The Child With Respiratory Dysfunction

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Asthma

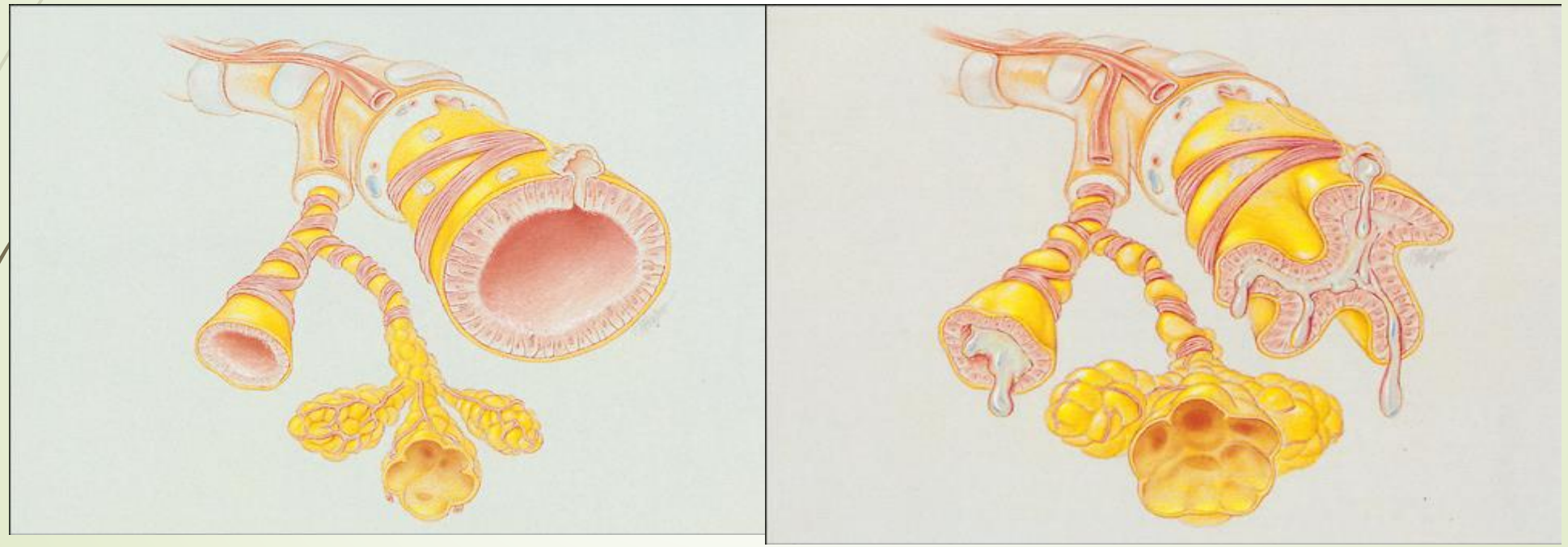
Definition

- Asthma is a chronic inflammatory disorder of the airways characterized by recurring symptoms, airway obstruction, and bronchial hyperresponsiveness.

- It is the most common cause of school absences and form a major portion of admission to emergency room and hospitals

