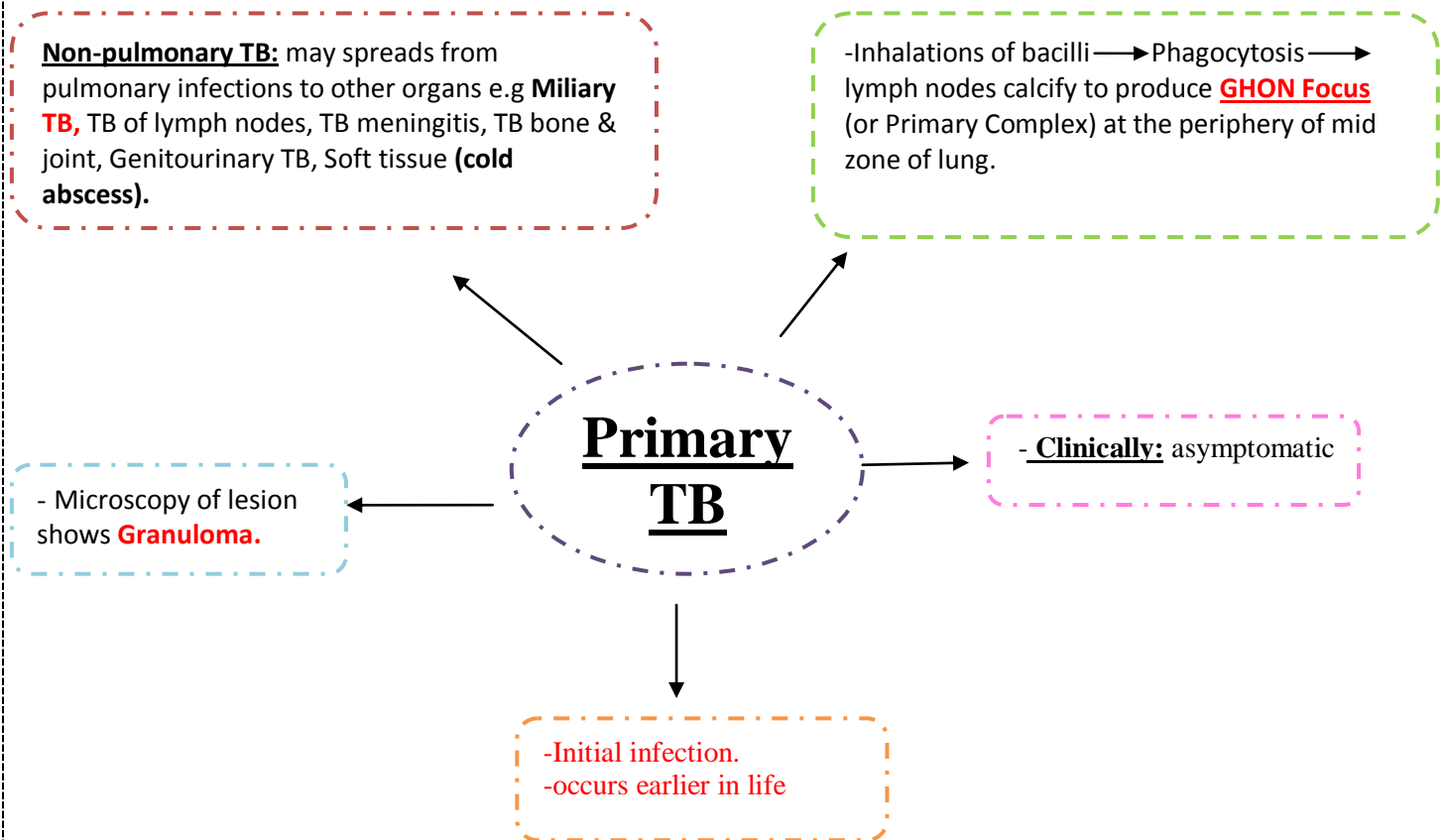
Acid-Fast Bacilli (AFB):

- Stain used: **Ziehl-Neelsen stain (ZN stain)**

- **Multiply intracellularly.**

- Delayed hypersensitivity reaction type of immune response

- **Slowly growing (2 - 8 wks).**



Tuberculin Test:

-Uses(PPD).
-Activates synthesized lymphocytes to produce CMI which appear as skin indurations.
- Low level activity induced by environmental mycobacteria

-May not distinguish between active and past infection except in an individual with recent contact with infected case.

- (And cannot distinguish the BCG "vaccination ")

Methods of Tuberculin Test:

-Intradermal inoculation of 0.1 ml of PPD.
- Read after 48-72hrs.

Methods:

1. Mantoux test.
2. Heaf test (screening).

Negative Tuberculin Test:

-No induration , either due to:
-No previous infection
-Pre-hypersensitivity stage
-Lost TB sensitivity with loss of antigen
***AIDS patients are anergic and susceptible to infection.**

Positive Tuberculin Test:

- **1- >5mm induration in the following:**
 - Recent contact with active TB.
 - HIV .
 - Chest X-ray consistent with healed TB.
- **2- >10mm induration:**
 - IV drugs user, HIV seronegative patient.
 - Medical conditions eg. diabetes , Residents & employee at high risk
 - Patients from country with high incidence.
 - Children < 4yrs or exposed to adult high risk group.
 - Mycobacteriology lab. personnel.
- **3- >15 mm induration:**
 - Positive in any persons including those with no risk factors for TB.

***Specimens:**

In case of Pulmonary TB: take 3 early morning sputum samples., and repeat sample

*** Direct microscopy of specimen:**

Z-N or (Auramine) stain.to identify infectious cases(open cases).

***Culture: gold standard for identification and sensitivity.**

***Media used:** Lowenstein-Jensen media (LJ).

***Contains:** eggs, asparagine, glycerol, pyruvate/ malachite green.

*Colonies appear in LJ media after 2-8 weeks as eugenic, raised,buff,adherent growth enhanced by glycerol (*MTB*) or by pyruvate (*M.bovis*).

Identification:

*Morphology , growth at 37C + 5-10 CO₂

*Biochemical tests :Niacin production & Nitrate. (we use this test to elect enviromental mycobacterium)

*Sensitivity testing

*Guinea pig inoculation: rarely used.

Lab diagnosis

Other media plus LJ media may be used:

1-Fluid media (middle Brook)

2-MGIT.

