

UAB Trauma Airway Management Clinical Practice Guideline

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Purpose: Provide a framework and reference point for airway management across the trauma spectrum. This includes the evaluation of the head and neck and if required: pre-intubation, intubation and post intubation management.

Objective: Recognizing that all trauma airways are potentially high-risk, a protocolized and anticipated process is key to team based approach to care of traumatically injured patient. Ensure a standardized and evidence based practice of trauma airway management with the ability to follow key outcome metrics

1. Responsibilities

a. Trauma Airway Resident

- i. Required for all level 1 trauma activations
- ii. Perform Head & Neck Examination
 1. Evaluation of the Calvarium
 - a. Injury size and location (depressions/lacerations)
 2. Ocular Examination
 - a. Extraocular movements, Pupil size, and light reactivity
 3. Auricular Examination: including tympanic membrane evaluation
 4. Mid-Face Evaluation
 5. Oral Evaluation
 - a. If patient is cooperative, ask about loose teeth, missing teeth or unstable bite
 6. Neck Evaluation (excluding C-spine)
- iii. Assistance with placement of Cervical Collar (If Indicated)
 1. If patient arrives with collar, change after roll prior to CT.
 2. If patient has no collar, apply prior to EMS transfer to UAB bed.
- iv. Assistance with maintaining C-Spine protection during log roll procedure

- v. Perform AMPLE History (Allergies, Medication, Past Medical History, Last Meal, events leading)
 - vi. Endotracheal Intubation (if required)
 - 1. Supervisor at bedside (senior anesthesia resident, ED attending, anesthesia attending)
 - 2. Medications to be pushed opposite to the blood pressure cuff when possible at the direction of the Trauma Lead
 - b. Trauma Respiratory Therapist
 - i. Assurance of airway equipment setup and functionality
 - ii. Assist in cervical spine protection (including c-collar placement)
 - iii. Assistance with maintaining C-Spine protection during log roll procedure
 - iv. Ventilator management
 - v. Transport of ventilated patient
 - vi. Assistance with administration of oxygen (if required)
 - c. Trauma Resident Leader
 - i. Decision to Intubate
 - 1. Medication Selection
 - a. Assistance from anesthesia and pharmacy (if available)
 - b. Includes post intubation analgesia and sedation
 - 2. Drug administration
 - a. Once hemodynamically prepared for intubation
 - b. Once the team is prepared and ready for intubation
 - ii. Monitor vital sign parameters during intubation
 - iii. Continue to lead resuscitation to prevent peri-intubation cardiac arrest
2. Indications for endotracheal intubation
 - a. Airway trauma that is not resolved through other maneuvers
 - i. Head of bed elevation
 - ii. Suction
 - b. Hypoxia
 - i. Not resolved with administration of supplemental oxygen
 - c. Hypercapnia
 - i. Consider EtCO₂ monitoring
 - d. Combative patient
 - i. Can consider sedative/hypnotics without intubation
 - 1. Attempt to treat pain first
 - 2. Ketamine (1 mg/kg IV/IO)
 - e. Expected clinical course
 - i. Palliative
 - f. Glasgow coma score less than 8 in patient with concern for traumatic brain injury
 - g. Cardiac arrest
 - h. Overdose
 - i. Aspiration
3. Endotracheal intubation procedural guidelines for Rapid Sequence Intubation (RSI)
 - a. Pre-procedural (Prior to intubation)

- i. Initiate pre-oxygenation through non-rebreather or Bag Valve Mask
 1. Consider concurrent nasal cannula use ^[1,2,3]
- ii. Ensure the systolic blood pressure is adequate
 1. Transfuse prior to intubation if needed
 - a. Consider if shock index (HR/SBP) is > 1 to 1.2
 2. Utilize vasopressors if needed to temporize while transfusion is ongoing
- iii. Confirm and function check airway equipment
 1. if not performed prior to arrival
- iv. 3 minutes of oxygenation prior to paralysis ^[1,2,3]
 1. Consider augmenting with Nasal Cannula
 2. See above if combative patient
- v. Positioning
 1. Remove Cervical Collar, if present
 - a. Maintain in-line cervical spine stabilization, as needed, through additional staff
 2. Head of Bed Elevation 30-45 degree
 - a. Indication
 - i. All patients unless contraindicated
 - b. Contraindication
 - i. Spinal Injury (consider reverse-trendelenburg)
 - ii. Hypotension
 3. Medications should be injected on the opposite side of the BP cuff when possible
- vi. Medications
 1. Medication Delivery
 - a. Choice and Timing made by Trauma Lead
 - i. Anesthesia is encouraged to provide recommendations on dosing, but trauma lead decides when to push medications
 2. Sedative (Hypnotic)
 - a. Ketamine (*First Line*) (1-2 mg/kg)^[11]
 - i. Preferred for patients with hemorrhagic shock or hypotension
 - ii. Obesity as a risk factor for hypotension in trauma patients ^[5]
 - iii. Average dose: 100 mg
 1. Dosing based off of actual BW if BMI < 40 kg [4]
 2. Ideal/adjusted BW for BMI > 40kg ^[4]
 - b. Etomidate (0.3 mg/kg)
 - i. Reduced dose in hemorrhagic shock
 - ii. Average dose: 20mg