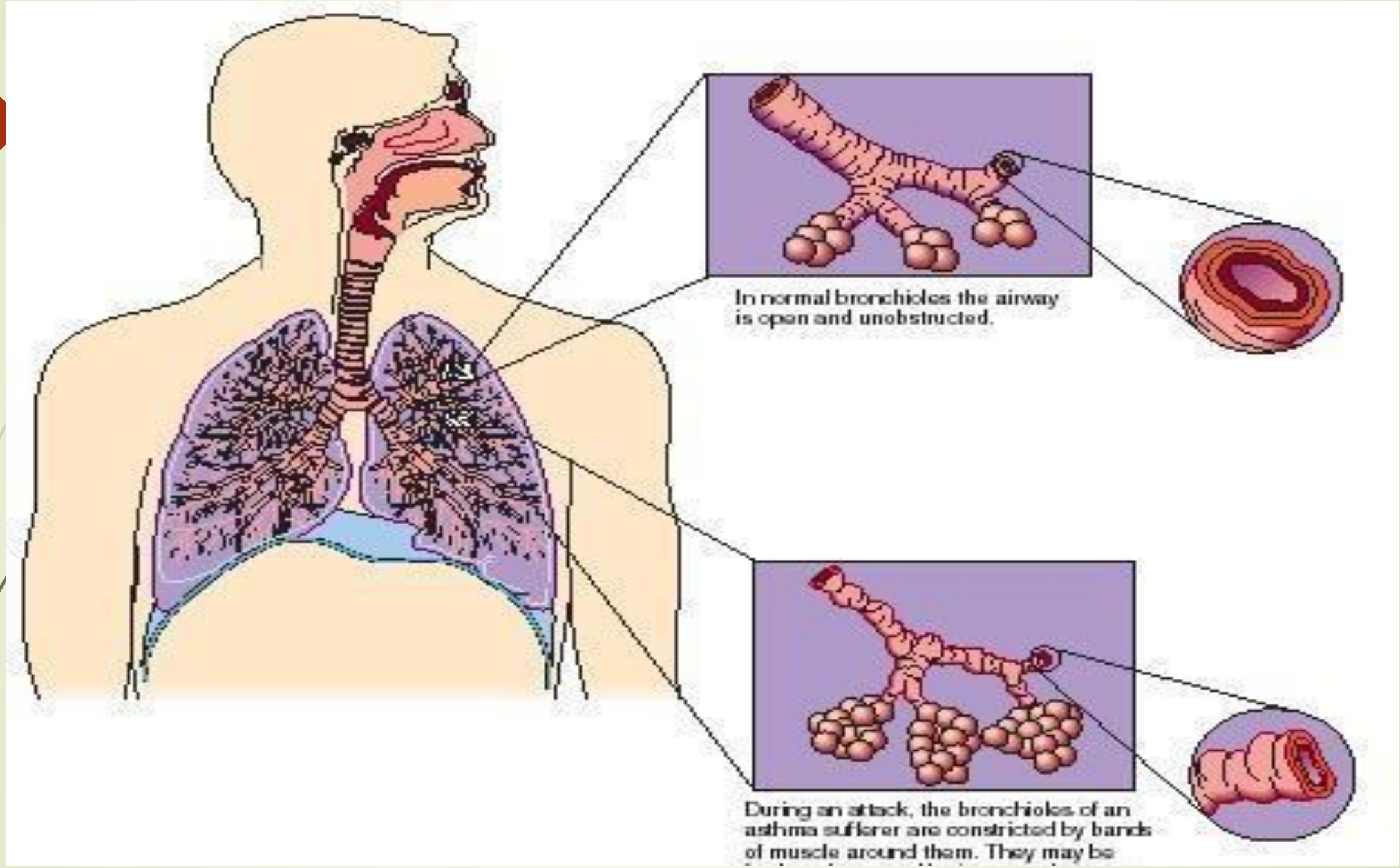
A, The normal lung. B, Bronchial asthma

B = thick mucus, mucosal edema, and smooth muscle spasm causing obstruction of small airways; breathing becomes labored and expiration is difficult.



A

B


In normal bronchioles the airway is open and unobstructed.
During an attack, the bronchioles of an asthma sufferer are constricted by bands of muscle around them. They may be

Etiology

1. Hypersensitivity to foreign substances, plant pollens
2. Non allergic precipitating factor:
   i. Bronchial compression from external pressure
   ii. Foreign body in the air way
   iii. Diffuse endobronchial inflammation
   iv. Post exercise bronchial constriction
3. Family history of allergy suggest genetic basis

Triggers Tending to Aggravate Asthmatic Exacerbations

- Allergens:
- Outdoor—Trees, shrubs, weeds, grasses, molds, pollens, air pollution
- Indoor—Dust or dust mites, mold
- Irritants—Tobacco smoke, wood smoke, odors, sprays
- Exposure to occupational chemicals
- Exercise Cold air Colds and infections
- Changes in weather or temperature
- Environmental change—Moving to new home, starting new school
- Animals—Cats, dogs, rodents, horses
- Medications—Aspirin, nonsteroidal anti inflammatory drugs, antibiotics
- Strong emotions—Fear, anger, laughing, crying
- Conditions—Gastroesophageal reflux, tracheoesophageal fistula
- Food additives—Sulfite preservatives

Pathophysiology:

Mechanism that produce symptoms:

1. Inflammation and edema of the mucus membrane
2. Accumulation of tenacious secretions from mucus glands
3. Spasm of the smooth muscle of the bronchi and bronchioles which decrease the diameter of the bronchioles

4. The sequence of these mechanisms is not the same in all patients
5. These obstructive processes interfere with ventilation and result in characteristic symptoms of: coughing, shortness of 'breath and wheezing
6. Inspiration: normally the bronchi dilate and elongate during inspiration
7. Expiration: bronchi contract and shorten.

4. Following an inflammatory process caused mostly by allergens the obstruction will increase causing forced expiration through the narrowed lumen
9. The air trapped in the lung increase (the obstruction is between the alveoli and the lobar bronchi)
10. The obstruction forces the patient to breath at a higher and higher lung volume

10. The patient fight to inspire leading to fatigue
11. Decrease respiratory effectiveness cause increase 02 consumption
12. Also inspiration occur at higher lung volume that lead to hyper inflate the alveoli
13. With increased obstruction C02 increase leading to hypoxia, respiratory acidosis and ending in respiratory failure

Incidence:

- Common age 3 and above
- In young children incidence is high in males
- Equal sex incidence in adolescence
- Decrease in puberty
- 3% of school children have symptoms of asthma.
- in urban indwellers than rural.