3-Automated methods :- eg. Bactec MGIT. (to detect CO₂ produced by the bacteria)

4-Measurement of interferon – gamma (IF-γ) .Has a specific significance than tuberculin test.

5-PCR: directly from specimen (CSF).

❖ In General :

- you take specimen (sputum or CSF or urin ... etc)
- Then you stain it (Z/N) and you look for AFB
- Then after that you culture the specimen in either fluid media (middle Brook) or solid media(LJ)
- Then you identify the organism (by Biochemical tests)

Management of a TB case:

Second Line:

*If the bacteria was resistant to first line drugs. More toxic than the first line drugs.

*PAS , Ethionamide, Cycloserine, Kanamycin, Fluroquiolones.

***Isolation: for 10-14 days (for smear positive.**

* We use Triple regimen of therapy Why ?

1-To prevent resistant mutants

2-To cover strains located at different sites of the lung .

3-To prevent relapse

Treatment must be guided by sensitivity testing.

*First Line Treatment:

Isoniazide (INH) ,Rifamocin (RIF) ,Ethambutol(E), Pyrazinamide (P), Streptomycin (S)

*INH+ RIF +P for 2 months then continue with INH+RIF for **4-6 months.**

*Directly Observed Therapy (DOT).

Prevention of TB:

*Prevent bovine TB By :

- 1- Tuberculin testing of herds.
- 2- Slaughter of infected animals.
- 3- Pasteurization of milk.

1-Recognition of new cases.

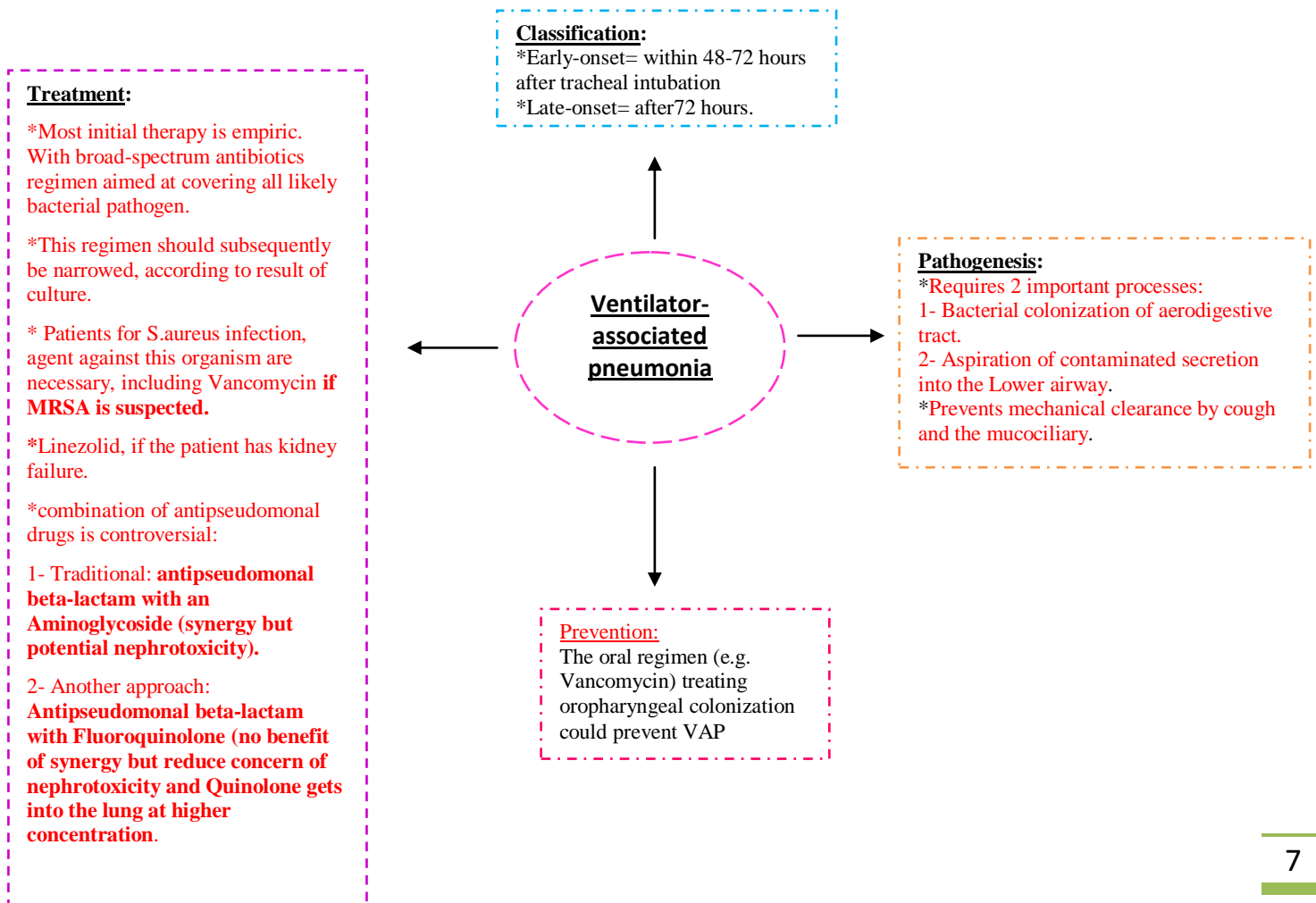
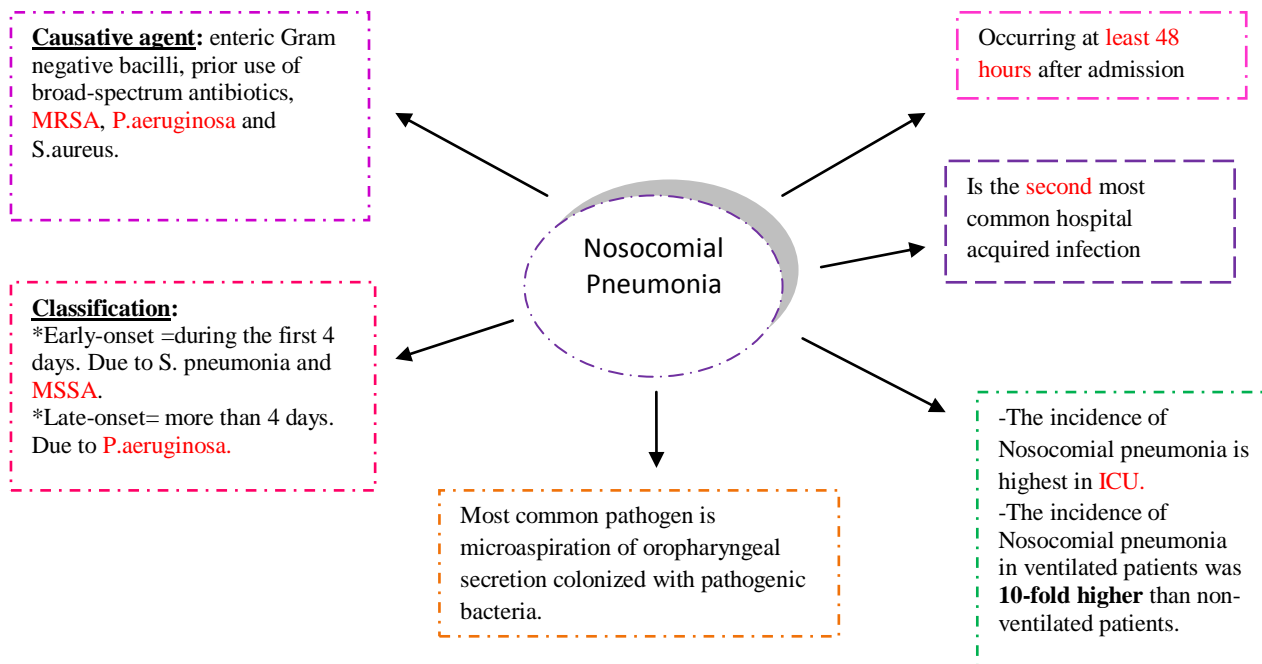
2-Propylaxis with INH of contacts.

