



# 320 MIC Microbial Diagnosis

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# What is the Respiratory System?

- **Respiratory System** is made up of the organs in the body that helps to breathe.
- Respiration **means** Breathing.
- **The goal of breathing** is to deliver oxygen to the body and to take away carbon dioxide.
- **The primary organs of the respiratory system** are lungs, which carry out this exchange of gases as we breathe.

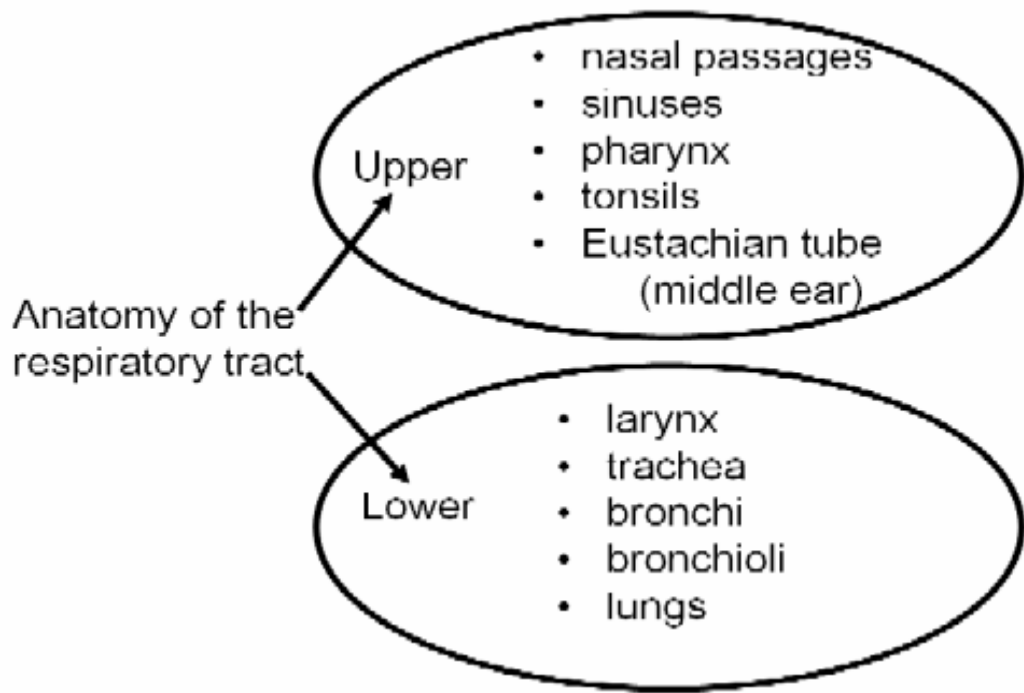
- **Respiratory Tract** is a system of organs functioning in respiration and consisting especially of the Nose, Throat; Pharynx, Larynx, Trachea, Bronchi, and Lungs.
- **So:** RT is organs that are involved in breathing.
- **Respiratory Tract Infection** refers to any number of infectious diseases involving the respiratory tract.

It is classified into two types

The Upper Respiratory Tract (URT)

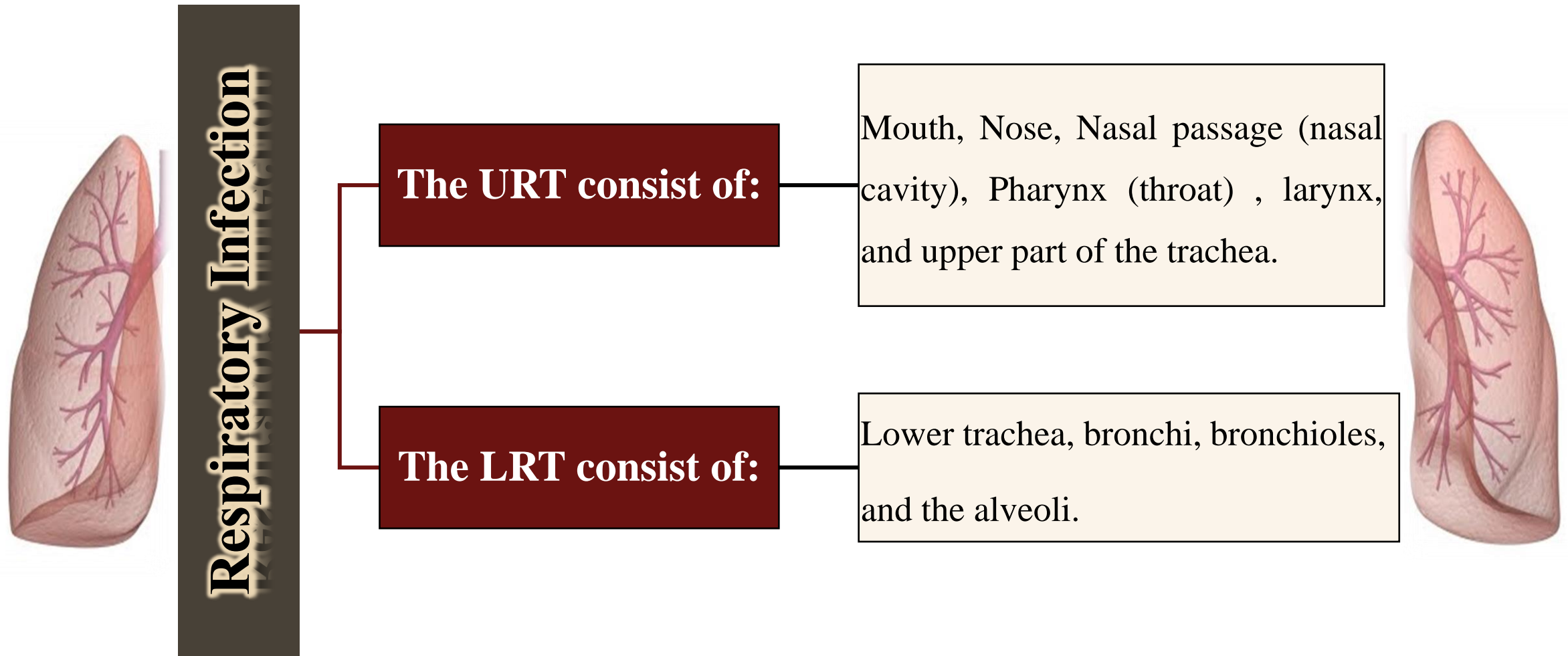
The Lower Respiratory Tract (LRT)

