Inhalation Injury Aerosol Treatment Protocol (Small Volume Nebulizer)

Purpose

To standardize the delivery of inhalation injury aerosol drug therapy via small volume (hand-held) nebulizer.

Policy

Respiratory Care Services will provide equipment and therapy for the aerosolization of pharmacological agents to maintain airway patency and provide clearance of retained secretions.

Accountability/Training

- All Respiratory Care Services Clinical Personnel.
- Training must be equivalent with the minimal technician entry level in the Respiratory Care Service with understanding of age specific requirement of the patient population being treated.

Physician's Order

The written physician's order must specify inhalation injury protocol:

Dosage and Administration:

- Nebulize 10,000 units of heparin and 3 cc's of normal saline every 4 hours times seven days. Alternating with 3-5 cc's of mucomyst (acetylcysteine) every 4 hours (This will result in the patient receiving nebulizations treatments every 2 hours for 7 days).

Indications

Nebulization of Heparin and mucomyst (acetylcysteine) is indicated as an adjunctive therapy for patients with abnormal, viscid, or inspissated mucous secretion following inhalation injury.

Goals

- **Heparin**: Aid in the inhibition of fibrin cast formation and reduction of free radical ions. Heparin has been shown to decrease the respiratory rate necessary to maintain normocarbia owing to a reduction in fibrin cast formation and resultant reduction of airway obstruction.

- **Acetylcysteine/mucomyst**: has shown to aid in reducing accumulation of airway secretions, with concomitant improvement in pulmonary function, gas exchange and prevent of recurrent respiratory infection and airway damage.

Contra-indications

Adverse side effects of medications:

- **Heparin:**
  - Preexisting bleeding tendency
  - Threatened abortions
  - Subacute bacteria endocarditis

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- Suspected intracranial hemorrhage
- Inaccessible ulcerative lesions
- Heparin sensitivity
- Shock

- **Acetylcysteine/mucomyst:**
  - **Mucomyst:** is contraindicated in those patients who are sensitive to it.

Equipment

- Small volume Nebulizer Kit (includes small volume nebulizer with T-piece, vinyl tubing and flex tubing.
- Mouthpiece, tracheostomy mask, T-piece, face tent, or aerosol mask.
- Appropriate flow meter.

Procedure

Step	Action
1	Check physician's order sheet. Verify patient ID
2	Wash hands.
3	Explain purpose of therapy and procedure to the patient.
4	Plug flow meter into 50psi wall outlet (or use portable compressor).
5	Attach T-piece to top of nebulizer.
6	Attach one end of the vinyl tubing to the nipple adapter of the flow meter. Attach other end of tubing to nipple adapter on the bottom of nebulizer.
7	Add proper mediation to small volume nebulizer.
8	Attach mouthpiece to one end of nebulizer T-piece and the flex tubing to the other end of the T-piece.
9	If using alternate appliance (i.e., Trach mask, aerosol mask) connect appliance to top of nebulizer.
10	Position patient in semi-Fowler's sitting position as tolerated.

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11	Monitor patient's respiratory rate and pulse prior to beginning treatment and auscultate the patient's chest.
12	Turn on flow meter to 5-7 lpm.
13	Begin treatment. • If using a mouthpiece, have patient place mouthpiece on top of tongue, holding it gently between the teeth with lips sealed around it. If patient is alert but unable to make a seal, use lip seal and/or nose clips. • If an aerosol mask is necessary, gently extend patient's head and bring mask down over nose, then lower over mouth. • If patient is intubated or trached, attach adapter to tube or use trach collar.
14	When administering therapy to a patient on mechanical ventilation attach the small volume nebulizer in-line using a spring loaded “In-Line NebTee™ “ with valve.

Procedure Continued

Step	Action
14 Continued	With the inspiratory side of the circuit, proximal to the patient wye. Power the nebulizer via vinyl tubing connected to the oxygen flow meter. Remove set-up form circuit when treatment is completed.
15	Instruct patient to take slow deep breaths during course of treatment with a 3-5 second inspiratory hold, if tolerated.
16	Monitor patient's RR and pulse during and after treatment and notify physician of any significant changes.
17	Encourage any spontaneous cough during treatment and ask patient for voluntary cough following treatment. Note patient's effort and sputum production.
18	Auscultate the patient chest.
19	To reduce the incidence of pneumonia and other respiratory tract infections; discard remaining contents of solution in nebulizer, rinse nebulizer with sterile

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	water and dry. * NOTE: In lieu of using sterile water to rinse nebulizers after each treatment it is recommended that we follow Epidemiology recommendations, which recommends using a single use alcohol swab to wipe out each nebulizer in-between treatments please allow SVN to dry before putting away.
20	Place equipment in patient plastic equipment bag.
21	Chart RCS treatment card and RCS patient flow sheet on chart per RCS Policies # 7.1.1 and # 7.1.2.

Discontinuation of Orders

The patient will be evaluated after every treatment. A complete pulmonary assessment will be done every 72 hours or as indicated. Based on the assessment the therapist will write a SOAP note and make recommendations for changes in therapy or discontinuance as needed.

Undesirable Side Effects

Heparin:

- Decreased clotting times
- Severe asthma
- Giant urticaria
- Rhinitis
- Lacrimation
- Fever
- Drug re-concentration.

Mucomyst:

- Airway obstruction resulting from the swelling of dried, retained secretions that result in partially plugged airways.
- Bronchospasm from the aerosol droplets and certain medications, i.e., mucomyst.
- Drug re-concentration.

Assessment of Outcome

The effectiveness of small volume aerosol treatment will be judged on how well it accomplishes the stated clinical goals. Observation of the following should be noted on the RCS flow sheet and in the patient progress notes. Includes, but is not limited to:

- Sputum - color, amount, consistency.
- Auscultation - comparison of pre- and post-treatment breath sounds;

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breath sounds improved.

- Arterial blood gas measurement and/or pulse oximetry.
- Work of breathing - evaluating the ventilatory pattern, use of accessory muscles; decreased WOB.
- Color – presence of cyanosis.
- Patient's subjective response ("breathing easier").
- FEV_1/FVC and/or peak flow improvement. (If ordered, measured before and after treatment), and
- SpO2

Patient Teaching

Step	Action
1	Explain to the patient why he/she is receiving small volume aerosol treatment. Relate it to the disease or injury state.
2	Instruct proper body alignment for maximal breathing efficiency.
3	Proper cough instruction or cough assistance.
4	Instruct patient to breathe through the mouth or trach and to breathe slowly and deeply - a slight inspiratory pause is ideal.
5	Instruct patient to breathe diaphragmatically to assure that the maximum distribution and deposition of aerosol will occur in the basilar areas of the lung.
6	Alert patient to possible onset of strong cough.
7	As a result of the educational aspects of this therapy, the patient should be able to verbalize and demonstrate understanding of this therapy.

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Infection Control

Follow procedures outlined in Healthcare Epidemiology Policies and Procedures #2.24; Respiratory Care Services http://www.utmb.edu/policy/hcepidem/search/02-24.pdf.

Safety

- Instruct patient and visitors in safety rules for oxygen.
- Safety guidelines as outlined in section 3.6 of this manual will be followed.

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