3-Follow up cases .

4- Immunization with BCG to all new borne

- The best way is to Isolate the patient
- Use of BCG " vaccination "
- Pasteurization of milk

Health Care Associated Pneumonia



Viral infection of the upper respiratory tract

Influenza	A	B	C
Infect	Humans and animals	Humans	Humans
Spreading	epidemic and pandemic	epidemic	Mild
Antigenic variations	Major and minor	Minor	stable

	Definition	Organism	Symptoms & signs
Common cold	Inflammation of the nose and throat (nasopharynx)	Rhinoviruses Coronaviruses	-Watery nasal discharge -Sneezing. -Mild sore throat. -Fever is not common.
Croup	Inflammation of the larynx, trachea and bronchi (acute laryngotracheobronchitis in <u>infants and young children</u>).	Parainfluenza types 1 & 2	-Difficult and labored breathing - Barking spasmodic cough. - <u>Inspiratory stridor</u> . - Hypoxia and cyanosis. - Fever and cough.
Bronchiolitis	Bronchioles become inflamed, edematous and obstructed by mucous	Respiratory Syncytial Virus (<u>RSV</u>) parainfluenza virus type 3	- Expiratory obstruction. - <u>Expiratory wheezing</u> . - Difficult & labored breathing. - Hypoxia and cyanosis.
Influenza "Flu"	The virus infects the epithelial cells of the nose, throat, Bronchi and occasionally the lungs	Influenza viruses (A, B, C)	Fever, malaise, chills, sore throat, hoarseness, headache, cough and generalized aches

<i>Antigenic shift</i>	<i>Antigenic drift</i>
Occurs only in influenza <u>A viruses</u>	Occurs in both influenza <u>A and B</u> viruses
A complete change in the hemagglutinin (HA) alone or the Hemagglutinin (HA) and neuraminidase(NA)	It is a minor antigenic change in the Hemagglutinin (HA)

virus	family	Envelope	Viral genome
Rhinoviruses	Picornaviridae	Un-enveloped	ss-RNA, with positive polarity
Coronaviruses	Coronaviridae	Enveloped (Helical nucleocapsid)	ss-RNA, with positive polarity
Parainfluenza type 1 and 2 (PIV 1&2)	Paramyxoviridae	Enveloped	ss-RNA with negative polarity
Respiratory Syncytial Virus (RSV)	Paramyxoviridae	Enveloped	ss-RNA with negative polarity .
Adenoviruses	Adenoviridae	Unenveloped	linear ds-DNA
Influenza viruses (A, B, C)	Orthomyxoviridae	Enveloped (helical nucleocapsid)	7 - 8 segments of ss-RNA with negative polarity

Upper Respiratory Tract Infection

Syndromes/diseases	organism	Clinical features	diagnosis	Treatment
Pharyngitis	Group A streptococcus	Sore throat Fever Tender and enlarged lymph nodes	Throat swap (blood media)	Penicillin
Sinusitis	S.pneumoniae H.influenza M.catarrhalis oral anaerobes in chronic	More local symptoms in acute Less local symptoms in chronic	X-rays CT/MRI	Quinolones or Ceftriaxone
Otitis media	S. pneumonia H. influenza	Ear pain Red tympanic membrane Fever	Otoscope	Amoxicillin
Epiglottitis	<i>H.influenzae</i> Type b <i>S.pneumoniae</i>	Fever Difficulty breathing Drooling Dysphasia	X-ray	Ceftriaxone
Diphtheria	Corynebacterium diphtheriae	Sore throat Difficulty in breathing and swallowing Gray thick pseudomembrane	Throat swap (tinsdale media)	Erythromycin
Pertussis	<i>Bordetella pertussis</i> (GNB)	paroxysmal cough	Nasopharyngeal swap (Charcoal and blood media)	Erythromycin

Bacteria Causing Pneumonia

Clinically: New opacity on chest radiography in the presence of respiratory symptoms.

Bacterial causing pneumonia

Epidemiology:
Common in winter months.

Acquired environment:

- Community Acquired Pneumonia "CAP".
- Hospital Acquired Pneumonia "HAP".
- Nursing home acquired and immunocompromised host.

