Medication Assisted Induction (MAI) Guideline

Effective June 1, 2018

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MEDICATION ASSISTED INDUCTION (MAI) GUIDELINE

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REVISION HISTORY

Description of Change	Change Effective Date
Original Document	06/01/2018
Approved by: T. Preston Bennett, MD Operational Medical Director, Warren County	Signature: 

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PREFACE

This Medication Assisted Induction (MAI) Guideline was approved by the Operational Medical Director of Warren County, T. Preston Bennett, MD to be implemented on June 1, 2018. This guideline is intended to provide guidance to those Paramedic level, advanced life support (ALS) providers in Warren County that have been authorized to and are considering initiating a Medication Assisted Induction (MAI) airway management procedure. This guideline specific to Warren County was drafted from the LFEMSC Regional Medication Assisted Induction Guideline.

MEDICATION ASSISTED INDUCTION (MAI) AUTHORIZATION TO PRACTICE

The 2018 Edition of the Warren County Fire and Rescue Services, Medication Assisted Induction (MAI) Guideline is to be utilized by authorized advanced life support personnel at the Paramedic level to provide this life-saving treatment. This treatment can be deployed from any Warren County Fire and Rescue Services, advanced life support licensed transport unit staffed with an authorized MAI Paramedic.

This Authorization to Practice for Medication Assisted Induction may be withdrawn under such conditions as, but not necessarily limited to, intoxication/substance abuse while on duty, practicing without a valid ALS certification at the Paramedic level, and failure to comply with requests/directions of the Agency OMD.

Any Emergency Department Physician in the Region who receives a patient from EMS and feels that there is reasonable question or concern pertaining to the safety of or about the patient care provided while utilizing this guideline; he/she must immediately inform in writing the following persons of such safety issue, question or concern.

- The ALS provider's Jurisdictional EMS Coordinator; Captain Kevin Catlett.
- The Agency OMD; T. Preston Bennett, MD
- The Virginia Office of Emergency Medical Services Program Representative.

T. Preston Bennett, MD
Operational Medical Director; Warren County Fire and Rescue Services.

Date

THIS IS NOT A CONTRACT
I have attended a Medication Assisted Induction (MAI) training session and acknowledge receipt of this authorization.

_____/_____/_____
Date of Class

Print Name and Certification Number

Provider Signature

Warren County Fire and Rescue 00943
Agency Affiliation

Warren County
City / County

Instructor, Medication Assisted Induction
(Instructor Print Name)

Instructor, Medication Assisted Induction
(Instructor Signature)

MEDICATION ASSISTED INDUCTION (MAI) GUIDELINE

Scope:

This guideline is designed to allow trained Paramedic level providers the option of managing patient airways with Medication Assisted Induction in Warren County. This document will provide clear guidelines to trained Paramedic level providers about patient care requiring MAI, proper documentation, and the essential quality assurance/quality improvement review.

NOTE: Medication Assisted Induction is not a standing order and requires the MAI authorized Paramedic to contact an Online Medical Control Physician and seek permission to perform the skill. Once permission has been granted, the authorized MAI Paramedic may perform MAI when the patient's condition warrants the treatment. In the event that the MAI authorized Paramedic attempts direct voice contact with an Online Medical Control Physician but cannot establish or maintain that contact and reasonably determines that a delay in treatment may jeopardize the patient, the MAI authorized Paramedic may perform the MAI procedure.

This guideline will apply to any patient that meets the patient profile in Section IV of these guideline.

I. Definition:

Medication Assisted Induction, or MAI, is the use of pharmacological agents to facilitate endotracheal intubation. Sedation and/or paralysis, allows laryngoscopy and placement of an endotracheal tube in those patients who fulfill the patient profile requirements.

II. Purpose:

MAI is an organized approach to emergency intubation comprised of sedation, muscle paralysis if needed along with continued sedation after successful intubation. Pharmacological paralysis when needed facilitates endotracheal intubation and maximizes the probability of successful placement of an endotracheal tube while minimizing hemodynamic responses and complications.

