

## **CONTINUOUS MEDICATED AEROSOL (NEBULIZED) THERAPY**

**PURPOSE:** To uniformly deliver medication to the airways to reduce the incidence of bronchospasm that remains uncontrolled between intermittent therapies.

**CRITERIA FOR USE:**

1. Utilized when conventional bronchodilator therapy fails in refractory or status asthmaticus cases.
2. Not for prophylactic use.

**HAZARDS/COMPLICATIONS:**

- A. Bronchospasm (hypersensitive airways)
- B. Hyperventilation
- C. Dizziness, tingling of face and fingers, nausea or vomiting.
- D. Tachycardia

**PHYSICIAN ORDER:**

- A. Specify frequency
- B. Specify FI02. If not stated, all patients receiving supplemental O2 will receive treatments with oxygen.
- C. Specify medication dosages, including the diluent.
- D. Specify other treatments modalities if desired.

**PROTOCOL FOR ADMINISTRATION AND FOLLOW UP:**

- A. Instruction will be given concerning therapy. Performance, goals and individual patient needs will be evaluated:
- B. Continuous therapies will be monitored on a Q4 hour basis.

**EVALUATION OF EFFECTIVENESS:**

- A. Improved cough mechanism and removal of secretions.
- B. Improved air movement and decrease in shortness of breath and bronchospasm.
- C. Improved gas exchange.

**EQUIPMENT:**

- A. CONTINUOUS MEDICATED AEROSOL THERAPY (NONINTUBATED)
  1. Hudson 1770 Large Volume Nebulizer or Heart by Vortran
  2. Large bore corrugated tubing
  3. Aerosol mask
  4. Air-oxygen blender
  5. Oxygen analyzer
  6. Stethoscope
  7. Medications
- B. CONTINUOUS MEDICATED AEROSOL THERAPY (INTUBATED)
  1. MiniHeart 100611 Nebulizer
  2. 22mm Connector
  3. Tee piece
  4. Oxygen Flowmeter/Oxygen Blender
  5. Stethoscope
  6. Medications.

**PERSONNEL:**

1. RRT 1 AND RRT 2
2. CRTT 1 AND CRTT 2

PROCEDURE:

GENERAL - FOR ALL MEDICATED AEROSOL THERAPIES:

1. Verify written physician order.
2. Review patient's chart for the following:
  - a. Admitting or most recent updated diagnosis
  - b. Progress notes
  - c. Nursing notes
  - d. Review lab data and x-ray findings
  - e. Respiratory Progress notes:
3. Time of last therapy
4. Patient tolerance and performance
5. Physician assessment
6. Special needs and considerations
7. Approach and inform patient of the purpose of visit
  - a. Identify self and department
  - b. Identify patient by comparing hospital and billing numbers on the armband to those on the physicians' orders for therapy.
  - c. Educate and inform patient/family of therapy procedure and answer all questions pertinent to therapy.
8. Wash and dry hands before continuing therapy session. Utilize appropriate personal protective equipment. Universal Precautions are observed.

*CONTINUOUS MEDICATED AEROSOL THERAPY (NONINTUBATED)*

1. Mix medications in the continuous nebulizer:

**In the Hudson 1770 nebulizer for an 8 hour treatment as follows:**

  - a. Aseptically place bronchodilator in reservoir to run for 8 hours (I.E. 2.5mg Prov/hr X 8 hrs = 20mg Prov or 4cc of 5mg/cc strength)
  - b. Aseptically fill the reservoir to a total of 152cc with normal saline. (With the flowmeter set at flush, the maximum flow will be 12 Lpm. The Hudson 1770 nebulizer produces 19 cc/hr output at this setting. Therefore, 19cc X 8 hrs = 152cc total solution.)

**In the Heart Nebulizer by Vortran Medical Technology, Inc.:**

  - a. Aseptically place bronchodilator in reservoir to run for 4 hours (ex. 5mg/hr of Prov X 4 hr = 20mg Prov / 5mg/cc = 4cc Prov)
  - b. Aseptically fill the reservoir to a total volume of 200cc with normal saline. (With the flowmeter at 15 LPM, the Heart nebulizer output is 50cc/hr. Therefore, 50cc/hr X 4hrs = 200cc total solution). The difference between the total solution and the volume of Proventil is the amount of normal saline to be added.
2. Connect the 1770 nebulizer (or Heart by Vortran) to blender flowmeter, set the oxygen concentration and verify with analyzer.
3. Assemble large bore corrugated tubing (length should be as short as possible) and aerosol mask and connect to nebulizer.
4. Turn flowmeter on to flush (the medication flow will be set to 12 LPM).
5. Place mask on patient and verify that flow and aerosol output are adequate.
6. Monitor heart rate, respiratory rate and, if available, SaO<sub>2</sub>.
7. Age appropriate considerations include choosing an appropriate fitting mask for adult versus pediatric use.
8. Discard PPE. Wash hands after patient contact.
9. Document as per department guidelines.

*CONTINUOUS MEDICATED AEROSOL (INTUBATED)*

1. Aseptically place the appropriate amount of drug in the nebulizer in order to deliver a 4-hour dose. (Example: For 2.5mg/HR of albuterol, place 2cc of 5mg/cc albuterol in nebulizer.)

