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TO: All Seattle Firefighter Paramedics

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SUBJECT: Guidelines For Therapy: Metered Dose Inhaler (MDI)

The purpose for these therapy guidelines is to:

1. Assure proper use of metered dose inhalers (MDI) for awake, cooperative patients with evidence of airflow obstruction.
2. Assure proper use of metered dose inhalers (MDI) for intubated patients with evidence of airflow obstruction.

COMMENTS:

Bronchodilator therapy using inhaled aerosolized medication is an important component of the treatment of asthma and of chronic obstructive airway disease. A wide range of drugs (including bronchodilators) may be administered as aerosols. In order to be effective, aerosols must overcome a series of filters protecting the respiratory tract and reach the lungs. The most efficient of these filters are located in the upper airways (mouth, nose, etc.). The receptor sites for beta agonist drugs are located in the small, conducting airways. Therefore, a sufficient quantity of the drug must be presented so that the upper airway filters are overwhelmed and the site of action reached.

Inhalation therapy offers several advantages over oral or IV therapy:

- Smaller doses of metered dose inhalers (MDIs) are usually as effective as IV medications.
- The onset of action for the MDI is rapid, (within 5 minutes and peaking by 15 - 20 minutes).
- The incidence of side effects is low.

Because only about 10% of the MDI dose penetrates the lung, extension devices or spacers are used to reduce the deposition of the aerosol molecule in the oropharynx and increase the deposition in the lung.

Although meter dose inhalers (MDI's) offer several advantages, the canisters themselves do have some limitations. After a single dose (1 puff) is administered, the medication and propellant require at least 20 -30 seconds to redistribute within the canister. When delivering consecutive puffs, using 2-3 alternating canisters provides adequate redistribution of medication and propellant within the canisters.

INDICATIONS:

1. The use of metered dose inhalers (MDI) is appropriate for patients with known COPD or asthma with acute exacerbations.
2. The use of metered dose inhalers (MDI) is appropriate for patients without known respiratory disease who exhibit expiratory wheezing.
3. The use of metered dose inhalers (MDI) is appropriate/indicated for patients with known respiratory disease with evidence of airflow obstruction who require endotracheal intubation in order to control the degree of respiratory failure.

CONTRAINDICATIONS:

1. The use of metered dose inhalers (MDI) is contraindicated in the patient whose airflow obstruction is due to an inhaled foreign body.
2. The use of metered dose inhalers (MDI) is contraindicated in the patient with airflow obstruction and an acute myocardial infarction.
3. MDIs are not used as first line drug in Congestive Heart Failure.

PROCEDURE:

1. Evaluate the patient for:
 - a. respiratory rate
 - b. pulse, blood pressure
 - c. expiratory wheezing
2. Contact the Medic-1 physician to discuss the patient's history, symptoms, and plan including the use of metered dose inhalers (Albuterol).
3. Initiate a Plan B (D5W) TKO. Connect patient to EKG monitor.
4. Select the MDI (Albuterol) and proper spacer.
 - a. Awake adult - able to use spacer: use Blue Aerochamber without the mask.
 - i. Deliver four (4) puffs of Albuterol at one (1) puff per breath. Use alternating canisters for each puff.
 - ii. Wait 2 - 3 minutes
 - iii. Repeat step a.i. until:
 - pulse rate increases by > 20% and remains elevated
 - arrhythmias or tremors develop
 - respiratory status improves
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 - b. Awake adult - unable to use spacer without mask, use Blue Aerochamber with mask.
 - i. Deliver four (4) puffs of Albuterol at one (1) puff per breath. Use alternating canisters for each puff.
 - ii. Wait 2 - 3 minutes
 - iii. Repeat step b.i. until:
 - pulse rate increases by > 20% and remains elevated
 - arrhythmias or tremors develop
 - respiratory status improves
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 - c. Awake child - use Orange Aerochamber, with the mask.
 - i. Deliver four (4) puffs of Albuterol at one (1) puff per breath. Use alternating canisters for each puff.
 - ii. Wait 2 - 3 minutes.
 - iii. Repeat step c.1. until:
 - pulse rate increases by > 20% and remains elevated
 - arrhythmias or tremors develop
 - respiratory status improves

d. Intubated patients - connect the White Aerovent chamber to endotracheal tube (ETT) and ventilation bag.

i. Deliver ten (10) puffs of Albuterol at one (1) puff per ventilation. Using alternating canisters per puff.

ii. Wait 2 to 3 minutes.

iii. Repeat step d.i. until:

- pulse rate increases by 20% and remains elevated
- arrhythmias or tremors develop
- respiratory status improves

****Note:** The ventilation rate of an intubated asthmatic or COPD patient should not exceed 10 breaths per minute. (Excessive ventilation can result in hypotension or barotrauma!)

e. Document the number of puffs of Albuterol and the time delivered on the flow sheet of the Form 20B.

5. Consider administration of Aminophylline, 50-250mg IV at 25mg/minute if respiratory distress continues.