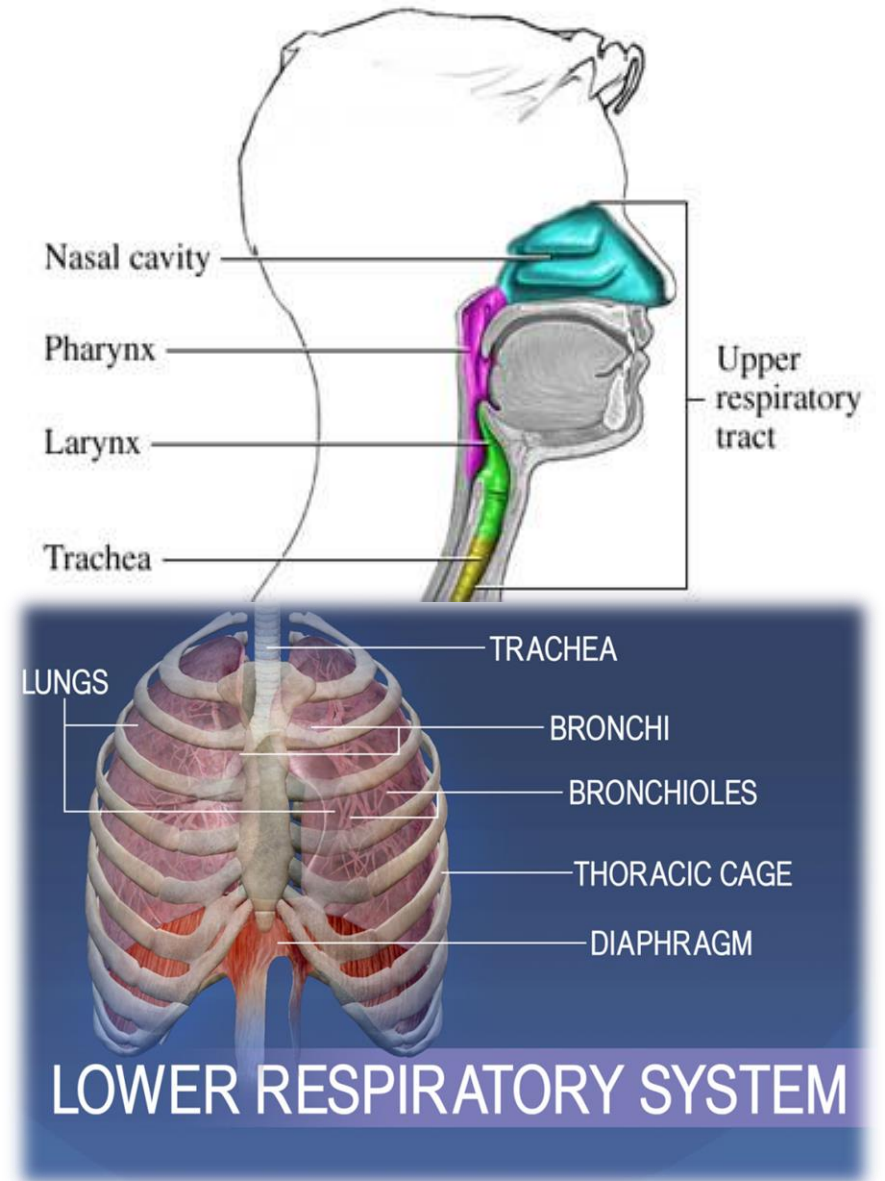
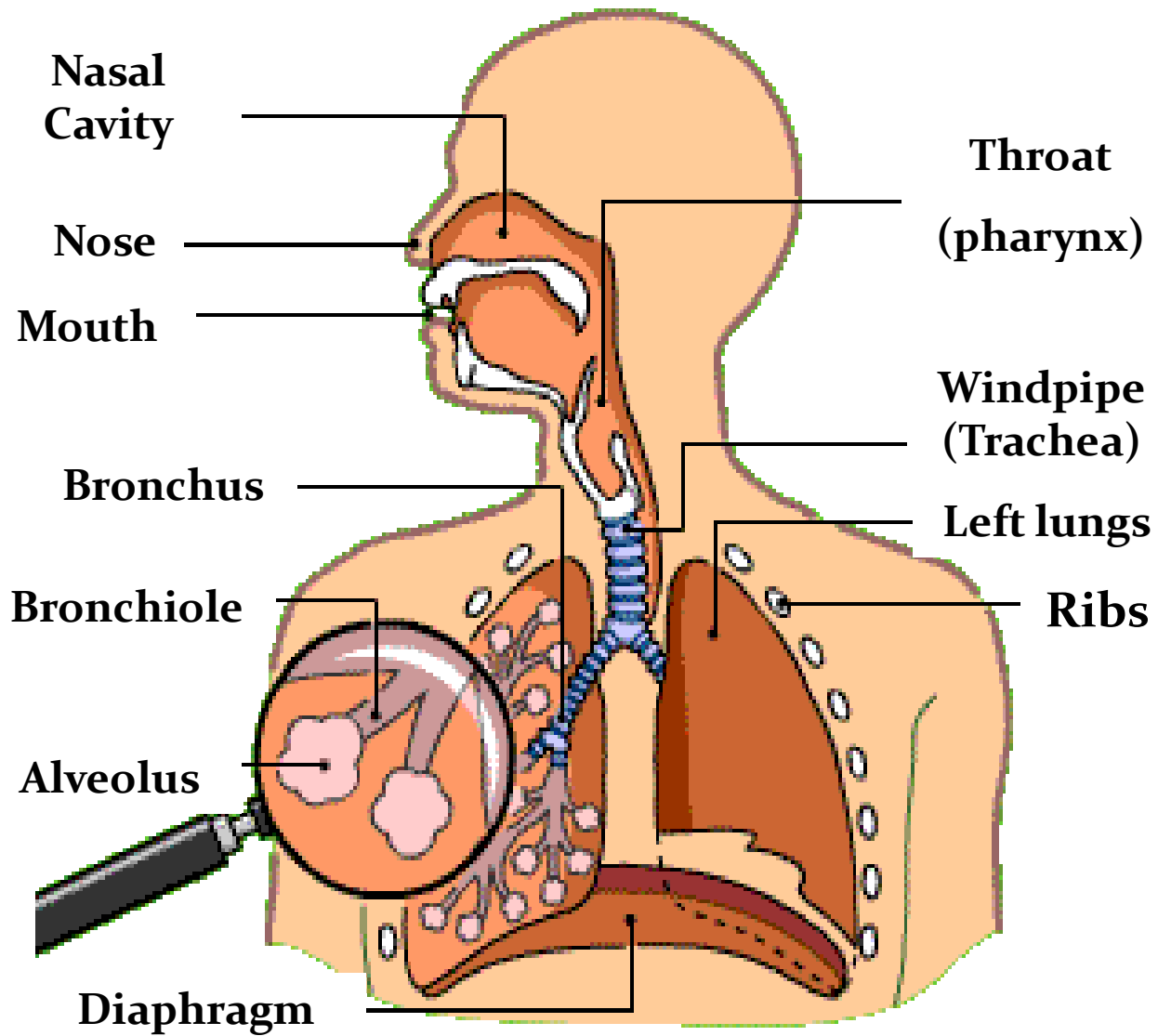


