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INLAND NORTHWEST HEALTH SERVICES

Continuous Positive Airway Pressure (CPAP)

For the Basic EMT



What is CPAP?

- Continuous Positive Airway Pressure (CPAP)
- A non-invasive alternative to intubation
- Does not require any sedation
- It provides comfort to the patient with acute respiratory distress by reducing work of breathing

Key Points of CPAP

- CPAP has been successfully demonstrated as an effective adjunct in the management of a variety of respiratory distress states.
- CPAP may prove to be a viable alternative in many patients previously requiring endotracheal intubation by prehospital personnel.

CPAP vs. Intubation

- | | |
|--|--|
| <ul style="list-style-type: none"> • CPAP <ul style="list-style-type: none"> – Non-invasive – Easily discontinued – Easily adjusted – Use by EMT-B – Does not require sedation – Comfortable | <ul style="list-style-type: none"> • Intubation <ul style="list-style-type: none"> – Invasive – Usually don't extubate in field – Potential for infection – Requires highly trained personnel – Can require sedation – Traumatic |
|--|--|

How does CPAP work

- Helps to splint the airways open, preventing collapse of alveoli
- Uses continuous oxygen flow with pressure to improve diffusion of oxygen into the blood
- Recruits alveoli that have collapsed

Benefits

- Decreases work of breathing.
- Improves oxygenation by increasing FRC with PEEP.
- Induces positive pressure in thorax with resultant decrease in preload of RV.

CPAP Mechanism

- Increases pressure within airway.
- Airways at risk for collapse from excess fluid are stented open.
- Gas exchange is maintained
- Increased work of breathing is minimized

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Indications

CPAP:

- Respiratory distress / hypoxemia secondary to CHF, acute pulmonary edema, pneumonia, asthma and/or COPD *without ventilatory failure*

BiPAP

- Respiratory distress/ hypoxemia secondary to CHF, acute pulmonary edema, pneumonia, asthma and/or COPD *with impending or existing ventilatory failure*

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Contraindications

1. unconscious
2. respiratory arrest
3. agonal respirations
4. pneumothorax
5. hypovolemic shock
6. acute MI with hypotension
7. chest trauma
8. persistent nausea/vomiting
9. active upper GI bleeding or recent history of gastric surgery
10. facial anomalies/stroke/facial trauma

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Risks

- Gastric distention, vomiting, aspiration
- Drying of secretions, mucus plugging
- Hypotension
- Pneumothorax
- Corneal drying

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Disease States Where CPAP May Be Indicated

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Pulmonary Edema/Congestive Heart Failure

- Defined
 - Fluid which collects in the lung tissue and alveoli
- Signs/Symptoms/Assessment
 - Anxious, Pale, Clammy, Dyspnea, Tachypnea, Confusion, Edema, Hypertension, Diaphoresis
 - Rales, Ronchi, Tachycardia, JVD, Pink Frothy Sputum, Cyanosis

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Pulmonary Edema/Congestive Heart Failure

- Signs/Symptoms/Assessment
 - Fatigue
 - Dyspnea on exertion
 - Orthopnea
 - Chest Pain?
 - Evaluate for MI

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Pulmonary Edema/Congestive Heart Failure

- Treatment
 - Focused history and physical exam
 - Complains of trouble breathing.
 - Airway control w/ adequate ventilation
 - Oxygenation (will have decreased SaO₂)

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Pulmonary Edema/Congestive Heart Failure

- What about nitro?
 - Does patient have Rx?
 - Facilitate administration of nitroglycerine
 - Consult medical direction.
- Baseline vital signs
- Reassess

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Chronic Obstructive Pulmonary Disease (COPD)

- Defined
 - Lung tissue loses elasticity secondary to destruction of the alveoli (Emphysema)
 - Inflammation of the bronchial tree. Diagnosed by productive cough which lasts at least three months a year for at least two consecutive years (Chronic Bronchitis)
 - COPD patients often have both

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Chronic Obstructive Pulmonary Disease (COPD)

- Signs/Symptoms/Assessment
 - Low exercise tolerance
 - Productive cough/wheezing
 - Minor hemoptysis
 - Accessory muscle use
 - Pursed lip exhalation
 - May have coarse crackles, wheezes or just diminished breath sounds
 - Barrel-chested

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Chronic Obstructive Pulmonary Disease (COPD)

- Signs/Symptoms/Assessment
 - Tachypnea, cyanosis, agitation, tachycardia, hypertension
 - Confusion, tremor, stupor, apnea

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Chronic Obstructive Pulmonary Disease (COPD)

- Treatment
 - Focused history and physical exam
 - Complains of trouble breathing.
 - Airway control w/ adequate ventilation
 - Oxygenation
 - Has a prescribed inhaler available.
 - Consult medical direction.
 - Facilitate administration of inhaler
 - Repeat as indicated.
 - Baseline vital signs.
 - Reassess

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Asthma

- Defined
 - Condition which causes the bronchi to constrict making it difficult to exhale (air trapping)
 - May be caused by allergic reactions and/or emotional distress
 - The most serious form, status asthmaticus, is a true life-threatening emergency

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Asthma

- Signs/Symptoms/Assessment
 - Dyspnea, chest tightness, wheezing, and cough
 - Obvious SOB, wheezing, accessory muscle use, paradoxical respirations, hyperresonance, prolonged expiration
 - Change in Mental Status: agitation, confusion, lethargy, exhaustion
 - Cardiac Arrhythmias

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Asthma

- Treatment
 - Focused history and physical exam
 - Complains of trouble breathing.
 - Airway control w/ adequate ventilation
 - Oxygenation
 - Has a prescribed inhaler available.
 - Consult medical direction.
 - Facilitate administration of inhaler
 - Repeat as indicated.
 - Baseline vital signs.
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Pneumonia

- Defined
 - Inflammation of both the bronchioles and alveoli
 - May be viral, bacterial, or fungal. Spread by droplets or contact with infected person
 - Common cause of death in North America

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Pneumonia

- Signs/Symptoms/Assessment
 - Acute onset of chills, fever, dyspnea, pleuritic chest pain, cough, adventitious breath sounds.
 - In geriatric patients, the primary sign may be an altered mental state.

