	COUNTY OF SACRAMENTO EMERGENCY MEDICAL SERVICES AGENCY	Document #	8829.08
	PROGRAM DOCUMENT: **Noninvasive Ventilation (NIV)**	Initial Date:	01/25/08
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Signature on File	Signature on File
EMS Medical Director	EMS Administrator

Purpose:

A. To serve as a guideline for the indications and application of CPAP or BiPAP.

Authority:

A. California Health and Safety Code, Division 2.5
B. California Code of Regulations, Title 22, Division 9

Definitions:

A. Noninvasive ventilation (NIV): Refers to the administration of ventilatory support without using an invasive artificial airway (endotracheal tube or tracheostomy tube). In prehospital care, this can be provided by either:
   1. Continuous positive airway pressure (CPAP)
   2. Bi-level positive airway pressure (BiPAP)

Indications:

A. Adult and Pediatric patients in moderate to severe respiratory distress being treated under protocol #8026-Respiratory Distress and PD #9003-Pediatric Respiratory Distress Reactive Airway Disease, Asthma, Bronchospasm, Croup, or Stridor: Shortness of Breath and who are:
   1. Spontaneously breathing
   2. Conscious
   3. Indications:
      - Congestive Heart Failure (CHF) with acute pulmonary edema
      - Severe Asthma
      - Chronic Obstructive Pulmonary Disease (COPD)
      - Near Drowning

Contraindications:

A. Agonal respirations or apneic patients
B. Pediatric patients < 12 years of age
C. Systolic Blood Pressure (SBP) < 80 mmHg in pediatric patients
D. Cardiac and/or respiratory arrest
E. Suspected pneumothorax
F. Vomiting patients

G. Uncooperative patients after coaching
H. Inability to achieve a good seal with the CPAP or BiPAP facemask
I. Major trauma, especially head injury or significant chest trauma
J. GCS ≤ 14
K. Inability to maintain airway patency
L. Inability to remain in a sitting position

Special Precautions:

A. Do not delay medication administration to apply a non-invasive ventilatory support device.
B. Patients must be CONTINUOUSLY monitored for the development of:
   1. Respiratory failure – remove device and use Bag Valve Mask (BVM) and/or advanced airway adjunct
   2. Vomiting – remove device to prevent aspiration.
   3. Suspected barotrauma – remove device.
C. Monitor oxygen consumption, especially if nebulizers are being run off the same oxygen supply
D. If staffing permits, allow one paramedic to focus on setting up, coaching and monitoring the patient's response to CPAP or BiPAP and another paramedic responsible for patient care.

Equipment:

A. CPAP or BiPAP pressure generator and circuit.
B. Appropriate sized facemask and straps
C. Inline nebulizer if required for bronchodilator administration
D. Oxygen supply

Procedure:

A. Assemble equipment
B. Explain procedure to patient
C. Assist patient to use and tolerate the mask and circuit
D. Use straps to maintain CPAP or BiPAP seal if needed
E. Patient to be transported in a position that facilitates continuous visual monitoring and minimizes aspiration risk
F. Document lung sounds before and after application of CPAP or BiPAP frequently or if clinical change.
G. Starting CPAP pressure shall be 5 cm H2O. If using BiPAP set IPAP to 10 cm H2O and EPAP to 5 cm H2O.
H. NIV support pressures may be increased for clinical effect 2.5-5 cm every 5 minutes. Use the lowest NIV pressures which result in clinical improvement to maintain O2 saturation > 90% and improve patient work of breathing.
I. If patient becomes unresponsive or has agonal respirations, remove CPAP or BiPAP and assist ventilations with BVM and airway adjuncts.

J. Monitor patient and response to NIV.
K. Notify hospital that a NIV is in use so that equipment can be made available upon arrival at the hospital to continue.

Medication Administration:

A. FiO2 shall be titrated to the least amount needed to maintain SAO2 ≥ 94%.
B. If indicated for wheezing, Albuterol 5 mg will be administered via in line nebulizer utilizing at least 8 liters per minute.
C. Nitrates, if indicated for CHF, shall be delivered per CHF algorithm via sub lingual Nitroglycerine 0.4mg to 1.2mg prior to application of NIV, then Nitropaste one (1) inch applied to the chest.

Management of Hypotension on NIV:

A. CPAP or BiPAP may introduce transient hypotension via decreased venous return.
B. If SBP < 90 mmHg, for adults, decrease the NIV to no more than 5 cm H2O pressure, and administer 500 cc normal saline bolus x 1, if SBP remains < 90 mmHg after fluid bolus then remove device and any Nitro paste.
C. If SBP < 80 mmHg, titrate to a minimal Systolic Blood Pressure (SBP) for patient's age, decrease CPAP to 5 cm H2O pressure, and administer 20ml/kg normal saline bolus x 1. If SBP remains < 80 mmHg after fluid bolus then remove CPAP.

Cross Reference: Respiratory Distress- PD# 8026
Respiratory Distress: Reactive Airway Disease, Asthma, Bronchospasm, Croup, or Stridor- PD 9003