



# Certified Pediatric Nurse Review Course: Respiratory/ENT Disorders

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**NEMOURS**  
CHILDREN'S HEALTH

# Introduction

Respiratory and ENT conditions are the most common causes for illness in the pediatric population and require prompt intervention.

The CPN exam has historically focused on respiratory assessment and intervention as a top priority for review.

# Objectives

- Describe assessment of respiratory distress in pediatric patients of all ages
- Prioritize management priorities in children with common respiratory conditions.
- Describe treatment in common respiratory/ENT conditions in pediatric patients.
- Describe common conditions or complications in the pediatric respiratory system

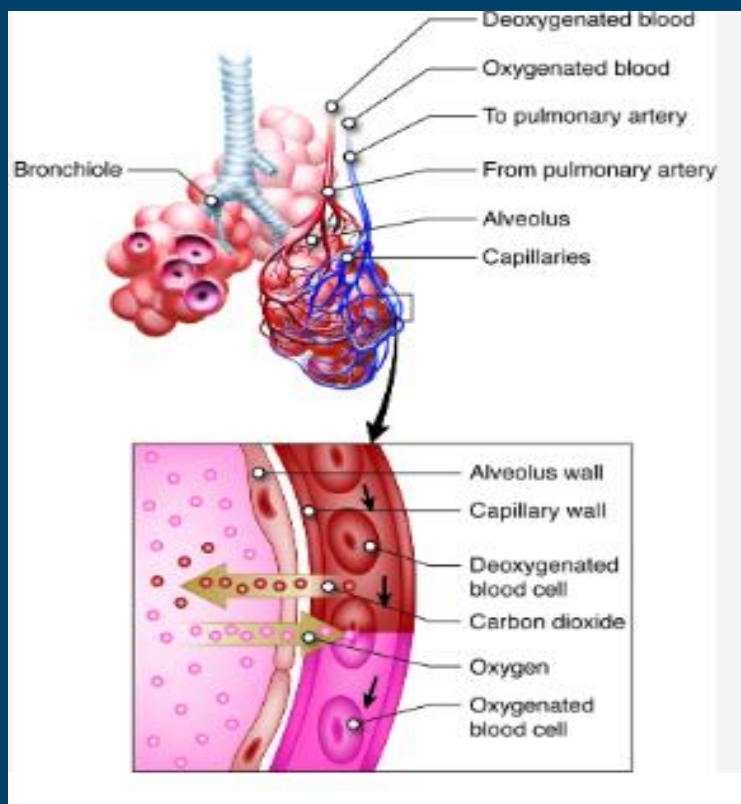


# Lung Physiology

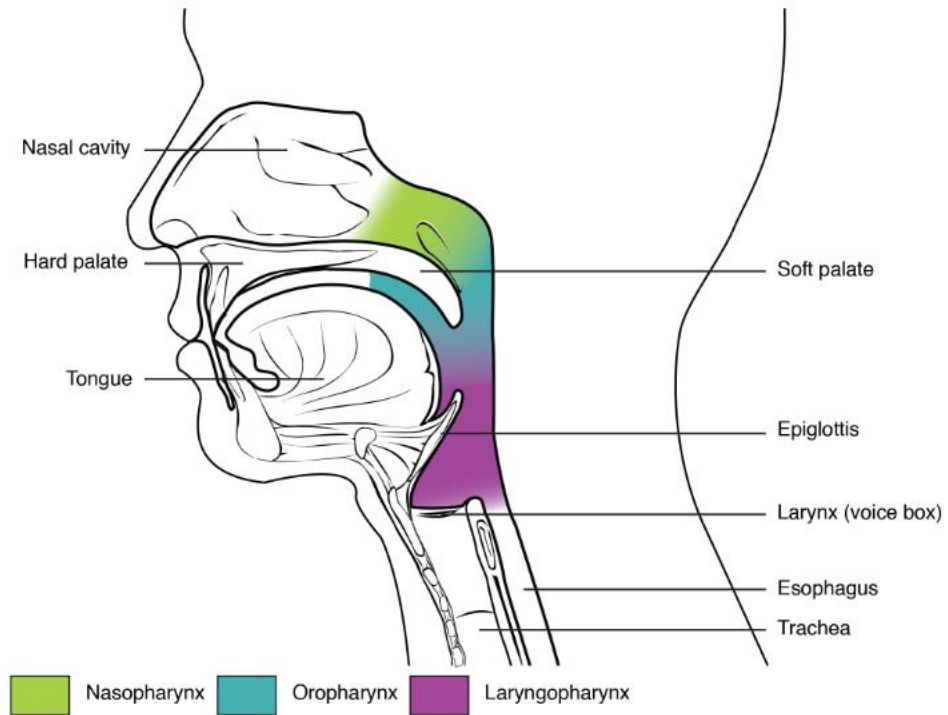


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# Air Exchange

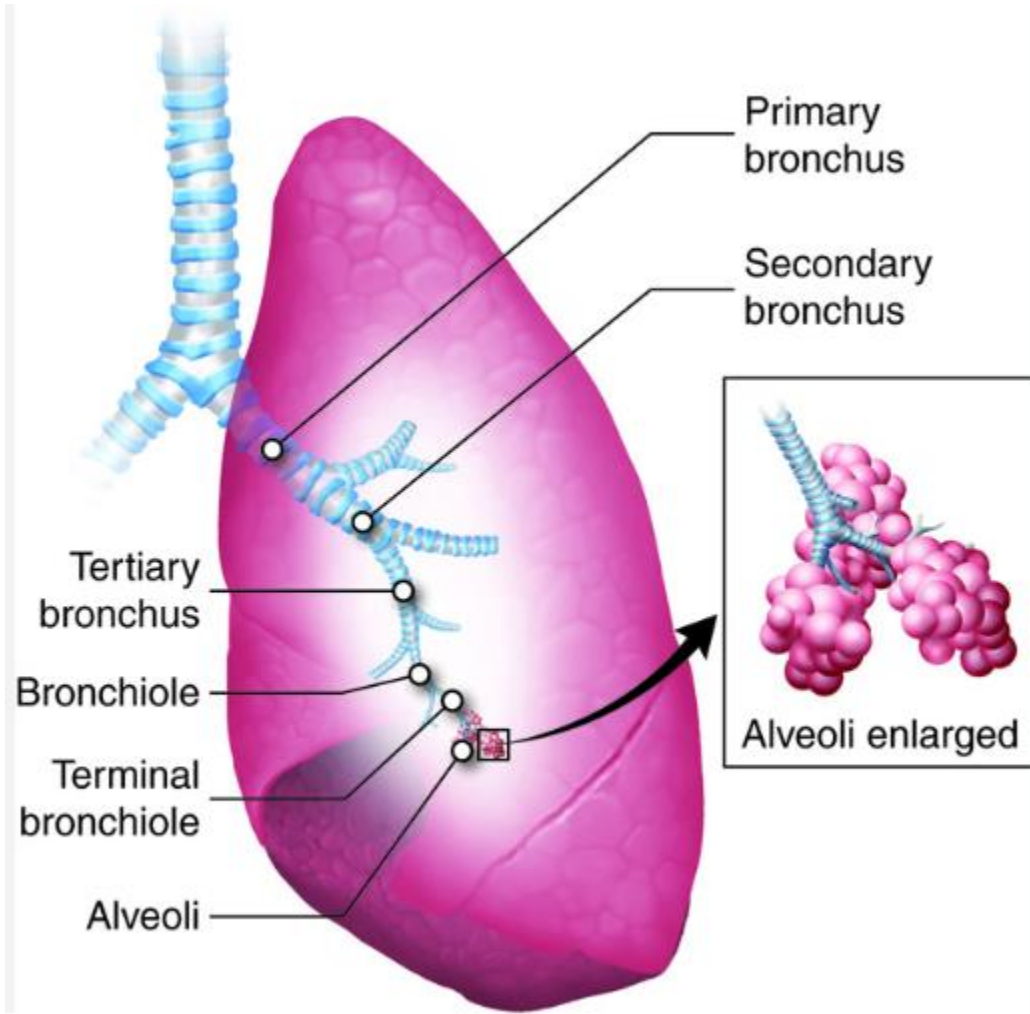


- Ventilation occurs when atmospheric gases cross into the lungs with inspiration
- These gases are absorbed via diffusion across the alveolar capillary membranes
- Gases are then expelled during expiration
- Perfusion occurs when oxygenated blood moves via vascular exchange in the tissues



