Changes in the Airway With COPD

Manifestations of Severe COPD

- Air is trapped in the lower respiratory tract
- The alveoli degenerate and fuse together
- The exchange of gases is greatly impaired
Preventive and Treatment Measures for COPD/asthma/emphysema
• Reduce environmental exposure to irritants
• Stop smoking
• Filter allergens from the air
• Avoid exposure to known irritants and allergens
• If these fail, we may need medication to
  – Open the conducting airways through muscular bronchodilation
  – Decrease the effects of inflammation on the airway lining

Adult Respiratory Distress Syndrome (ARDS)
• Characteristics
  – Progressive loss of lung compliance and increasing hypoxia due to a lack of surfactant and thus impaired opening of the alveoli.
• Causes
  – Cardiovascular collapse, major burns, severe trauma, and rapid depressurization, prematurity
• Treatment
  – Reversal of the underlying cause combined with ventilatory support

Bronchodilators/Antiasthmatics
• Used to dilate the airways and thus facilitate respiration
• Used for asthma and bronchospasms associated with COPD.
• Given orally, so increased risk for systemic adverse effects
• If given via nebulizer, fewer risk for systemic adverse reactions.
Xanthines

- **Action**
  - Direct effect on the smooth muscles of the respiratory tract, both in the bronchi and in the blood vessels
  - Inhibit release of SRSA and histamine thus decreasing bronchial swelling
- **Indication**
  - Symptomatic relief or prevention of bronchial asthma and for reversal of bronchospasm associated with COPD
  - Also used to stimulate respirations in Cheyne-Stokes respiration and to treat apnea and bradycardia in premature infants
- **Pharmacokinetics**
  - Narrow therapeutic margin, so no longer first line drugs
  - Rapidly absorbed from the GI tract
  - Metabolized in the liver and excreted in the urine
  - Available in oral or parenteral form*

Xanthines (cont.)

- **Contraindications**
  - Caution with GI problems, coronary disease, respiratory dysfunction, renal or hepatic disease, alcoholism, and hyperthyroidism
- **Adverse effects**
  - Related to theophylline levels in the blood (See table 55.3 on page 905)
    - Therapeutic levels (10-20 mcg/mL)
    - Increased levels cause GI upset, nausea, irritability, and tachycardia to seizure, brain damage, and even death
- **Drug-to-drug interactions**
  - Many drugs interact with xanthines
  - Nicotine increases xanthine metabolism*
Prototype Xanthines

What do we do as the nurse?

- Screen for allergies or contraindications to its use
- Physical Assessment
- Teach pt to administer oral drugs with food or milk to relieve GI irritation
- Monitor the patient's response to the drug
- Provide comfort measures including rest periods, quiet environment, dietary control of caffeine, and headache therapy as needed
- Provide periodic follow-up including blood tests to monitor serum theophylline levels

What do we do as the nurse?

- Provide thorough patient teaching
- Monitor the patient's response
- Monitor for adverse effects (CNS effects, cardiac arrhythmias, GI upset, local irritation)
- Monitor for potential drug-drug interactions
- Evaluate the effectiveness of the teaching plan
- Monitor effectiveness of comfort measures and compliance with the regimen
Sympathomimetics

- **Action**
  - Dilation of the bronchi with increased rate and depth of respiration.
  - Beta-selective adrenergic agonists
  - Systemic effects including increased BP, increased heart rate, vasoconstriction, and decreased renal and GI flow

- **Indications**
  - Acute asthma attack
  - Bronchospasm in acute or chronic asthma
  - Prevention of exercise-induced asthma

- **Pharmacokinetics**
  - Rapidly distributed after injection and transformed in the liver to metabolites that are excreted in the urine.
  - Only in pregnancy if benefits outweigh risks.

Sympathomimetics (cont.)

- **Contraindications**
  - Pregnancy and lactation
  - Depend on the severity of the underlying condition and how systemic effects will effect these.

- **Adverse effects**
  - Sympathomimetic stimulation
  - CNS stimulation
  - GI upset, cardiac arrhythmias, hypertension, bronchospasm, sweating, pallor, and flushing

- **Drug-to-drug interactions**
  - General anesthetics*

What do we do as the nurse?

- Screen for allergies or other contraindications for its use
- Physical assessment
- Instruct the patient on different responses to different drugs
- Advise patients to use the minimal amount needed for the shortest period to prevent adverse effects and accumulation of the drug
- Use 30-60 minutes prior to exercise
- Provide safety measures to prevent injury
What do we do as the nurse?