Classification:

• Anatomical:

1. Lobar: entire lobe.
2. Bronchopneumonia.
3. Interstitial.

• Pathogen:

1. *Gram-positive*: as *Streptococcus pneumoniae*, Staphylococcus aureus, Group A hemolytic streptococci.
2. *Gram-negative Bacteria*, Klebsiella pneumoniae, Haemophilus influenza, Moraxella catarrhalis and E.coli.
3. *Atypical Bacteria*: *Mycoplasma pneumoniae*, Chlamydia pneumoniae and *Legionella*. Anaerobic bacteria.
4. Viral and fungal

Recent influenza:

S.pneumoniae
S.aureus

Most common cause of community-acquired pneumonia:

- **Chronic lung diseases:**
 - *S.pneumoniae*
 - *H.influenza*.
- **Recently hospitalized:**
 - Gram negative
 - *legionella*

Adult:

1. *S.pneumoniae*. (the most common).
2. The second common depending on the season.
 - In winter → Viral.
 - In summer → *Mycoplasma pneumoniae*

Children:

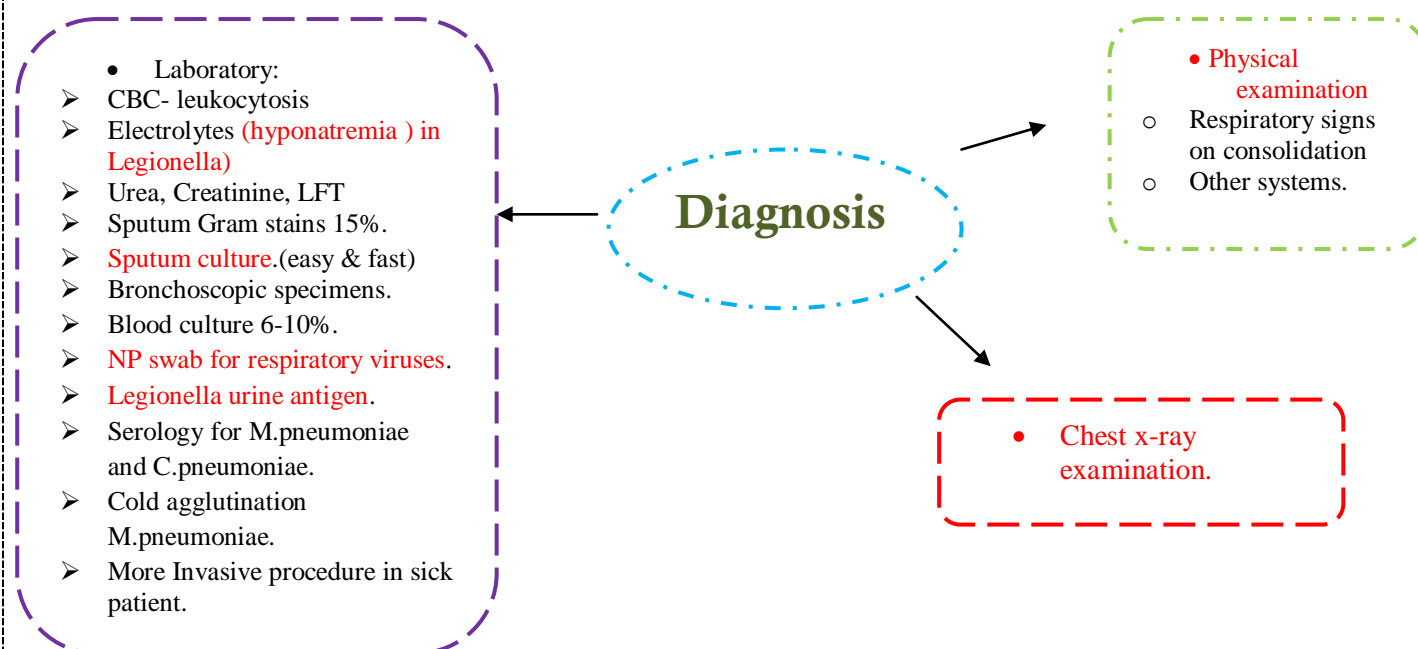
- Viral (the most common in children)
 1. *Respiratory Syncytial virus*
 2. Parainfluenza virus
 3. Human metapneumovirus
- Bacterial
 1. *S.pneumoniae* (the second common)
 2. *H.influenza* type B
 3. Group B streptococci in neonate.

- The difference between typical and atypical community-acquired pneumonia : (**Very important table**)

Variable	Typical	Atypical
Etiology	<i>S.pneumoniae</i> , <i>H.influenza</i>	<i>Mycoplasma pneumoniae</i> , <i>chlamydophila pneumonia</i> , <i>legionella</i> , TB, viral or fungal
Clinical presentation	Sudden onset of fever, chill, productive cough, shortness of breath and chest pain	Gradual onset headache, sore throat and body ache
Diagnosis Gram Stain	Useful	Useless (no cell wall)
Radiography	Lobar infiltrate	Dramatic changes: patchy or interstitial
Treatment with penicillin	Sensitive	Resistant. (Because penicillin work in cell wall, and atypical organisms have no cell wall! However , <i>Erythromycin</i> works on them)

▪ Importance of history taking in patient with community-Acquired pneumonia.

History	Pathogen
Solid organ transplant	Any pathogen Bacterial , viral, fungal,or parasitic
HIV	<i>Pneumocystis jirovecii</i>
Travel to some area in USA	Endemic Mycosis
Exposure to air-conditioning, cooling towers, hot tub, hotel stay, grocery store mist machine	<i>Legionella pneumophila</i>
Exposure to Turkeys, chickens, ducks or parrots	<i>Chlamydia psittaci</i>
Exposure to contaminated bat caves	<i>Histoplasma capsulatum</i>
Exposure to sheep, goat or cattle	<i>Coxiella burnetii</i>
Exposure to rabbits	<i>Francisella tularensis</i>
Occupation	<i>Mycobacterium tuberculosis</i> , HIV