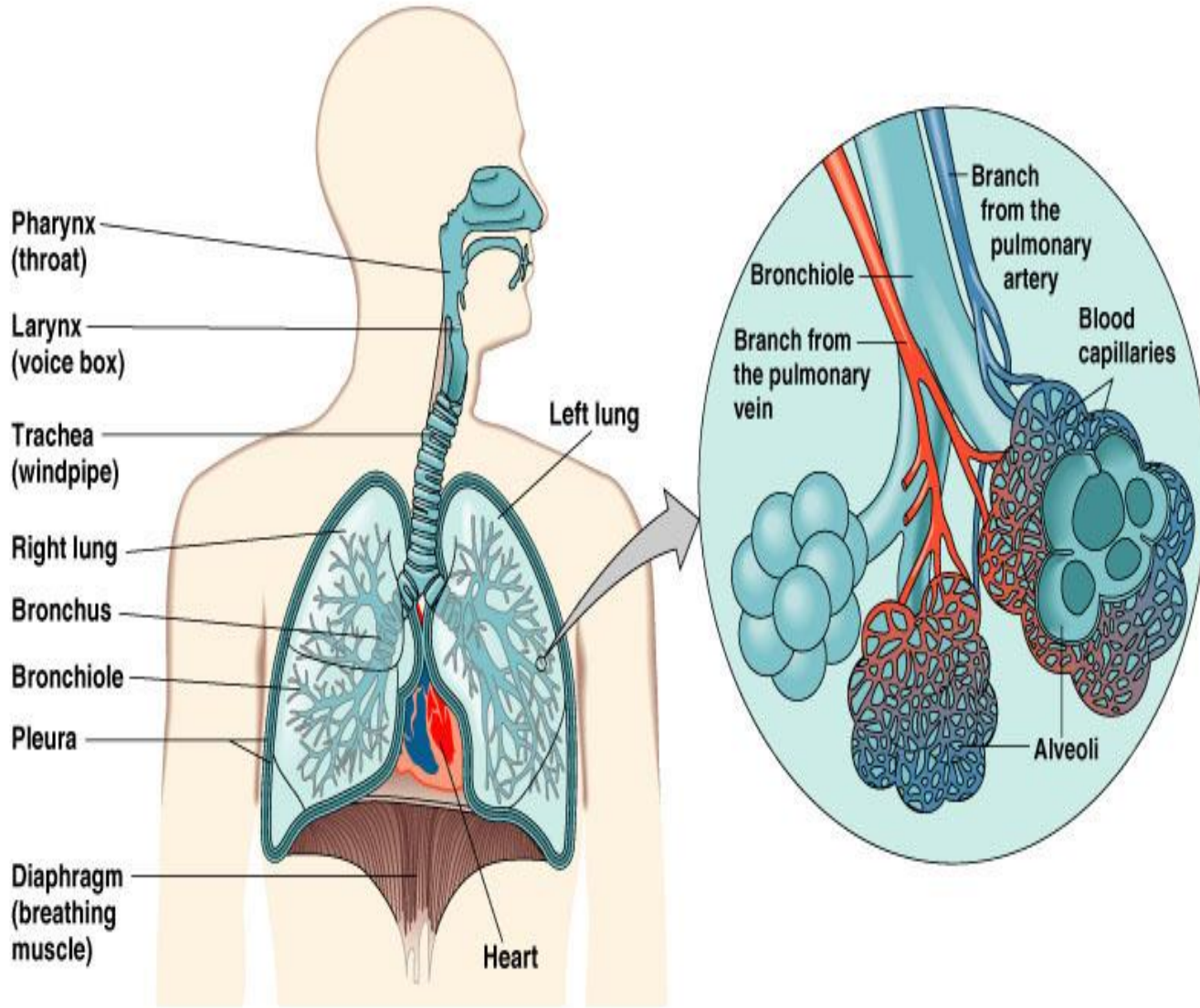


# Respiratory Tract Infection ( RTIs)

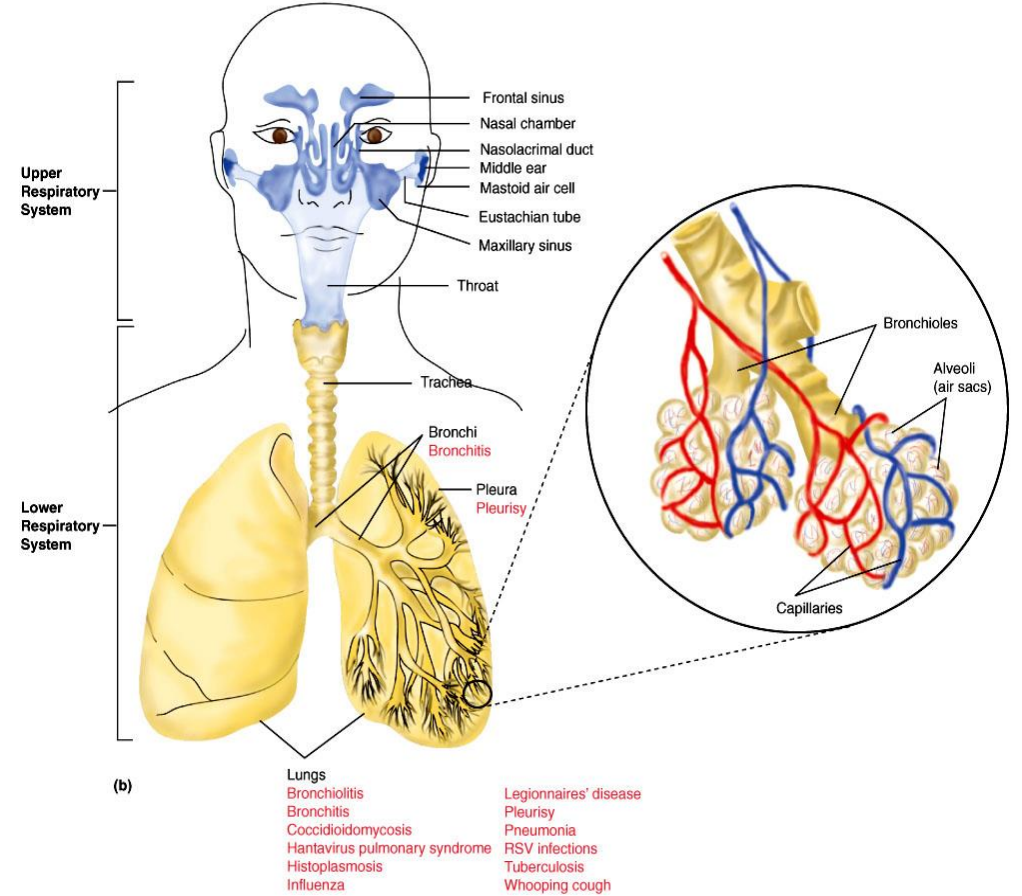
**Classification of the respiratory tract are described according to anatomical area of involvement.**





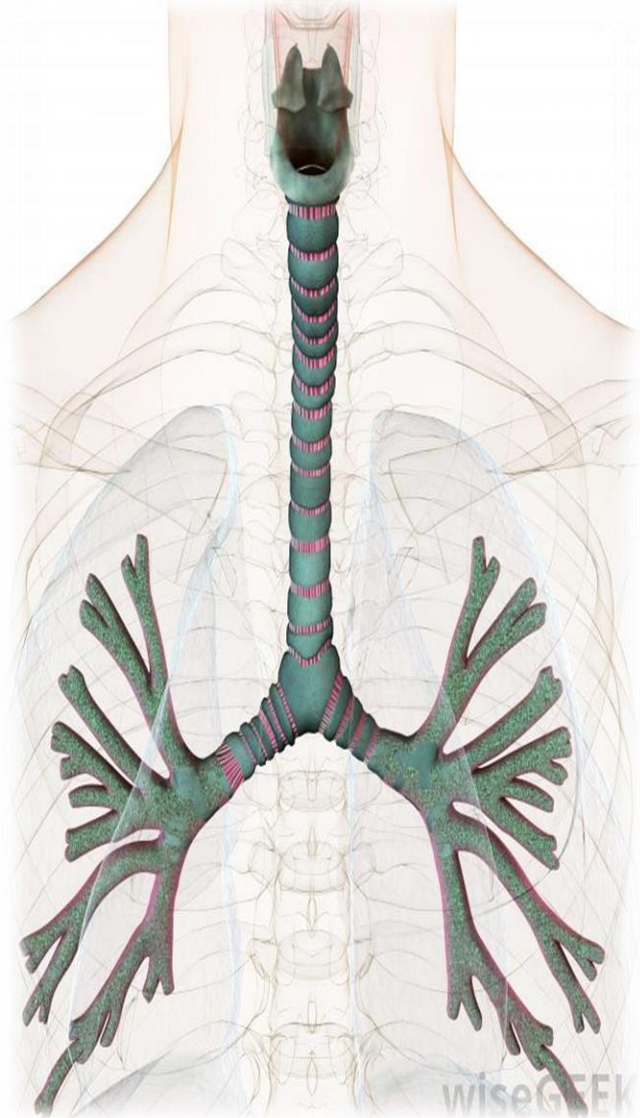


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## ❖ Learning Objectives



- Identify the general parts that consisting of respiratory system.
- State the etiology and factors leading to RTIs in the infant or young child.
- Collecting different samples from the RT.
- Discus common condition of the upper respiratory infection.
- Contrast the effects of various respiratory infections observed in infants and children.



## Etiology and Factors leading to RI

1. Infectious  
Agents

2. Age

3. Size

4. Resistance

5. Seasonal  
variations.

# ❖ Etiology and factors leading to RI

## 1. Infectious Agents

- Virus.
- *Streptococci, Staphylococci, Haemophilus Influenza, Chlamydia, Pneumococci.*

## 2. Age

- Infant younger than age 3 months have **lower infectious rate** (protected from maternal antibodies).
- The infection rate increases from 3 to 6 months of age.

## ❖ Etiology and factors leading to RI

The viral infection rate increase during (infant, and preschool years).

### 3. Size

The diameter of the airway is smaller in young children, the organism may move rapidly.

### 4. Resistance

**The ability to resist depending on several factors:**

- Deficiency of immune system.

- Malnutrition.
- Anemia.
- Fatigue.
- Allergies.
- Asthma.
- Cardiac abnormalities.



