Cardiopulmonary Services
Department Policy
Proc 7.19

RESPIRATORY MEDICATIONS

Purpose: To define and describe medications administered by Respiratory Therapy to patients.

Sympathetic receptors:

1. *Alpha receptors:* - *found primarily in blood vessels*
   - *stimulation = vasoconstriction of blood vessels*
2. *Beta 1 receptors:* - *found primarily in the heart*
   - *stimulation = increase in heart rate*
3. *Beta 2 receptors:* - *found primarily in smooth muscles*
   - *stimulation = smooth muscle relaxation*

MEDICATIONS

1. Sympathomimetics
   A. Nonselective sympathomimetics: These drugs stimulate all the sympathetic receptors.
      a. **Epinephrine**
         1. Indications:
            - status asthmaticus
            - topical application for bleeding (ETT instillation)
         2. Dosages:
            - SubQ: 0.001 ml/kg of 1:1,000 (not to exceed 0.5ml)
            - Inhalation: 0.2-0.5 ml of 1:100
            - Topical: in trace amounts
         3. Precautions:
            - tachycardia
            - nausea / vomiting
            - palpitations
            - nervousness
            - headaches
            - hypertension
      b. **Racemic Epinephrine (Vaponephrine)**
         1. Indications:
            - relief of bronchial or vascular congestion
            - subglottic edema and post extubation swelling
         2. Dosages:
            - adult: 0.25-00.50 ml/3ccNS
            - pediatric: 0.20-0.25 ml/3ccNS
         3. Precautions:
            - tachycardia
            - nausea / vomiting
            - palpitations
            - nervousness
            - headaches
            - hypertension

   B. Beta Sympathomimetics: These drugs stimulate only the Beta receptors.
      a. **Isoetharine (Bronkosol)**
         1. Action: This drug is more receptive for Beta 2 receptors
         2. Indications:
            - bronchospasm
         3. Dosage:
            - adult: 0.25-0.50 ml/3ccNS
            - pediatric: 0.20-0.25 ml/3ccNS
            - HHN unit does: 0.30 ml/3ccNS
            - MDI: 4 inhalations.

4. Precautions:
   - tachycardia
   - nervousness
   - weakness
   - chest pain
   - headaches
   - nausea / vomiting

C. Non-Catecholamine Beta Sympathomimetics: These drugs are selective for Beta 2 receptors. They are used primarily for bronchodilation.
Precautions:
- tachycardia
- nausea/vomiting
- headache

a. **Metaproterenol (Alupent**)
1. Dosage:
   - adult: 0.25-0.30 ml/3ccNS
   - pediatric: 0.20-0.25 ml/3ccNS
   - HHN unit does: 0.3 ml/3ccNS
   - MDI: 4 inhalations
2. Peaks: 30-60 min
3. Duration of action: 4-6 hours

b. **Albuterol (Proventil, Ventolin)**
1. Dosage:
   - adult: 0.5 ml/3ccNS (2.5mg)
   - pediatric: 0.25-0.5 ml/3ccNS
   - Unit dose: 0.5 ml/3ccNS (2.5mg)
   - MDI: 4 inhalations
   - Rotocap: 1 capsule (No longer available at LSUMC)
2. Duration of action: 4-6 hours

c. **Terbutaline (Brethine, Bricanyl)**
1. Dosage:
   - 1.5 mg every 4-6 hours
   - MDI: 1-2 inhalations
2. Onset: 5-30 min
3. Peaks: 1-2 hours
4. Duration of action: 3-6 hours

d. **Salmeterol (Serevent)**
1. Indication: Treatment and prevention of bronchospasm. Serevent is not intended for the treatment of acute asthma exacerbations or for symptoms that can be managed with occasional use of short-acting inhaled Beta 2 agonists.
2. Dosage: (MDI version D/C'd after 9-16-03)
   - MDI: 2 inhalations (21mcg/puff) twice daily, 12 hours apart
   - DPI: 1 inhalation (50mcg) twice daily, 12 hours apart
3. Onset: 10-20 min
4. Peaks: 3-4 hours
5. Duration of action: 12 hours

e. **Lev-albuterol (Xopenex)**
1. Indication: Treatment of bronchospasm. Company states less Beta-1 effects than albuterol.
2. Dosage: 1.25 mg and 0.63 mg unit dose vials

2. Nonsteroidal Anti-Inflammatory Agents

A. **Cromolyn Sodium (Intal)**
a. Action: Inhibits mast cell degradation. It stabilizes the mast cell to prevent the release of Type I allergic reactions that cause bronchoconstriction.
b. Indication: Preventative management of asthma. For prophylactic use only.
c. Dosage: 20mg
d. Precautions:

- irritation of bronchioles and throat
- bronchospasm

B. **Nedocromil Sodium (Tilade)**
   a. Action: Inhibits the activation of and mediator release from a variety of inflammatory cell types associated with asthma.
   1. Indication: Preventative management of asthma. For prophylactic use only.
   2. Dosage:
      - MDI: 2 inhalations (3.5mg) four times a day
   3. Precautions:
      - coughing
      - bronchospasm
      - headaches