NOTE: Neuromuscular blocking agents will not be given without first giving a sedative agent. If the sedative agent allows for relaxation and sedation sufficient enough for successful orotracheal intubation then a neuromuscular blocking agents may be withheld.

A general overview of MAI involves: assessment of the patient; pre-oxygenation; preparation of equipment and medications; sedation; muscle relaxation; intubation; securing the airway; continuous reassessment; continued sedation; delivery of the patient to the most appropriate medical facility; and completion of the quality assessment/quality improvement process.

III. Patient Profile:

The standard of airway control is orotracheal intubation using MAI as indicated for the following patients:

- A patient requiring definitive airway control (intubation), but cannot be intubated using standard airway management techniques due to the presence of a gag reflect or trismus.
- Failure to appropriately ventilate / oxygenate a patient with other conservative resources such as CPAP or BVM.

IV. Patient Contraindications:

- Any patient under age 12 and/or weighing less than 50 kg.
- Any patient who has spontaneous respirations with adequate ventilation/oxygenation and a protected airway.
- Any patient where intubation may not be successful due to airway obstruction or trauma (i.e. epiglottitis, major facial/laryngeal trauma with significant edema or distortion of facial/airway anatomy).
- Upper airway obstruction.
- Any patient with known hypersensitivity to MAI medications.

V. Recognized Potential MAI Complications:

- Inability to secure the airway after paralytic administration.
- Dysrhythmias.
- Aspiration.
- Tachycardia.
- Bronchospasm.
- Increased intracranial pressure.
- Inability to recognize decreased neurological status.
- Hypoxia.
- Cardiac arrest.

VI. EMS Provider Profile:

EMS providers who meet the following criteria will be cleared to perform MAI:

- Paramedic certification.
    - Current Protocol Authorization to Practice
    - Current Surgical Cricothyrotomy Authorization to Practice.
    - Current MAI Authorization to Practice
- 1 year of intubation experience as a Paramedic or other healthcare provider authorized to intubate.
- Completion of a training program that incorporates all elements of this MAI Guideline including proficiency testing that has been approved by the Local Operational Medical Director and Jurisdictional EMS Coordinator.

- Continued education in MAI medication administration and intubation skills annually to maintain the authorization to perform MAI

VII. MAI Medications

The following medications have been approved by the Warren County Operational Medical Director, T. Preston Bennett, MD for use in Medication Assisted Intubation by MAI authorized Warren County Paramedics. The MAI authorized Warren County Paramedics may utilize these drugs when providing care from a Warren County Fire and Rescue Licensed EMS vehicle; Fentanyl, Ketamine, Vecuronium and Versed.

NOTE: Substitutable neuromuscular blocking agents include Rocuronium and Succinylcholine. If substitutable drugs are stocked, informational Drug Formulary Bulletins will be sent to all MAI authorized Warren County Paramedics.

VIII. MAI Patient Care Guideline:

1. Preparation

- Take into consideration the indications, risks and alternatives to MAI.
- Obtain SAMPLE history.
- Evaluation of the anatomy of the hypopharynx.
    - LEMON acronym
        - Look, Evaluate, Mallampati, Obstruction, Neck
- Perform a neurological assessment.

  a. Document neurological status, GCS Score, Pain response and extremity movement.

2. Essential equipment:

- Suction Unit with Rigid Tip "Yankauer" type catheter attached.
- Oxygen attached to an adult BVM device with ETCO2 attached.
- Laryngoscope; Video type preferred.
- ET tube, stylet, and Bougie device. Bougie usage is optional.
- Backup Airway Devices; King Airway™ and Surgical Cricothyrotomy Kit
- Medications: Fentanyl, Ketamine, Vecuronium and Versed
- Cardiac Monitor, Pulse Oximetry, ETCO2 monitoring and blood pressure monitoring.