## **5. Seasonal variations.**

# Collection of Upper Respiratory Tract Specimens

1- Optimal timing

2- Swab types

3- Collecting the OP swab

4- Collecting the NP swab



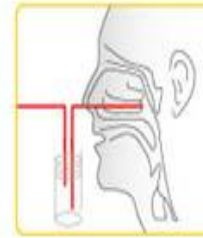
Nasal swab



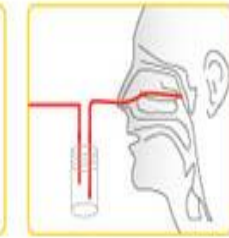
Throat swab



Nasopharyngeal swab



Nasal aspirate



Nasopharyngeal aspirate

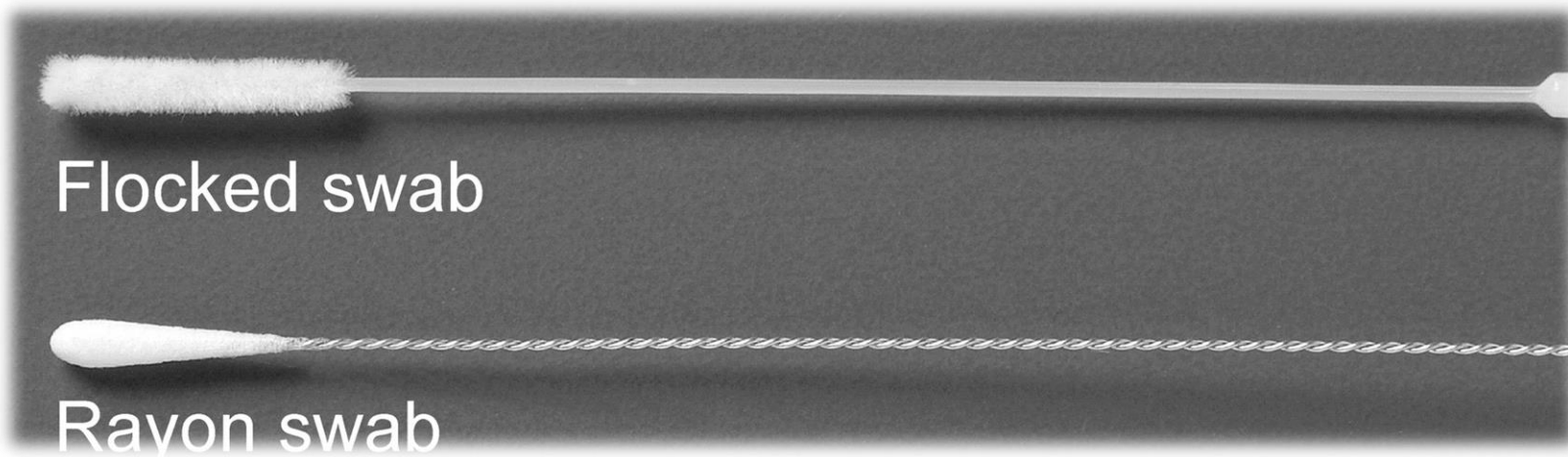
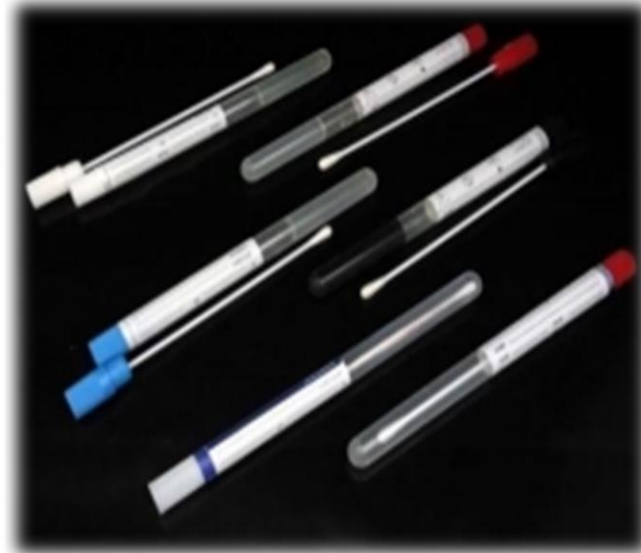
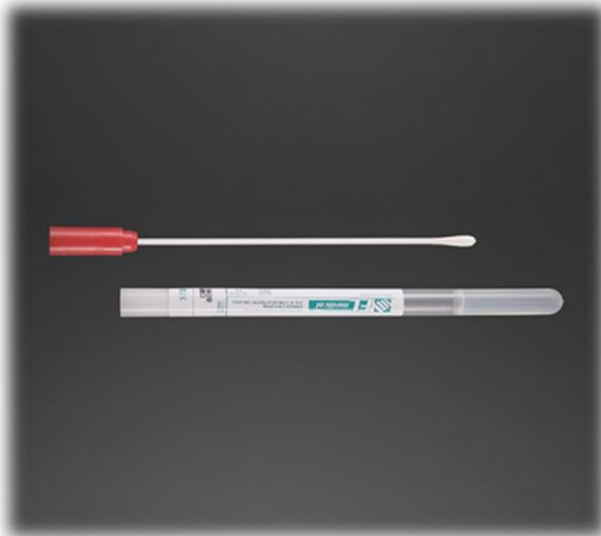


# ❖ Collection of Upper Respiratory Tract Specimens

## 1. Oropharyngeal (OP) and Nasopharyngeal (NP) swabs (Oro - Naso Pharynx)

- **a. Optimal timing:** Specimens should be collected within 3 days of symptom onset and no later than 7 days from all patients.
- **b. Swab types:** Use only sterile dacron or rayon swabs or flocced swabs. DO NOT use swabs with wooden sticks, as they may contain substances that inactivate some viruses and inhibit some molecular assays.

## ❖ 2- Swab types



Flocked swab

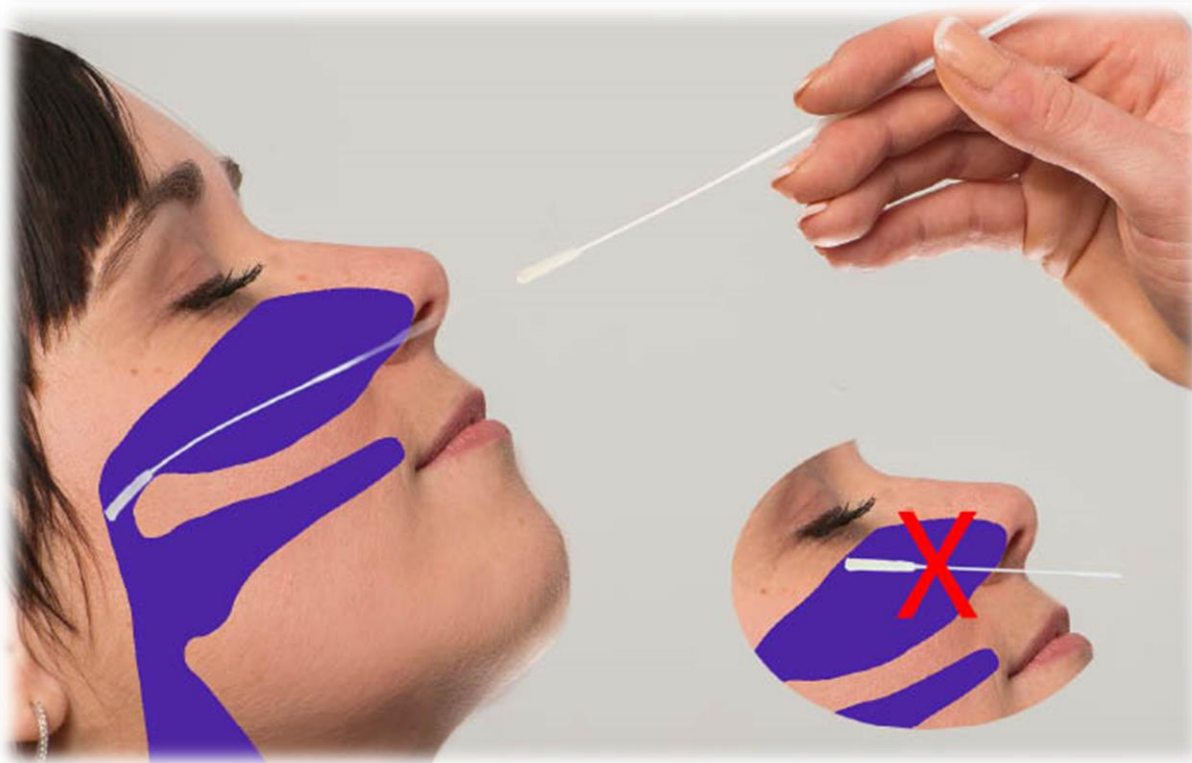
Rayon swab



## ❖ Collection of Upper Respiratory Tract Specimens

- **Collecting the OP swab:** Insert swab into the posterior pharynx and tonsillar areas. Rub swab over both tonsillar pillars and posterior oropharynx and avoid touching the tongue, teeth, and gums.
- **Collecting the NP swab:** Insert flexible wire shaft swab through the nares parallel to the palate (not upwards) until resistance is encountered or the distance is equivalent to that from the ear to the nostril of the patient indicating contact with the nasopharynx. Gently, rub and roll the swab. Leave the swab in place for several seconds to absorb secretions before removing.