2. Place normal saline in nebulizer with the medication to give a total amount of 32cc of solution. (The MiniHEART 10061 nebulizer produces 8cc/HR output at a flowrate of 2 Lpm.)
3. Assemble the nebulizer, 22mm connector, and T-piece.
4. Attach the nebulizer to an oxygen blender, set at the same FiO2 as the ventilator, and adjust flowmeter to 2Lpm. Observe that the medication is being nebulized adequately.
5. Calculate the circuit charging volume as follows:
  - $30 \text{ ml/sec} \times \text{exp. time} = \text{circuit charging volume}$
  - 30 ml/sec is the unit charging volume of the MiniHEART 100611 nebulizer at a flowrate of 2Lpm.
  - $\text{Exp. Time} = \text{resp cycle time} - \text{insp. time}$   
 $(60\text{sec} / \text{RR}) - [(60\text{sec} / \text{masterRR}) \times (\text{insp}\% + \text{pause}\%)]$
6. If non-continuous flow ventilation is being used, place the nebulizer in the insp. circuit, a distance equal to the calculated volume proximal to the patient Wye connector. (One 6-inch section of adult corrugated tubing equals approximately 50cc) (1cm of Tygon tubing equals approximately 1.5cc).
7. If continuous flow ventilation or flow sensitivity is being used, attach the nebulizer to the ET-Tube and connect a length of tubing equal to the calculated circuit charging volume between the nebulizer and the Wye connector. (One 6-inch section of adult corrugated tubing equals approximately 50cc) (1cm of Tygon tubing equals approximately 1.5cc). **See Fig. 1 (attached)**

**WARNING:** Use of excess charging volume in this setup will create deadspace and may cause CO<sub>2</sub> retention.

8. Verify ventilator operation and assess the patient.

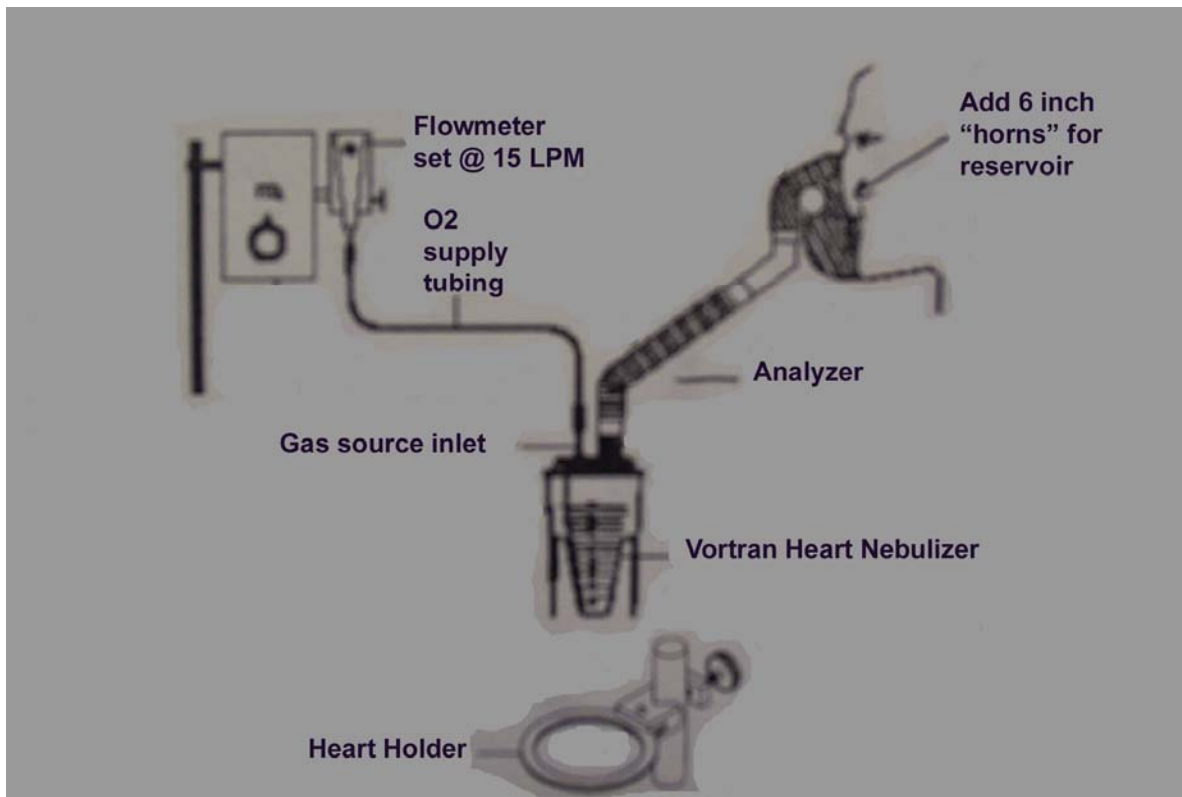
NOTE: Expiratory volume readings and ventilator sensitivity will be affected and may require adjustment. Continuous aerosolization may affect the exp. flow transducer, therefore, double exp. filters shall be used and changed Q2 hours.

9. Discard PPE and wash hands after patient contact.
10. Document procedure as per department guidelines.

#### REFERENCES:

1. *AARC Clinical Practice Guidelines*, 1993.
2. Burton, Gee, Hodgkin, **Respiratory care**, 1977
3. Vortran Medical Technology, Sacramento, CA
4. Hudson RCI, Temecula, CA

Revised: 1988, 1989, 1990 1991, 1992,  
1993 1995  
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**Example for Continuous Xopenex:**

**1.25mg/hr = 1 vial of 1.25 mg per hour**

**4 hour therapy = 4 vials, fill to 200cc mark with NS**

**2.5mg/hr = 8 vials of 1.25mg + NS to 200cc mark**

Figure 1

