



2. AIRWAY MANAGEMENT: BAG-VALVE-MASK VENTILATION

a) PURPOSE

- (1) Bag-valve-mask (BVM) ventilation is the technique of providing rescue breathing for patients with inadequate respiratory effort or cardiac arrest. Patients in respiratory failure may respond to BVM ventilation and not require endotracheal intubation.
- (2) A BVM may also be used to administer inhaled medications for patients with severe respiratory failure.

b) INDICATIONS

- (1) Inadequate respiratory rate

(a) Adult	less than	8
(b) Adolescent (13–18 years of age)	less than	12
(c) Child (1–12 years of age)	less than	16
(d) Infant/Toddler (less than 1 year of age)	less than	20
- (2) Inadequate respiratory effort
 - (a) Absent or diminished breath sounds
 - (b) Paradoxical breathing (chest and abdomen moving in opposite directions)
 - (c) Cyanosis or oxygen saturation less than 90% on 100% oxygen by nonrebreather with the exception of patients with chronic hypoxemia
- (3) Symptomatic Bradycardia

(a) Adult/Adolescent (greater than 13 years of age)	Heart rate less than 60
(b) Child (1–12 years of age)	Heart rate less than 80
(c) Infant (less than 1 year of age)	Heart rate less than 100
- (4) Cardiac arrest
- (5) Altered mental status
Glasgow Coma Scale of 8 or less

c) CONTRAINDICATIONS

None

d) POTENTIAL ADVERSE EFFECTS / COMPLICATIONS

- (1) Gastric distension
- (2) Vomiting
- (3) Increased intracranial pressure as a result of increased vagal stimulation if mask applied over the patient's eyes

e) PRECAUTIONS

- (1) Have suction available since vomiting may occur.
- (2) Use an appropriate size airway adjunct with BVM.
- (3) Use an appropriate size mask to avoid pressure over the eyes (pediatric patient), which may cause vagal stimulation.
- (4) For single clinician BVM use the “E-C clamp” technique to achieve an adequate seal and avoid pressure on the soft tissues of the face or neck: Place the third, fourth, and fifth fingers along the jaw to provide a chin lift (forming an E); use the thumb and index finger to hold the mask on the child’s face (forming a C).
- (5) If the patient does not have adequate chest rise and breath sounds with BVM, consider the following interventions:
 - (a) Use 2-hand jaw lift and oral airway to relieve tongue obstruction.
 - (b) Use a larger bag to increase the volume of air delivered into the patient.
 - (c) Evaluate and treat the patient for gastric distension.
Clinicians may manually decompress the stomach and/or open an existing gastric tube or button and/or place NG or OG tube.

f) SUGGESTED SIZES FOR RESUSCITATION MASKS

Age	Mask Size
Premature infants	Neonatal
Newborn to 1 year	Infant
1–4 years	Toddler
5–12 years	Pediatric
Greater than 13 years of age	Small adult
Adult	Adult

g) SUGGESTED SIZES FOR RESUSCITATION BAGS

Age	Bag Size
Infant to less than 1 year of age	Infant (450–500 mL)
Child 1–12 years	Pediatric (750 mL)
Adolescent/Adult	Adult (1,000–1,200 mL)



3. AIRWAY MANAGEMENT: CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP)

a) INDICATIONS

- (1) Respiratory distress or failure, due to cardiogenic pulmonary edema or COPD/asthma, in which the patient demonstrates spontaneous respirations and a patent, self-maintained airway
- (2) Patients who are 13 years of age or older
- (3) Exception: EMT may transport a patient who is chronically on CPAP who is going for routine medical care and has in attendance a patient provided attendant who can manage the patient's own CPAP.