Clinical manifestations:

A. Onset may be gradual with nasal congestion, sneezing and watery nasal discharge before the attack
B. Attack may occur suddenly mostly at night with:

1. Wheezing primarily with expiration
2. Anxiety and apprehension
3. diaphoresis

1. Uncontrollable cough, dry at first then productive (frothy, clear, gelatinous sputum)
2. Dyspnea with increased effort during expiration
3. Shortness of breath
4. Prolonged expiratory phase
5. Audible wheeze
6. Pale appearance - but may be flushed cheeks and red ears, and lips deep red color

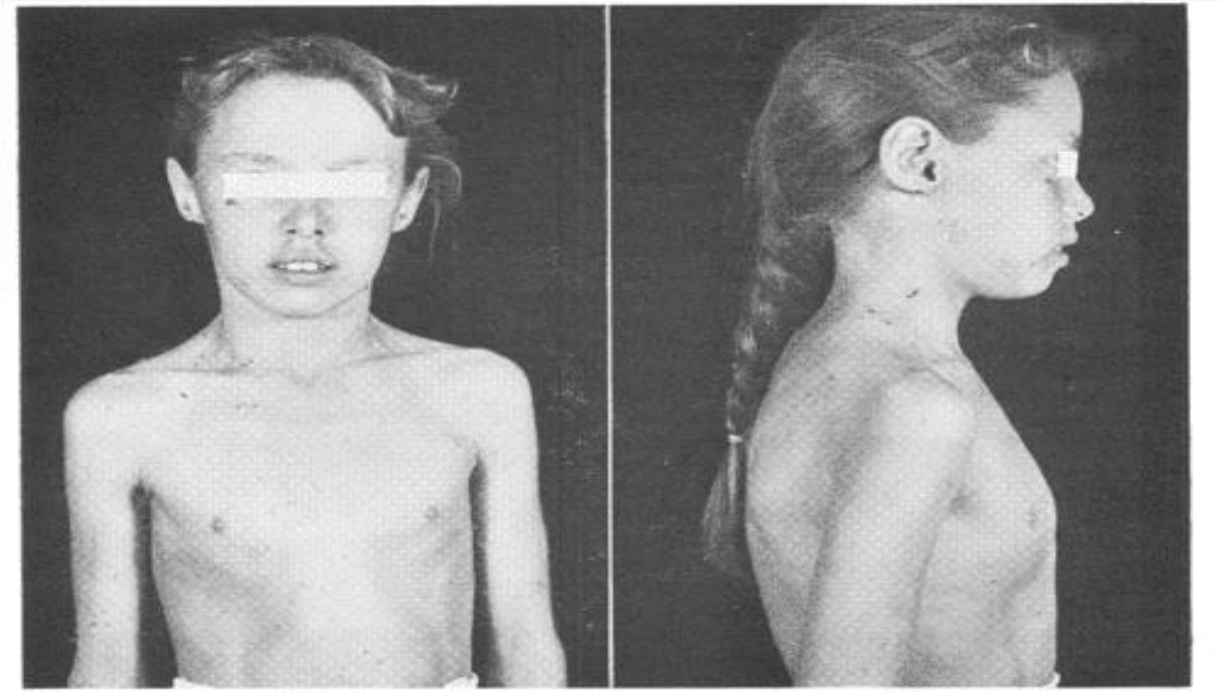
10. May progress to cyanosis of nail beds and circumoral area
11. Restlessness - apprehension
12. Anxious facial expression
13. Sweating
14. May sit upright, shoulders in a hunched over position hands on bed or chair
15. Speaks with short, panting broken phrases
16. Chest: hyper resonance on percussion
17. Coarse, loud breath sounds

18. Wheezing through out the lung field
19. Prolonged expiration
20. Crackles
21. Generalized inspiratory and expiratory wheezing increasingly high pitched


chest tightness
shortness of breath
wheezing
rapid breathing
cough
asthma symptoms
tiredness

With repeated episodes:

- "Barrel (pigeon) chest - elevated shoulders-Use of accessory muscles of respiration
- Facial appearance: flattened molar bones, and circles beneath the eyes



- Based on the symptom indicators of disease severity, asthma is classified into four categories:
- intermittent
- mild persistent
- moderate persistent
- severe persistent.

