

Medical Procedures**Date: 02/01/2021****Non-Invasive Positive Pressure Ventilation (NIPPV)****Policy #7040****I. Purpose:**

A. The purpose of this policy is to define the indication and procedures required for the use of Non-Invasive Positive Pressure Ventilation (NIPPV), including Continuous and/or Bi-Level Positive Airway Pressure (CPAP or BiPAP) by paramedics.

II. Authority:

A. Health and Safety Code, Section 1797.220, 1798. Title 22, Section 100170.

III. Policy:

A. Paramedics may utilize NIPPV under the following conditions:

1. Indications:

- a. The purpose of NIPPV is to improve ventilation and oxygenation in an effort to avoid intubation in patients who present with severe respiratory distress, and have significant issues with oxygenation, ventilation or both. Often congestive heart failure (CHF) with acute pulmonary edema, COPD, pneumonia, or interstitial lung disease are common causes of severe respiratory distress.
2. NIPPV is authorized for use in patients who are 14 years of age and older (or larger than the pediatric measurement tape device) with any one of the following:
 - a. Awake, alert and able to follow commands.
 - b. Able to maintain their own airway.
 - c. Exhibit two or more of the following:
 - i. Respiratory rate > 20
 - ii. Pulse Oximetry < 94%
 - iii. Use of accessory muscles during respiration
 - iv. Increased work of breathing
3. Continuous Capnography - Continuous capnography will be used for all airway, respiratory and ventilatory procedures in Imperial County. The target range will be between 35-45 mmHg, in patients with a pulse, while providing adequate ventilation.
 - a. Continuous capnography should be applied to the patient prior to NIPPV and optimally as soon as respiratory distress is identified
4. Conditions in which NIPPV may be helpful include:
 - a. Congestive Heart Failure (CHF) with acute pulmonary edema
 - b. Acute exacerbation of COPD or asthma
 - c. Near drowning/submersion
 - d. Other causes of severe respiratory distress, excluding trauma
5. **Contraindications:**
 - a. Absolute Contraindications:
 - i. Respiratory or cardiac arrest
 - ii. Agonal/failing respirations
 - iii. Inability to maintain airway
 - iv. Altered mental status or inability to cooperate
 - v. Systolic blood pressure <90 mmHg

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- vi. Signs and symptoms of pneumothorax
 - vii. Major facial, head or chest trauma
 - viii. Facial abnormalities or inability to obtain a mask seal
 - ix. Tracheostomy
 - x. Unconsciousness
 - xi. Vomiting or copious secretions
 - xii. Suspected or known pneumothorax
 - b. Relative Contraindications:
 - i. Claustrophobia or unable to tolerate mask
6. **Equipment:**
 - a. NIPPV pressure generator and circuit set with ability to deliver 5.0 cm to 10 cm of H₂O pressure
 - b. Appropriate sized face mask and straps
 - c. In-line nebulizer if required for bronchodilator administration
 - d. Sufficient oxygen supply
7. **Procedure:**
 - a. Place patient in a seated position
 - b. Monitor ECG, vital signs (BP, HR, RR, SpO₂, EtCO₂)
 - c. Monitor vital signs every five minutes; SpO₂ AND EtCO₂ must be used continuously to monitor patients oxygen saturation
 - i. Vital signs prior to application of NIPPV must be documented.
 - d. Set up the NIPPV system (per manufacturer's recommendation) with pressure set at 5-10 cm H₂O
 - i. Only approved Imperial County EMS devices (Pulmodyne® O2-RESQ™, Boussignac and WhisperFlow)
 - e. Explain to the patient what you will be doing
 - f. Verify that oxygen is flowing to the mask. Apply mask while reassuring patient – encourage patient to breathe normally (may have a tendency to become anxious or panic – reassure and coach)
 - g. Settings:
 - i. Continuous positive airway pressure (CPAP):
 - a) 5 – 15 cm H₂O for respiratory distress, especially pulmonary edema or CHF, COPD, asthma, drowning, possible aspiration, or pneumonia.
 - b) For COPD/Asthma, or sepsis due to pneumonia, approximately 3-5 cm H₂O is often effective; the risk of increasing PEEP and increased thoracic pressure (and “auto peep”) in these patients should be considered.
 - ii. Bi-level positive airway pressure device (BiPAP):
 - a) Inspiratory PAP 10 – 15 over Expiratory PAP 5 – 7 cm H₂O for pulmonary edema, CHF, COPD, asthma, drowning, possible aspiration, or pneumonia.

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- b) During titration keep IPAP – EPAP at least a difference of 5 cm H₂O. 15 cm H₂O is maximum pressure that should be utilized with NIPPV.
 - c) Increasing positive pressure can cause hypotension. Use caution or remove and re-evaluate with systolic blood pressures consistently < 90 mmHg.
 - h. Reevaluate the patient – normally the patient will improve in the first 5 minutes with NIPPV as evidenced by:
 - i. Decreased heart rate
 - ii. Decreased respiratory rate
 - iii. Decreased blood pressure
 - iv. Increased SpO₂
 - i. If the patient does not improve or becomes worse with NIPPV, remove the NIPPV device and assist ventilations with BVM as needed
 - j. Notify the receiving facility of the type of NIPPV device that is being used
8. **Documentation:**
Should include:
- a. Indication for use of NIPPV
 - b. Pre procedure vital signs
 - c. Intra and post (if applicable) procedure vital signs
 - d. Complications
 - e. Response to treatment
9. **Risks:**
- a. NIPPV is not without risk. These risks include:
 - i. Development or worsening a pneumothorax
 - a) If a patient suddenly has increased work of breathing or unilateral lung sounds, consider treatment for pneumothorax
 - ii. Decreased blood pressure
 - a) Consider IV fluids early in the course of NIPPV if a patient's blood pressure appears to be affected
 - iii. Airway obstruction with secretions or the patient's tongue
 - a) This is likely a sign the patient is not conscious enough for NIPPV. Consider intubation, supraglottic airway, or BVM administration.

APPROVED:

Signature on FileKatherine Staats, M.D.
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