3. Corticosteroids
   A. Action: anti-inflammatory, immunosuppressive agents with direct and In-direct effects resulting in bronchodilation.
   B. Indications:
      a. Status asthmaticus
      b. Chronic bronchitis
   C. Precautions
      a. Oral candidasis
      b. Adrenal suppression
      c. Hypertention
   D. Aerosolized Steroids:
      a. **Dexamethasone (Decadron)**
      b. **Beclamethasone (Vanceril, Beclovent)**
      c. **Triamcinolone (Azmacort)**
      d. **Flunisolide (Aerobid)**
      e. **Fluticasone propionate (Flovent)** a glucocorticoid that is available in 3 different strengths. (44mcg 2 puffs BID, 110mcg 2 puffs BID, 220mcg up to 4 puffs BID)
      f. **Budesonide Suspension (Pulmocort):** delivered via HHN (PARI-neb). Dosage: (available in .25mg and .5mg respules): .5 to 1mg qday (respules can be given bid to total ordered Qday dosage)
   E. Non-aerozolized Steroids:
      a. **Prednisone**
      b. **Methylprednisolone (Medrol)**
4. Anticholinergics: These drugs block the cholinergic receptor sites on smooth muscle to exhibit parasympatholytic actions (resulting in bronchodilation).
   A. **Atropine**
      a. Indications:
         - to relieve bronchospasm
         - can be used as antisialogogue (to dry up secretions)
      b. Dosage: 1.0-1.5 mg
      c. Onset: 15 min
      d. Peaks: 1-2 hours
      e. Precautions
         - inhibits salivation
         - palpitations
         - tachycardia
         - nervousness

   B. **Ipratropium Bromide (Atrovent)**
      a. Indication:
         - to relieve bronchospasm
      b. Dosage:
         - Unit dose: 500 mcg (0.02% solution)
         - MDI: 2-4 inhalations

c. Precautions:
- palpitations
- dizziness
- cough
- nausea
- headaches
- dryness of oropharynx
- blurred vision

5. Mucolytics / Surface Active Agents

A. **Acetylcysteine (Mucomyst**)

a. Action: The sulfhydryl group in acetylcysteine "opens" disulfide linkages in mucus thereby lowering the viscosity.

b. Indications:
- adjunct therapy for patients with abnormal, viscid, or inspissated mucus secretions
- acetamenophen overdose

c. Dosage: 3-4 cc of 10-20% solution mixed with bronchodilator

d. Precautions:
- nausea / vomiting
- irritation of mucosa
- bronchospasm
- incompatible with aerosolized antibiotics

e. LSUHSC Mucomyst Policy Statement. The following guidelines shall be adhered to when nebulizing Mucomyst:
- These guidelines do not apply to cystic fibrosis patients.
- These guidelines only govern the nebulization of Mycomyst by the Cardiopulmonary Services department.
- All orders for nebulization of Mucomyst shall be administered in conjunction with a bronchodilator.
- All orders involving the nebulization of Mucomyst shall be automatically stopped within 24 hours after initiation.

B. **Sodium Bicarbonate (NaHCO3)**

a. Action: Adjusts the pH of mucus, decreasing the surface tension to facilitate mucolytic action.

b. Indication: tracheal irrigation

c. Dosage:
- irrigation: 2-5 ml of 2-8.4% NaHC03 in 2-5 ml NS

d. Precaution: mucosal irritation

C. **Ethyl Alcohol 30-50% (Ethanol)**

a. Indication:
- pulmonary edema

b. Precautions:
- mucosal irritation
- intoxication
- vasodilation

6. Anti-Protozoal Agent: **Pentamidine Isethionate (Nebupent**)

A. Action: The drug interferes with protozoal nuclear metabolism inhibition of DNA, RNA, phospholipid and protein synthesis. It is known to have activity against pneumocystis carinii.

B. Indication: Prevention of Pneumocystis carinii pneumonia (PCP) in high risk, HIV-infected patients.

C. Dosage: 300mg once every 4 weeks (nebulized)

D. Precautions
a. cough
b. bronchospasm
c. fatigue
d. shortness of breath

7. Combination drugs:
   I. **Combivent (Ipratropium bromide and albuterol sulfate):**
      1. An inhalation bronchodilator aerosol that contains a combination of the anticholinergic bronchodilator, ipratropium bromide, and the beta-2 adrenergic bronchodilator, albuterol sulfate.
      2. Mechanism of Action: it is expected to maximize the response to treatment in patients with COPD by reducing bronchospasm through two distinctly different mechanisms, anticholinergic (parasympatholytic) and sympathomimetic.
      3. It is indicated for use in patients with COPD on a regular aerosol bronchodilator who continue to have evidence of bronchospasm and who require a second bronchodilator.
      4. Each actuation delivers 21mcg of ipratropium bromide and 120 mcg of albuterol sulfate from the valve and 18 mcg of ipratropium bromide and 103 mcg of albuterol sulfate (equivalent to 90mcg albuterol base) from the mouthpiece.
      5. **A unit dose of Combivent is 4 puffs at LSUHSC**.