Symptoms increase in frequency or intensity until the last category of severe persistent asthma

Intermittent Asthma

- Symptoms less than 2 days a week
- Nighttime symptoms (awakenings):

None (ages 0 to 4);

less than two times a month (ages 5 to 11)

- Interference with normal activity: None
- Use of short-acting *f*À-agonist for symptom control: Less than 2 days a week

Mild Persistent Asthma

- Symptoms more than two times a week, but less than one time a day
- Nighttime symptoms: One or two times a month (ages 0 to 4); three or four times a month (ages 5 to 11)
- Interference with normal activity: Minor limitation
- Use of short-acting *ƒ*À-agonist for symptom control: More than 2 days a week but not daily

Moderate Persistent Asthma

- Daily symptoms
- Nighttime symptoms three or four times a month (ages 0 to 4); more than once per week but not nightly (ages 5 to 11)
- Interference with normal activity: Some limitation
- Use of short-acting â-agonist for symptom control: Daily

Severe Persistent Asthma

- Continual symptoms throughout the day
- Frequent nighttime symptoms
- Interference with normal activity: Extremely limited
- Use of short-acting â-agonist for symptom control: Several times a day

Asthma: Risk Assessment

- Prior ICU admissions
- Prior intubation
- >3 emergency department visits in past year
- >2 hospital admissions in past year
- >1 bronchodilator used in past month
- Use of bronchodilators > every 4 hours
- Chronic use of steroids
- Progressive symptoms in spite of aggressive Rx

Diagnosis:

1. History of symptoms. and physical examination
2. Barrel chest- Chest X-Ray shows hyper expansion of airways
3. Pulmonary function tests show air trapping and decreased expiratory flow measurement of forced expiratory volume at one second (FEV1)

4. Blood: CBC : Easinophilia in peripheral blood and nasal secretions

5. Routine skin and sputum testing may help determine allergic causes

Treatment:

Objective is to relieve symptoms and improve ventilation capacity:

1. Bronchodilators: I.V Aminophyline. S.C Epinephrine.
2. Corticosteroids reduce the inflammatory component of bronchial obstruction, decrease mucus production and mediator release, as well as the late phase (cellular) inflammatory process.

- Methyl prednisone IV in severe cases
- May need Reglan if experiencing GI upset
- PO prednisone – always give with food to decrease GI upset

3. Continuous assessment of respiratory status: Blood gas studies
4. Maintain patent air way and oxygenation, suction of viscous secretions, ensure humidity and position correctly.
5. Re-establish and maintain fluid and electrolyte balance
6. Cardiac monitoring (increased *B/P* & Rt sided heart failure and arrhythmias may develop)

7. Maintain bed rest and physical comfort
8. Parental reassurance
9. Anti-inflammatory agents and expectorants given as indicated
10. Intubations and ventilation if necessary

- Long-term daily ibuprofen (NSAID) given in a dose sufficient to achieve a peak plasma concentration and to decrease the need for IV antibiotics in young patients with mild pulmonary involvement.

Status Asthmaticus

- Status asthmaticus is a medical emergency that can result in respiratory failure and death if unrecognized and untreated. Children who continue to display respiratory distress despite vigorous therapeutic measures, especially the use of sympathomimetics (e.g., albuterol, epinephrine), are in status asthmaticus. The condition may develop gradually or rapidly, often coincident with complicating conditions, such as pneumonia or a respiratory virus, which can influence the duration and treatment of the exacerbation.

- Therapy for status asthmaticus is aimed at improving ventilation, decreasing airway resistance and relieving bronchospasm, correcting dehydration and acidosis, allaying child and parent anxiety related to the severity of the event, and treating any concurrent infection. Humidified oxygen is recommended and should be given to maintain an oxygen saturation greater than 90%.

Long term care:

Objective:

1. **Prevention of acute attacks - Decrease school absence**
2. **Minimal medications and treatment**
3. **Participation in normal activities**
4. **Normalization of pulmonary function tests**
5. **Promotion of normal growth and development.**

Nursing considerations:

1. Assessment of the respiratory system: Observation - Inspection Palpation - Auscultation - Percussion Some physical characteristics: Chest configuration –
2. Posturing Breathing assessment and finger clubbing

Nursing diagnosis

- Ineffective breathing pattern RlT allergic response in bronchial tree
- Activity intolerance RlT imbalance between oxygen supply and demand
- Altered family process RlT having a child with a chronic illness

Nursing intervention

- The nursing care of the child with asthma begins with a review of the child's health history; the home, school, and play environment
- In addition, the nurse notes and evaluates physical characteristics of chronic respiratory involvement, including chest configuration (e.g., barrel chest),

- avoiding triggers, avoiding allergens, and using medications as needed.
- Therapy includes efforts to reduce underlying inflammation and relieve or prevent symptomatic airway narrowing.
- Therapy includes patient education, environmental control, pharmacologic management, and the use of objective measures to monitor the severity of disease
- Parents and children need to know how to avoid allergens that precipitate asthma episodes.