CLINICIAN MUST ASSURE THAT THE CPAP MASK FITS THE PATIENT APPROPRIATELY.

b) CONTRAINDICATIONS (NEW '20)

- (1) Circumstances in which endotracheal intubation or a surgical airway is indicated to secure a patient airway
- (2) Facial deformity or trauma which prevents the use of the device
- (3) Patient has significantly decreased level of consciousness or an inability to protect their airway
- (4) Patient has a tracheostomy
- (5) Patient is vomiting
- (6) Circumstances in which the patient does not improve or continues to deteriorate despite CPAP administration
- (7) Known intolerance for noninvasive airway procedures (CPAP)

c) PROCEDURE

- (1) Assure patent airway.
- (2) Administer 100% O₂ via appropriate delivery system.
- (3) Perform appropriate patient assessment, including obtaining vital signs, pulse oximeter (SpO₂) reading, and cardiac rhythm.
- (4) Apply CPAP device per manufacturer's instructions.
- (5) Continuously reassess the patient.
- (6) Monitor continuous pulse oximetry.
- (7) Monitor continuous ETCO₂ with nasal prongs (if available).
- (8) Follow the appropriate set of standing orders for continued treatment.
- (9) Contact the medical control as soon as possible to allow for prompt availability of hospital CPAP equipment and respiratory personnel.



FOR CIRCUMSTANCES IN WHICH THE PATIENT DOES NOT IMPROVE OR CONTINUES TO DETERIORATE DESPITE CPAP AND/OR MEDICATIVE THERAPY, TERMINATE CPAP ADMINISTRATION AND PERFORM BVM VENTILATION AND ENDOTRACHEAL INTUBATION IF NECESSARY.

CPAP MAY BE CONSIDERED FOR NON-CARDIOGENIC PULMONARY EDEMA.



4. AIRWAY MANAGEMENT: LARYNGEAL TUBE AIRWAY DEVICE (KING LTS-D™)

a) PURPOSE

To provide an alternative means of ventilating patients who cannot be intubated via laryngoscopy.

b) INDICATIONS

Inability to place an endotracheal tube in a patient who has no gag reflex (including patients who cannot be intubated following the administration of succinylcholine).

c) CONTRAINDICATIONS

- (1) Responsive patients with an intact gag reflex
- (2) Lack of an appropriately-sized device
- (3) Known esophageal disease or ingestion of caustic substances

d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS

- (1) The LTS-D airway does not protect against the effects of regurgitation and aspiration.
- (2) High airway pressures may divert gas either to the stomach or to the atmosphere.
- (3) Intubation of the trachea cannot be ruled out as a potential complication of the insertion of the LTS-D airway. After placement, perform standard checks for breath sounds and utilize an appropriate carbon dioxide monitor.

e) PROCEDURE

- (1) Inspect all components of the LTS-D for visible damage.
- (2) Select appropriately sized LTS-D airway as specified by manufacturer.
- (3) Test cuffs by injecting the maximum volume of air (by size) as specified by manufacturer and lubricate with water soluble jelly.
- (4) Maintain cervical immobilization (if indicated) and lift tongue and jaw upward with one hand. Ideal position of the head is in the “sniffing position”; however, the LTS-D airway can be inserted with the head in neutral position.
- (5) Insert LTS-D airway using a lateral approach and advance the tip behind the base of the tongue while rotating the tube back to midline so the blue line faces the patient’s chin.
- (6) Without exerting excessive force, advance tube until base of connector is aligned with teeth and gums.
- (7) Inflate cuff and ventilate patient. Gently withdraw the tube until ventilation becomes easy and free-flowing.
- (8) Adjust cuff inflation to obtain a seal of the airway.
- (9) Ventilate and evaluate lung ventilation (breath sounds, absence of gastric sounds, chest rise, ETCO_2 , oxygen saturation).
- (10) Once effective ventilation is confirmed, continue to monitor oxygen saturation and ventilate to desired ETCO_2 level.
- (11) If unable to achieve adequate ventilation using LTS-D airway, remove device, reinsert, and attempt again. If unable to ventilate, reattempt bag-valve-mask ventilation and consider obstructed airway maneuvers.