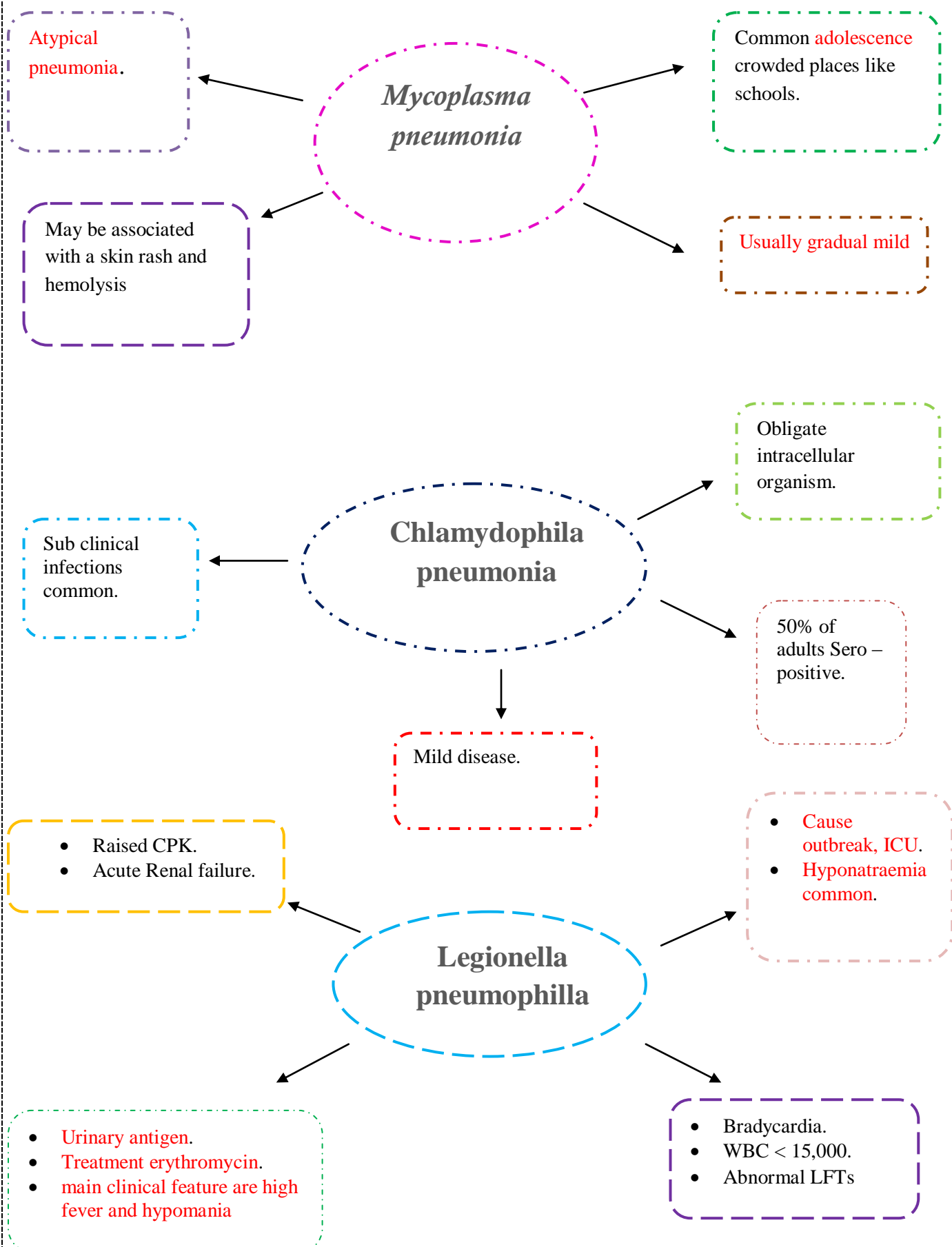


Antibiotics selection

	Macrolide (Azithromycin or clathromycin)	Fluoroquinolone(FQ)	Ceftriaxone (β lactam)
Outpatient	√		
Outpatient with comorbidity and or macrolides treatnet		√	√ + macrolide
Inpatient Non ICU		√	√+ macrolide
Inpatient ICU			√ +macrolide or FQ

- **Macrolide** is the most common drug used in CAP.
- There are some patients were treated by **Macrolide** before, so they develop resistant to the drug. In those patients we have to use other drug (**Fluoroquinolone**) or (**Macrolide + Ceftriaxone**)

Organisms	Antibiotics
<i>Pseudomonas</i>	Macrolide + ceftazime or FQs
<i>MRSA</i>	Vancomycin or linazolid
<i>Chlamydophila psittaci</i>	Macrolide or tetracycline
<i>Coxiella burnetti</i>	Macrolide or tetracycline
Legionella (have high fever and ↓ Na level (hyponatremia)	Erythromycin



Respiratory Fungal Infection 1

Fungal that affects the lungs:

- **Clinical presentation** : Cough, **Hemoptysis** & variable fever

- **X-ray Findings** : Air crescent

Chronic Aspergillosis

Allergic bronchopulmonary aspergillosis (ABPA)

- **Clinical presentation** :

History of Asthma and Bronchial obstruction.
Fever, malaise (feeling of general discomfort).
Eosinophilia, Wheezing +/-

- **Also have** :

Skin test reactivity to Aspergillus.
Serum antibodies to Aspergillus.
Serum IgE > 1000 ng/ml
Pulmonary infiltrates.

Clinical presentation : Cough, Hemoptysis, Fever, Pneumonia & Leukocytosis

Invasive Pulmonary Aspergillosis

- **X-Ray Finding** : Halo Sign

Other diseases caused by Aspergillus

Corneal ulcer
Endophthalmitis
Otitis externa – otitis media (caused by A. niger).
Nail & skin infection (caused by A. niger).

Fungal Sinusitis:

	Clinical Presentation	Complications in Immunocompromised	Different Diagnosis
Chronic Aspergillus Sinusitis	- Nasal obstruction, recurrent sinus infections, loss of smell and nasal polyps. - Aspergillus Flavus is the most common	1. orbital apex syndrome 2. generalised proptosis and blindness 3. cerebral aspergillosis	_____
Allergic Aspergillus Sinusitis			_____
Invasive Aspergillus Sinusitis			_ Mucormycosis, Scedopsporium, Fusarium infection

Respiratory Fungal Infection: (Diagnosis + Specimen)

	Specimen	Direct Microscopy	Culture : on SDA	Serology	PCR	Risk Factors
Aspergillus	Sputum, BAL, Lung Biopsy. But in Sinusitis we use only : Look for mucin	Stained smear Result will show: Septate fungal hyphae	-In sensitive -No cycloheximide (if it is positive = indicate Aspergillus,) If it is negative does not mean the pt is not affected by Aspergillus and we should do further investigation (e.g. biopsy)	- Test for antibody: Using I.D - Test for Antigen : ELISA test for galactomannan Antigen	Just in invasive Asp.	- Immunocompromised : 1.AIDS 2.Cancer 3. Drugs (cytotoxic& steroids). 4. Diabetes
Zygomycosis		Stained smear , Result will show : Non- septate fungal hyphae		_____	_____	1. Diabetic ketoacidosis. 2. Granulocytopenia. 3. Corticosteroid therapy. 4. Malignancy.