Additional suggestions include the following:

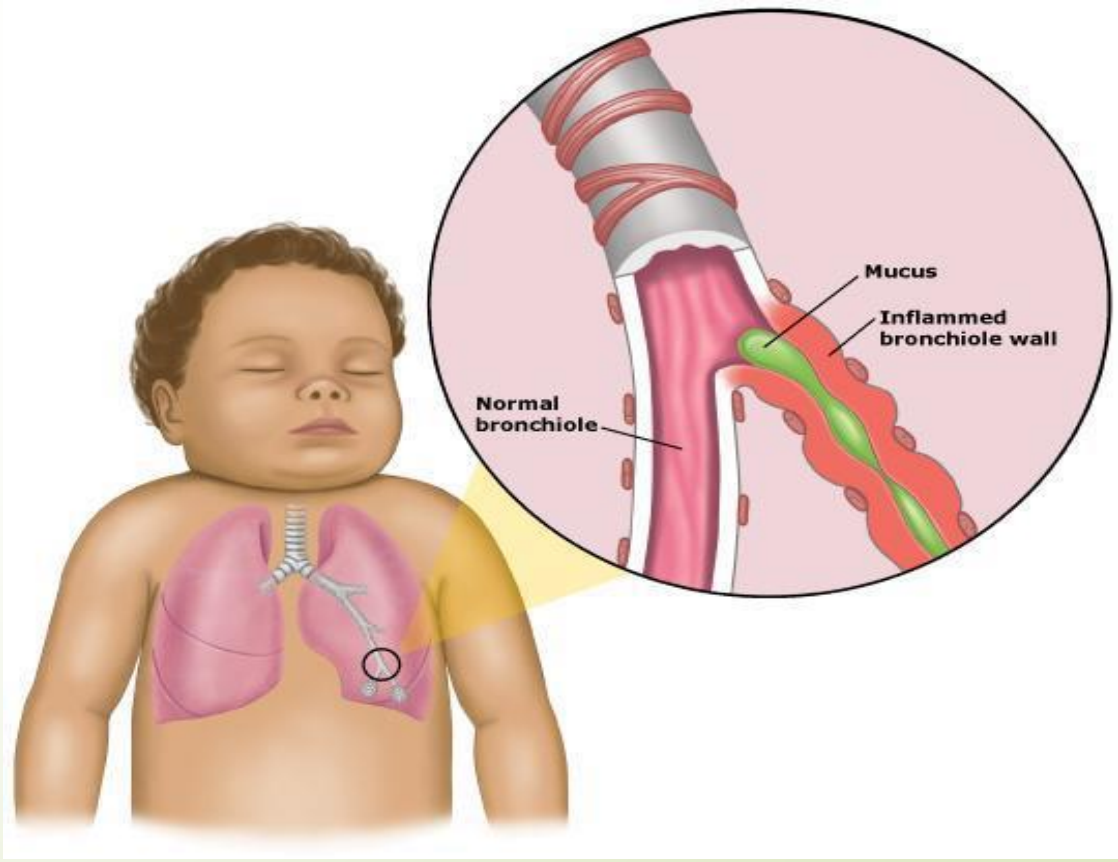
- Cover pillows and mattresses with dustproof covers.
- Wash bedding in hot water once a week. Dry completely.
- Keep child indoors while lawn is being mowed
- Keep windows and doors closed during pollen season; use air conditioner if possible
- The child should not be present during cleaning activities.
- Wet-mop bare floors weekly; wet-dust and clean child's room weekly.
- Limit or prevent child's exposure to tobacco and wood smoke
- Use air conditioners with high-efficiency particulate air filters.

Bronchiolitis

BRONCHIOLITIS

Acute bronchiolitis is a common viral disease of the lower respiratory tract of infants, resulting from inflammatory obstruction at the bronchiolar level.

Age group is: infants < 6 months up to 2 years.
Greater incidence in males.
Common in ‘Winter and spring



Causative agent

- ·Respiratory syncytial virus RSV, common in infancy and early childhood .
- •Para influenza virus
- •Influenza virus
- •Adenovirus
- •Mycoplasma pneumoniea

Clinical manifestations

- .Occur several days after nasopharyngeal infection (5-8 days incubation period)
- • Respiratory distress, characterized by:

1.Paroxysmal wheezy cough

2.Dyspnea and decreased breath sound

3.Irritability gradually becoming evident

- Increased respiratory rate (40-80) causes difficulty to suck & breath at the same time
- •Fever some times
- •Cyanosis
- •Dehydration
- •Shallow intercostals & subcostal retraction

Complications

- •Exhaustion & anoxia
- •Secondary bacterial infection
- •Pneumothorax
- •A pnoeic spells
- •Circulatory collapse
- •Increased predisposition to Asthma

