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CPAP

C*ontinuous*

P*ositive*

A*irway*

P*ressure*

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What is CPAP?

Continuous Positive Airway Pressure (CPAP) is a non-invasive method to provide respiratory support to certain patients. CPAP has been shown to rapidly improve vital signs, gas exchange, the work of breathing, decrease the sense of dyspnea, and decrease the need for endotracheal intubation in patients who suffer from shortness of breath from Congestive Heart Failure (CHF) and Acute Pulmonary Edema (APE).

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Key Points of CPAP

- CPAP has been successfully demonstrated as an effective adjunct in the management of Pulmonary Edema secondary to CHF

- CPAP allows/buys time for administered medications to be able to work

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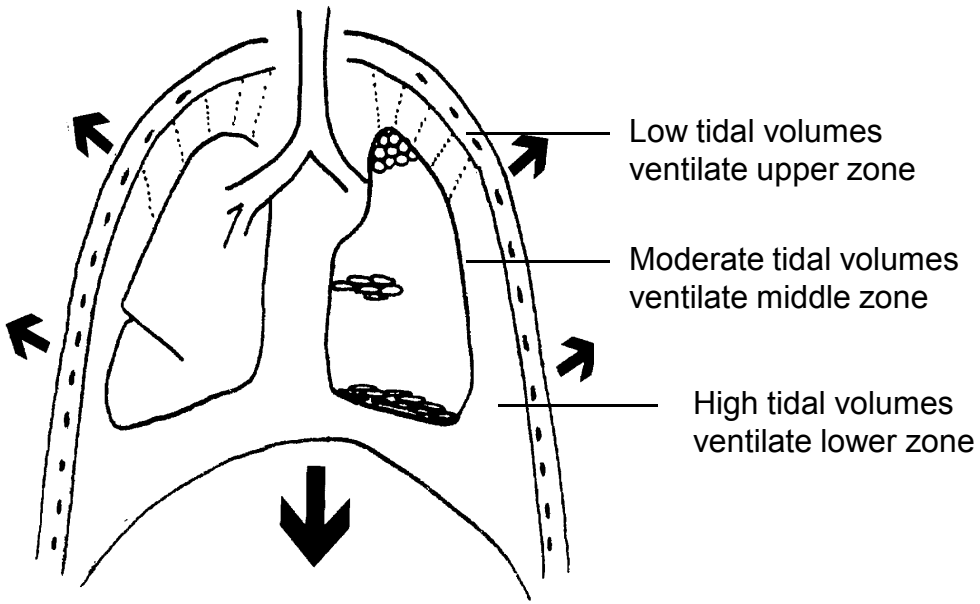
Lung Inflation

CPAP works by providing increased continuous gas pressures at the level of the *lower* airway structures, improving gas exchange in the alveoli



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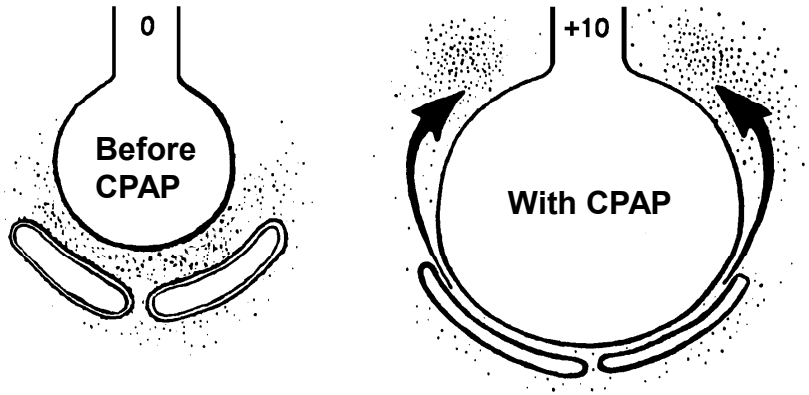
CPAP Mechanism

