



Spectrum
Health

Respiratory Decline and BiPAP

Nursing Clinical Education Resources

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Respiratory Decline and BiPAP

The module will provide the following education:

- Basic overview of respiratory stability and instability oxygenation and ventilation
- Arterial Blood Gasses (ABGS) awareness
- Bi-PAP/CPAP policy
 - Indications
 - Equipment
 - Contraindications
 - Roles/Responsibilities
 - Nursing Assessment

Respiratory Stability Definitions

Oxygenation

- Oxygenation is gas exchange, increasing the partial pressure of oxygen in the body
- Oxygenation Failure – inadequate alveolar gas exchange

Ventilation

- Ventilation is the provision of fresh air into the lungs, O₂ in CO₂ out
- Ventilation Failure – inadequate alveolar ventilation

Respiration

- The gas exchange between the body and the external environment

What is Respiratory Distress

Increased respiratory needs

- These patients could have an **increased or decreased** respiratory rate
- **Increased** oxygenation needs
- **Changes** in arterial blood gas levels
- **Decreased** responsiveness

Arterial Blood Gas Awareness

Parameter	Normal	Significance
pH	7.35 - 7.45	Indicates if the blood is acidotic or alkalotic: 1. pH less than 7.35 = acidosis 2. pH greater than 7.45 = alkalosis
paCO ₂	35 - 45	<u>Respiratory Parameter</u> 1. Hyperventilation blows off CO ₂ → decreased PaCO ₂ → respiratory alkalosis 2. Hypoventilation retains CO ₂ → increased PaCO ₂ → respiratory acidosis
HCO ₃	22 - 26	<u>Metabolic parameter</u> - regulated by the kidneys. 1. Decreased HCO ₃ → metabolic acidosis 2. Increased HCO ₃ → metabolic alkalosis
PaO ₂	80 - 100	Amount of oxygen dissolved in plasma
SaO ₂	95 - 100%	Extent to which Hgb is saturated with oxygen. Affected by pH, pCO ₂ , temperature and FiO ₂ .

Respiratory Failure

Abnormalities of oxygenation and ventilation severe enough to threaten vital organs

Causes can be primary pulmonary disorder (starts in the lungs) or extra pulmonary disorder (starts other than the lungs).

Ventilation Failure =

- Inadequate alveolar ventilation
- Corrected with increased frequency of breaths

Oxygenation Failure =

- Inadequate alveolar pulmonary gas exchange
- Corrected with oxygen or pressure

Per the BiPAP/CPAP Therapy Policy

Respiratory instability is defined as:

- Respiratory rate equal to or greater than 30 breaths per minute
- Oxygen requirement greater than 50% while on positive pressure
- Arterial pH equal to or Less than 7.35
- Decreased responsiveness

Patients who meet the criteria for respiratory instability could be cared for in any care area at the discretion of the Respiratory Care Medical Director

What is the Difference between BiPAP and CPAP?

Bi-Level Positive Airway Pressure (BiPAP)

BiPAP augments patient ventilation by supplying two levels of positive pressure

- One level on inspiration
 - IPAP - inspiratory pressure = pressure that occurs when patient inhales for a breath
- One level on exhalation
 - EPAP – expiratory pressure = continuous positive pressure
- Assists patients' respiratory efforts
- Improves oxygenation AND ventilation

Continuous Positive Airway Pressure (CPAP)

CPAP aids at one level of positive pressure through the breathing cycle

- “Stents” open airways – pressure helps keep airways open
- Improves ONLY oxygenation

Clinical Indications of BiPAP Therapy

Obstructive Sleep Apnea (OSA)

Prophylactic postoperative patients

Chronic Obstructive Lung Disease exacerbation

Obesity/Hypoventilation Syndrome

Neuromuscular weakness

Bronchopulmonary Dysplasia (BPD)

Restrictive Lung Disease

Chronic Respiratory Failure

Cardiogenic Pulmonary Edema

Failure to wean from mechanical ventilation

Acute measure to deter impending intubation

Relative Contraindications of BiPAP Therapy

- Altered mental status/Delirium
- Bullous lung disease/Pneumothorax
- Pathologically low blood pressure
- Severe cardiac arrhythmias or acute coronary artery disease
- Stroke with impaired cough and/or gag reflex
- Seizures
- Facial fractures or burns
- Excessive secretions
- Vomiting
- Patients susceptible to Pneumocephals
- Cerebral spinal fluid leaks
- Abnormalities of the cribriform plate
- Prior history of head trauma
- Pneumocephals

Contraindications to BiPAP Therapy

- Unresponsive patients
- Bilateral hand restraints
- Patient is unable to cough or clear their airway
- Safety attendants should not be used to monitor for complications related to BiPAP/CPAP for unresponsive patients
- Safety attendants may be required for a patient with delirium who frequently removes the mask

Patients with contraindications may still receive Bi-PAP therapy at the discretion of the Respiratory Care Medical Director

Roles and Responsibilities

Licensed Respiratory Therapist (LRT)

- Set up and titrate pressures
- Maintain functionality of equipment
- Monitor patient for changes in status / complications
- Document as outlined in policy

Nursing

- Notify LRT of any ongoing or unresolved alarms
- Aid in adjusting mask for patient
- Assess for skin integrity
- May remove patient from BIPAP/CPAP for patient care needs but should notify the LRT prior to removal.
- Monitor for changes in patient status / complications
- Maintain communication with ordering provider regarding patient's tolerance or intolerance to therapy, signs and symptoms of respiratory compromise.
- Documentation if therapy is in place

BiPAP Nursing Assessment Standards

Work of breathing

Mentation

Patient Tolerance of BiPAP Therapy

Oxygen Saturation - Continuous SPO2
needs to be ordered

Lung Sounds

Respiratory Rate

Mask fit and skin integrity

Lab values as ordered by provider –
Examples: ABGs

Transporting patients requiring BiPAP

- A patient who **does demonstrate** respiratory instability without BiPAP will be transported via Bi-PAP/CPAP device capable of non-invasive ventilation. Respiratory is required to accompany patient throughout transport.
- If a patient **does not demonstrate** respiratory instability without BiPAP, they will be placed on appropriate oxygen device for transport. Respiratory is not required to accompany this patient.

Please view the linked video

<https://vimeo.com/403035876>



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