Treatment

- •Antibiotics given until confirmation established
- •Ribavirin antiviral agent for RSV with special precautions given as aerosolized by hood, tent or mask 12-20 hrs for 1-7 days
- •Respiratory syncytial virus Immune globulin used prophylactically to prevent RSV infection in high risk infants
- •I. V immunoglobin G provide neutralizing antibodies against sub type A&B strains of RSV, given in epidemic season & monthly for high risk infant's protection

Nursing management

- High humidity & 02 relieves arterial hypoxia
- •Monitoring ABGs
- •Possible ventilator assistance.
- •Maintain Acid -Base & fluid electrolyte and nutrition balance
- •N.G. tube feeding or I. V for several days
- Keep nasal airway patent
- •Continuous vital signs monitoring, and observe for respiratory acidosis, dehydration & cardiac failure
- •Recemic Epinephrine via intermittent positive pressure breathing (IPPB) may relieve brochospasm
- •Minimal handling to allow undisturbed sleep & rest

PNEUMOMIA

Definition

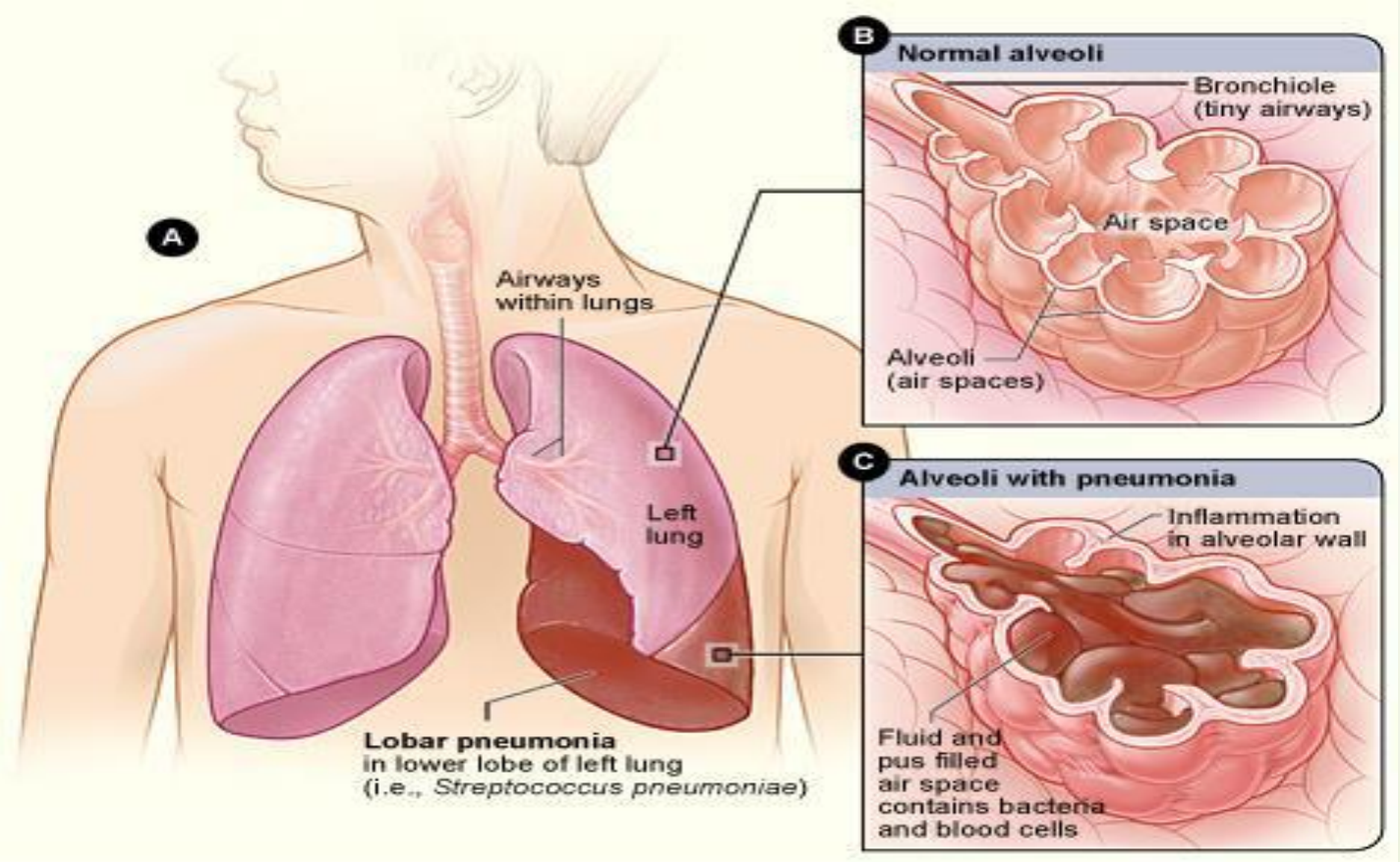
- **Pneumonia, an inflammation of the pulmonary parenchyma**.