- Provide small, frequent meals and nutritional consultation if GI effects interfere with eating
- Teach the patient the proper use of the prescribed delivery system
- Provide thorough teaching
- Offer support and encouragement
- Monitor the patient’s response to the drug
- Monitor for adverse effects
- Evaluate the effectiveness of the teaching plan
- Monitor the effectiveness of other measures to ease breathing

Prototype Sympathomimetics

Anticholinergic Bronchodilators

- Provide relief for patients who cannot tolerate the sympathetic effects of other drugs
- Action
  - Anticholinergics block vagal effect therefore relaxing smooth muscle and leading to bronchodilation.
- Indication
  - Maintenance treatment of bronchospasm associated with COPD and emphysema
- Pharmacokinetics
  - Onset of action is 15 minutes when inhaled
  - Peak in 1 to 2 hours; duration of action is 3 to 4 hours
Anticholinergic Bronchodilators (cont.)

• Cautions
  - Any condition aggravated by the anticholinergic effects of the drug*

• Adverse effects
  - Related to the anticholinergic effects of the drug
  - Dizziness, headache, fatigue, nervousness, dry mouth, sore throat, palpitations, and urinary retention

What do we do as the nurse?

• Screen for allergies or other contraindications to its use
• Physical Assessment
• Ensure adequate hydration and provide environmental controls such as a humidifier
• Encourage the pt to void before each dose to prevent urinary retention
• Provide safety measures to prevent injury
• Provide small, frequent meals and sugarless lozenges to relieve dry mouth and GI upset
• Review inhaler use; do not exceed 12 inhalations in 24 hours

What do we do as the nurse?

• Advise the pt not to drive or use hazardous machinery
• Provide thorough patient teaching
• Offer support and encouragement
• Monitor the patient’s response to the drug
• Monitor for adverse effects
• Evaluate the effectiveness of the teaching plan
• Monitor the effectiveness of other measures to ease breathing
Inhaled Steroids

- **Action**
  - Decrease the inflammatory response in the airway and promote smooth muscle relaxation
- **Indications**
  - Prevent and treat asthma
  - Treat chronic steroid-dependent bronchial asthma
- **Pharmacokinetics**
  - Well absorbed from the respiratory tract
  - May take 2-3 weeks to reach effective levels
  - Metabolized by natural systems, mostly within the liver, and excreted in the urine

Inhaled Steroids (cont.)

- **Contraindications**
  - Not used for emergency during an acute attack or status asthmaticus
  - Pregnancy and lactation
  - Used with caution in patients with active infection*
- **Adverse effects**
  - Sore throat
  - Hoarseness
  - Coughing
  - Dry mouth
  - Pharyngeal and laryngeal fungal infections

Prototype Inhaled Steroids

- **Prototype Summary:**
  - **Prednisolone**: Effective in treating asthma, decreases airway inflammation and reduces bronchial hyperreactivity.
  - **Fluticasone**: Used as a maintenance treatment for asthma.
  - **Budesonide**: Lowers the rate of asthma exacerbations and improves symptoms.

*Adverse effects include:
- **Prednisolone**: Cushingoid features, insomnia, mood changes.
- **Fluticasone**: Sore throat, hoarseness, coughing.
- **Budesonide**: Dry mouth, laryngeal fungal infections.

Copyright © 2008 Lippincott Williams & Wilkins.
### What do we do as the nurse?

- Screen for allergies and other contraindications to its use
- Physical Assessment
- Advise patient not to use the drug to treat an acute asthma attack or status asthmaticus
- Taper systemic steroids carefully during the transfer to inhaled steroids
- Have the patient use decongestant drops before using the inhaled steroid
- Have the pt rinse the mouth after using the inhaler to decrease systemic absorption and decrease GI upset

### What do we do as the nurse?

- Monitor for any signs of respiratory infection
- Provide thorough patient teaching
- Offer support and encouragement
- Monitor the patient’s response to the drug
- Monitor for adverse effects
- Evaluate the effectiveness of the teaching plan
- Monitor the effectiveness of other measures to ease breathing

### Leukotriene Receptor Antagonists

- Developed to act more specifically at the site of the problem associated with asthma
- Actions
  - Selectively and competitively block or antagonize receptors for the production of leukotrienes thus blocking many of the signs and symptoms of asthma
- Indications
  - Prophylaxis and chronic treatment of bronchial asthma in adults and in patients younger than 12 years of age
  - Not for acute asthma attacks
- Pharmacokinetics
  - Rapidly absorbed from the GI tract, extensively metabolized in the liver, and primarily excreted in the feces
Leukotriene Receptor Antagonists (cont.)