- CPAP increases the airway pressures allowing for better gas diffusion & for re-expansion of collapsed alveoli
- CPAP allows the refilling of collapsed, airless alveoli
- CPAP expands the surface area of the collapsed alveoli allowing more surface area to be in contact with capillaries for gas exchange



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Goal of Therapy With CPAP

- Increase the amount of inspired oxygen
- Decrease the Work of Breathing (WOB)

In turn to:

- ❖ Decrease the need for intubation
- ❖ Decrease the hospital stay
- ❖ Decrease the mortality rate

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Contraindications

- O2-RESQ System
  - Pneumothorax
  - Decreased cardiac output and gastric distention
  - Severe facial injury (noninvasive use)
  - Respiratory Arrest
  - Hypotension secondary to Hypovolemia
- Always follow local established protocol

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The Requirements of CPAP

- The real requirement is for Continuous ***CONSTANT*** Positive Airway Pressure with *minimal* fluctuations in system pressure between inspiration and expiration

- The CONSTANT pressure will help reduce the patient WOB, which is important since it reduces the resistance to airflow that is present in lung disease

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O2-RESQ™ SYSTEM

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O2-RESQ SYSTEM

- Fixed Flow Generator with filter
- 72” Corrugated Anti-Asphyxia Circuit
- O2-CPAP™ Valve
- Mask & Head Strap
- Single Patient Use

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High Flow Generator

- O2-RESQ Generator is a fixed flow Venturi device that uses an oxygen supply in conjunction with entrained air to generate an output flow
  - Venturi tube ratio of approx. 10:1
  - Flow up to 140 Lpm and 30% FiO_2
- O2-RESQ Generator with DISS fitting hooks up to a 50psi Oxygen source
- Built in filter to protect device

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O2-CPAP Valve & Anti-Asphyxia Valve

- O2-CPAP Valves provide fixed pressure at any flow rate
  - Ensure that valve remains open during inspiration
- O2-CPAP Valves are attached onto the elbow of the circuit
- 5.0, 7.5 & 10.0cm H_2O are the most commonly used pressures
- O2-CPAP Valves can be easily changed to another pressure
  - 2.5, 5.0, 7.5,10.0,12.5,15.0, 20.0cm H_2O
- Circuit has an Anti-Asphyxia valve which allows fresh air intake and prevents exhalation into the tubing in the event of no fresh gas flow

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O2-RESQ Face Mask Options

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SealMask™ and Head Strap

- SealMask
  - Comes with a Standard Non Adjustable Foam Forehead Pad
  - Has a single lip ribbed thermoplastic cushion for a comfortable low pressure seal
  - Three sizes available:
    Large, Medium, & Small

- Head Strap
  - Attachment for Mask Posts
  - Dual Positioning Tabs

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AirMask™ and Head Strap

- AirMask
  - Comes with a Standard Non Adjustable Foam Forehead Pad
  - Utilizes a BVM style bladder cushion for a comfortable low pressure seal
  - Three sizes available:
    Large, Medium, & Small

- Head Strap
  - Attachment for Mask Posts
  - Dual Positioning Tabs

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SoftMask™ and Head Strap

- SoftMask
  - Comes with a Standard Non Adjustable Foam Forehead Pad
  - Has a supple thermoplastic bladder cushion with valve for a comfortable low pressure adjustable seal
  - Three sizes available: Large, Medium, & Small

- Head Strap
  - Attachment for Mask Posts
  - Dual Positioning Tabs

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BiTrac ED™ Mask and Head Strap

- BiTrac ED™ Mask
  - Multi-positioning (up/down , in/out) OmniClip™ with Silicone Forehead Pad
  - Dual lip silicone cushion for excellent and comfortable low pressure seal
  - Four sizes available: X-Large, Large, Medium, & Small

- Head Strap
  - Attachment Clip to Mask
  - Dual Positioning Tabs

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BiTrac Shield™ ED Mask

- BiTrac Shield ED™ Mask
  - Single lip silicone face plate for comfortable low pressure seal
  - Excellent for patients with beards and facial issues
  - One size available: Adult