5. AIRWAY MANAGEMENT: GASTRIC TUBE FOR DECOMPRESSION

a) PURPOSE

A naso/orogastric tube is passed to relieve the gastric distension or pressure in an effort to reduce the risk of aspiration and increase the intrathoracic volume.

b) INDICATIONS

- (1) All pediatric intubated patients
- (2) Pediatric patients with gastric distension complicating Bag Valve Mask Ventilation **(NEW '20)**
- (3) Intubated adult patients exhibiting signs and symptoms of gastric distension that compromise ventilation or circulation

c) CONTRAINDICATIONS

- (1) History of esophageal varices
- (2) Esophageal or gastric surgery within the past 6 weeks
- (3) Anatomical deformity complicating nasal passage of the tube (nasogastric)
- (4) Suspected basilar skull fracture

d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS

- (1) Tracheal intubation with gastric tube
- (2) Epistaxis
- (3) Coiling or knotting of tube in the stomach or esophagus
- (4) Trauma to the nose, esophagus, or stomach
- (5) Triggering vomiting
- (6) Intracranial placement of gastric tube in patients with unidentified skull fractures

e) PRECAUTIONS

Have suction available since vomiting may be induced.



PARAMEDIC ONLY

6. AIRWAY MANAGEMENT: NASOTRACHEAL INTUBATION

a) PURPOSE

Nasal intubation is the technique of passing an endotracheal tube through the nose and pharynx into the trachea. This is done without using a laryngoscope to visualize the vocal cords (blind technique). The procedure is limited to breathing patients in whom oral intubation is difficult.

b) INDICATIONS

- (1) Use is primarily for hypoxemic CHF and COPD patients and is allowed for closed head injury patients with clenched teeth
- (2) An oxygen saturation of less than or equal to 90% in a patient on 100% oxygen by face mask and respiratory distress
- (3) A respiratory rate of 8 or less per minute or 35 or greater per minute
- (4) A Glasgow Coma Score of 8 or less, **or**
- (5) Loss of gag reflex

c) CONTRAINDICATIONS

- (1) Patient receiving anticoagulants, such as Coumadin (warfarin)
- (2) Patient with upper airway hemorrhage, significant mid-facial trauma, or laryngeal trauma
- (3) Patient with cerebral spinal fluid leakage or evidence of basilar skull fracture


d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS

- (1) Epistaxis
- (2) Intubation of the esophagus
- (3) Trauma to the oral pharynx, vocal cords, esophagus, or trachea
- (4) Right mainstem bronchus intubation
- (5) Vomiting
- (6) Increased intracranial pressure, as result of increased vagal stimulation



- (7) Pneumothorax/tension pneumothorax from high pressure ventilation or underlying preexisting trauma
- (8) Intracranial tube placement through basal skull fracture

e) PRECAUTIONS

- (1) Topical anesthesia (lidocaine 4% spray or gel) should be applied to both nares to minimize discomfort.
- (2) Confirmation of ET placement
 - (a) Utilization of the Beck Airway Airflow Monitor (BAAM) device when available
 - (b) Auscultation of all lung fields to confirm air exchange
 - (c) Auscultation of the epigastrium to deny disturbance of gastric fluids upon ventilation
 - (d) Observation of bilateral expansion of the thorax
 - (e) ETCO₂ detection device required. At a minimum, use colorimetric devices.
 - (f) The esophageal detection device
 - (g) Documentation of tube depth at the nares
 - (h) Other clinical signs of improved perfusion and ventilation (e.g., pupillary response, skin color, etc.)
- (3)  Nasal intubation may require facilitation with sedation. When hypovolemia is unlikely and hypotension is not present, morphine/fentanyl or midazolam, or a combination of both, may be given by direct medical consultation to achieve mild sedation.



7. AIRWAY MANAGEMENT: NEEDLE DECOMPRESSION THORACOSTOMY (NDT)

a) PURPOSE

Needle Decompression Thoracostomy is the procedure of introducing a needle/catheter with a minimum length of 3.25 inches and a minimum diameter of 14 gauge (with optional add-on flutter valve attached) into the pleural space of the chest to provide temporary relief for the patient suffering from a tension pneumothorax.

