

Post Intubation Care

- ▶ Confirmation of correct ETT position
 - EtCO₂ monitoring with continuous capnography is considered the "Gold" standard in airway confirmation. It **shall** be used in **all** transports of patients with invasive airway devices.
 - Pre-hospital EMS providers should use all available means to determine correct ETT position.
 - A minimum of two clinical and one instrumental method of determination is recommended.
 - The following methods may be used to confirm correct ETT placement.
 - Use of end tidal CO₂ detection
 - Normal values for end tidal CO₂ is 5% to 6% which is equivalent to 35 - 45 mmHg.
 - Direct visualization of the ETT passing through the vocal cords into the trachea.
 - Auscultation of the epigastrium to confirm the absence of disturbance of the gastric fluids during ventilation.
 - Auscultation of all lung fields to confirm adequate air exchange.
 - Observation of bilateral expansion of the thorax during ventilation.
 - Other clinical signs of improved perfusion and improved ventilation and oxygenation
 - Stable heart rate
 - Pupillary response
 - Stable and rising oxygenation saturation
 - Improved skin color
- ▶ Depth of ETT placement
 - Correct depth avoids right main-stem bronchus intubation and inadvertent extubation.
 - General depths of placement at the teeth or gums:
 - Adult male: 21-23 cm
 - Adult female: 19-21 cm
 - Infant: 10-11 cm
 - Child over 1 y/o: (12cm + Age/2) or (ETT size X 3)
 - Direct visualization of cuff of ETT below the vocal cords.
 - Inflated cuff of the ETT can be palpated in the sternal notch when the pilot balloon is compressed.

Post Intubation Care continued

▶ Securing the ETT

- Initially manually secure ETT in place with your thumb and forefinger.
- A commercial ETT securing device with an incorporated bite block is recommended.
- At a minimum, place an oral airway and tape the ETT in place.
 - If circumferential taping is utilized, use care not to occlude venous blood flow from the head.
 - To avoid excess motion, tape the ETT to the maxilla, not the mandible.
- To further minimize head movement, consider placement of a cervical collar.

▶ Following the securing of the ETT, note and document the depth of ETT placement.

▶ Ventilation

- With an ETT and 100% oxygen, large tidal volumes and hyperventilation are not necessary and have been shown in recent studies to be detrimental to patient outcome.
- Use care to avoid hyperventilation, place patient on mechanical ventilator if available.
- Ventilate with a tidal volume of approximately 6-8 mL/kg or clinically, just enough volume to see the chest rise with each administered breath.
- Rate of ventilation:
 - Initially
 - Adult: 10-12 / min
 - Child: 20 / min
 - Infant / Toddler: 30 / min
 - Then, titrate rate using ETCO₂ monitoring to maintain an ETCO₂ of 35 - 40 mmHg.
 - If suspected acidosis (DKA, Aspirin overdose, etc.) maintain EtCO₂ & Respiratory rate post intubation to levels prior to intubation. Do not attempt to normalize EtCO₂ readings.
 - If the patient has a head injury **and** signs of herniation, titrate respiratory rate to achieve an ETCO₂ of approximately 30 mmHg.

▶ Patient Positioning

- As soon as possible once patient is secured to EMS stretcher position head of cot at least 30 degrees to allow better expansion of lungs and ventilator compliance.

Post Intubation Care continued

- ▶ Maintenance of Analgesia, Sedation, Neuromuscular Blockade
 - Purpose: To provide additional analgesia, sedation, and/or neuromuscular blockade in order to maintain ETT placement to facilitate continued oxygenation and ventilation in an intubated patient.
 - Indications
 - Patients awakening from medications used for drug assisted intubation.
 - Comatose patients recovering from paralytic drugs used for rapid sequence intubation.
 - Patients initially intubated without pharmacological assistance but are now recovering due to improved oxygenation and ventilation.
 - Medications: All should be administered IV or IO and in 50% reduced doses in the elderly (Age 70+), debilitated or unstable patient.
 - Analgesia
 - Appropriate pain control will facilitate ventilation and oxygenation and allow the use of smaller doses of sedatives and may avoid the need for pharmacological paralysis with neuromuscular blockers.
 - Narcotics are the primary medications used for analgesia in intubated patients.
 - Fentanyl
 - Potent analgesic.
 - No histamine release as compared to morphine.
 - Large doses can rarely cause chest wall rigidity requiring neuromuscular blockade.
 - Rapid onset (5 min) and short duration (15 min).
 - Dosage: Adult and Peds: 1-3 mcg/kg IV, may repeat every 20 min PRN
 - a. If giving IV, administer over 1-2 min
 - Ketamine
 - Dissociative agent that provides both analgesia & sedation.
 - Does not suppress respiratory function.
 - Rapid push may result in laryngospasm
 - Rapid onset (30-45 sec) Duration (10 - 15 min)
 - Dosage: 1 - 2 mg/kg IV

