REGION 11 CHICAGO EMS SYSTEM PROTOCOL	Title: Airway Management
	Section: Respiratory
	Approved: EMS Medical Directors Consortium
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AIRWAY MANAGEMENT

I. PATIENT CARE GOALS

1. Maintain a patent airway.

2. Provide effective oxygenation and ventilation using the least invasive method to achieve those goals.

3. Anticipate, recognize and alleviate respiratory distress.

4. Provide necessary interventions quickly and safely to patients with the need for respiratory support.

5. Identify and plan for a potentially difficult airway.

II. PATIENT MANAGEMENT

A. Assessment

1. History – Assess for:

   a. Time of onset of symptoms.
   b. Associated symptoms.
   c. History of asthma or other breathing disorders.
   d. Choking or other evidence of upper airway obstruction.
   e. History of trauma.
   f. Prior similar episodes, what has helped in the past, home interventions for symptoms.
   g. Severity of shortness of breath.

2. Physical Examination – Assess for:

   a. Abnormal respiratory pattern, rate and/or effort.
   b. Use of accessory muscles.
   c. Ability to speak words or sentences.
   d. Quality of air exchange, including depth of respiration and equality of breath sounds.
   e. Abnormal breath sounds (wheezing, rhonchi, rales, or stridor).
   f. Cough.
   g. Skin color (cyanosis or pallor), presence of diaphoresis.
   h. Mental status, including anxiety.
   i. Hypoxia.
   j. Airway obstruction with foreign body or swelling (angioedema, posterior pharyngeal and laryngeal infections).

k. Signs of a difficult airway (short jaw or limited jaw thrust or mobility, small thyromental space, upper airway obstruction, large tongue, obesity, large tonsils, large neck, craniofacial abnormalities, excessive facial hair, trismus).
l. Signs of fluid overload (jugular vein distention, peripheral edema)
m. Traumatic injuries impairing upper and lower airway physiology:
    i. Facial injuries
    ii. High spine injury (affecting phrenic nerve/intercostal muscles)
    iii. Neck injury (expanding hematoma, tracheal injury)
    iv. Chest wall injury (bruising, paradoxical chest motion, subcutaneous air)

B. Treatment and Interventions

1. The approach to airway management is to implement the interventions below in a stepwise fashion to meet the patient care goals above.

2. Monitoring should include continuous pulse oximetry and waveform capnography for assessment and guiding treatment.

3. Oxygen

    a. Administer oxygen as appropriate with a target of achieving over 94% saturation.
    b. Depending on patient presentation this may be accomplished with nasal cannula, simple face mask, non-rebreather mask, bag-valve mask (BVM), or continuous positive airway pressure (CPAP) (Oxygen Delivery Methods Procedure).

4. Open and maintain patent airway. If needed:

    a. Provide head tilt-chin lift or jaw thrust if concern for potential spinal injury.
    b. Suction airway.

5. Oropharyngeal Airways (OPA) and Nasopharyngeal Airways (NPA)

    a. Consider the addition of an OPA and/or NPA to make BVM ventilation more effective, especially in patients with altered mental status.

6. Bag-Valve Mask (BVM) ventilation

    a. Use bag-valve mask (BVM) ventilation in the setting of respiratory failure with inadequate oxygenation and/or ventilation (Bag-Valve Mask Ventilation Procedure – BLS/ALS).
    b. Two-person, two-thumbs-down BVM ventilation is more effective than one-person technique and should be used when additional providers are available.
    c. Apply continuous waveform capnography for monitoring (Capnography Procedure – ALS).
    d. Ventilation
        i. Tidal volume

1. Ventilate with just enough volume to see chest rise, approximately 6-8 mL/kg ideal body weight.
2. Over-inflation or hyperventilation can have negative effects on patient outcome.

ii. Rate
1. Adult: 10 breaths/minute
2. Child: 20 breaths/minute
3. Infant: 30 breaths/minute

iii. Monitor $ETCO_2$ to maintain goal of 35-45 mmHg.

7. Non-Invasive Ventilation (NIV) - CPAP

a. For severe respiratory distress or impending respiratory failure, consider continuous positive airway pressure (CPAP Procedure - ALS).

8. Supraglottic Airway (SGA) – I-gel

a. Consider the use of an SGA if BVM is not effective in maintaining oxygenation and/or ventilation (I-gel Supraglottic Airway Procedure – BLS/ALS).
b. SGA is the preferred airway in cardiac arrest.

9. Endotracheal Intubation

a. When less-invasive methods (BVM, SGA placement) are ineffective, use endotracheal intubation to maintain oxygenation and/or ventilation (Endotracheal Intubation Procedure - ALS).
b. Other indications may include severe inhalation burns or airway obstruction.

10. Post-advanced airway management

a. Confirm placement of advanced airway (endotracheal tube or SGA) with waveform capnography, absent gastric sounds, and bilateral breath sounds (Capnography Procedure – ALS).
b. Monitor clinical signs, pulse oximetry, cardiac rhythm, blood pressure, and waveform capnography.

11. Gastric decompression may improve oxygenation and ventilation; when there is obvious gastric distention insert a suction catheter through the gastric channel on the SGA.

12. When patients cannot be oxygenated or ventilated effectively using the above interventions, transport to the closest appropriate hospital for airway stabilization.

C. Patient Safety Considerations

1. When less invasive methods do not meet patient care goals, endotracheal intubation can be used. Document all airway management methods and clinical response.

2. Once a successful SGA placement or intubation has been performed, obstruction or displacement of the tube can have negative effects on patient outcome.

    a. Continuously monitor the end-tidal CO2 and adjust tube placement as needed to maintain a good waveform.

III. NOTES/EDUCATIONAL PEARLS

A. Key Considerations

1. Pediatric airway management should include bag-valve mask ventilation or supraglottic airway and only be escalated to endotracheal intubation if those methods are ineffective to maintain oxygenation and ventilation.

2. Bag-valve mask (BVM)

    a. Appropriately sized masks should completely cover the nose and mouth and maintain an effective seal around the cheeks and chin.
    b. Ventilation should be delivered with only sufficient volume to achieve chest rise.

3. Endotracheal intubation

    a. In addition to preoxygenation, apneic oxygenation (high-flow oxygen by nasal cannula) may prolong the period before hypoxia during an intubation attempt.
    b. Adequate preoxygenation can avoid peri-intubation hypoxia and subsequent cardiac arrest.
    c. Positive pressure ventilation after intubation can decrease preload and subsequently lead to hypotension - consider IV fluid bolus for hypotension.

B. Pertinent Assessment Findings

1. Ongoing assessment and monitoring with continuous waveform capnography is critical when an airway device is in place.

2. Acute worsening of respiratory status or evidence of hypoxemia can be secondary to displacement or obstruction of the airway device, pneumothorax or equipment failure.