b) INDICATIONS

- (1) Patients who are assessed to have a life-threatening tension pneumothorax in extremis with absent lung sounds AND clear evidence of hemodynamic compromise to include hypotension (systolic blood pressure less than 100 mmHg), and/or arrest
- (2) If traumatic arrest is suspected due to multi-system blunt trauma, or due to penetrating neck, chest, or abdominal trauma, bilateral needle decompression should be performed. Once catheters are placed, **do not remove**.
- (3) Allowable site: **(NEW '20)**
 - (a) Adults and children 15 years of age and older:
 - (i) Fifth (5th) intercostal space, anterior axillary line
 - (ii) If fifth (5th) intercostal space site is not available, use second (2nd) intercostal space at the mid-clavicular line on the anterior chest wall
 - (b) Children under 15 years of age:
 - (i) Use the second (2nd) intercostal space, at the mid-clavicular line on anterior chest wall

c) CONTRAINDICATIONS

Patients whose tension pneumothorax can be relieved by the removal of an occlusive dressing from an open chest wound

d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS

- (1) Intercostal vascular or nerve injury
- (2) Pneumo/hemothorax
- (3) Direct damage to the lung
- (4) Pericardial/cardiac injury
- (5) Infection

e) PRECAUTIONS

- (1) Reassessment of catheter patency
- (2) Second decompression may need to be performed if reaccumulation, catheter occlusion, or dislocation is evident.



8. OBSTRUCTED AIRWAY FOREIGN BODY REMOVAL: DIRECT LARYNGOSCOPY

a) PURPOSE

The attempted correction of a foreign-body airway obstruction through direct laryngoscopy should be accomplished only by a Maryland licensed CRT-(I) or paramedic. This is accomplished after the ALS clinician has determined (by noting repeated unsuccessful attempts at dislodging the object by applying the standard basic method of foreign body removal by BLS clinicians or the ALS clinician) that the object cannot be dislodged by these means. The patient must be unconscious and supine before this method is attempted.

b) INDICATIONS

Patient must be unconscious due to foreign body upper airway obstruction that has not resolved with standard basic methods for foreign body removal.

c) CONTRAINDICATIONS

None

d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS

Trauma to the oral pharynx, vocal cords, esophagus, or trachea

e) PRECAUTIONS

It is important to distinguish the foreign body from portions of the patient's anatomy.



9. AIRWAY MANAGEMENT: OROTRACHEAL INTUBATION

a) PURPOSE

- (1) Endotracheal intubation involves the passage of an endotracheal tube with direct visualization or digital manipulation through the larynx and into the trachea to provide direct maximum ventilatory support for a patient.
- (2) Blind digital intubation is accomplished without the laryngoscope.

b) INDICATIONS

- (1) Cardiac arrest
- (2) Respiratory arrest, patient without gag reflex
- (3) Deep coma, patient without gag reflex
- (4) Patient in extremis, in severe respiratory distress with extremely poor air exchange, or agonal respirations (gag reflex may be present)

c) CONTRAINDICATIONS

Upper airway obstruction due to foreign objects

d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS

- (1) Intubation of the esophagus
- (2) Trauma to the oral pharynx, vocal cords, esophagus, or trachea
- (3) Right mainstem bronchus intubation
- (4) Vomiting
- (5) Increased intracranial pressure as a result of increased vagal stimulation
- (6) Pneumothorax/ tension pneumothorax from high pressure ventilation or underlying preexisting trauma

e) PRECAUTIONS

- (1) When the patient cannot be intubated (following no more than two tracheal intubation attempts), avoid future intubation attempts until the patient reaches the hospital, unless otherwise directed by the physician.
- (2) Confirmation of ET placement

As it has been determined that no single method of assessment is 100% reliable, the position of the endotracheal tube must be assessed to be properly in the trachea by all means available to the EMS clinician. The following methods may be used to confirm proper placement of the endotracheal tube:

