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|  | <b>COUNTY OF SACRAMENTO</b><br>EMERGENCY MEDICAL SERVICES AGENCY | <b>Document #</b>          | <b>8837.03</b>  |
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|   | <b>Pediatric</b><br><b>Pediatric Airway Management</b>           | <b>Last Approval Date:</b> | <b>11/14/19</b> |
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 EMS Medical Director

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 EMS Administrator

**Purpose:**

- A. To ~~serve as~~ **establish** a pediatric airway management skills guideline when managing a pediatric airway.

**Note:**

- For airway obstruction, refer to ~~policy~~ **PD# 9001**
- For medical management of conditions which cause respiratory distress, refer to policy 9003
- For Noninvasive Ventilation (NIV) refer to ~~policy~~ **PD# - 8829**
- For Neonatal Resuscitation, refer to ~~policy~~ **PD# - 9009**
- For complete CPR guidelines, refer to ~~policy~~ **PD# - 9006**
- **NO intubation** and/or supraglottic airways for pediatric patients < 8 years of age, unless age not known, and then only children who meet or exceed the GREEN length on Handtevy or Broselow length based tapes.
- Intubation and/or supraglottic intubation is an option for children ≥ 8 years of age.

**Authority:**

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

**Indications:**

- A. Inadequate ventilations or oxygenation not reversible by, or as adjunct to indicated medical treatments.
- B. Bag-Mask ventilation is the airway management of choice in all pediatric patients
- C. Endotracheal or Supraglottic intubation may be used when BVM airway management fails to provide adequate ventilation or oxygenation **ONLY** for children ≥ 8 years of age. If age not known, only children who meet or exceed the GREEN length on Handtevy or Broselow length based tapes.
- D. Percutaneous Cricothyrotomy may be used when indicated under ~~policy~~ **PD# 9001**.

**Procedure:**

**BLS**

- A. Respiratory failure is characterized by inadequate ventilation, insufficient oxygenation, or both. Anticipate respiratory failure if any of the following signs is present:
  1. An increased respiratory rate, particularly with signs of distress (e.g., increased respiratory effort including nasal flaring, retractions, seesaw breathing, or grunting)
  2. An inadequate respiratory rate, effort, or chest excursion (e.g., diminished breath sounds or gasping), especially if mental status is depressed
  3. Cyanosis with abnormal breathing despite supplementary oxygen

- B. BLS airway management skills are the cornerstone of pediatric airway management, and include:
1. Proper positioning with jaw thrust or head tilt with chin lift maneuver
  2. Use of OPA or NPA when appropriate to maintain an open airway
  3. Selection of correct size mask that fully covers nose and mouth and provides a tight fit
  4. Selection of correct BVM bag – “Infant” (250ml) for < 10kg; “Child” (500ml) for 10-20kg; “Adult” for > 20kg.
  5. For children under 8 years (20-25 kg), effective single rescuer BVM airway management can be achieved with the EC clamp technique, using three fingers of one hand lift the jaw (they form the “E”) while the thumb and index finger hold the mask to the face (making a “C”).
  6. Ventilation rates: infants - 20-30 breaths per minute; older children - 16-20 breaths per minute. The tidal volume delivered to the child should be appropriate to see chest rise
  7. Care should be taken to not over-ventilate the patient – “use only the force and tidal volume necessary to just make the chest rise.”
  8. Give each breath slowly, over approximately 1 second, and watch for chest rise.
  9. If the chest does not rise, reopen the airway, verify that there is a tight seal between the mask and the face (or between the bag and the advanced airway), and reattempt ventilation.
- C. Additional Considerations
1. Infants and young children have large occiputs compared to adults. This major difference causes more flexion of the neck when the patient is supine. Also, children have larger tongues which can cause airway obstruction. Extra care must be taken to achieve adequate positioning and relief of tongue obstruction with airway adjuncts.
  2. If skilled rescuers are available, a 2-person technique may provide more effective bag-mask-ventilation than a single-person technique. A 2-person technique may be required to provide effective bag-mask ventilation when there is significant airway obstruction, poor lung compliance, or difficulty in creating a tight seal between the mask and the face. One rescuer uses both hands to open the airway and maintain a tight mask-to-face seal while the other compresses the ventilation bag. Both rescuers should observe the chest to ensure chest rise. Because the 2-person technique may be more effective, be careful to avoid delivering too high a tidal volume that may contribute to excessive ventilation.
  3. Gastric inflation can be minimized by using lower inspiratory pressures, which is done by delivering breaths slowly and providing smaller tidal volumes.

**Procedure:**

**ALS**

- A. Age's  $\geq$  8 years, when BLS airway management cannot maintain adequate ventilation or oxygenation, endotracheal intubation or supraglottic intubation may be considered. If age not known, only children who meet or exceed the GREEN length on Handtevy or Broselow length based tapes.
- B. NIV may only be considered for pediatric BLS airway management in patients > 12 years of age as per PD# 8829.
- C. Age >12 years – Airway management shall follow adult airway management workflow.
- D. Pediatric Advanced Airway Considerations ( $\geq$  8 years of age):
  1. Endotracheal intubation in children requires special training because the pediatric airway anatomy differs from that of the adult. The likelihood of successful endotracheal tube placement with minimal complications is related to the length of training, supervised experience in the field, and adequate ongoing experience.

2. In preparation for intubation, confirm that tubes with an internal diameter (ID) 0.5 mm smaller and 0.5 mm larger than the estimated size are available. During intubation, if the endotracheal tube meets resistance, place a tube 0.5 mm smaller instead.
  3. ET size can be estimated by using the formula: Cuffed endotracheal tube ID (mm) =  $3.5 + (\text{age}/4)$ .
  4. There is a risk of endotracheal tube misplacement, especially during patient transport. Since no single confirmation technique, including clinical signs or the presence of water vapor in the tube, is completely reliable, use both clinical assessment and confirmatory devices to verify proper tube placement immediately after intubation, again after securing the endotracheal tube, during transport, and each time the patient is moved. The following are methods for confirming correct position:
    - a. Look for bilateral chest movement and listen for equal breath sounds over both lung fields, especially over the axillae.
    - b. Listen for gastric insufflation sounds over the stomach. They should not be present if the tube is in the trachea.
    - c. End-Tidal  $\text{CO}_2$   $\text{CO}_2$  Monitoring
      - All patients with advanced airways shall have end tidal  $\text{CO}_2$   $\text{CO}_2$  detector or other approved confirming device. In addition, continuous waveform capnography will be utilized throughout transport and until transfer of care has occurred.
  5. Two attempts at an advanced airway may be made and then the Paramedic shall reassess the adequacy of BLS airway interventions. If BLS airway interventions are insufficient, a third advanced airway attempt will be made by a different (non-intern) Paramedic if available or a supraglottic airway device shall be used. A supraglottic airway device shall be used on the fourth advanced airway attempt, if no contraindications exist.
- E. If an intubated patient's condition deteriorates, consider the following possibilities (mnemonic DOPE):
1. **D**isplacement of the tube
  2. **O**bstruction of the tube
  3. **P**neumothorax
  4. **E**quipment failure

**Cross Reference:** PD# 8829 – Noninvasive Ventilation (NIV)  
PD# 9009 – Neonate Resuscitation  
PD# 9006 – Cardiac Arrest