- ❖ In Allergic Aspergillus Sinusitis Diagnosis we use : Aspergillus precipitins
- ❖ **Treatment** for Aspergillus: Voriconazole & Amphotericin B.
- ❖ Treatment for Zygomycosis: Amphotericin B & Posaconazole(other azoles are not effective)
 - In some cases surgery is required such as sinusitis.

Zygomycosis (mucormycosis):

Classification	Complications	Clinical presentation of acute zygomycosis
1. Pulmonary zygomycosis.	1. Angioinvasion, Thrombotic invasion of blood vessels	- Fever, pulmonary infiltrates, Consolidation, nodules, cavitation, pleural effusion and hemoptysis.
2. Rhinocerebral zygomycosis.	2. Pulmonary infarctions and hemorrhage 3. Rapid evolving clinical course 4. High mortality	- If not treated, infection may extend to chest wall, diaphragm, and pericardium

Respiratory Fungal infection 2

Invasive candidiasis: infections happen in immune-compromised patients and healthy person.

Risk factor of Candida: Surgery, Age, Long stay in hospital/ICU

Infection	Organism	Risk factors	Diagnosis	Treatment
Pulmonary Cryptococcus	Cryptococcus neoformans C. gattii	Immunocompromised patients *cause meningitis	India Ink (capsule) Serology (Capsular Antigen by latex agglutination)	Combination of Amphotericin B & Flucytosine.
Pneumocystosis "PCP"	Pneumocystis jiroveci	AIDS patients	Sputum BAL PCR Silver stain (cysts) Immunofluorescence (more sensitive and it is better than silver stain)	Trimethoprim-sulfamethoxazole

Direct microscopy with stains e.g. GMS "silver stain" will show **Budding yeast cells and pseudohyphae +/-**

infection	Clinical presentation	Risk factors	diagnosis	Treatment
Mucocutaneous and cutaneous " Oral thrush "	White patches on tongue	Neonate and >65yrs patients Immunocompromised patients AIDS	Swabs	Fluconazole Voriconazole Amphotericin B
Pulmonary " Pneumonia "	Chills Fever Productive cough rusty sputum	Aspiration of organism Hematogenous Candidiasis Immunocompromised patients	Sputum Lung biopsy B.A.L	
Blood " candidemia "	Fever Complications: Septic shock - retinitis	Catheters trauma surgery Immuno-suppressants	Blood culture 1-Germ tube test. 2-Chlamydia-spores production in corn meal agar. If it is – (do biochemical test).	

Bacteria causing upper respiratory tract infection:

- ★1. Common causes of a sore throat (pharyngitis) is viral infections, and the commonest bacterial infection is group a streptococcus
- ★2. The common cause of Pharyngitis in adult is: Group a streptococcus
- ★3. Corynebacterium diphtheria cause Diphtheria, and can be prevented by vaccination
- ★4. Gray thick pseudomembrane is a characteristic of Diphtheria, the pseudomembrane close "blocks" the throat and cause suffocation.
5. Bordetella pertussis (GNB) cause Pertussis
- ★6. Paroxysmal cough is a characteristic of Pertussis
- ★7. Pertussis is diagnosed by Nasopharyngeal swap in Charcoal and blood media
- ★8. In order to treat sore throat we give the patient penicillin but orally we give him Amoxicillin

Tuberculosis:

- ★1. TB is a chronic infectious disease which mostly caused by Mycobacterium Tuberculosis M.TB.
2. TB could be Latent infection (which affect 1/3 of human race) or Active disease (usually devolved after patient immunity is compromised).
3. In Africa it is common that TB couple with HIV infection.
- ★4. Immuno compromise patients (e.g. Diabetic patient's) are the most likely to have TB infection.
- ★5. The immunity in TB infection is Cell Mediated Immunity (CMI).
6. Primary infection is initial infection " first time to be infected "
7. Secondary infection it's either Re-activation or Re-infection.
- ★8. Most common site for TB is lungs the pulmonary TB is the most infectious (because you can cough it or sneeze it ...).
9. Pulmonary TB my spreads from Lungs to Lymph Nodes, Bones & tissue.
10. The organism is very slow growing, it take almost 6 to 8 week to grow in the laboratory.
- ★11. The best confirmatory test to diagnose TB is isolation of the organism in the specimen at the laboratory.
12. The quickest test is when you stain the specimen and look for the organism under the microscope.
- ★13. Isolation of the patient for 10-14 days for smear positive cases i.e. > 1000 organisms / ml, because it's considered infectious case.
- ★14. To Treat TB we use :Isoniazide (INH), Rifamoicin (RIF), Ethambutol (E), Pyrazinamid (P), Streptomycin (S)
- ★15. For the prevention of TB we use BCG " vaccination"

Bacteria Causing Pneumonia:

1. Community Acquired Pneumonia is Most Common in Winter Months
- ★ 2. Streptococcus Pneumonia is the Most Common Organism in Community Acquired Pneumonia
3. Haemophilus Influenza is the Most Common Organism in Hospital Acquired Pneumonia
4. Mycoplasma Pneumonia is Common in Atypical Pneumonia
- ★ 5. Most Common Cause of Community-Acquired Pneumonia in Children is Viral The Second Common Cause in Children is Streptococcus Pneumonia
- ★ 6. Most Common Cause of Community-Acquired Pneumonia in Adults is Streptococcus Pneumonia
- ★ 7. Typical Pneumonia: is Sensitive to Penicillin , Atypical Pneumonia: isn't Sensitive to Penicillin But to Erythromycin
- ★ 8. Typical Pneumonia is Presented By : Sudden onset of fever, chill, productive cough, shortness of breath and chest pain and it caused by S.pneumonia
- ★ 9. Atypical Pneumonia is Presented By : Gradual onset headache, sore throat and body ache
- ★ 10. In the diagnosis of pneumonia with gram stain, with Typical pneumonia will see the organism along with pus cells , but with Atypical pneumonia we only see the pus cells
11. In HIV the Most Common Organism Causing Pneumonia is Pneumocystis jiroveci
12. Legionella pneumophilla is Found in Cooling Towers , Hot Tubs , Hotels
13. Chlamydia psittaci is Found in Turkeys, chickens, ducks or parrots
- ★ 14. Legionella pneumophilla is Diagnosed By Decrease in Na (↓Na)
15. Sputum Culture is the Most Common Diagnostic Test
- ★ 16. Macrolide is the Most Common Drug Used in Community Acquired Pneumonia
17. Mycoplasma Pneumonia is Common in adolescence
18. Legionella pneumophilla Cause Hyponatremia