# Upper Airway

- Nose
- Sinuses
- Pharynx
- Larynx
- Trachea
- Epiglottis



# Lower Airway

- Bronchi
- Bronchioles
- Lungs

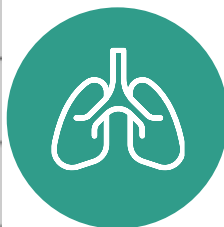


# Normal Respiratory Assessment

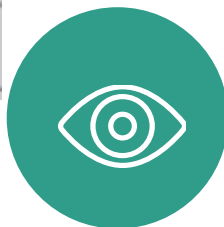
| Age Group                  | Heart Rate | Respirations | Systolic BP |
|----------------------------|------------|--------------|-------------|
| Preterm                    | 120 - 180  | 50 - 70      | 40 - 60     |
| Newborn (0 to 1 Month)     | 100 - 160  | 35 - 55      | 50 - 70     |
| Infant (1 to 12 Months)    | 80 - 140   | 30 - 40      | 70 - 100    |
| Toddler (1 to 3 Years)     | 80 - 130   | 20 - 30      | 70 - 110    |
| Preschool (3 to 6 Years)   | 80 - 110   | 20 - 30      | 80 - 110    |
| School Age (6 to 12 Years) | 70 - 100   | 18 - 24      | 80 - 120    |
| Adolescents (12+ Years)    | 60 - 90    | 14 - 22      | 100 - 120   |