- (a) Visualization of the ET tube protruding adequately past the vocal cords and into the trachea
 - (b) Auscultation of all lung fields to confirm adequate air exchange
 - (c) Auscultation of the epigastrium to deny disturbance of the gastric fluids upon ventilation
 - (d) Observation of the bilateral expansion of the thorax
 - (e) ETCO₂ detection device. At a minimum, utilize colorimetric devices (required for all intubated patients).
 - (f) The esophageal detection device
 - (g) Documentation of tube depth at the lip
 - (h) Other clinical signs of improved perfusion and ventilation (e.g., pupillary response, skin color, etc.)
- (3) Once initial placement is confirmed:
- (a) The tube must be adequately secured
 - (b) The patient must be prepared for transport in such a fashion as to minimize movement of the head and neck. **(NEW '20)**
- (4) Placement of the tube should be verified by all means possible (as in "(2)" above) and as often as possible as part of the clinicians' ongoing assessments. It has been further noted that flexion of the neck can cause 3–5 cm displacement of the ET tube dislodging the tube from the trachea. At a minimum this reconfirmation should occur
- (a) Once the patient is prepared for transport,
 - (b) Anytime the patient is moved,
 - (c) Anytime dislodgment of the tube is suspected, and
 - (d) When responsibility for care is transferred to any other clinician.
- (5) During routine reporting procedures, documentation of proper placement should include which methods were utilized and at which points, in the care of the patient, verification was accomplished.
- (6) Maintain neutral alignment of head and neck with cervical stabilization when intubating trauma patients.
- (7) The Blind Digital method may be utilized for intubation of a patient in whom hyperextension of the cervical spine may be contraindicated. It may also benefit patients with severe facial trauma. However, it must be emphasized that this can be a difficult procedure, and the clinician must be certain that the patient cannot bite.

f) **SUGGESTED SIZES FOR ENDOTRACHEAL TUBES AND SUCTION CATHETERS**

Equipment Sizes

AGE	ORAL AIRWAY	BAG-VALVE-MASK	ETT SIZE	ETT BLADE	SUCTION CATHETER	GASTRIC TUBE
Premature	0	NEONATAL	2.5–3.0	0	6F	5F
Newborn	0	NEONATAL	3.0–3.5	0–1	6F	5–8F
3 mo.	1	INFANT	3.5	1	6–8F	5–8F
6 mo.	1	INFANT	3.5–4.0	1	8F	8F
1 yr.	1	INFANT	4.0	1	8F	8F
2 yrs.	2	CHILD	4.0–4.5	1–2	8–10F	8–10F
3 yrs.	2	CHILD	4.5	2	10F	10F
4 yrs.	3	CHILD	4.5–5.0	2	10F	10–12F
6 yrs.	4	CHILD	5.0–5.5	2	10F	12–14F
8 yrs.	4	CHILD	5.5–6.0	2	10–12F	14F
10 yrs.	5	CHILD	5.5–6.5	3	12F	14F
12 yrs.	5	ADULT SMALL	6.5–7.0	3	12F	14–18F
14 yrs.	5	ADULT	6.5–7.5	3	12–14F	16–18F
ADULT	5	ADULT	7.0–10.0	4	12–14F	16–18F



ENDOTRACHEAL TUBE SELECTION FOR A CHILD SHOULD BE BASED ON 16 PLUS CHILD'S AGE DIVIDED BY FOUR [$(16 + \text{YEAR}) / 4 = \text{TUBE SIZE}$] OR SIZE RECOMMENDED BY LENGTH-BASED RESUSCITATION TAPE (E.G., BROSLOW TAPE).

AGE IN THE CHART IS A QUICK REFERENCE. GIVEN INDIVIDUAL VARIATIONS IN AIRWAY SIZE, MAY CONSIDER ONE TUBE SIZE LARGER AND ONE TUBE SIZE SMALLER. USE A LENGTH-BASED TAPE IF AVAILABLE.

10. AIRWAY MANAGEMENT: TRACHEOSTOMY CHANGE



a) PURPOSE

Changing a tracheostomy tube may be required to reestablish a patent airway in patients who present with respiratory distress secondary to tracheostomy tube occlusion or obstruction that has not been relieved through suctioning.

b) INDICATIONS

- (1) Inability to ventilate with BVM
- (2) Ineffective spontaneous ventilations (poor chest rise, decreased breath sounds bilaterally)
- (3) Hypoxia, cyanosis, or decreased O₂ saturation levels, not relieved by suctioning
- (4) Increased work of breathing
- (5) Altered mental status secondary to hypoxia

c) CONTRAINDICATIONS

None

d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS

- (1) Inability to reinsert a tracheostomy tube
- (2) Edema at stoma site
- (3) Inability to maintain adequate chest rise and fall with assisted ventilations due to air leak around uncuffed tracheostomy tube