## ❖ Collection of Upper Respiratory Tract Specimens



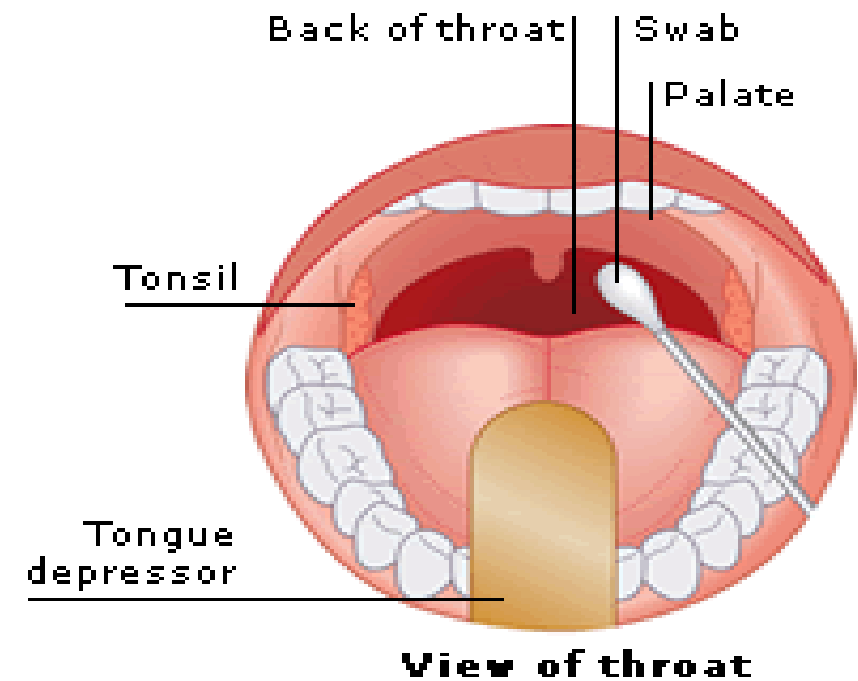
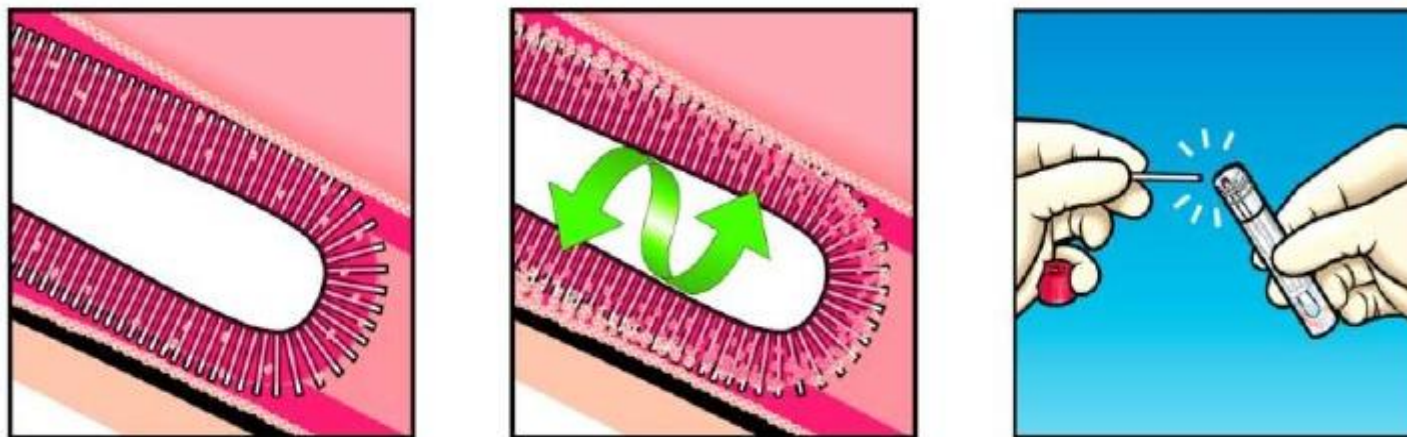
- **e. Specimen handling.**

- 1- Place NP and OP swabs immediately into a sterile vial containing 2 ml of viral transport media without antibiotics.
- 2- Both swabs can be placed in the same vial, if desired.
- 3- Aseptically, cut or break applicator sticks off near the tip to permit tightening of the cap.
- 4- Label the vial with the patient's name, ID number, specimen type, and date collected.

**Note:** If specimens will be examined within 48 hours after collection, keep specimen at 4°C and ship on wet ice or refrigerant gel-packs, otherwise store frozen at  $\leq -70^{\circ}\text{C}$  and ship on dry ice. Avoid freezing and thawing specimens. Viability of some pathogens from specimens that were frozen and then thawed is greatly diminished and may result in false-negative test results.

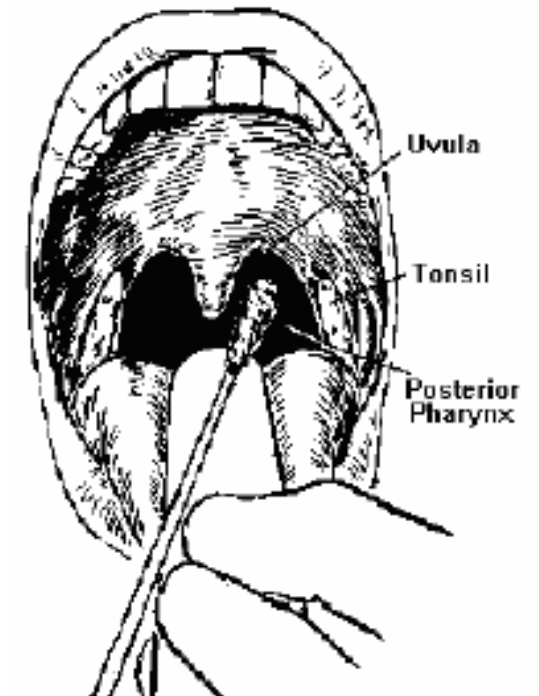


Copan Flocked Swabs for Nasopharyngeal Sample Collection



## • Method of collecting a throat swab

- 1. Hold the tongue down with the depressor. Use a strong light source to locate areas of inflammation in the posterior pharynx and the tonsillar region of the throat behind the uvula.
- 2. Rub the area back and forth with the swab. Withdraw the swab without touching cheeks, teeth or gums and insert into a screw-cap vial containing viral transport medium.
- 3. Break off the top part of the stick without touching the tube and tighten the screw cap firmly
- 4. Label the specimen containers with patient's name type of specimen and date of collection
- 5. Complete the laboratory request form.



- **Method of collecting Nasopharyngeal Swabs (per-nasal and post nasal swab)**
- **1.** Seat the patient comfortable, tilt the head back.
- **2.** Insert a flexible swab beneath the inferior turbinate of either nostril or leave in place for a few seconds and move the swab upwards into the nasopharyngeal space.
- **3.** Rotate the swab on the nasopharyngeal membrane a few times; slowly withdraw with a rotating motion against the mucosal surface of the nostril.

- **Method of collecting Nasopharyngeal Swabs (per-nasal and post nasal swab)**
- **4.** Remove the swab carefully and insert it into a screw-cap tube containing transport medium.
- **5.** Repeat the procedure in the other nostril using a new sterile swab.
- The tip of each swab is put into a vial containing 2-3 ml of viral transport media (VTM), and the applicator stick is broken off.
- **6.** Label vial with patient's name, specimen type & date of collection; complete lab request form.

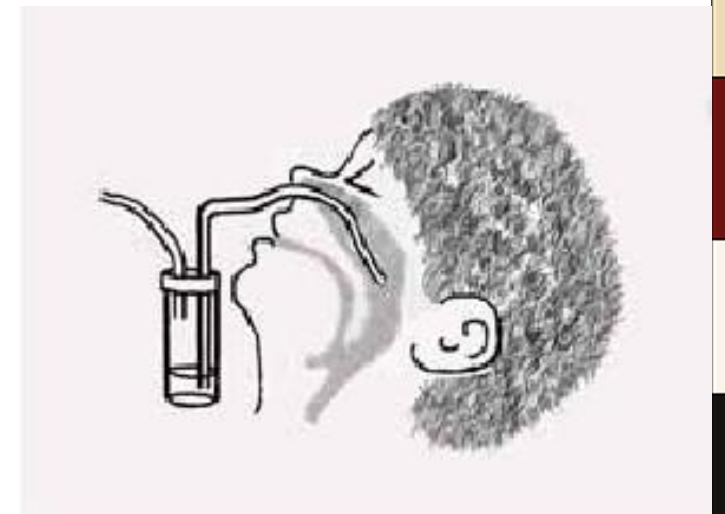
- **Aspirates**

- **1.** Nasopharyngeal secretions are aspirated through catheter connected to a mucus trap and fitted to a vacuum source.
- **2.** The nasal aspirates are collected by introducing a few ml of saline into the nose with a syringe fitted with affine tubing or catheter.
- **3.** The catheter is inserted into a nostril parallel to the palate. Then the vacuum is applied and the catheter is slowly withdrawn with a rotation motion.