Health Care Associated Pneumonia:

1. Definition of pneumonia: infection of the pulmonary parenchyma
2. Streptococcus pneumonia (commonest cause of CAP) : usually susceptible to antibiotic
- ★3. Pseudomonas aeruginosa (commonest cause of HCAP): usually resistant to antibiotics
- ★4. Health care associated pneumonia caused by Gram negative organisms like: P.aeruginosa, Acinetobacter or by Gram positive organisms like: MRSA.
5. Health care associated pneumonia (HCAP): Occurring at least 48 hours after admission
- ★6. The incidence of ventilator associated pneumonia is highest in ICU (intensive care unit)
7. Pathogenesis: Most common is microaspiration of oropharyngeal secretions colonized with pathogenic bacteria
- ★8. Most initial therapy is empiric (treatment before diagnosis) so we give the patient broad-spectrum antibiotic.
- ★9. In case of gram -ve we give the patient Anti-pseudomonal drugs (either with Aminoglycoside or with Fluoroquinolone)
- ★10. In case of gram +ve we give the patient Anti-MRSA drugs (Vancomycin) but with renal failure patient we give him (Linezolid) which has less possible nephrotoxicity

Viral infection of the respiratory tract

- ★1. Common cold is caused by Rhino & Corona viruses
2. Croup is caused by parainfluenza types 1 & 2
3. Bronchiolitis & Pneumonia I is caused by Respiratory Syncytial Virus "RSV " and PIV type 3)
4. Adenoviruses infections can cause: Pharyngo -conjunctival fever, acute respiratory diseases, Gastroenteritis, Urinary tract infection.
- ★5. The main neutralizing antigen and the one whom responsible for the immunity is: HA
6. Antigenic variations in Influenza A is Major & Minor , in Influenza B is Minor and it is stable with Influenza C
- ★7. Antigen shift change due to recombination & Antigen drift due to mutation
- ★8. Treatment: Amantadine and remantadine against Influenza A, Zanamivir (Relenza) & Oseltamivir (Tamiflu) against Influenza A&B " The first one is by inhalation. The second orally"
9. The flu shot vaccine is given to people older than 6 months , and The nasal spray flu vaccine (Flu mist) is given to people between 5-49yrs

Respiratory Fungal Infections

1. Aspergillosis is caused Aspergillus species mainly A. fumigates and A. flavus.
2. X-ray findings of Aspergilloma shows air crescent.
- ★ 3. Clinical presentation of chronic Aspergillus: **Cough, Hemoptysis & variable fever**
- ★ 4. X-ray findings of invasive pulmonary Aspergillosis shows Halo sign
5. Air quality in hospitals Can cause Nosocomial pulmonary Aspergillosis
- ★ 6. In Fungal sinusitis Biopsy showed Hyphal invasion.
7. Chronic invasive Aspergillus sinusitis Direct Microscopy will show septate fungal hyphae.
- ★ 8. galactomannan Antigen (antigen associated with aspergillous)
9. In Allergic Aspergillus Sinusitis Diagnosis we use : Aspergillus precipitins
10. Zygomycosis caused by Zygomycetes which is Non-septate hyphae
11. One of the risk Factors to cause Aspergillus infection is Surgery, and for Zygomycosis infection is Diabetic ketoacidosis.
- ★ 12. Treatment for Aspergillus: Voriconazole & Amphotericin B.
13. Azoles are not effective in Zygomycosis except Posaconazole

Respiratory Fungal infection – II

- ★ 1. A albicans is the most commonly responsible for Candidiasis
2. Most infections are due to person's own flora
3. We can say the Candidiuria is Infection (when the colony count is **10^5 cfu/ml or $> 10^3$ cfu/ml**)
4. 75% of all women get a vaginal yeast infection at least once , In 50-60% of the cases, is caused by Candida albicans
5. Central venous catheters (CVC) (major source to cause Candidemia)
6. Candidemia can cause Ocular involvement (retinitis)
- ★ 7. Fever could be the only clinical manifestation of the candidemia
8. Candida is the fourth in causing Nosocomial bloodstream infections.
- ★ 9. Blood culture We do this culture to diagnosis if there is blood infection whether by bacteria or fungal and it's very important to diagnose Candidemia
- ★ 10. Systemic treatment of Candidiasis is Fluconazole
11. Antifungal susceptibility testing isn't done routinely in the microbiology lab
12. C. glabrata can be less susceptible or resistant to Fluconazole
- ★ 13. Can treat the pulmonary cryptococcosis by Amphotericin B
- ★ 14. Pneumocystosis (PCP) is especially common in AIDS patients
15. Pneumocystis jiroveci does not grow in laboratory media e.g. SDA

Cases

Case 1

- A 67- year-old man is very tired, has no appetite, has a dry **persistent cough**, **fever** and has had chills and sweats. **He lost 13 pounds in the last month without dieting**. A chest x-ray shows **bilateral upper lobe involvement**, mediastinal and hilar lymphadenopathy. **Sputum contained an acid-fast bacillus**. **Cultures on Lowenstein-Jensen medium were positive after 2 weeks in culture** the most possible diagnosis is:

➤ **It is Tuberculosis (secondary TB).**

We treat this pt with INH+ RIF +P for **2 months** then continue with INH+RIF for **4-6 months**.

Case 2

- A pt was in the ICU he was effected by bacteria, Gram stain shows that the organism is **gram negative**, the most common cause is:

➤ **It is Pseudomonas aeruginosa.**

Note: if it is Gram positive it going to be S.aureus.
If not mention Gram positive or negative it is going to be MRSA (most common)

Case 3

- Several children from the **same daycare** present with **runny nose**, sneezing. What is the most possible diagnosis?

➤ **It is common cold caused by Rhinovirus.**

Case 4

- A 2-year-old child **coughs like a barking seal**, has sore throat, fever and **hoarse voice**, with a high-pitched noise on inhalation and difficulty breathing. What is the most possible diagnosis?