PATIENTS GREATER THAN EIGHT YEARS OF AGE WHO REQUIRE ASSISTED VENTILATIONS WILL NEED TO HAVE A CUFFED TUBE INSERTED TO PREVENT AIR LEAK AROUND THE TUBE AND ENSURE ADEQUATE CHEST RISE. IF AN APPROPRIATE SIZED CUFFED TRACHEOSTOMY TUBE IS NOT AVAILABLE, THEN ALS CLINICIANS MAY USE AN ET TUBE.

e) PROCEDURE

- (1) Two clinicians or clinician and trained family member
- (2) Use latex-safe sterile gloves and equipment.
- (3) Position patient with the head and neck hyperextended to expose the tracheostomy site.
- (4) Explain procedure to patient/family.
- (5) Have new tracheostomy tube nearby.
- (6) To remove the tracheostomy tube:
 - (a) If a double cannula tracheostomy tube is in place, attempt to change inner cannula first and reassess the patient to see if the obstruction is relieved. If the patient continues to have respiratory distress, change the entire tracheostomy tube. If cuffed, deflate using a 10 mL syringe.
 - (b) Carefully cut the tracheostomy ties.

- (c) Remove the tracheostomy tube, outward and backward towards the chest.
- (d) Lubricate the new tracheostomy tube with lubricating jelly or saline/water.
- (e) Insert new tracheostomy tube into stoma, inward and downward towards the lungs.
NOTE: STOP IF YOU MEET RESISTANCE (see (7) below).
- (f) If cuffed tracheostomy tube is used, once the tube has been inserted, inflate the cuff with an appropriate amount of air to avoid air leak around the tube (1–3 mL for pediatric tubes and 5–10 mL for adult tubes).
- (g) Reassess the patient.
- (h) With good chest rise and fall and improved skin color, secure the tracheostomy tube with ties or Velcro® at the back of the neck, so only one fingertip fits between the neck and the ties.
- (7) If you meet resistance inserting the tracheostomy tube, do NOT force the tube into the stoma. Request ALS rendezvous, if appropriate. Assess the patient:
 - (a) Reposition the patient, hyperextend the neck area.
 - (b) Reoxygenate using BVM to stoma site, with infant mask and appropriate size reservoir bag for the patient's size. Assess for chest rise and fall.
 - (c) If inadequate rise and fall of the chest, AND the patient has not had a laryngectomy, attempt BVM orally while placing an occlusive dressing over the stoma site. If a laryngectomy patient, you will only be able to ventilate with BVM at the stoma site.
 - (d) Attempt to insert a half-size smaller tracheostomy tube after lubricating with lubricating jelly or saline/water.
 - (e) Proceed with (6) f-g-h above.
 - (f) If you meet resistance, reassess the patient. Reoxygenate as needed.
 - (g) Insert a suction catheter through the tracheostomy tube, and use the suction catheter as a guide to insert the tracheostomy tube.
 - (h) Proceed with (6) f-g-h above.
 - (i) If ALS, attempt to insert a similar sized endotracheal tube into the stoma. If cuffed endotracheal tube is used, inflate the cuff with an appropriate amount of air to avoid air leak around the tube (1–3 mL for pediatric tubes and 5–10 mL for adult tubes).
 - (j) If ALS and unable to insert the ET tube into the stoma, AND the patient has not had a laryngectomy, attempt to intubate orally and apply an occlusive dressing over the stoma site.
 - (k) If you continue to have problems, STOP, consult the Base Station and continue BVM ventilations orally, or BVM to tracheostomy site ventilations if a laryngectomy patient, while en route to the closest appropriate hospital.