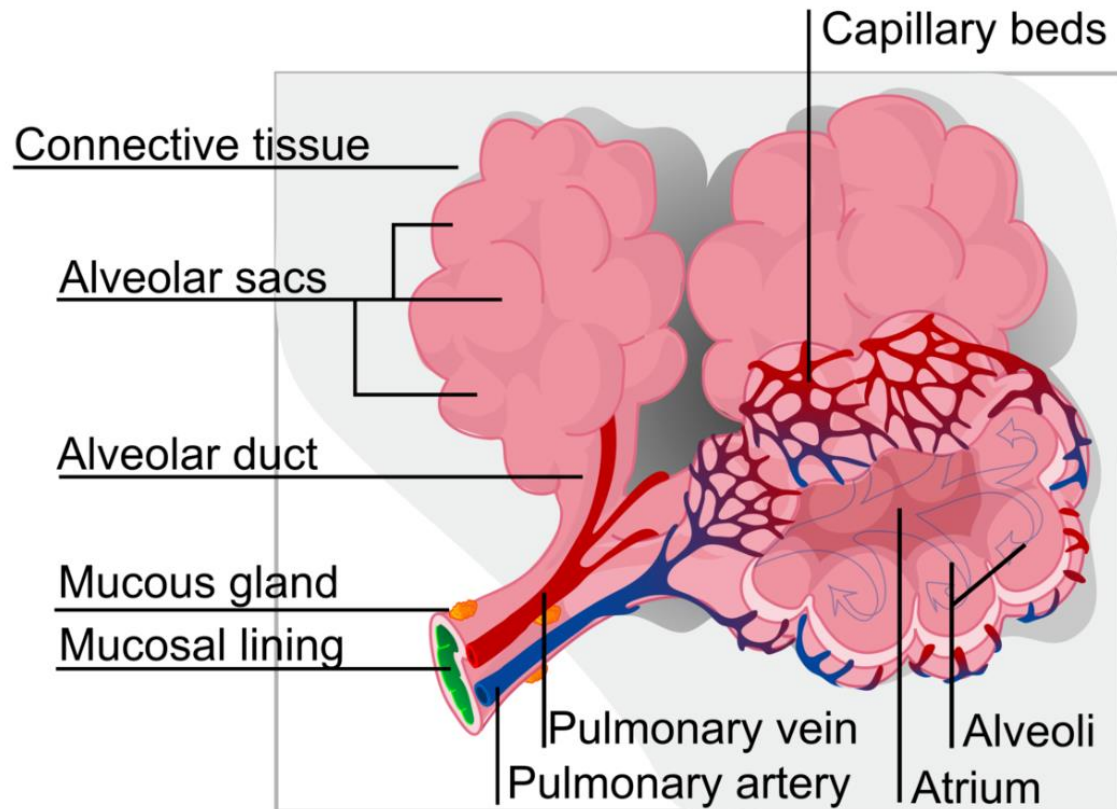
**Auscultation**



**Percussion**



**Inspection**



# Airway- Infant

Surfactant, a complex phospholipid, begins to develop around 24 weeks gestation

Acts to reduce surface tension

Prevent alveolar collapse

Improve Lung Compliance

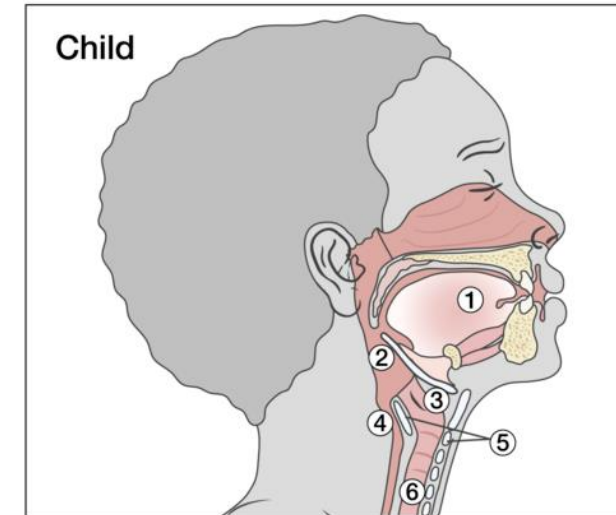
Provide Immune response

Lungs are immature at birth and continue to develop alveoli continue to develop through puberty

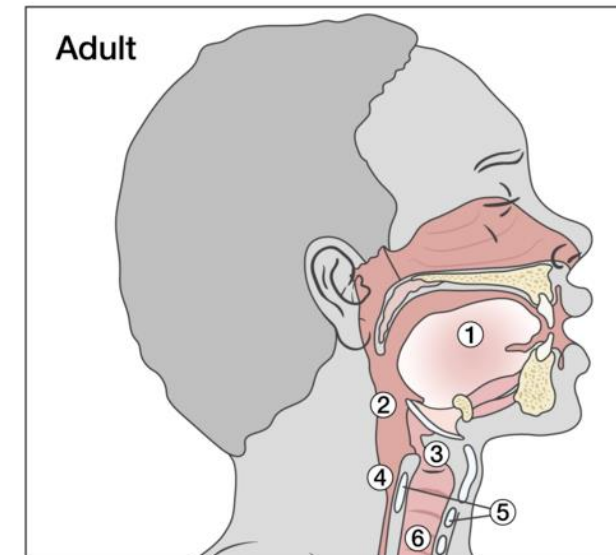
Until ~ 6 weeks of age infants are obligatory nose breathers

# Anatomical Differences

- Respiratory anatomy differs in infants and children significantly impacting treatment and urgency of intervention based on age
- Up to age 5 a child respiratory lumen is narrower than an adult's



- ① **Tongue:**  
Child's is larger relative to size of mouth
- ② **Epiglottis:**  
Floppier, U-shaped in child; shorter in adult
- ③ **Vocal cords:**  
Upward slant in child, horizontal in adult