3. Establish an open airway and pre-oxygenate:

- Pre-oxygenation is required before proceeding with sedation and paralysis if needed. If at all possible, allow the patient to pre-oxygenate on his or her own.
    - **Breathing Patient:** 15 LPM O2 via NRBM (2 – 3 minutes).
    - **Inadequate Breathing:** 15 LPM via BVM (1 – 2 minutes)
        - Bag-Valve Mask assist increases potential for gastric distention, which increases the possibility of vomiting and aspiration.
- Provide high flow oxygen via nasal cannula while intubating.
    - 15 LPM O2 via N/C

4. Continuous Patient Monitoring:

- Cardiac Monitoring, Pulse Oximeter and Blood Pressure.

5. Vascular Access:

- Flush IV to ensure patency.

6. Premedication:

- Fentanyl – 3 mcg/kg or up to a single bolus dose of 200 mcg.
    - 3 minutes prior to administering Ketamine or Vecuronium if needed.
    - Maximum efficiency is 1 to 2 minutes after dosing.
    - **Contraindications:** Known hypersensitivity, respiratory depression or systolic blood pressure <90.

7. Sedation:

- Ketamine – 2mg/kg via IV/IO rapid bolus <20 seconds
    - Administer 1 minute prior to the neuromuscular blocking agent being administered if paralysis is needed.
        - Intubation without the Neuromuscular blocking agent is authorized if the mandible is flaccid.
        - Sedatives must be administered prior to administration of a neuromuscular blocking agent, to eliminate the sensation of paralysis.
        - Onset of action is 30 to 40 seconds.
    - **Contraindications:** Known hypersensitivity

8. Administration of a Neuromuscular Blocking Agent:

- Vecuronium – 0.1 mg/kg IV/IO rapid bolus.
    - Onset of action is 2 minutes
    - **Contraindications:** None

- **Continued sedation is necessary to control agitation. Hypertension and tachycardia may be early indicators of the patients awakening to paralysis. Patients who exhibit agitation, seizure activity, cough, increased gag reflex or other activities which may compromise adequate ventilation and/or airway control, need immediate intervention.**
- **Neuromuscular blocking agents do not have sedative properties, do not alter pain reception and do not stop seizure activity. Keep your patient sedated.**

9. Intubation:

- Intubation should be performed when the muscles are fully relaxed. Do not attempt laryngoscopy until the mandible is flaccid.
- Two laryngoscopy intubation attempts
    - Preferred use of Video Laryngoscope and Bougie if needed.
    - Anytime SPO2 drops below 5% of the patient's baseline, ventilations are required with a BVM and supplemental oxygen.
    - King Airway as primary backup if unable to facilitate intubation.
        - Surgical Cricothyrotomy if unable to ventilate with King Airway.

10. Verification of Tube Placement:

- 4 methods of endotracheal tube confirmation required.

    1. Visualization of the tube passing through the cords.
    2. Presence of condensation on the inside of the ET tube.
    3. Presence of bilateral breath sounds and absence of breath sounds over the epigastrium.
    4. Continuous Waveform ETCO2 Monitoring.

- Note the depth of the endotracheal tube.

    After each patient transfer or movement, the endotracheal tube placement must be re-verify and documented to ensure appropriate tube position.

- Tube placement verification is more important than the intubation itself. Unrecognized esophageal intubation is catastrophic.

11. Secure the Endotracheal Tube:

- Commercial ET Tube Holder applied.
- Rigid cervical collar applied.

12. Considerations:

- Once a neuromuscular blocking agent is given, the provider assumes complete responsibility for maintaining an adequate airway and ventilations.
- Maintain sedation/paralysis per re-dosing schedule
- Continuous monitor oxygen saturations and ETCO2
- Under **NO CIRCUMSTANCES** should MAI be used to restrain a violent or combative patient.