- Head Strap
  - Attachment Clip to Mask
  - Dual Positioning Tabs
  - Has a strap going the over the head to better position the mask

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O2-RESQ Accessories

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O2-RESQ CPAP Valves

- O2-CPAP Valves provide fixed pressure at any flow rate
- O2-CPAP Valves are attached onto the elbow of the circuit
- 5.0, 7.5 & 10.0cm H_2O are the most commonly used pressures
- O2-CPAP Valves can be easily changed to another pressure
  - Available pressures are:
  - 2.5, 5.0, 7.5,10.0,12.5,15.0, 20.0cm H_2O

Always ensure that the valve remains open during inspiration

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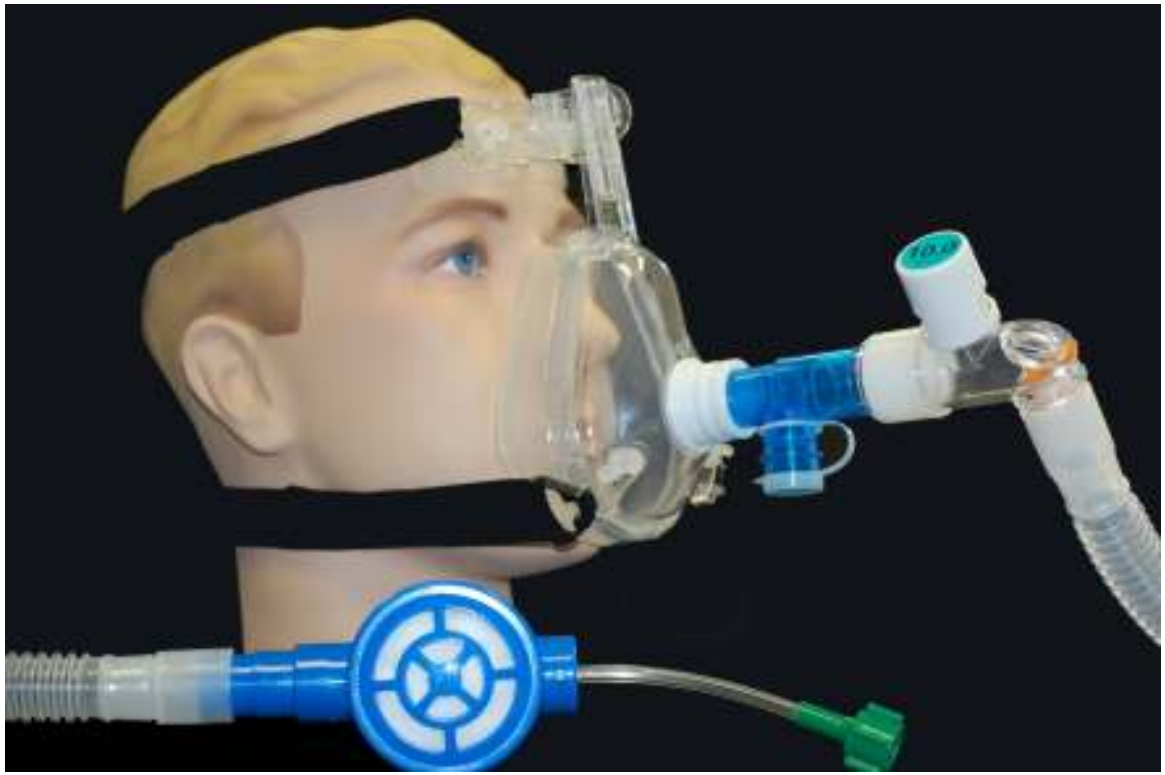
Valved “T” Adapter

The Valved “T” is an optional accessory used to attach a nebulizer into the O2-RESQ



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O2-RESQ Filter

- The O2-RESQ Filter is an optional accessory that reduces the risk of medic infections by filtering exhaled air from patient
  - Bacterial/Viral Efficiency 99.9999%
- Attach the Filter between the Circuit Elbow and the Mask