- Cautions
  - Hepatic or renal impairment
  - Pregnancy and lactation

- Adverse effects
  - Headache, dizziness, myalgia, nausea, diarrhea, abdominal pain, elevated liver enzyme concentrations, vomiting, generalized pain, fever, and myalgia.

- Drug-to-drug interactions
  - Propranolol, theophylline, terfenadine, and warfarin
  - Calcium channel blockers, cyclosporine, and aspirin

What do we do as the nurse?

- Screen for allergies or other contraindications to its use
- Physical Assessment
- Teach pt to administer the drug on an empty stomach because food decreased the drugs availability
- Teach pts not to use for an acute asthma attack or bronchospasm
- Caution the patient to take the drug continuously and not to stop the medication during symptom free periods
- Provide appropriate safety measures to prevent injury
- Use gt to avoid OTC meds containing aspirin which interferes with the drugs effectiveness
**What do we do as the nurse?**

- Provide thorough patient teaching
- Offer support and encouragement
- Monitor patient’s response to the drug
- Monitor for adverse effects
- Evaluate the effectiveness of the teaching plan
- Monitor the effectiveness of other measures to ease breathing

**Lung Surfactants**

- **Action**
  - Reduce the surface tension within the alveoli, allowing expansion and gas exchange
  - Replace the surfactant that is missing in the lungs of neonates with RDS
- **Indication**
  - Rescue treatment of infants who have developed RDS
  - Prophylactic tx for those high risk for RDS
- **Pharmacokinetics**
  - Begin to act immediately on instillation into the trachea
  - Metabolized in the lungs

**Lung Surfactants (cont.)**

- **Contraindication**
  - Emergency drugs have no contraindication
- **Adverse effects**
  - Patent ductus arteriosus
  - Hypotension
  - Intraventricular hemorrhage
  - Pneumothorax
  - Pulmonary air leak
  - Hyperbilirubinemia
  - Sepsis
Prototype Lung Surfactants

What do we do as the nurse?

- Screen for time or birth and weight to determine appropriate dosage
- Physical Assessment
- Monitor the pt continuously during administration (life support measures may be needed)
- Ensure proper placement of the ET tube
- Ensure staff is knowledgable on med administration
- Suction the infant immediately before administration, but not for 2 hours after administration to allow time for the drug to work
- Provide support and encouragement to parents
- Continue other supportive measures related to the patients prematurity

What do we do as the nurse?

- Monitor the patient’s response to the drug
- Monitor for adverse effects
- Evaluate the effectiveness of the teaching plan
- Support parents as appropriate
- Monitor the effectiveness of other measures to support breathing and stabilize the patient
- Evaluate the effectiveness of other support measures related to the immaturity of the infant
Mast Cell Stabilizers

- **Action**
  - Prevent the release of inflammatory and bronchoconstricting substances when the mast cells are stimulated to release these substances because of irritation or the presence of an antigen.
  - Work at the cellular level to inhibit the release of histamine and SRSA.

- **Indications**
  - Treatment of chronic bronchial asthma.
  - Exercise-induced asthma.
  - Allergic rhinitis.

- **Pharmacokinetics**
  - Excreted during exhalations or in urine and feces.

Mast Cell Stabilizers (cont.)

- **Contraindications**
  - Known allergy.
  - Cromolyn not during acute attack or for children under 2.
  - Nedocromil not for under 12 y/o.
  - Pregnancy and lactation.

Mast Cell Stabilizers

- **Adverse effects**
  - Cromolyn
    - Swollen eyes, headache, dry mucosa, and nausea.
  - Nedocromil
    - Headache, dizziness, fatigue, tearing, GI upset, and cough.

- **Drug-to-drug interactions**
  - Isoproterenol.
Prototype Mast Cell Stabilizers

What do we do as the nurse?

- Screen for allergies or other contraindications to its use
- Physical Assessment
- Teach proper use of delivery system
- Caution patients not to stop abruptly
- Caution patients to continue using the drug even during symptom free periods
- Administer oral drug 30 min before meals and at bedtime
- Initiate safety precautions to prevent injury
- Teach pts not to wear soft contact lenses as they can be stained or warped with Cromolyn eye drops

What do we do as the nurse?

- Provide thorough patient teaching
- Offer support and encouragement
- Monitor patients response to the drug
- Monitor for adverse effects (drowsiness, dizziness, headache, GI upset, local irritation)
- Evaluate the effectiveness of the teaching plan
- Monitor the effectiveness of other measures to ease breathing
Use of Lower Respiratory Tract Agents Across the Lifespan