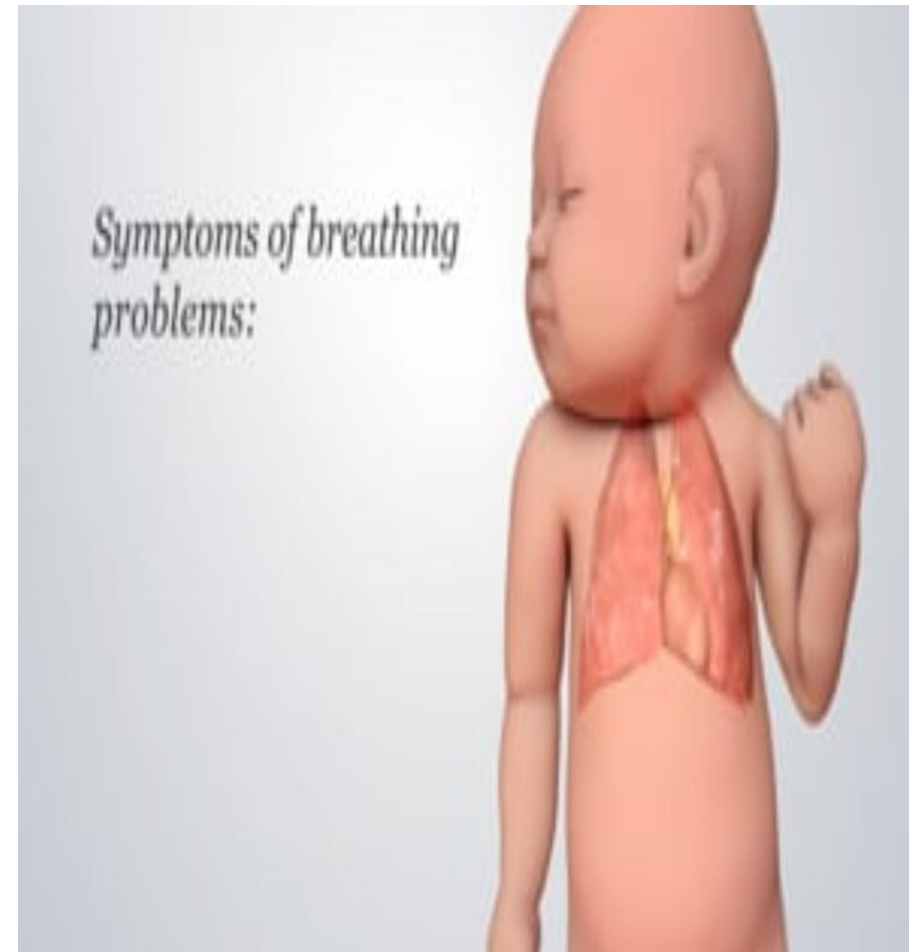
- ④ **Larynx:**  
Child's is more anterior and superior
- ⑤ **Cricoid:**  
Narrowest part of child's airway
- ⑥ **Trachea:**  
Narrow and less rigid in child



## Physiology and Assessment

# Respiratory Assessment in an Infant

- Assess gestational age at birth
- Assess environmental factors such as exposure to smoke, mold or air contamination
- Assess onset of any symptoms of illness, including symptoms seen
- Assess home treatments
- Assess rate and regularity
- **Note that infants are obligatory nose breathers, so nasal congestion is not well tolerated**



# Respiratory Assessment- Child

- Assess gestational age at birth
- Assess environmental factors such as exposure to smoke, mold or air contamination
- Assess onset of any symptoms of illness, including symptoms seen
- Assess home treatments
- Assess rate and regularity
- Assess Sounds
  - Audible
  - Auscultation
  - Percussion

# Respiratory Assessment, Continued

- Cyanosis
- Irritability
- Vital signs
- Percussion
- Auscultation



# Diagnostic Tools/ Treatment Modalities

- Pulse Oxygenation
- Chest radiography
- CT Scan
- Blood gases ( venous and arterial)
- Nasal pharyngeal swab
- Pulmonary function tests
- Laboratory testing
- Oxygen delivery modalities
  - Low Flow cannula
  - Face Masks
  - High Flow
  - BiPap
  - Endotracheal Intubation
- Nebulizers
- Aerolized medications



## Common Respiratory Abnormalities

# Respiratory Distress

- Factors outside Respiratory Assessment
  - Anxiety
  - Irritability
  - Observe position of the patient
  - Activity
  - Energy Level
  - Level of consciousness
- Respiratory System
  - Quantity
  - Quality
- Cardiovascular
  - Clubbing
  - Hypoxia

# Treatment of Respiratory Distress

- Supportive
  - Oxygen
  - Chest physiotherapy
  - Suctioning
  - Incentive Spirometry
- Monitoring
  - NPO status