13. Restocking of Vecuronium – Used or Expired

- Used and Expired restocked is thru Lester and Mowery's Pharmacy; Monday – Saturday between the hours of 0900 – 1800.
- Emergency restocking – WMH ED Pyxis
    - This option is only to be exercised after usage and if Lester and Mowery's Pharmacy is closed.

FENTANYL (Sublimaze®)

Scope EMR | EMT | AEMT | INT | PM

Generic Name:	**Fentanyl (fen'-ta-nil)** ***DEA Class: Schedule II***
Trade Name:	Sublimaze®, Duragesic®, Fentora®
Chemical Class:	Opiate derivative
Therapeutic Class:	Narcotic analgesic
Actions:	Fentanyl is a powerful synthetic opiate with mechanism of action similar to Morphine. It is considered both faster acting and of shorter duration than Morphine. Binds with opiate receptors in the CNS, altering both perception of and emotional response to pain through unknown mechanism. Specifically used for patients with marked hypertension and suspected intracranial pressure.
Pharmacokinetics:	*IV:* Onset immediate. Peak effect several minutes. Duration of action 30 to 60 minutes.
Indication:	Moderate to severe pain.
Contraindications:	1. Known hypersensitivity 2. Respiratory depression
Precautions: ***Pregnancy Cat. C***	1. Use with caution with suspected traumatic brain injury. 2. Use with caution in patients with COPD. 3. Use with caution in patients with cardiac bradyarrhythmias.
Side Effects:	*CNS:* dizziness *CV:* hypotension, hypertension, bradycardia *EENT:* blurred vision *GI:* nausea, vomiting *RESP:* respiratory depression, apnea, laryngospasm *SKIN:* diaphoresis
Administration:	*Adult:* 3 mcg/kg up to 200 mcg IV over 1 to 2 minutes.
Supply:	100 mcg in 2 mL
Notes:	If a subsequent dose is given prior to the peak effect of the initial dose, there is a risk of dose stacking and potential overdose.

KETAMINE (Ketalar®)

Scope EMR | EMT | AEMT | INT | PM

Generic Name:	**Ketamine (ket'-a-meen)**
Trade Name:	Ketalar®
Chemical Class:	Analgesic
Therapeutic Class:	General anesthetic
Actions:	Ketamine attaches to NMDA receptors which disassociates the portion of the brain that controls consciousness from the portion of the brain that controls vital bodily functions. The result is, when given in sufficient doses, anesthesia that provides pain control and amnesia while not causing hypotension or prolonged apnea.
Pharmacokinetics:	*IV:* Onset 30-40 seconds. $t_{½}$ = 5 minutes.
Indications:	Pain augmentation as an adjunct to an opiate analgesic. Patients with a psycho-social condition exhibiting extreme anxiety and/or combative / violent behavior. Sedation.
Contraindications:	1. Hypersensitivity to the drug. 2. Marked hypertension with potential for increased intracranial pressure. 3. Patients less than 12 years of age and/or under 50 kg.
Precautions: ***Pregnancy Cat. B***	In patients with cardiac diseases/syndromes, Ketamine might worsen such conditions; NOT indicated as sedation prior to cardioversion or transcutaneous pacing.
Side Effects:	*CNS:* confusion, delirium, vivid dreams *CV:* hypertension, tachycardia *GI:* nausea, vomiting, hypersalivation *RESP:* respiratory depression
Administration	*Adult:* *IV:* Give 2 mg/kg IV over 1-2 minutes. May repeat as needed every 10 to 15 minutes.
Supply:	Vial contains 500 mg in 10 mL.
Notes:	1. Ketamine (in lower doses) is much more effective in relieving pain when given following a dose of an opiate analgesic. It is effective in relieving pain when combined with another opioid. 2. The first line analgesic is Fentanyl. Morphine may be substituted when a Fentanyl contraindication exists or when Fentanyl is not available.