   II. **Advair Diskus (salmeterol and flovent)**
      1. DPI with a fixed dose of 50 mcg salmeterol (serevent) combined with 100mcg, 250mcg, or 500mcg of fluticasone propionate (flovent).
      2. Not indicated for the relief of acute bronchospasm.
      3. Dosage: 100mcg/50mcg (flovent/serevent), 250/50, or 500/50 1 inhalation b.i.d.

8. Recombinant Human Deoxyribonuclease I Solution:
   Dornase Alfa (Pulmozyme)
   A. Action: Pulmozyme hydrolyzes the DNA in sputum of cystic fibrosis patients and reduces sputum viscoelasticity.
   B. Indication: Daily administration in the management of CF patients to reduce the frequency of respiratory infections requiring parenteral antibiotics and to improve pulmonary function.
   C. Dosage: one 2.5 mg single-use ampule inhaled once daily using a recommended nebulizer.
   D. Precautions:
      a. pharyngitis
      b. chest pain
      c. voice alteration

9. Anti-Viral Agent: **Virazole (Ribavirin)**
   A. Action: unknown
   B. Indication: Treatment of hospitalized infants and young children with severe lower respiratory tract infections due to respiratory syncytial virus.
   C. Dosage: Three rounds of 6 grams Virazole in 300 ml sterile water nebulized via the SPAG unit at 17 ml/hr for 18 hours.
   D. Adverse Reactions:
      a. bronchospasm
      b. hypoventilation
      c. hypotension
      d. bradycardia

10. Antibiotic: **Tobramycin (Tobi)**
   A. Action: Aminoglycoside antibiotic disrupts protein synthesis eventually resulting in cell death (gram negative organisms).
   B. Indication: Management of CF patients with *Pseudomonas Aeruginosa*

C. Dosage: One 5 mL ampule contains 300mg of tobramycin. Given B.I.D. / Q12 with recommended nebulizer (Pari type neb)
D. Precautions:
   a. tinnitus
   b. bronchospasm
   c. curare-like effect possible with myasthenia gravis / Parkinson's

Use the Pari LC Plus for:
Pulmicort (steroid)
Pulmozyme (mucolytic)
Tobramycin (antibiotic)

Use the HDN Salter Neb:
For any med you would use in our standard HHN (optional)

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SPIRIVA (Tiotropium bromide) FACT SHEET

Drug Category: Anticholinergic / Antimuscarinic / Parasympatholytic
Mechanism of Action: Inhibition of M_3-receptors at the smooth muscle (in airways) leading to bronchodilation lasting longer than 24 hours
Indications: Spiriva is indicated for the long-term, once-daily, maintenance treatment of bronchospasm associated with COPD, including chronic bronchitis and emphysema.
Contraindications: Spiriva is contraindicated in patients with a history of hypersensitivity to atropine or its derivatives, including ipratropium, or to any component of this product.
WARNINGS: Spiriva is intended as a once-daily maintenance treatment for COPD and ***is not indicated for the initial treatment of acute episodes of bronchospasm, i.e., rescue therapy***.
Precautions: may potentially worsen symptoms and signs associated with narrow-angle glaucoma, prostatic hyperplasia or bladder-neck obstruction and should be used with caution in patients with any of these conditions.
Information for Patients:
Do not remove capsules from blister packaging until immediately before use. Expose one capsule at a time.
Do not allow powder to enter eyes (blur vision and pupil dilation).
Do not use for immediate relief of breathing problems.
Most common reported adverse drug reaction was dry mouth.
You must hear the "rattle" of capsule in the HandiHaler.
More than one inhalation is acceptable if needed.
Do not exhale / blow into HandiHaler.
Dosage: Spiriva capsules contain 18 micrograms (mcg) of tiotropium.

Use the HandiHaler "Trainer" on the Bulletin Board To practice.

Special Considerations: Per our P & T committee policy
"It may only be used in stable pulmonary patients or in patients near discharge with COPD or emphysema. Tiotropium (Spiriva®) will be automatically discontinued if ipratropium (Atrovent®) is ordered and vice versa since there is no rational reason for concurrent administration"
Pharmacy will be responsible for monitoring orders. Thus, they will control the drug as they do Serevent disc-halers. We will not store it in our department. Pharmacy will send the 6 day dose pak with the Handihaler device to the patient's unit. The RT will educate the patient and delivery treatments while patient is here. Upon discharge, as with the Serevent, we are not allowed to give the remainder of the meds to the patient to take home (that's illegal). The nurse should send them back to Pharmacy. The patient may, however, take home their Handihaler device as they may need it with their home prescription.

R.Milholen

REFERENCES:

1. *AARC Clinical Practice Guidelines, 1993.*
2. Medical Director and Department of Medicine clinical practice standards.
3. Pharmacy and Therapeutics Committee guidelines.

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