➤ **It is croup caused by parainfluenza virus.**

Case 5

- **Infant** with **bronchiolitis** has low-grade fever, rapid heart rate, **rapid breathing**, and **expiratory wheezing**. What is the most possible cause?
- **It is RSV.**

Case 6

- Pt presented with **Fever**, malaise, chills, sore throat, hoarseness, headache, cough and generalized aches. What is the most common diagnosis?
- **It is influenza "flu".**

Case 7

- A 7 years old boy presented to the pediatrician complaining of pain when he swallows, has a headache, and has vomited twice. Upon examining, the doctor finds that pharynx, tonsils, and uvula are swollen and erythematous (red) and his tonsils are studded with white areas of exudate. He is febrile (temperature 40.3 degrees centigrade) with tender, bilateral, cervical lymphadenopathy (enlarged lymph nodes).
- A Complete Blood Count (CBC) performed on a sample of boy`s blood reveals that he has a leukocytosis (increased number of WBCs) due to a neutrophilia (increased number of neutrophils).
- **The boy is diagnosed as having acute bacterial pharyngitis**
And treated with phenoxymethyl penicillin for five days. A throat swab taken before starting **antibiotics** grows **beta-hemolytic streptococci (Group A)**. After three days of treatment, his temperature has returned to normal and he has made an uneventful recovery.

Case 8

- A 5 year old boy presented to emergency room complaining of sudden sore throat, malaise, low grade fever and he had difficulty in swelling. Examination reveals a white, thick, coating of the tonsils, uvula, and palate. Attempts to scrape the coating cause bleeding.
- **The boy is diagnosed as having Corynebacterium diphtheria**
That caused by **Corynebacterium diphtheria**. The doctor described **Erythromycin** as treatment

Case 9

- A 5 year old boy presented to emergency room complaining of Difficulty breathing, drooling, dysphasia and fever. X-ray shows thumb side epiglottitis. While taking history of the patient the doctor recognized that the boy is unvaccinated.
- **The boy is diagnosed as having Epiglottitis**
That caused by H.influenzae Type b. The doctor described Ceftriaxone as treatment.

Case 10

- A 2 years old girl presents to the emergency room with fever, cough, runny nose, stridor and difficulty breathing. Temperature is high; there is audible stridor and a barking cough. The chest is clear and the child does not look toxic.
For laboratory investigation, nasopharyngeal swap was taken and cultured in Charcoal media.
- **The child is diagnosed as having Pertussis**
That caused by Bordetella pertussis (GNB). The doctor described Erythromycin as treatment.

Case 11

- A 3-year-old girl is brought to hospital by her mother because she has a fever and complains that her ear hurts. She has no significant medical history. Her mother explains that she developed a “cold” about 3 days ago with sniffles. Her temperature is 37.8°C, and the rest of the physical examination is completed with some difficulty. The only abnormalities are slight redness of the throat, a nose full of thick green mucus, and injected tympanic membranes.
- **The doctor diagnosed her as acute otitis media (AOM) By the Otoscope**
Caused by S. pneumonia, H. influenza, and treatment he advised her to take Amoxicillin.

Case 12

- A **6 year-old** female patient who was referred to Dr. Ramadan. The patient had suffered from chronic sinus problems. Symptoms included constant nasal congestion, coughing, and snoring. An initial exam with Dr. Ramadan showed edematous red nasal mucosa and colored nasal discharge. A CT scan confirmed bilateral maxillary blockage and bilateral thickening of the mucus membrane.
- **The patient was diagnosed as chronic sinusitis**
Caused by oral anaerobes which could be treated with Quinolones or Ceftriaxone for 2-4 weeks

Case 13

- A 15 – year-old girl came to the hospital, presented with cough with sputum, chest pain and shortness of breath. Her temperature was 39.2 °C. A chest X-ray showed right lower lung lobe consolidation. Laboratory studies show elevated WBC. The doctor gives her penicillin as the best treatment.
- Which one of the following is the most likely organism that can cause these symptoms
 - *Mycoplasma pneumoniae*
 - *Legionella*
 - *Chlamydia pneumoniae*
 - **S. pneumoniae**

Case 14

- A 20 years old male was presented to the chest clinic with variable fever and cough up blood. In laboratory investigations, X-ray showed mass in the lung, Air crescent.
What is the most likely diagnosis?
- **Aspergilloma.**

Case 15

- A 39-year-old woman with a history of pneumonia, fever and cough up blood. A CBC showed with increasing white blood cell counts (Leukocytosis), and sputum studies were positive for Aspergillus.
- **The patient diagnosed to have invasive aspergillosis.**
 - ☒ What was the result of chest radiograph?
 - Halo sign.

Case 16

- A 33 years old female presented to the emergency room with a history of asthma. She had a symptoms of fever, and malaise. CBC showed increase in eosinophil. also positive Skin test reactivity and Serum antibodies to Aspergillus. Serum IgE was more than 1000 ng/ml. What is the most likely diagnose?
- **Allergic bronchopulmonary Aspergillous (ABPA).**

Case 17

- A 40 years old diabetic male presented to ER with Fever, hemoptysis and pulmonary infiltrates. X-ray showed Consolidation, nodules, cavitation, pleural effusion. Lung biopsy was recommended to diagnose her.
In laboratory investigations direct microscopy for stained smear showed broad non-septate fungal hyphae.
- **She was diagnosed as Zygomycosis.**
Amphotericin B, Posaconazole were given to him as treatment .
 - ☒ What is the most common organism that cause Zygomycosis?
 - Zygomycetes.

Case 18

- A 33 years old Immunocompromised male complaining of Chills, Fever, Productive cough and rusty sputum.
- **He was diagnosed as Pulmonary Candidacies caused by Candida.**
 - ❖ The best way to diagnose him?
 - Isolation of Candida from sputum
 - Lung biopsy

Case 19

- A 20 years old female presented to the initial clinic complaining of fever with a history of trauma.
- **Doctor diagnosed her as Candidiasis**
And gave her Fluconazole and Voriconazole as treatment.
- ❖ The best way to diagnose her:
 - **Blood serology.**

Case 20

- A 40 years old immunocompromised patient presented to ER with a history of meningitis. The doctor asked for India ink Serology for diagnose.
- **Diagnose was Pulmonary cryptococcosis.**
 - ❖ What is the most common pathogen?
 - Cryptococcus neoformans.
 - C. gattii.

Case 21

- A 35 years old AIDs patient presented to chest clinic. Diagnosed as Pneumocystosis caused by Pneumocystis jiroveci. Trimethoprim and sulfamethoxazol were given as treatment.
- **The best way for diagnose is :**
 - Sputum
 - BAL
 - Microscopy (GMS)
 - Immunofluorescence