- **Aspirates**

- 4. Mucus from the other nostril is collected with the same catheter in a similar manner.
- 5. After mucus has been collected from both nostrils, the catheter is flushed into a screw cap vial with 3 ml viral transport media
- 6. Label the vial with patient's name type of specimen and date of collection.
- 7. Complete the laboratory request form.



## ❖ Collection of Lower Respiratory Tract Specimens

**1. Sputum, tracheal aspirate, bronchoalveolar lavage (BAL) fluid, pleural fluid.** Due to the increased technical skill and equipment needs, collection of specimens other than sputum from the lower respiratory tract may be limited to patients presenting with more severe disease, including persons admitted to the hospital and/or fatal cases.

**a. Optimal timing:** These specimens may be obtained at any time during the clinical course, but ideally prior to initiation of antimicrobial therapy.

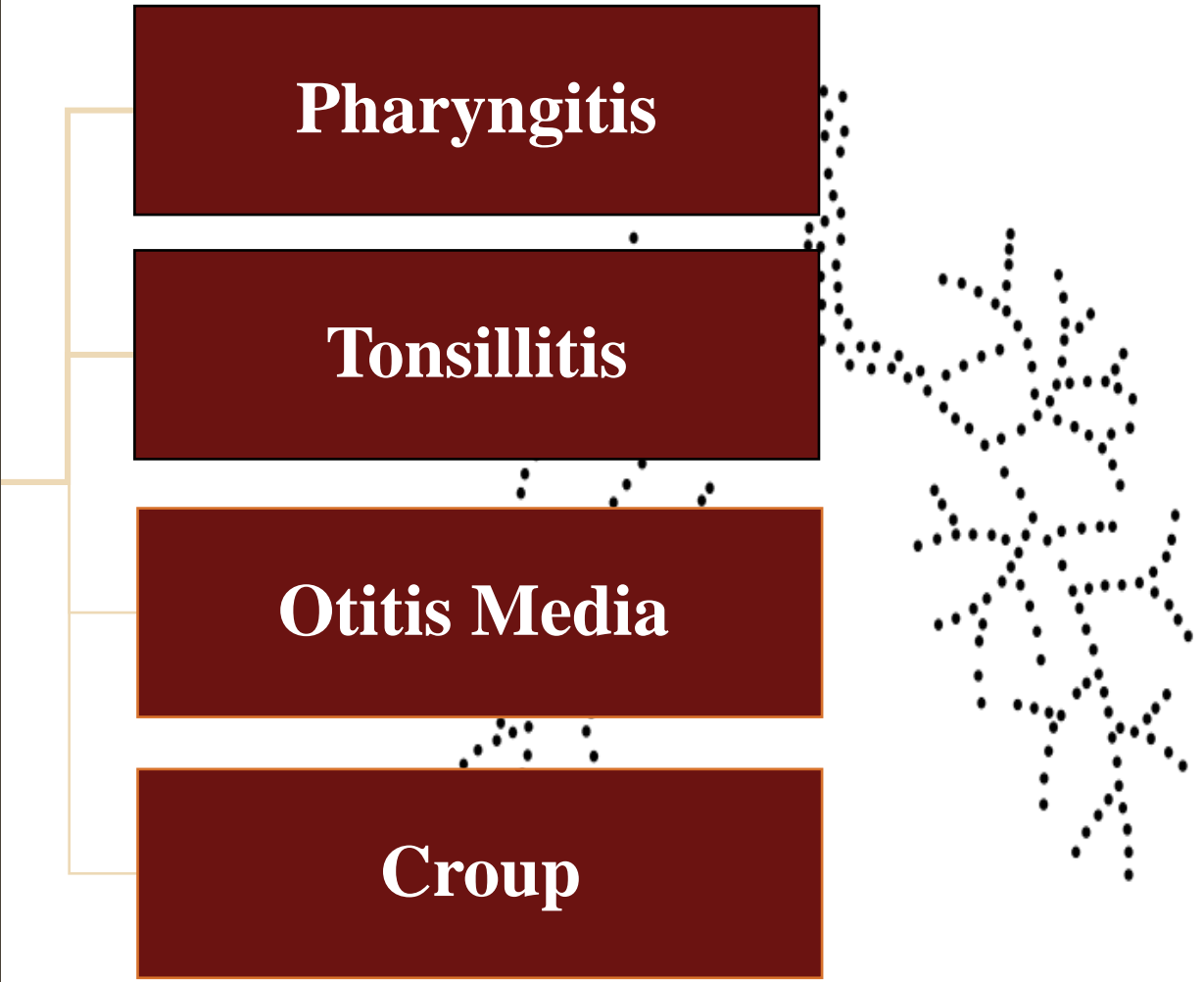
**b. Specimen types:** Acceptable lower respiratory tract specimens include sputum, tracheal aspirate, BAL fluid, pleural fluid, or lung biopsy. Specimens with less chance for upper airway contamination (i.e., BAL fluid, pleural fluid, lung biopsy) are preferred.

## c. Specimen collection.

- **i. BAL fluid, tracheal aspirate, pleural fluid** Collect specimens in sterile containers. Centrifuge half of the specimen, and fix the cell pellet in formalin. Place the remaining uncentrifuged fluid into sterile vials with external caps and secure with Parafilm. Label each specimen container with the patient's name, ID number, the specimen type, and the date the specimen was collected.
- **ii. Sputum**
  - Educate the patient about the difference between sputum and oral secretions.
  - Have the patient rinse the mouth with water and then expectorate deep cough sputum directly into a collection cup.



# Upper Respiratory Infections



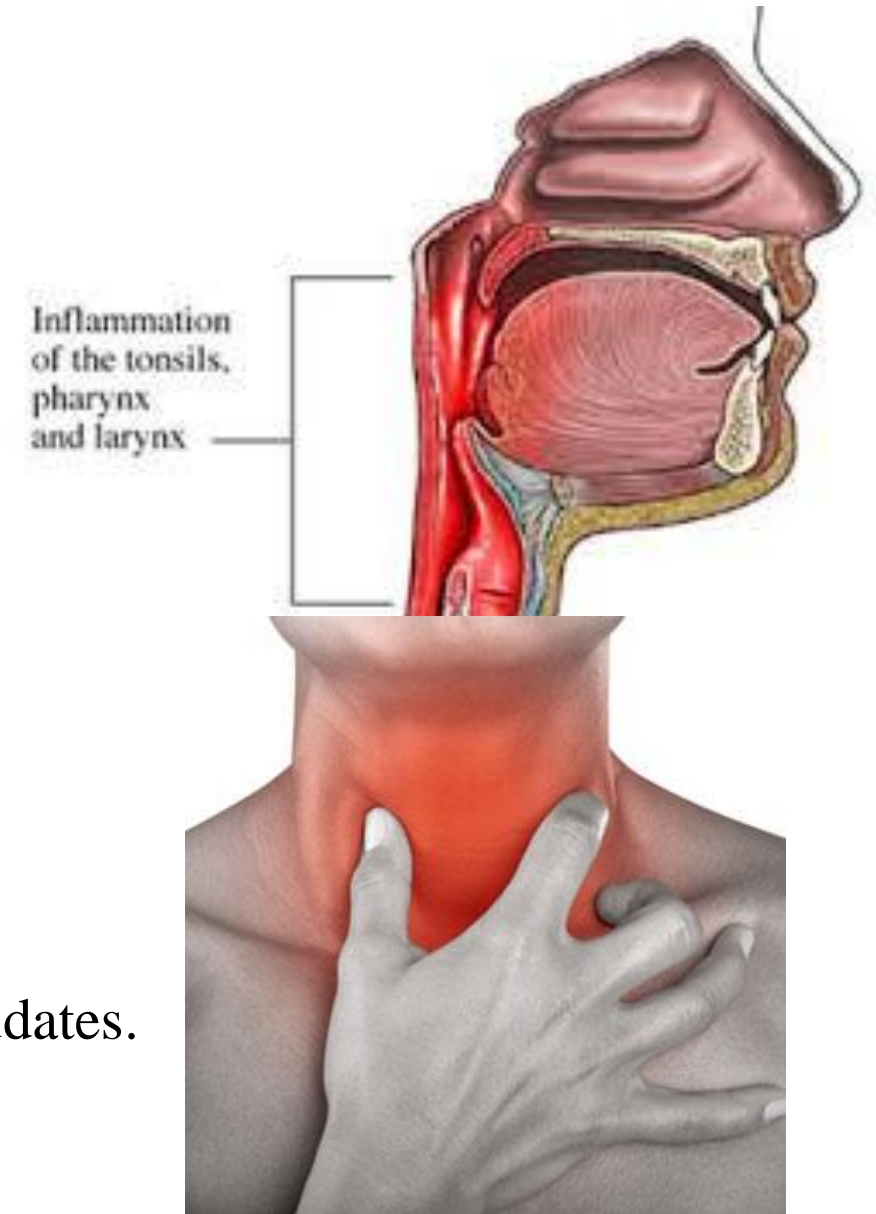
# 1. Pharyngitis

## • Definition

Hemolytic streptococci infection of the upper air way (throat).