MIDAZOLAM (Versed)

Scope | EMR | EMT | AEMT | INT | PM

Generic Name:	**Midazolam (mid-az'zoe-lam)** **DEA Class: Schedule IV**
Trade Name:	Versed
Chemical Class:	Benzodiazepine
Therapeutic Class:	Sedative/hypnotic
Actions:	Midazolam causes central nervous systems depression via facilitation of inhibitory GABA1 at benzodiazepine receptor sites (BZ1 – associated with sleep; BZ2 – associated with memory, motor, sensory, and cognitive function). Midazolam is a short-acting benzodiazepine that is three to four times more potent than Diazepam. Midazolam has important amnestic properties.
Pharmacokinetics:	*IV: Onset 3 to 5 minutes. t½ = 1.2 to 12.3 hours.*
Indications:	Sedation for endotracheal intubation only after the ET tube is inserted.
Contraindications:	1. Hypersensitivity to the drug. 2. Hypotension (SBP less than 90 mm Hg). 3. Acute angle closure glaucoma.
Precautions: ***Pregnancy Cat. D***	Administer cautiously when alcohol intoxication is suspected. Emergency resuscitative equipment must be available prior to the administration of Midazolam. Vital signs must be continuously monitored during and after drug administration. Midazolam has more potential than the other benzodiazepines to cause respiratory depression and respiratory arrest.
Side Effects:	*CNS:* drowsiness, amnesia, altered mental status *CV*: hypotension, tachycardia, PVCs *RESP:* bronchospasm, coughing, laryngospasm, respiratory depression, and arrest Interactions: The effects of Midazolam can be accentuated by CNS depressants such as narcotics and alcohol.
Administration	*Adult:* Sedative prior to intubation/induction; Give 0.1 mg/kg IV/IO up to single 5mg bolus. Sedative after intubation/induction; Give 0.05 mg/kg IV/IO up to single 5mg bolus. **Note; To be used as a sedative if Ketamine is unavailable**
Supply:	Vial containing 5 mg in 1 ml.

ROCURONIUM BROMIDE (®)

Scope EMR | EMT | AEMT | INT | PM

Generic Name:	**Rocuronium Bromide ()**
Trade Name:	ZEMURON®
Chemical Class:	Non depolarizing neuromuscular blocking agent
Therapeutic Class:	Paralytic
Actions:	Blocks cholinergic receptors on motor endplate, does not result in muscle depolarization, no fasiculations observed. Subsequent nerve impulse transmission is inhibited.
Pharmacokinetics:	*IV:* Onset 1 minute Peak: 1 - 3 minutes Duration: 25 – 40 minutes
Indications:	For MAI
Contraindications:	None
Side Effects:	*Apnea, respiratory insufficiency, hiccups, tachycardia, transien hypotension* No fasciculation.
Administration	*Adult: IV:* Give 1 mg/kg IV/IO over 20 seconds.
Supply:	Vial contains 50 mg in 5 mL.

VECURONIUM BROMIDE (NORCURON®)

Scope EMR | EMT | AEMT | INT | PM

Generic Name:	**Vecuronium Bromide**
Trade Name:	NORCURON®
Chemical Class:	Non depolarizing neuromuscular blocking agent
Therapeutic Class:	Paralytic
Actions:	Blocks cholinergic receptors on motor endplate, does not result in muscle depolarization, no fasiculations observed. Subsequent nerve impulse transmission is inhibited.
Pharmacokinetics:	*IV:* Onset 2 minutes Peak: 2 - 3 minutes Duration: 25 - 40 minutes
Indications:	For Medication Assisted Induction
Contraindications:	None
Side Effects:	*Apnea, respiratory insufficiency*
Administration	*Adult: IV:* Give 0.1 mg/kg IV/IO rapid bolus. **Reconstitute with 10 ml NSS**
Supply:	Vial contains 10 mg in 10 mL. Medication vial, NSS vial, Draw needle and 10 ml syringe will be stored in the ALS drug box, inside of a large pill bottle. The medication vial and NSS vial expiration dates will be written on the outside of the pill bottle and the pill bottle lid secured with tamper tape or seal.as shown below.