11. AIRWAY MANAGEMENT: TRACHEOSTOMY SUCTIONING



a) PURPOSE

Tracheostomy suctioning may be required to maintain a patent airway in patients who present with respiratory distress secondary to tracheostomy tube occlusion or obstruction.

b) INDICATIONS

- (1) Increased secretions from tracheostomy site or a mucous plug
- (2) Hypoxia, cyanosis, or decreased oxygen saturation levels
- (3) Increased work of breathing
- (4) Altered mental status secondary to hypoxia

c) CONTRAINDICATIONS

None

d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS

- (1) Bleeding at tracheal stoma site
- (2) Dislodgment of tracheostomy tube
- (3) Exaggerated cough reflex with introduction of saline
- (4) Increased hypoxia/respiratory distress
- (5) Infection

e) PROCEDURE

- (1) Two clinicians or clinician and trained family member
- (2) Use latex-safe sterile gloves and equipment.
- (3) Position patient with the head and neck hyperextended to expose the tracheostomy site.
- (4) Pre-oxygenate patient at the tracheostomy site:
 - (a) NRB mask if patient has adequate effective spontaneous respirations
 - (b) BVM if ventilator-dependent or there are ineffective spontaneous respirations
- (5) Select appropriately sized suction catheter (2 x internal diameter of tracheostomy tube).
- (6) Insert suction catheter:
 - (a) Measure from the tracheostomy site to the sternal notch.

OR

- (b) Insert until there is a cough reflex.
- (7) Apply suction ONLY as the catheter is withdrawn, rotating the catheter in a twisting motion between thumb and finger.
- (8) Suction for maximum of 10 seconds.
- (9) Reoxygenate and reevaluate patient.
- (10) Repeat suction procedure as needed (for thick secretions instill 3–5 cc sterile saline/water prior to repeat suctioning).

12. AIRWAY MANAGEMENT: VENTILATORY DIFFICULTY SECONDARY TO BUCKING OR COMBATIVENESS IN INTUBATED PATIENTS

a) INDICATIONS

Patients successfully intubated with an endotracheal tube, an approved alternative airway device, or cricothyroidotomy, for whom the ability to provide manual or mechanical ventilation is impaired secondary to bucking or combativeness

b) CONTRAINDICATIONS

Unsecured airway

c) PROCEDURE

- (1) Ventilatory difficulty secondary to bucking or combativeness in intubated patients. **(NEW '20)**
 - (a) Ketamine may be preferred for patients who have hypotension or possible hypovolemia, or if ventilatory difficulty is thought to be the result of pain response.
 - (i) Dose: Administer 2 mg/kg IVP/IO over 60 seconds. May repeat 2 additional doses of 1 mg/kg for IVP/IO every 10-15 minutes to a total of 3 doses as needed. Additional doses require medical consultation.
 - (2) Midazolam up to 0.1 mg/kg IVP/IO/(over 1–2 minutes)/IM, titrated to abate bucking and relax ventilation while maintaining systolic blood pressure greater than 90 mmHg (110 mmHg if injuries include a suspected head injury). Maximum single dose is 5mg.
 - (3) If ventilatory difficulty is thought to be the result of pain response, opioid may be used per Pain Management Protocol in addition to or instead of midazolam: Titrate to abate bucking and relax ventilation while maintaining systolic BP greater than 90 mmHg.
 - (4) Continue to monitor oxygen saturation and ventilate to desired ETCO_2 level.
 - (5) Obtain on-line medical direction if further problems present.
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- (6) Midazolam up to 0.05 mg/kg IVP over 1–2 minutes, titrated to abate bucking and relax ventilation while maintaining systolic BP: greater than 60 in neonates, 70 in infants, and $[70 + (2 \times \text{years}) = \text{systolic BP}]$ for patients greater than 1 year of age. Maximum single dose is 5 mg.
 - (7) If ventilatory difficulty is thought to be the result of pain response, opioid may be used per Pain Management Protocol in addition to or instead of midazolam: Titrate to abate bucking and relax ventilation while maintaining systolic BP: greater than 60 in neonates, 70 in infants, and $[70 + (2 \times \text{years}) = \text{systolic BP}]$ for patients greater than 1 year of age.
 - (8) Continue to monitor oxygen saturation and ventilate to desired ETCO_2 level.
 - (9) Obtain on-line medical direction if further problems present.