## • Clinical manifestations

- Headache, Fever, Abdominal pain, Anorexia.
- The tonsils and pharynx may be inflamed and covered with exudates.
- Swallowing difficult.



- **Therapeutic Management**

- Antibiotics (penicillin, oral erythromycin ....etc).
- Painkiller.



The reddened appearance of a throat with pharyngitis

## 2. Tonsillitis

### • Definition

Tonsils are masses of lymphoid tissue located in the pharyngeal cavity.

### • Etiology

1. Tonsillitis often occurs with Pharyngitis.
2. Viral or bacterial



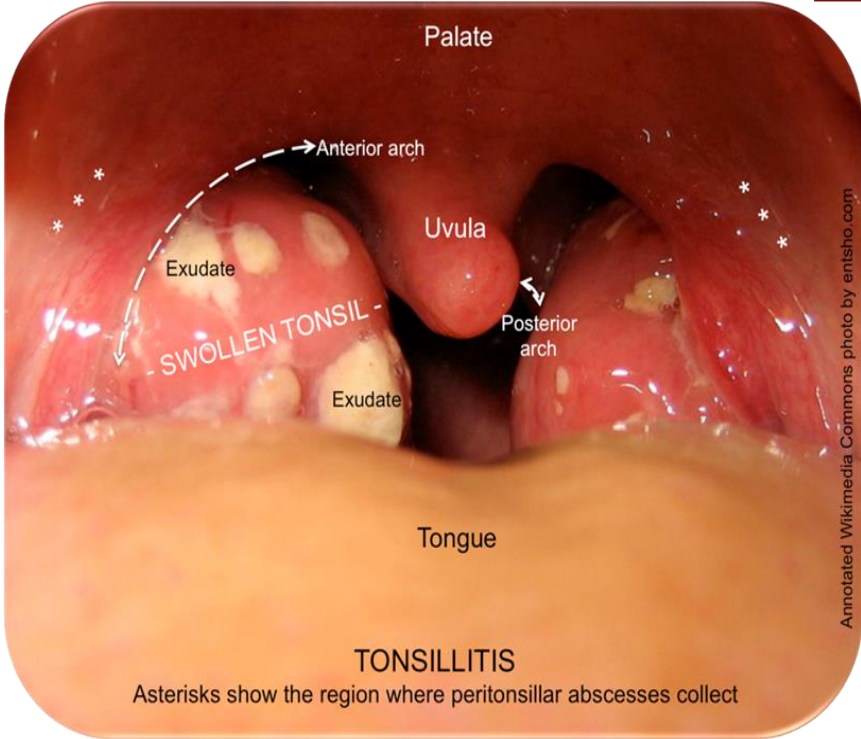
# Tonsillitis

**Clinical manifestations**

Difficulty swallowing and breathing.  
The child breathes through the mouth.

**Therapeutic management**

Tonsillectomy



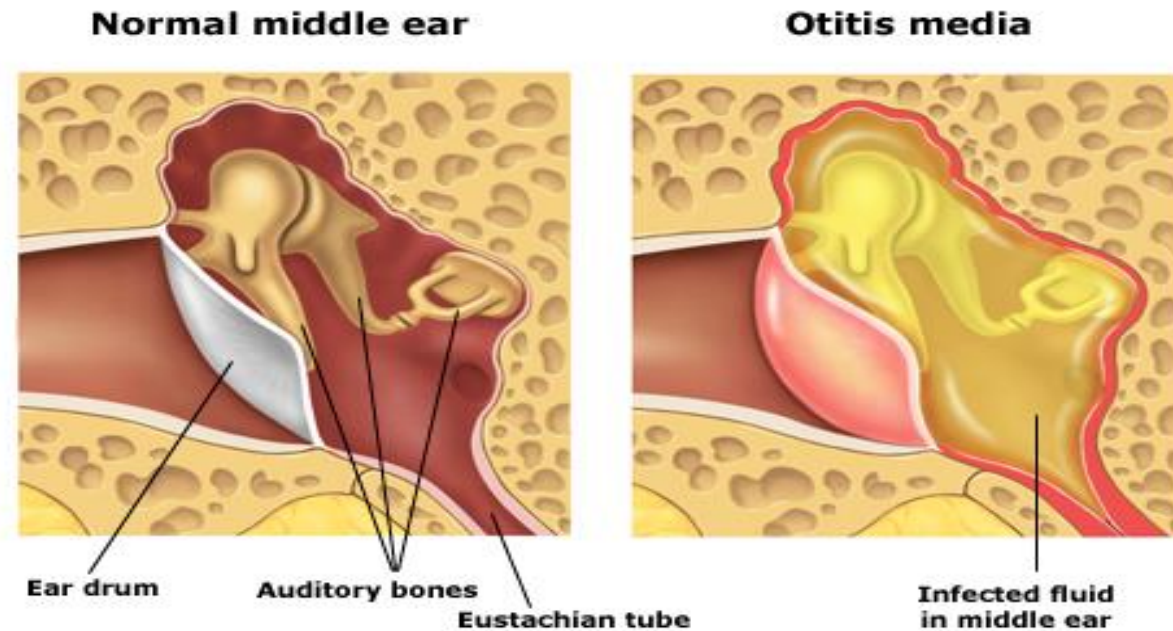


## 3. Otitis Media

- **Definition**

An inflammation of the middle ear without reference to etiology.

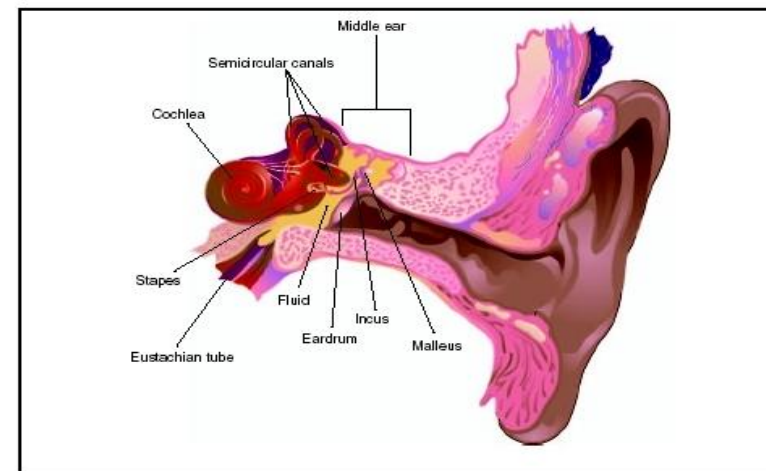
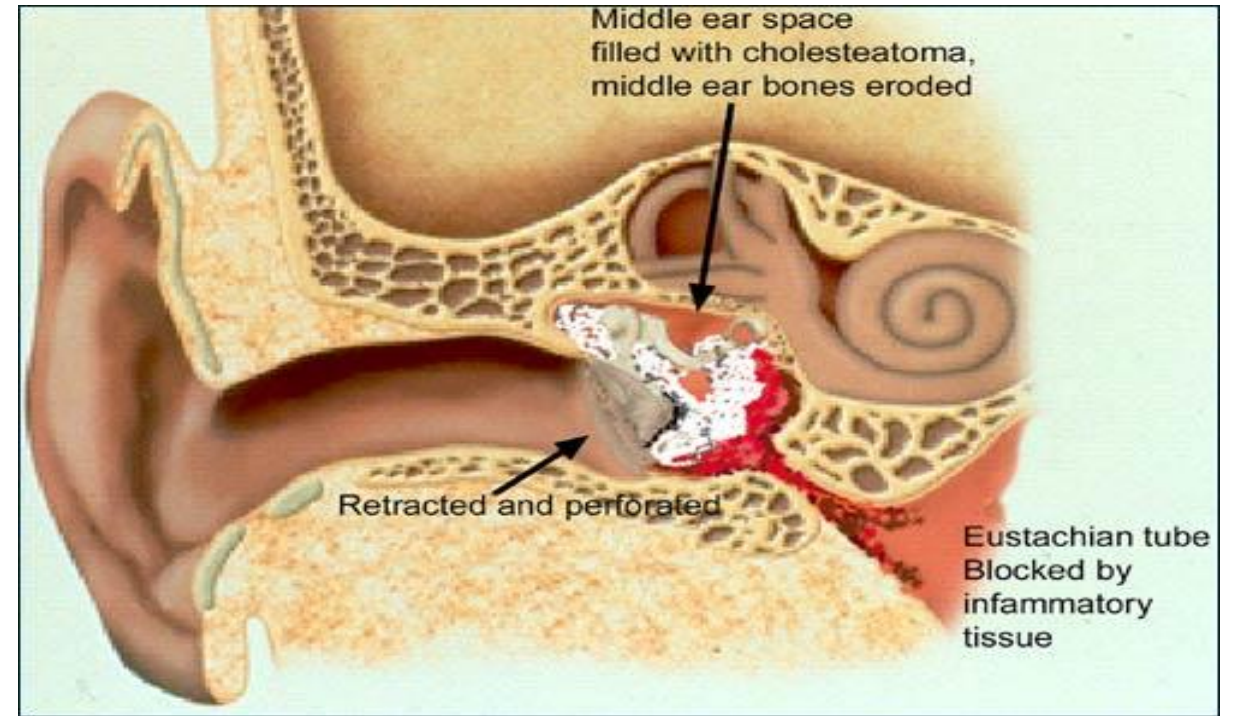
- **Etiology:** Bacteria