Post Intubation Care continued

- Sedation
 - Benzodiazepines are the most commonly used medications for continued sedation.
 - Single dose of Etomidate (Amidate) for initial intubation is safe. Repeat doses should be avoided due to inhibition of endogenous steroid synthesis.
 - Midazolam (Versed): Adult and Peds dose: 0.05-0.1 mg/Kg IV (max 5 mg) repeat every 5 min PRN.
 - Diazepam (Valium)
 - Adult: 1-5 mg IV, repeat every 5 min PRN
 - Peds: 0.1-0.5 mg/kg IV, repeat every 5 min PRN to a total dose of 5 mg in child < 5 y/o or 10 mg in child > 5yrs old

- Neuromuscular Blocking Drugs (NMB's) (Paralytics)
 - The non-depolarizing class of NMB's are preferred for maintenance of paralysis in the RSI patient or for the initial paralysis of the successfully intubated patient with DAI meds or in patients intubated without pharmacologic assistance. In the RSI patient, additional NMB will have to be administered quickly as the effects of the initial succinylcholine will begin to wear off in approximately 5 minutes.
 - Rocuronium is an NMB
 - Dosage: 1.2 mg/kg IV
 - Vecuronium (Norcuron) is the preferred NMB of choice although any non-depolarizing NMB in appropriate dose may be successfully utilized.
 - Dosage: 0.1 mg/kg IV initially and 0.05 mg/kg IV PRN for repeat dosing.

 - **CAUTION**
 - **MAINTAIN ADEQUATE ANALGESIA AND SEDATION WHEN ADMINISTERING PARALYTICS.**
 - **CONTINUOUSLY MONITOR OXYGENATION, VENTILATION, AND ETT POSITION WHEN ADMINISTERING PARALYTICS, ANALGESIA, AND SEDATION.**

Post Intubation Care continued

- ▶ Re-Confirming ETT Position
 - Anytime patient is moved.
 - Any changes in patient condition.
 - Anytime dislodgement is suspected.
 - Anytime care is transferred to another provider.
 - Perform the initial ETT confirmation steps.
 - Repeat laryngoscopy and directly confirm ETT position in the trachea if there is any question of correct position or any of the other confirmatory tests are equivocal.

- ▶ Documentation
 - Full report to the receiving physician or designated staff.
 - Specifically report any difficulties or complications related to airway management.
 - Include times and dosages of all medications given.
 - Complete the run report.
 - Complete the NAEMSP airway form and forward to the Medical Director.

Mechanical Ventilation

Mechanical Ventilation – Automatic Transport Ventilator only

NOTE: This is an advanced procedure. Agencies utilizing ventilators for interfacility transfers should maintain documentation of device-specific training, competency, and medical director approval for each participating paramedic.

- ▶ Maintain oxygen saturation of greater than or equal to 92%.
 - Attempt to maintain SpO₂ between 92% and 99%.
- ▶ Attach cardiac monitor, end-tidal CO₂ monitor.
- ▶ Assess and record vital signs, to include temperature, prior to transfer and every 5 minutes en-route.
- ▶ Reassess patient frequently during transport and document findings.
- ▶ Collect all transfer documentation: transfer sheet, EKG's, lab, other pertinent information.
- ▶ Review arterial blood gas prior to transport.
- ▶ Document ventilator settings and patient response.
- ▶ Document correct tracheal tube placement and secure appropriately.
- ▶ Maintain adequate analgesia.
 - Fentanyl 1.0-3.0 mcg/kg slow IV push; duration of action 30-60 minutes.
 - Ketamine 2 mg/kg, Slow IV push. Duration of action 15 minutes
- ▶ Maintain adequate sedation
 - Inadequate sedation may present as an unexplained increase in heart rate or blood pressure; the non-paralyzed patient may also demonstrate agitation, anxiety and/or restlessness.
 - Midazolam 0.035 mg/kg IV over 2-3 minutes. (IV)
- ▶ Maintain chemical paralysis if utilized pre-transport.
 - Monitor for motor activity.
 - Norcuron (Vecuronium) 0.1-0.15 mg/kg slow IV push; duration of action is 20-30 minutes.
 - Alternative paralytics include atracurium (Tracrium) and rocuronium (Zemuron).