13. VENTILATORY MANAGEMENT

a) PURPOSE

- (1) Manual ventilation using a bag-valve-mask (BVM) or mechanical (machine) ventilation can be an effective method for managing a patient in the pre-hospital environment when performed correctly. Ventilatory management is important at both the BLS and ALS levels.
- (2) Special considerations such as etiology of respiratory failure and method of achieved airway management, including intubation (e.g., rapid sequence intubation), may require the advanced life support clinician to provide additional care.

b) INDICATIONS

- (1) Any condition requiring assisted or artificial ventilation with a bag-valve-mask or mechanical (machine) ventilation
- (2) All patients will require manual ventilation after the placement of an advanced airway. Inadequate respiratory rate may be secondary to underlying respiratory pathology or the result of pharmacologic intervention secondary to medications used in rapid sequence intubation.

c) CONTRAINDICATIONS

None

d) POTENTIAL ADVERSE EFFECTS/COMPLICATIONS

- (1) Gastric distension, vomiting, and/or aspiration
- (2) Hypoxemia
- (3) Secretions and tube/bag obstruction
- (4) Barotrauma
- (5) Patient agitation
- (6) Equipment failure



e) PROCEDURE/PRECAUTIONS:

- (1) Have suction available and ensure a patent airway using a BLS airway adjunct (OPA or NPA).
- (2) Rate of **initial** ventilation by single hand bag-valve technique should generally be the following:
 - (a) For all ages except neonates, 1 breath every 5 seconds (8–12 breaths/min)
 - (b) For a neonate, 1 breath every 3 seconds (higher rates may be required)
- (3) **AVOID** hyperventilating unless patient exhibits signs of brainstem herniation (e.g., unequal pupils, posturing). Hyperventilation is associated with increased mortality.

- (4) In the absence of contraindications (e.g., CPR or spinal trauma), consider elevating the head of the bed to 30 degrees.
- (5) Continuous pulse oximetry shall be used. If a sudden drop in SpO₂ is observed, assess airway patency and consider obstruction (e.g., tongue, vomitus, blood), poor seal around BVM, and flow of oxygen being administered (LPM).



- (6) A gastric tube should be considered for gastric decompression whenever distention is caused by BVM ventilation. Gastric distention can reduce effectiveness of ventilations.
- (7) Waveform capnography and patient-specific considerations:
 - (a) Continuous ETCO₂ shall be used whenever an advanced airway has been placed.
 - (b) Continuous ETCO₂ monitoring is encouraged for all other manually-ventilated patients.
 - (c) The waveform shape and reading can contribute to an understanding of the underlying pathology.
 - (d) Waveform capnography is utilized to optimize manual ventilation. Deliver ventilations to achieve a target ETCO₂ level of 35–40 mmHg if patient has a pulse. **(NEW '20)**
 - (e) ETCO₂ can be used to assess trends during a cardiac arrest and may contribute to understanding the pathology. A sudden substantial increase in ETCO₂ may indicate ROSC.
 - (f) Hypercapnia is seen in patients experiencing respiratory failure as a result of obstructive disease, such as asthma and COPD. Chronic baseline hypercapnia should be considered when ventilating to a target ETCO₂.
 - (g) A target ETCO₂ of 30–35 mmHg should be used for the rare patient who exhibits signs of brainstem herniation. Lower ETCO₂ has been associated with increased mortality. **(NEW '20)**
- (8) If advanced airway is placed and patient does not have adequate chest rise, absent or significantly diminished breath sounds, or decreased SpO₂ or abnormal ETCO₂ levels, consider the **DOPES** mnemonic:
 - “**D**”: Is the tube displaced? Assess for bilateral breath sounds and reassess tube depth and compare to initial depth noted after insertion.
 - “**O**”: Is an obstruction present? Suction the tube with a flexible suction catheter.
 - “**P**”: Are there signs of a tension pneumothorax? If present, perform needle decompression thoracostomy.
 - “**E**”: Is there an equipment malfunction? Check oxygen flow in tubing and level in portable cylinder, determine whether SpO₂ and ETCO₂ devices are working correctly, and ensure the cuff is adequately inflated.
 - “**S**”: If history of asthma or COPD is known, consider extending the interval between ventilations to avoid stacked ventilations.

- (9) Consider using a positive end expiratory pressure (PEEP) valve on the BVM, especially if the patient is hypoxemic (start at 5 cm H₂O).
- (10) If combativeness or bucking prevents the delivery of adequate ventilations, management shall be guided by the Ventilatory Difficulty Secondary to Bucking Protocol.