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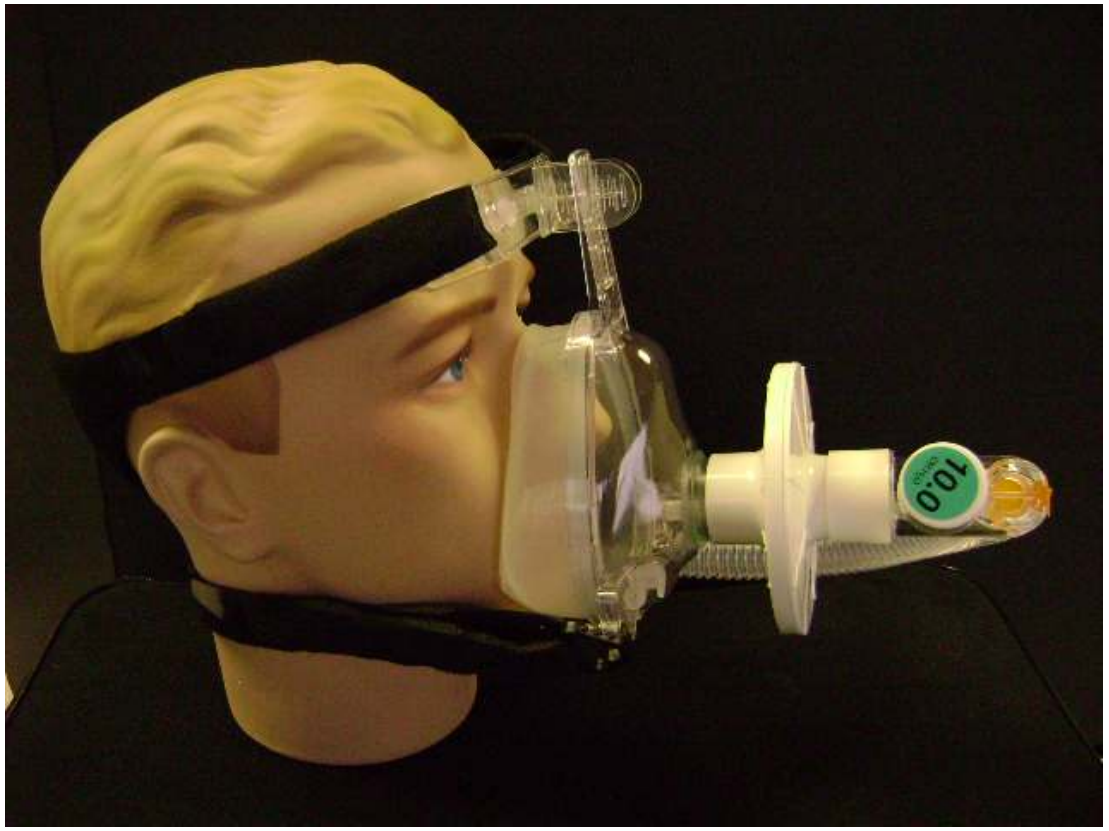
O2-RESQ Filter Position



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O2-RESQ Oxygen Hook Up

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O2-RESQ Connection to a Regulator

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Note: Regulator must be set to “0”

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Typical Flow Meter Connection

-Set Flow to Flush-

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"D" Cylinder O_2 Depletion Test Results

O2-RESQ vs. Boussignac

- **The elapsed time for the O2-RESQ to run a "D" cylinder completely empty when connected to the DISS fitting on a regulator is 28 minutes.**

- **The elapsed time for the Boussignac to run a "D" cylinder completely empty when connected to the nipple fitting on a regulator set to 25 LPM, is 14 minutes.**

Note: See discussions in the following slides for more information

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O2-RESQ “D” Cylinder Depletion Test Results

The elapsed time for the O2-RESQ to run a “D” cylinder completely empty when connected to the DISS fitting on a regulator is <u>28 minutes</u>.

