

APPENDIX: 03

TITLE: MEDICATION ASSISTED INTUBATION (MAI) SUPPLEMENT

REVISED: June 01, 2019

I. BACKGROUND:

Known as Rapid Sequence Induction (RSI), Crash Airway Procedures (CAP), Medicated Assisted Intubation (MAI), etc., the use of medications to assist in intubation is both lifesaving and risky. Pharmacological agents should be used to assist the paramedic in performing intubation in patients who are difficult to intubate due to excessive gag reflex, and in instances where protecting the airway is a potential life-saving maneuver. Endotracheal intubation, in this context, should only be initiated when it can be completed in a short period of time, so as not to unduly delay provision of adequate ventilation. Specific examples of circumstances which may necessitate pharmacological agent use during intubation include:

- Isolated head trauma
- Cerebrovascular accidents
- Multiple system trauma
- Overdose
- Status epilepticus
- Acute pulmonary edema
- Respiratory failure
- Severe burns
- And based on anticipated clinical course

The above indications are applicable in instances that it becomes necessary to manage severe respiratory distress, optimize airway protection, hyperventilate for central nervous system lesions, or to provide ventilatory assistance in the presence of hypoventilation and hypoxia when other means of doing so are ineffective or contraindicated.

The paramedic should be thoroughly familiar with ALL DRUGS DISCUSSED WITHIN THIS SECTION.

II. PRE-INTUBATION MEDICATIONS (not all inclusive):

Sedative Hypnotics. To be used before paralyzing agents as an induction agent *alternative* to ketamine:

- Etomidate (Amidate): for adults and children greater than two years of age
 - ADULTS and PEDS (IV/IO): 0.2 – 0.4 mg/kg

Dissociative Anesthetic. To be used before paralyzing agents as an induction agent *alternative* to etomidate:

- Ketamine:
 - ADULTS and PEDS (IV/IO): 2 mg/kg SLOW IV push one minute prior to paralytic administration

Neuromuscular Blocking Agents. To be used after etomidate or ketamine:

- Succinylcholine chloride (Anectine):
 - ADULTS (IV/IO): 1-2 mg/kg, repeat one time only
 - PEDS (IV/IO): 1-2 mg/kg for children, 2 mg/kg for infants
- Rocuronium bromide (Zemuron):
 - To only be used in induction when succinylcholine is specifically contraindicated
 - ADULTS and PEDS (IV/IO): 1mg/kg, repeat PRN

Other Medications. Used in specific situations:

- Atropine to prevent reflex bradycardia; for children > one month of age
 - (IV/IO): 0.02 mg/kg, minimum dose of 0.1 mg, max single dose of 0.5 mg

III. PROCEDURE:

1. Preparation

- Have the following ready:
 - Bag-valve-mask connected to functioning oxygen delivery system
 - Working suction with Yankauer suction tip attached
 - Full Intubation set to include:
 - Endotracheal tube(s) with stylet, syringe and intact cuff and ETT
 - Laryngoscope with blades and bright light source.
 - Scalpel (full cricothyrotomy kit preferred)
 - Alternative airway (example: Combitube, LMA, KING or other device, if available and appropriate)
 - Endotracheal tube introducer (AKA the “bougie”, Flexiguide)
 - Anticipated pharmacological agents
 - Manpower to adequately manage the patient in the event of desaturation or other adverse event (i.e. Cardiac Arrest) .
 - Check to be sure that a functioning, secure vascular access device (IV or IO) is in place.
 - Note: If unable to establish IV or IO access certain drugs may be given IM instead
 - Cardiac monitor and SPO2. Be alert for the possibility of bradycardia or other dysrhythmias. Bradycardia and desaturation can be peri-arrest indicators.
- Assess the patient for likelihood of successful intubation and need for definitive airway, and the feasibility of alternative methods (Nasal ETT, BVM use only).
- Ensure adequate oxygenation, with a BVM if required, while preparing the equipment.
- Brief the team on the care plan and contingency actions.