- The lung parenchyma is that portion of the lungs involved in gas exchange. The most prominent structure in this region is the alveolus.
- is common in childhood, occurring more frequently in infancy and early childhood.
- Clinically, pneumonia may occur either as a primary disease or as a complication of another illness.
- Pneumonia can be classified according to **morphology, etiologic agent, or clinical form.**

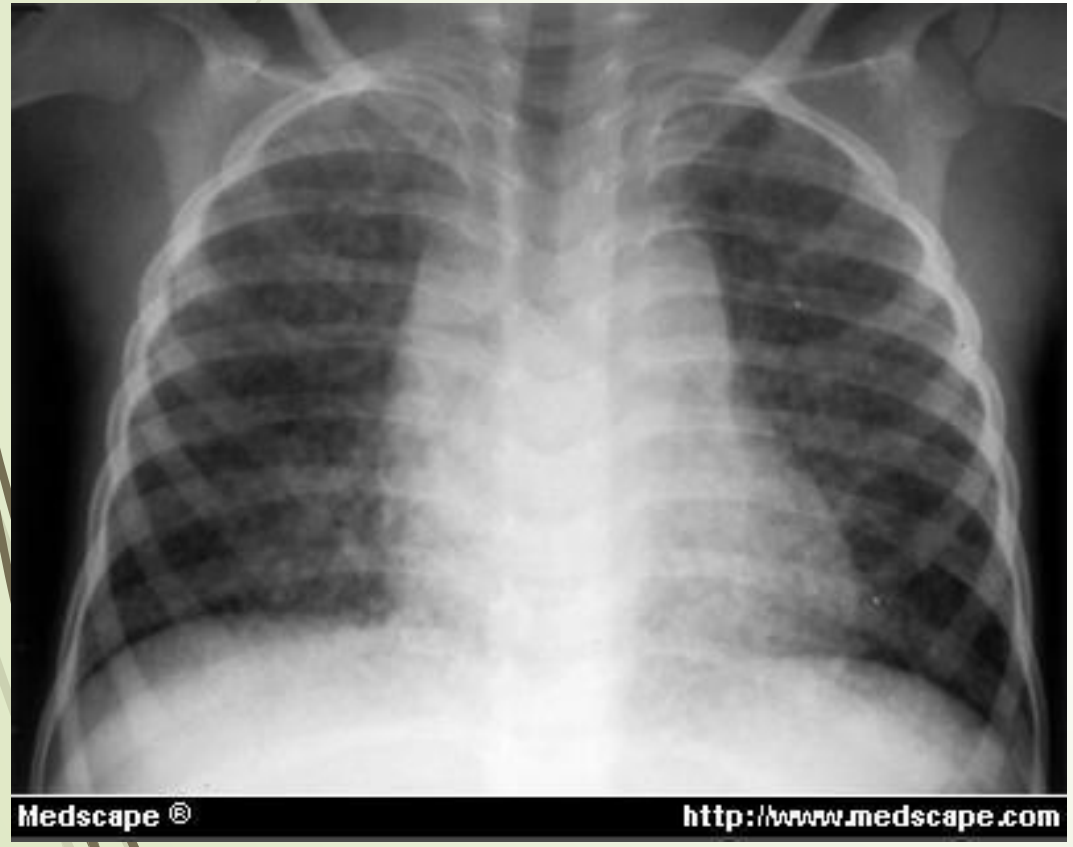
Morphologically pneumonias are recognized as:

- 1.Lobar pneumonia: all or a large segment of one or more lobes is involved. When both lungs are affected this is known as bilateral pneumonia.
- 2.Bronchopneumonia: Begins in the terminal bronchioles progressing to consolidated patches in near by lobules also called lobular pneumonia
- 3.Interstitial pneumonia: Inflammatory process is confined within the alveolar walls and the peribronchial and interlobular tissues.

Lobar pneumonia



Interstitial pneumonia



Bronchopneumonia

Causative agent

- Viruses
- Bacteria
- •Mycoplasma as in Primary Atypical Pneumonia
- •Aspiration pneumonia due to aspiration of foreign substances.

Viral pneumonia

- Causative agent: Viral pneumonias occur more frequently than bacterial pneumonias .
- •++ RSV in infants,
- • Influenza in older children,
- •Para influenza,
- •Influenza adenovirus
- Affects all ages
- Associated with URTI then it progresses to Interstitial pneumonitis

Clinical manifestations:

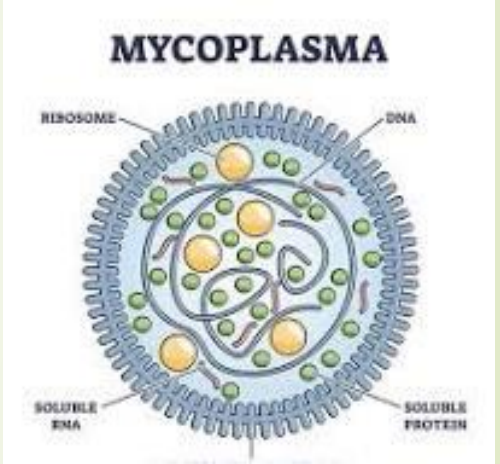
- •acute or insidious
- •mild fever –
- •slight cough and malaise
- •then" high fever, sever cough with or without productive cough of whitish sputum

Treatment and prognosis

- Good prognosis but may become complicated by bacterial infection
- Recovery within 7-10 days with symptomatic treatment,
- one week rest for Convalescence is needed.
- Treatment is usually symptomatic and includes measures to promote oxygenation and comfort, such as oxygen administration, chest percussion and postural drainage, antipyretics for fever management, monitoring fluid intake, and family support. **Antibiotics are reserved for children in whom the presence of a bacterial infection is demonstrated.**

Primary Atypical Pneumonia

- "Primary atypical pneumonia" is called primary to indicate, that it developed independently, not following another disease.
- Causative agent: Mycoplasma
- Age incidence 5-12 years



- Season: Autumn & winter it is more common in crowded living conditions

Clinical manifestations

- Sudden or insidious
- Systemic symptoms:
- Fever & chills
- Headache
- Anorexia
- Muscle pain
- Rhinitis, sore throat
- Dry hacking cough may be followed by cough of seromucoid then blood streaked

Treatment

- Erythromycin 2-3 weeks may be effective
- Most affected persons recover from acute illness in 7 to 10 days with symptomatic treatment, followed by a week of convalescence.
- Hospitalization is rarely necessary.

Bacterial pneumonia

- Bacterial pneumonia is often a serious infection:
- Causative agent :

1. Pneumococcus,
2. Group A streptococcus,
3. Staphylococcus
4. Enteric bacilli are most likely agents in infants under 3 months of age ++
5. Chlamydia infection
6. Pneumococcal infection & influenza type B, and staphylococcus aureus are common in 3 months to 5 years old children

Clinical manifestations

- Acute cases:
- •++ fever with toxic appearance
- •In older children: headache, abdominal pain or chest pain some times with respiratory distress
- •Meningism(A condition characterized by neck stiffness, headache, and other symptoms suggestive of meningeal irritation, but without actual inflammation of the meninges (MENINGITIS)
- •Cough initially dry & hacking
- •In smaller children: Irritability poor feeding
- •Sudden fever & seizures
- •Respiratory distress with air hunger
- •Tachypnea and circmuoral cyanosis

Diagnosis

- •High WBC but it is normal in infants with staphylococcus infection
- •Positive blood culture
- •Positive antistreptolysin 0 titer (ASO)

Treatment

- Antibiotic therapy, rest, liberal oral intake of fluids, and administration of antipyretics for fever are the principal therapeutic measures.
- •Penicillin G intramuscular injection for Pneumococcus & streptococcal Pneumonia
- •For staphylococcal type, semi synthetic penicillin is given
- •++ fluids
- •Antipyretics
- •02 if there is respiratory distress
- •Hospitalization for young children & for staphylococcal pneumonia & for complicated condition.

NEONATAL PNEUMONIA

- Pneumonia in the immediate neonatal period is different from other types of pneumonia described. If infection occurs within 3 to 5 days of birth, the pathogen is usually obtained from the mother transplacentally, or through aspiration of infected amniotic fluid intrauterine, or during or after birth. Group B hemolytic streptococcus may be present in the mother's vagina and asymptomatic but can cause a serious pneumonia to a newborn.
- It is characterized by a persistent cough, tachypnea, and sometimes rales. Radiographs show nonspecific abnormalities. Oral azithromycin given for 3 days is the treatment of choice; alternatively, erythromycin base or ethylsuccinate is administered for 14 days

Nursing diagnosis in acute respiratory tract infection

- 1.Ineffective breathing pattern R/T inflammatory process
- 2.Ineffective airway clearance R/T inflammation, mechanical obstruction, increased secretions
- 3.Risk for injury R/T infective organism
- 4.Interrupted family process R/T child's illness, hospitalization, and medical or therapeutic regimen

Nursing care of pneumonia

- •It is mainly supportive and symptomatic to meat the needs of each child
- •The child’s respiratory rate and status, oxygenation are assessed.
- administration of supplemental oxygen (as required) and antibiotics
- Rest and conservation of energy, encourage relief of physical and psychological stress
- •Disturb as little as possible Increase sleep and rest
- Position: semi sitting or as the child prefers.
- •For fever: cool environment & antipyretic drugs
- If there are secretions & the child is unable to get rid of them, then high humidity & postural drainage & suctioning are needed.
- •Psychological support to the parents and the child

Thank you