



**REGION 11  
CHICAGO EMS SYSTEM  
PROCEDURE**

Title: Continuous Positive Airway Pressure (CPAP)

Section: Airway Management

Approved: EMS Medical Directors Consortium

EMS Level: ALS

## **CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP)**

Continuous Positive Airway Pressure (CPAP) may be used as an adjunctive therapy for the treatment of patients with suspected Acute Pulmonary Edema, Chronic Obstructive Pulmonary Disease (COPD) or Asthma who present in **MODERATE to SEVERE** respiratory distress:

### INDICATIONS

- Pulse Ox less than 92%
- Respiratory rate greater than 25
- Accessory muscle use

Suspect Acute Pulmonary Edema, COPD or Asthma as the cause of respiratory distress in patients with:

- History of CHF/MI, COPD or Asthma
- Orthopnea
- On medications for CHF (furosemide, digoxin, ace inhibitor)
- Pulmonary rales, crackles
- Wheezing
- Lower extremity edema
- Jugular Venous Distension
- STEMI confirmed by 12 lead ECG

### CONTRAINDICATIONS

- Age less than < 10 years
- Inability to protect airway, significantly altered mental status.
- Hemodynamic instability:
  - a. Systolic blood pressure less than 100 mmHg
  - b. Significant arrhythmia (i.e. ventricular tachycardia, 3<sup>rd</sup> degree heart block)
- Inability to cooperate with fitting and wearing of mask
- Rapid deterioration once mask is placed
- Known or suspected pneumothorax
- Recent gastric, laryngeal, esophageal surgery
- Significant nausea and vomiting.

### EQUIPMENT

- Boussignac CPAP system or the Flow Safe II EZ CPAP system (private providers may use ventilator based system)
- Appropriate sized mask:
  - a. Boussignac – Size 5 medium (adult)
  - b. Flow Safe II EZ – Size large
- Oxygen tank with flow regulator able to generate 25 liters/min flow rate.
- D-tank must have a minimum of 2,000 psi.



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## **BOUSSIGNAC CPAP SYSTEM**

### PROCEDURE

1. Initiate RMC.
2. Explain procedure to patient (i.e. *"I am going to put this mask on your face to help you breath. Try to relax and breathe normally"*).
3. Prepare CPAP system equipment:
  - Insert white end of CPAP system into face mask
  - Connect funnel end of green O2 tubing to oxygen source
  - Turn on O2 and dial flow meter to desired setting (begin with 15 liters per minute (LPM) equaling CPAP of 5.0)
4. Prepare patient:
  - Place in fowler's or semi-fowler's position
  - One crew member gently place mask on patient's face obtaining a proper seal without leaks.
  - Second crew member secure mask to patients face with head strap.
5. Titrate CPAP:
  - Increase flow meter to 25 LPM equaling CPAP of 10 (see tables 1 and 2)
  - Reassess patient for mask seal and ability to cooperate/tolerate mask
  - If patient is unable to tolerate, decrease flow rate to 20 LPM and reassess
  - Continue close monitoring of patient with goal of:
    - i. Decreased heart rate
    - ii. Decreased respiratory rate/effort
    - iii. Improved oxygen saturation
6. Indications for discontinuation of CPAP (Place on 100% oxygen NRB mask):
  - Rapid deterioration (proceed to Advanced Airway Management procedure as indicated)
  - Inability to cooperate with wearing and fitting of mask
  - Hypotension (SBP less than 100 mmHg)
  - Worsening hypoxia (decrease in O2 saturations %)
  - Vomiting or inability to handle secretions
  - Suspected pneumothorax
  - Base station discretion



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**TABLE 1:** Liters of O<sub>2</sub> Flow = CPAP cm H<sub>2</sub>O

Flow (LPM)	CPAP (cm H <sub>2</sub> O)
10	2.5-3.0
15	4.5-5.0
20	7.0-8.0
25	8.5-10
>25	>10

**TABLE 2:** Minutes of CPAP use based on Oxygen Tank Size

Flow (LPM)	D Tank (minutes)	K Tank (minutes)
5	70	703
6	58	598
8	44	498
10	35	374
12	29	299
15	23	199
20	16	175
25	14	140



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## FLOW-SAFE II EZ CPAP System

PROCEDURE

1. Initiate RMC.
2. Explain procedure to patient (e.g. *"I am going to put this mask on your face to help you breath. Try to relax and breathe normally"*).
3. Prepare CPAP system equipment:
  - Connect oxygen tubing to flow meter or regulator.
  - Turn on O2 and dial flow meter to desired setting: begin with 8-9 liters per minute (LPM) equaling CPAP of 5.0
  - Adjust oxygen flow as indicated on yellow sticker attached to oxygen tubing. ***\*Manometer will not register until placed on patient***
4. Prepare patient:
  - Place in fowler's or semi-fowler's position
  - One crew member gently place mask on patient's face obtaining a proper seal without leaks. Place mask on patient's face and adjust with Velcro strap on each of 4 points.
  - Quick release clips allow fast access to remove mask.
  - Spring action forehead pads allow for adjustment of mask on bridge of nose.
  - Second crew member secure mask to patients face with head strap.
5. Titrate CPAP:
  - Increase flow meter to 13-14 LPM equaling CPAP of 10.0 (see table 3 below)
  - Reassess patient for mask seal and ability to cooperate/tolerate mask
  - If patient is unable to tolerate, decrease flow rate to 10-12 LPM and reassess
  - Continue close monitoring of patient with goal of:
    - i. Decreased heart rate
    - ii. Decreased respiratory rate/effort
    - iii. Improved oxygen saturation

**TABLE 3: CONNECT TO FLOW SOURCE ONLY**

CPAP Pressure (cm H2O)	Flow (LPM) Nebulizer Off	Flow (LPM) Nebulizer On
5.0	8 - 9	15 – 16
7.5	10 - 12	19 – 20
10.0	13 - 14	24 – 25
13.0 (Max)	FLUSH	28 - 30

**CAUTION:** CPAP pressure will decrease when nebulizer is activated and increase when nebulizer is deactivated. Verify CPAP pressure with manometer and adjust flow meter as needed.



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## **FLOW-SAFE II EZ CPAP WITH NEBULIZER**

**\*\*Only one oxygen source is necessary since the nebulizer portion is built into Flow-Safe II EZ CPAP System\*\***

6. Place medication in medication bowl.
7. Turn nebulizer switch to green (on). (see picture)
8. Adjust oxygen flow to maintain desired pressure:
  - Turning the switch to green will reduce pressure requiring an increase in oxygen flow to maintain original pressure.
  - For CPAP Pressure of 5.0, increase flow to 15-16 LPM
  - For CPAP Pressure of 10.0, increase flow to 24-25 LPM



9. Indications for discontinuation of CPAP (Place on 100% oxygen NRB mask):
  - Rapid deterioration (proceed to Advanced Airway Management procedure as indicated)
  - Inability to cooperate with wearing and fitting of mask
  - Hypotension (SBP less than 100 mmHg)
  - Worsening hypoxia (decrease in O<sub>2</sub> saturations %)
  - Vomiting or inability to handle secretions
  - Suspected pneumothorax
  - Base station discretion