Test set up:

A BiTrac ED non-vented full face mask was securely fastened to a plastic test fixture and checked for leakage. The mask was connected to the O2-RESQ 72” corrugated anti-asphyxia circuit and thus to the fixed flow O2-RESQ Generator. A 10cmH2O O2-RESQ CPAP valve was attached to the circuit elbow. CPAP levels were continuously measured via a pressure tap located on a plastic test fixture. Testing was conducted with the fixed Generator connected directly to the 50 psi DISS fitting on the oxygen “D” cylinder regulator. The supply valve was fully opened and timing was initiated. The initial CPAP level generated was 10.1 cmH2O. **<u>The CPAP level was stable at 10 cmH2O (+/- 0.2) throughout the test until the cylinder ran completely empty.</u>**

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Boussignac “D” Cylinder Depletion Test Results

The elapsed time for the Boussignac to run a “D” cylinder completely empty when connected to the nipple fitting on a regulator set to 25 LPM, is 14 minutes - * Boussignac information.

Note: ***Pulmodyne internal testing found that the initial CPAP level generated by the Boussignac product was only 8.2 cmH2O and decreased proportionately as the cylinder contents pressure decreased – approximately 0.3 – 0.4 cmH2O / 250 psi decrease in cylinder pressure. Measured CPAP pressure was approx. 6.3 cmH20 during the last 5 minutes of testing.***

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*Boussignac "D" Cylinder Depletion Test Results

Q: How long will a cylinder of O_2 last using the Boussignac CPAP System?

A: Based on the CPAP level administered (8.5 to 10.0 cmH_2O@ 25 lpm) and the corresponding flow rate required using the Boussignac CPAP System, the following chart provides the approximate time that a full cylinder will last:

Minutes of Oxygen by Cylinder Size All based on full 2200 PSI Cylinders

Flow	**D Cylinder**	**E Cylinder**	**MCylinder**
(LPM)	EMS Portable	EMS Portable	EMS Ambulances
5	70	123	703
6	58	102	598
8	44	77	498
10	35	61	374
12	29	51	299
15	23	41	199
20	16	29	175
25	**14**	23	140

This information is taken directly from the Bousssignac FAQ's found on www.vitaid.com

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Setting up the O2-RESQ System

Step 1 - Connect Generator directly to a 50psi Oxygen source on a Flow Meter or to a DISS fitting on an O2 tank regulator

Step 2

Remove the mask from Inner bag and attach the circuit to the mask. Turn on oxygen. Hand mask to patient for them to place on their face to get used to the flow. Then proceed to put the Head Strap on the patient.

Step 3

For all mask styles, Flip Head Strap forward and place mask on the patient's face. If using the BiTrac ED Mask, pinch the OmniClip, *slide it up or down* to find the best position on patient's forehead.

Step 4

For all mask styles, Flip Head Strap back over the patient's head, bring tabs forward on the top Head Strap and adjust equally to proper fit. Fold straps back to attach. Next attach the bottom 2 clips and repeat above sequence.

Step 5

Finally if using the BiTrac ED Mask, adjust the OmniClip *in and out* on Head Strap and Mask for best fit: <u>Do Not Over Tighten the Head Strap.</u> <u>Monitor the Patient.</u>

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Coaching The Patient

- Success is highly dependent upon patients tolerance and medics ability to coach the patient
  - Explain the procedure to the patient
  - Anticipate and control anxiety
    - CPAP may produce anxiety in some patients
    - Verbally coach breathing as needed
    - Consider having the patient hold the mask in place for a minute or so to reduce anxiety. As an option, the medic may hold the mask in place if a good seal is obtained.
  - Attach Head Straps loosely at first and gradually tighten until air leaks are eliminated
- Continue to coach patient

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CPAP vs. Intubation

- CPAP
  - Non-invasive
  - Easily discontinued
  - Easily adjusted
  - Use by EMT-B
  - Does not require sedation
  - Comfortable
- Intubation
  - Invasive
  - Usually don't extubate in field
  - Potential for infection
  - Requires highly trained personnel
  - Requires Sedation
  - Traumatic