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Pneumonia

- Treatment
 - Focused history and physical exam
 - Complains of trouble breathing.
 - Airway control w/ adequate ventilation
 - Oxygenation
 - Has a prescribed inhaler available.
 - Consult medical direction.
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Treatment with CPAP

Components Of A CPAP System



1. CPAP Control Unit

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Components Of A CPAP System



2. Breathing Circuit and Positive Pressure Face Mask

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Components Of A CPAP System

Lots and Lots of Oxygen!

D Cylinder duration= $\frac{.16 \times \text{tank psi}}{\text{LPM}}$

$2000 \times .16 = 320 / 25 = 12 \text{ minutes}$

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Procedure

- Apply CPAP mask and ensure snug fit without air leak
- Adjust air flow to achieve PEEP of 5 cm H₂O (may increase to 7.5 cm H₂O if patients condition does not improve in 15 minutes).
- Discontinue CPAP and consider BVM ventilation or intubation:
 - If mental status declines significantly
 - For significant drop in blood pressure (to a systolic BP <90 mmHg)
 - For worsening hypoxia or severe respiratory fatigue.

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Treatment With CPAP

- Patient improvement indicated by:
 - Improvement in dyspnea
 - Decreased respiratory rate
 - Improved pulse oximetry
 - Improved patient comfort

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Treatment With CPAP


- Removal
 - CPAP needs to be continuous and should not be removed unless the patient cannot tolerate the mask or experiences respiratory arrest and/or begins to vomit
 - Intermittent positive pressure ventilation (IPPV) with a BVM should be considered if CPAP is removed
 - A Laryngo Tracheal Device (King Airway, Combitube, etc.) should be used with a bag valve device if the patient is in respiratory arrest

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Treatment With CPAP

- Special Considerations
 - Do not remove CPAP until hospital therapy is ready
 - Watch for gastric distention which can cause vomiting
 - CPAP may be used with patients who have POLST forms or DNR orders

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Cases

CPAP Indicated?

- Patient #1: 68 year old male in moderate respiratory distress with history of CHF. Now has diffuse inspiratory crackles with SpO2 of 85% on NRB mask. His BP is 148/80, HR 96, RR24.

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CPAP Indicated?

- Patient #2: 72 year old female with long history of COPD. She is in severe resp. distress, alert & oriented, able to talk only in short bursts. HR 116, BP 132/78, RR20 with obvious accessory muscle use, SpO2 88% on NRB mask. Patient wants to avoid intubation if at all possible.

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CPAP Indicated?

Patient #3: 78 year male with history of COPD/CHF with respiratory failure and decreased level of consciousness. HR 124, BP 90/68, RR 16 with obvious accessory muscle use, SpO2 82% on NRB mask. Pt. is obtunded with GCS 7. Only response is moaning to noxious stimuli.



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CPAP Indicated?

Patient #4: 62 year old acute anterior MI, required several defibrillations, is now in CHF with inspiratory crackles and SpO2 of 88% on NRB mask. He is in moderate respiratory distress, is dizzy & has vomited several times. HR 116, BP 78/50



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CPAP Indicated?

Patient #5: 28 year old female presents with shortness of breath and audible expiratory wheezes. HR 132, RR 24, BP 134/80, SpO2 94% on rm air

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CPAP Indicated?

Patient #6: 67 year old obese female patient recently released from the hospital after gall bladder surgery. She is short of breath with inspiratory crackles in her lungs
HR 112, RR24, BP 108/56, SpO2 78% room air
Febrile

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Post-test

1. CPAP:
 - A. Is poorly tolerated and requires that patients be sedated
 - B. Is an ALS skill only
 - C. Can be a BLS skill with the proper equipment and training
 - D. Is a technically difficult skill requiring invasive airway adjuncts

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Post-test

2. CPAP may be indicated in the management of which of the following?
 - A. CHF
 - B. Pulmonary Edema
 - C. Asthma
 - D. Pneumonia
 - E. All of the above

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Post-test

3. Which of the following is/are contraindication(s) of CPAP?

- A. Unconscious pt
- B. Hypoxia
- C. Allergy to Oxygen
- D. Patient is DNR status
- E. All of the above

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Post-test

4. Which of the following is/are risks of CPAP therapy?

- A. Gastric distention
- B. Aspiration
- C. Hypotension
- D. Pneumothorax
- E. All of the above

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Post-test

5. You have started a lethargic pt with history of CHF & COPD on 5 cm of CPAP due to low oxygen saturation. Her SpO2 improves slightly but her LOC deteriorates and she is no longer arousable. What is the most appropriate action?

- A. Continue current therapy, CPAP cannot be discontinued in the field once it has been started
- B. Discontinue CPAP, assist with BVM with suction ready
- C. Continue CPAP but turn down her oxygen flow
- D. Turn her level of CPAP up to 7.5

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Special thanks to Sheila Crow of
Stitchin' Dreams Embroidery

wcsocrow@yahoo.com

For providing our Secret Question prize







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Questions/Comments?
Contact: Carolyn Stovall
509-242-4264
1-866-630-4033
stovalc@inhs.org
Fax: 509-232-8344






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If the name and address of your agency contact has changed, please let us know. This is where we mail your certificates.

Email updated name, address and email to:

Michelle Ensminger – ensminm@inhs.org

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