# Common Cold vs Allergies

## Cold

- May have low grade fever
- Sporadic sneezing
- Upper Airway only
- Rhinorrhea
- Achiness
- Eosinophil NOT present in nasal swab

## Allergies

- Usually, no fever associated
- Upper Airway only
- Rhinorrhea
- Dark circles under the eyes
- Sneezing may be patterned or continuous
- Triggered by event/environmental factor
- Itchiness in throat, nasal passages
- Eosinophil present in nasal swab

# Croup- Viral Infection of the Upper Airway

## Symptoms

- Edema from the viral infection causes inflammation of the larynx
- Characterized by a “barking” cough
- Inspiratory stridor may be present with activity and at rest
- Symptoms may wax and wane

## Treatment

- Fluids
- Humidified air
- Steroids
- Racemic Epinephrine

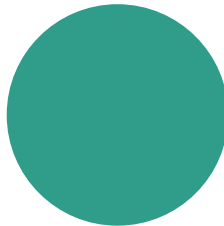
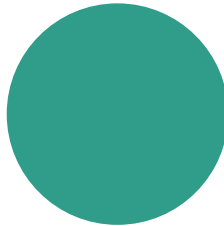
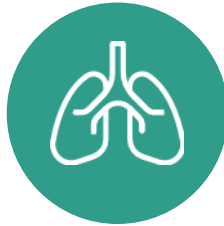
# Bronchiolitis

Lower Airway Infection of bronchioles

Characterized by: thick secretions, predominant in children under the age of 2

Treatment- supportive- suctioning as needed; IV fluids for tachypneic patients; respiratory support based on severity

Air trapping can occur causing atelectasis appears as hyperinflation on chest radiography



- Most common cause is the respiratory syncytial virus (RSV)
- New immunization for RSV
  - Recommended for infants younger than 8 months of age
  - Born during or entering their first RSV season
  - Whose mothers did not receive the maternal RSV vaccine during pregnancy

# Asthma

## Reactive Airway Disease

- Chronic, Reversible
  - Varies from intermittent, to severe persistent
- Precipitated by reaction to stimulus ( allergen, viral)
- Characterized by
  - Bronchoconstriction
  - Inflammation ( swelling)
  - Increased mucous production



# Assessing a Child with Asthma

- Degree of Distress
  - Dyspnea
  - Use of accessory muscles
  - Lung sounds
  - Oxygenation
- Cough
- Shape of chest
- Illness/ Exposure to Trigger
- Exercise tolerance

## Treatment

- Metered Dose Inhaler (MDI)/Spacer
- Nebulizer
- Moist air
- Steroids\*
- Leukotriene receptor antagonist (Montelukast, Flovent)

# ENT Specific Diseases

## Tonsilitis

- Commonly caused by viral infection
- Common in children with enlarged tonsils, history of bacterial infection concurrent with ear infection

## Epiglottitis

- Potentially Life Threatening
- Bacterial infection often associated with pneumonia and meningitis
- Stridor
- Hib vaccine decreased incidence

## Sinusitis

- Inflammation in the paranasal cavities
- Purulent nasal drainage
- Chronic and recurrent

# Ear Infection

## Otitis Externa

- inflammation outer ear/ear canal
- “Swimmers Ear”

### Treatment-

- Ear drops
- Pain Control
- Preventive Care ( ear plugs and/or 50:50 solution acetic acid to maintain pH)

## Otitis Media

- Inflammation of the inner ear with and without effusions
- Causes Step Pneumonia, Hemophilus influenza, Moraxella Catarrhalis
- Most common with reoccurrence with craniofacial anomalies

# Common non-viral airway concerns

## Foreign Body Aspiration

- Common in toddler and infant
- May be common in child with autism or Pica
- Assess for level of respiratory distress
- Heimlich maneuver
- Maintain airway reduce inflammation
- Removal of the antigen

## Carbon Monoxide Poisoning

- Colorless, odorless, tasteless nonirritating gas
- Occur with fires/furnace or heater malfunction, propane/wood/gas heating sources; homelessness living in a car
- Mild symptoms are headache, nausea, fatigue, flu like symptoms
- Symptoms progress to confusion, seizures, LOC, tachycardia