## 3. Otitis Media

### • Clinical manifestation

1. Fever.
2. Acute ear pain.
3. Pulling or rubbing in the ear.
4. yellow or red puffed of the tympanic membrane.
5. Rhinitis, cough , diarrhea.
6. Exudate discharge.



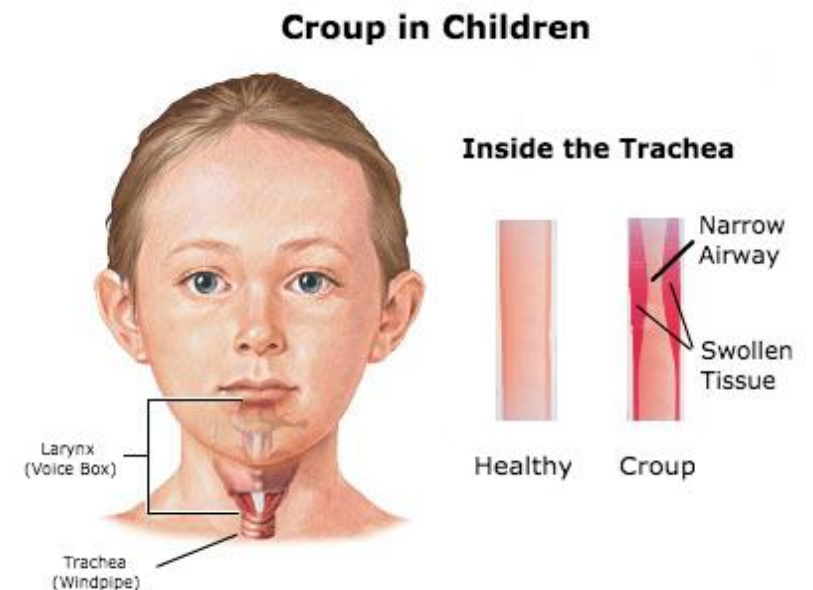
## 4. Croup (acute spasmodic laryngitis).

### • Definition

A severe inflammation and obstruction of the upper airway (larynx).

### • Etiology

1. Viral (RSV; Respiratory syncytial virus, Influenza virus).
2. Bacteria (*pertussis*, *diphtheria*, *mycoplasma*).

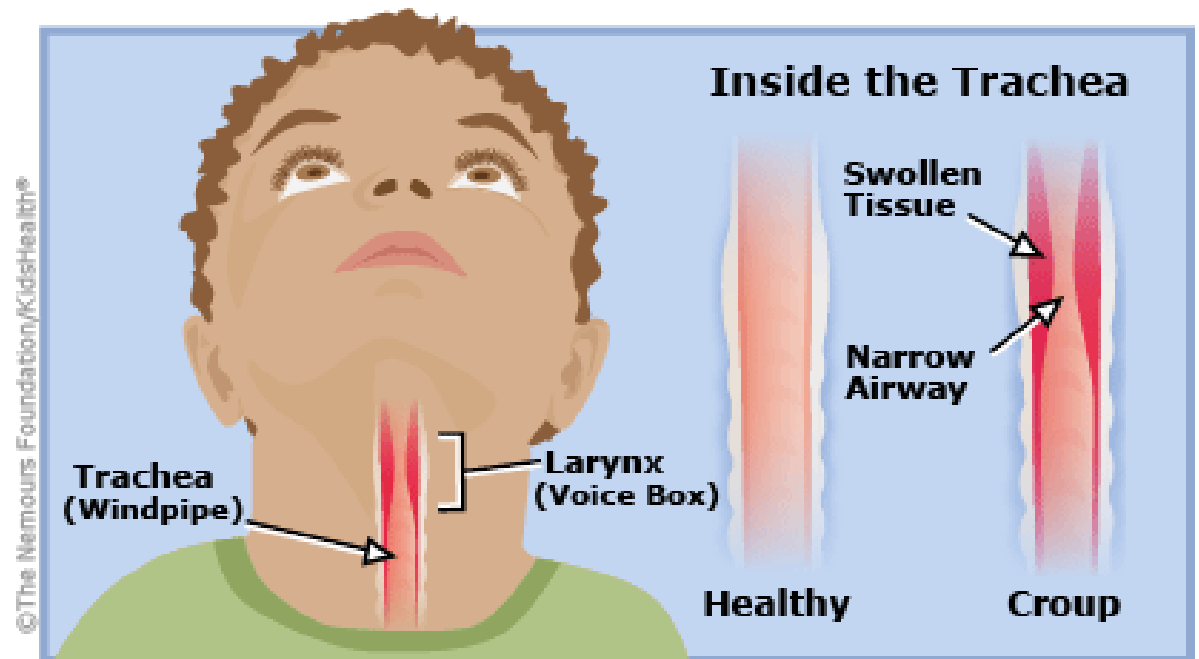
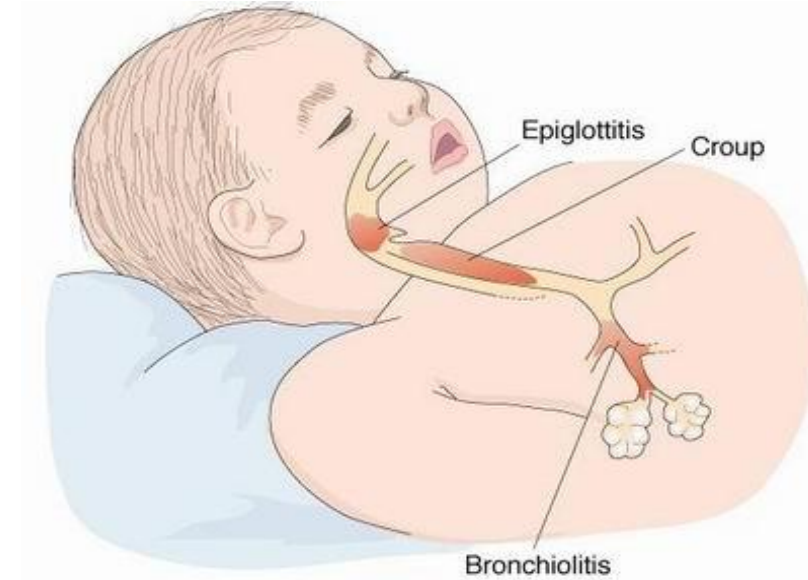


## • Clinical manifestation/Complications

1. Respiratory insufficiency
2. Barking cough or hoarseness.
3. Worse at night and can last 5 to 6 days.
4. Decrease breath sounds.
5. Dyspnea
6. Fever

## • Diagnostic test

1. Throat cultures
2. Laryngoscopy
3. Neck Xray



# Any Questions

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