2. Pre-oxygenation and Medication

- Pre-medicate as appropriate and feasible:
 - Atropine sulfate 0.02 mg/kg for children > one month of age
- Pre-Oxygenate:
 - Assist ventilations/oxygenate 2-3 minutes prior to intubation attempt unless patient's situation precludes this (inability to ventilate with BVM and inability to protect airway). Oxygenate as best as possible based on patient's condition using a BVM or similar means.
 - Good pre-oxygenation is a vital component to successful M.A.I. This ensures sustained oxygenation during the intubation attempt ("Safe Apnea").
 - Place patient on high flow nasal cannula during RSI procedures
 - 6+ LPM for PEDS
 - 15+ LPM for ADULTS
- Administer induction agent(s) and paralytic 45-60 seconds prior to intubation:
 - Administer a Sedative Hypnotic (i.e. **Etomidate**) or a Dissociative Anesthetic (i.e. **Ketamine**)
 - Administer a paralytic (i.e. **Succinylcholine** or **Rocuronium**)
- As patient relaxes:
 - Consider applying cricoid pressure to occlude the esophagus until intubation is successfully completed, the endotracheal tube cuff is inflated, and tube position confirmed
 - After fasciculation's stop (if they occur), demonstrate adequate jaw relaxation by manipulating the mandible. Jaw relaxation and decreased resistance to bag-mask ventilations indicate that the cords are paralyzed and that it is time to proceed with intubation.
 - If inadequate relaxation is present, give either a:
 - Second dose of Etomidate/Ketamine
 - OR
 - Initial or second dose of Succinylcholine

3. Intubation

- Refer to SWO Appendix 2, "Intubation Procedures"

4. Post Intubation Medications

- **Non-Depolarizing Neuromuscular Blocking Agents.** These are long acting paralytics to be used only after the ETT is secured:
 - **Vecuronium (Norcuron):** To be used only with estimated intubation times greater than 15-20 minutes, **on medical control order**, or as otherwise indicated in these SWOs.
 - **ONLY TO BE GIVEN AFTER TUBE IS CONFIRMED, AND SECURED**
 - ADULTS and PEDS (IV/IO): 0.1mg/kg, repeat PRN
 - **Rocuronium bromide (Zemuron):** Paralytic agent used *alternatively* to Vecuronium. To be used with estimated intubation times greater than 15-20 minutes, **on medical control order**, or as otherwise indicated in these SWOs.
 - **ONLY TO BE GIVEN AFTER TUBE IS CONFIRMED, AND SECURED**
 - ADULTS and PEDS (IV/IO): 1mg/kg, repeat PRN

- **Benzodiazepines (BZD).** Versed is the preferred benzodiazepine in the post-intubation setting:
 - Midazolam (Versed)
 - ADULTS (IV/IO/IM): 0.5-5 mg, max total dose 10mg
 - PEDS (IV/IO): 0.1-0.2 mg/kg, max single dose 5 mg, max total dose 10 mg
 - Diazepam (Valium):
 - ADULTS (IV/IO/IM): 5-10 mg, repeat PRN, max total dose 20 mg
 - PEDS (IV/IO): 0.2-0.3 mg/kg, repeat PRN, max total dose 20 mg
 - Lorazepam
 - ADULTS and PEDS (IV/IO): 0.05 mg/kg, titrate to sedation, repeat at 10 minutes PRN, max single dose 2 mg, max total dose 4 mg

- **Opiates.** Cautionary use with hypotension:
 - Morphine Sulfate (MS)
 - ADULTS (IV/IO/IM): 0.1 mg/kg initial dose, repeat at 0.05mg/kg every 10 min PRN, max single dose 10 mg, max total dose 20 mg
 - PEDS (IV/IM/IO): 0.1 mg/kg, repeat at 0.05 mg/kg every 10 min PRN, max single dose 5 mg, max total dose 15 mg
 - Fentanyl, (Sublimaze)
 - ADULTS (IV/IO/IM): 1 mcg/kg initial dose, repeat every 10 min PRN, max single dose 100 mcg, max total dose 200 mcg
 - PEDS (IV/IO): 1 mcg/kg, repeat every 10 min PRN, max single dose 75 mcg, max total dose 150 mcg
 - Hydromorphone (Dilaudid)
 - 0.5 mg, slow IV push over 2-3 minutes, Q 10 minutes PRN to a maximum of 2 mg (Limit dosage to 2 mg)

- **Disassociatives:** Preferred for trauma patients, patients who are at risk for hypotension, or who are refractory to other forms of sedation.
 - Ketamine HCL (Ketalar)
 - Adults and Peds (IV/IO) 2 mg/kg every Q 15 minutes PRN.

IV. PHYSICIAN PEARLS:

Previously, lidocaine was used for pretreatment of increased intracranial pressure during MAI. A review of the evidence has shown no clear benefit to this practice, but revealed an associated increased risk of hypotension, which can be detrimental in the neuro-critically ill. Therefore, the use of lidocaine during MAI for increased ICP is no longer recommended.