# Complex Respiratory Illnesses



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# Cystic Fibrosis (CF)

- Inherited autosomal recessive disease affecting exocrine glands
  - Faulty gene of Chromosome 7 resulting in the malfunction of the CF transmembrane regulator protein
  - Most common genetic disease in the US
- Lifespan late 40's
- Often accompanied by minimal pancreatic enzyme production also
- Exocrine organs are obstructed by constant and increased levels of mucous production
- Sweat contains 2-5 times more sodium and chloride levels
- Lung cilia move slower causing secretion accumulation, obstruction and air trapping
- Males are most often infertile
- Females have reduced ability to become pregnant due to level of mucous production

# Assessment and Treatment CF

- GI assessment
  - Prone to malabsorption
  - Undigested food within stool
- Respiratory
  - Distress
  - Quality of chronic cough
  - Mucous Quality compared to baseline
- Electrolyte abnormalities
- Clearing of mucous with chest physiotherapy and use of bronchodilators and careful pulmonary hygiene
- Fluid and hydration
- Administer pancreatic enzymes with meals
- Protein rich higher caloric meals
- Prompt treatment of any respiratory illness

# Respiratory Distress Syndrome

- Seen in the premature infant most often due to underdevelopment and under inflation of alveoli with premature birth
  - May occur in any pediatric patient with an anatomical abnormality affecting lung function
  - Fluid and fibrin often “leak” into the pulmonary capillary system causing hyaline membranes to form in the bronchioles blocking them from functioning as intended
- Early intervention is essential
  - Prior to birth treat mother with corticosteroid if possible to increase production of surfactant or administer surfactant within first 24 hours of life
  - CPAP or other support to assure alveoli are maintained open
  - Reduce stress on infant ( temperature, dehydration, etc.)

# Bronchopulmonary Dysplasia

- Complication from respiratory issues that require long term ventilatory support
- Ciliary activity in the lungs is inhibited or limited leading to difficulty clearing mucus from the lungs
- Interventions may include
  - Ventilatory support long term
  - Tracheostomy
  - Oxygen support
  - Chest physiotherapy

# Tracheostomy Dependence

- Some complex respiratory diseases, such as RDS and BPD, require an infant or child to have a tracheostomy.
- Trach tubes are inserted into the stoma and serve as an artificial airway so the child can breathe
- Patients with trach tubes may utilize mechanical ventilation (a ventilator), and some breathe on their own through the trach tube.



# Knowledge Check Questions



# Question One

A 3 year old child arrives in the ED with respiratory distress , sitting upright, leaning forward resting on hands, using abdominal and chest wall muscles. Does not react to health care personnel attending the child. Which is the priority nursing intervention you would perform?

- a. Provide oxygen support with humidity
- b. Provide a respiratory treatment such as MDI or nebulizer
- c. Assess lung sounds and vital signs
- d. Notify healthcare clinician and prepare to support airway ( have intubation equipment readily available)

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## Question Two

When reviewing routine vaccines which vaccine is most likely to impact potential respiratory illness?

- A. MMR
- B. HiB
- C. Tdap
- D. HPV

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# Question Three

When caring for a patient with Cystic Fibrosis (CF) what priority is important to keep in mind when planning interventions?

- A. Lifespan ~ 40 years
- B. CF obstructs the endocrine system glands
- C. Electrolyte levels may be altered
- D. Mucous may obstruct airway

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# Question Four

When assessing a patient for a respiratory illness what factors should be included in part of the assessment?

- A. Familial history of respiratory illness
- B. Environmental factors
- C. Length of illness
- D. Treatments provided at home
- E. B,C, D
- F. A,B,
- G. A,B, C and D

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## Question Five

When educating a parent about asthma treatment which response leads you to provide additional education about asthma to the parent.

- A. “We need to be aware of the triggers in our home”
- B. “ We only give the medications ordered when they have an attack, there is no daily medication”
- C. “ We should use the bronchodilator inhaler when an attack is occurring not the steroid inhaler”
- D. “ When my child is sick, I should be observant for any signs of an asthma attack”

# Answer Five

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