

# MACS

## Mask CPAP System

### MACS® CPAP Sample Protocol

Continuous Positive Airway Pressure (CPAP) has been shown to rapidly improve vital signs, gas exchange and the work of breathing while decreasing the sense of dyspnea. Mask CPAP supports patients in respiratory distress who would otherwise require intubation. CPAP can decrease the need for endotracheal intubation in patients who suffer from shortness of breath related to congestive heart failure (CHF), acute cardiogenic pulmonary edema or acute respiratory failure (ARF). In patients with CHF, CPAP improves hemodynamics by reducing preload and after-load.

**Indications:** Dyspnea / Hypoxemia secondary to;

- Congestive heart failure
- Acute cardiogenic pulmonary edema
- Pneumonia
- Chronic obstructive pulmonary disease (asthma, bronchitis, emphysema)
- Trauma related to acute respiratory failure
- Near drowning

For safe application of Mask CPAP patient should be:

- Awake and oriented
- Ability to maintain an open airway (GCS>10)
- Respiratory rate greater than 25 breaths per minute
- Systolic blood pressure above 90 mmHg
- Use of accessory muscles during respirations
- Any patient who is complaining of shortness of breath for reasons other than pneumothorax.

**Contraindications:** Patient conditions which may eliminate Mask CPAP application;

- Respiratory arrest
- Suspected of having a pneumothorax
- Inadequate respiratory effort or agonal respirations
- Unconscious
- Shock associated with cardiac insufficiency
- Penetrating chest trauma

Precaution should be taken with patient who:

- Has impaired mental status and is not able to cooperate with the procedure
- Has active upper GI bleeding or history of recent gastric surgery
- Complains of nausea or vomiting
- Has excessive secretions

### **Clinical Procedure:**

The **MACS** CPAP System is intended for use by properly trained personnel under the direct supervision of licensed medical Physician or Practitioner only. Personnel must become thoroughly familiar with the Operators Manual prior to using the **MACS** CPAP System on a patient.

This protocol / clinical procedure serves as a reference. The instructions in this protocol are not intended to supersede the physician's instructions regarding the use of the **MACS** CPAP System.

#### Prepare MACS CPAP for patient use;

1. Attach patient circuit to MACS CPAP System
2. Attach high pressure oxygen hose from rear panel on MACS to power takeoff of oxygen cylinder regulator
3. Set Oxygen control to 65%
4. Set CPAP level to 5 cm H<sub>2</sub>O and prepare to titrate to patient needs

#### Complete patient set-up procedure;

1. Assess patient for signs / symptoms of pneumothorax
2. Place patient in a sitting position
3. Attach heart monitor and pulse oximeter
4. Assess vital signs and SpO<sub>2</sub> q5 min
5. If BP <90 mm Hg systolic contact Medical Control prior to beginning CPAP
6. Explain the procedure to the patient:
  - a. Patient may benefit from holding the mask
  - b. Patient may require "verbal sedation" to be used effectively. Example: "You are going to feel some pressure from the mask but this will help you breath easier."
7. Turn on oxygen at the tank
8. Place mask over patient mouth and nose for a snug fit
  - a. Secure the mask with the head strap as patient gains confidence and tolerates therapy
  - b. Check around the mask for leaks and adjust appropriately. Minimize leaks into the eyes.
  - c. Instruct patient to breath in through their nose slowly and exhale through their mouth
9. Adjust CPAP level and oxygen control on MACS as needed
  - a. For CHF / Pulmonary Edema titration to 10 cm H<sub>2</sub>O may be indicated within a short period of time for patient benefit
  - b. For all other conditions of shortness of breath 5 cm H<sub>2</sub>O may be adequate
  - c. Use manometer to monitor patient effort and CPAP delivery
  - d. Monitor SpO<sub>2</sub> q5 min. If less than 95%, contact Medical Control to increase Oxygen setting to 100%
10. Treatment should be given continuously throughout transport to ED
11. Continue to coach patient to keep mask in place and readjust as needed
12. If respiratory status / level of consciousness deteriorate, remove device and consider bag valve mask ventilation and / or endotracheal intubation

Documentation on the patient care record should include:

1. CPAP level → (5 cm H<sub>2</sub>O – 10 cm H<sub>2</sub>O)
2. F<sub>i</sub>O<sub>2</sub> → (65% or 100%)
3. SpO<sub>2</sub> q5 minutes
4. Vital Sign q5 minutes
5. Response to treatment
6. Any adverse reactions

**Special Notes:**

1. Advise receiving hospital as soon as possible so they can prepare for the patient's arrival
2. Do not remove CPAP until hospital therapy is ready to be placed on the patient
3. Monitor patient for gastric distension which may lead to vomiting
4. Use nitroglycerine tablets to avoid nitroglycerine spray from being dispersed on patient / EMS crew
5. Nebulized medication for respiratory symptoms may be administered inline with the patient circuit. Place the nebulizer inline on the patient side of the exhalation valve.
6. To turn off the MACS, set the CPAP level to zero, disconnect the oxygen supply hose from the source or turn off the oxygen cylinder.

**MACS General Description:**

**MACS** is an all pneumatic device. Electrical power is not required for operation. **MACS** has been specifically designed for patient support by trained Emergency Medical Professionals, Respiratory Therapists, nurses and physicians, both in the prehospital and hospital environment. It may also be used at the accident scene, during intra and inter-hospital transport, in aircraft, on ambulances, and in emergency rooms. **MACS** can be applied to the patient using:

1. The mask that is included with the Airon Corp patient circuit
2. Any single port BVM resuscitator mask of an appropriate size
3. Properly placed endotracheal tube
4. Properly placed tracheostomy tube

**References** This sample protocol is based in part on the following protocols publicly available on the internet

- CPAP Protocol, Racine Area EMS, Racine, Wisconsin May 2007
- Continuous Positive Airway Pressure (CPAP), Ohio Emergency Medical Services, 2007