1. Dosing based off of actual BW if BMI < 40 kg [4]
2. Ideal/adjusted BW for BMI>40kg [4]

3. Neuromuscular Blockade

- a. Rocuronium (1.2mg/kg)
 - i. Average dose: 100mg
 - ii. Dosing is IDEAL BODY WEIGHT
- b. Succinylcholine (1.5mg/kg)
 - i. Average dose: 150mg
 - ii. Dosing is ACTUAL BODY WEIGHT

b. Procedural (Intubation)

- i. Endotracheal Intubation
 1. Perform video assisted laryngoscopy^[12]
 2. Consider cricoid pressure
- ii. Success defined
 1. Visualization
 2. Colorimetric CO₂ detection x 3
 3. Auscultation
 4. Chest Radiograph
- iii. Unable to intubate
 1. See unable to Difficult Airway Flowsheet

c. Post-intubation sedation

- i. Medication
 1. Analgesia
 - a. An analgesia first strategy is reasonable with the plan to add sedatives if patient is showing signs of discomfort/agitation as this can decrease duration of ventilation and ICU LOS ^[7,8]
 - b. Fentanyl
 - i. PRN bolus 1-2 mcg/kg q20-30 min
 - ii. Infusion @ 2-4 mcg/kg/hr (150-300 mcg/hr)
 - c. Hydromorphone
 - i. PRN Bolus 0.25-2 mg q1-2 hours
 - d. Ketamine
 - i. 0.1-0.3 mg/kg over 15 minutes
 2. Sedation
 - a. Propofol
 - i. Start at 10 mcg/kg/min and increase by 5 mcg q5 min
 1. *** Do not exceed 50 mcg/kg/min***
 - ii. Preferred for patients with seizure
 - iii. Start low and titrate slowly in hypotensive patients
 - iv. Adverse Drug Effects

1. Hypotension
2. Propofol Related Infusion Syndrome
 - a. Bradycardia, hemodynamic collapse, metabolic acidosis, rhabdomyolysis, renal failure
- b. Ketamine
 - i. PRN bolus 1 mg/kg q 30 min
 - ii. 2-4 mg/kg/hr
 - iii. Adverse Drug Effects:
 1. Laryngospasm
 2. Increases secretions (sialagogue effect)
- c. Dexmedetomidine
 - i. 0.2-0.7 mcg/kg/hr
 - ii. Do not use if deep sedation is necessary
 - iii. Adverse Drug Effects
 1. Hypotension
 2. Bradycardia
- d. Midazolam
 - i. 0.5-2 mg loading dose pushed over 3-5 minutes followed by 0.5-4 mg every hour (not to exceed 6 mg/hr)
 - ii. Non-benzodiazepine sedation is preferred as it has been shown to decrease ICU delirium, duration of ventilation and ICU LOS^[9]
3. Neuromuscular Blockade
 - a. Rocuronium
 - i. Average dose: 50mg
 1. 0.6-1.2 mg/kg
 - ii. If patient risk to self while adjusting sedation and analgesia
 - iii. New hypertension or tachycardia can be an indicator of inadequate sedation
 - b. Succinylcholine
 - i. Average Dose: 150-200 mg
 1. 1-2 mg/kg
 - ii. Ideal for closed head injury patients
 - iii. Risk for self extubation if poorly sedated
 - iv. DO NOT USE in: hyperkalemia, burns > 24 hours, crush injuries, prolonged immobilization, susceptibility to malignant hyperthermia
- ii. Tube Maintenance
 1. Secure tube
 2. Label Tube with Difficult Airway sticker if:
 - a. More than 2 attempts
 - b. Junior fails attempt

- c. Facial Trauma/disrupted anatomy
 - d. Inhalational Injury
 - e. Oropharyngeal/laryngeal edema
 - f. D-blade/Hyperangulated blade necessary
 - g. C-spine Injury
 - h. Difficult to bag/mask seal
 - i. Senior/attending deems it so
- iii. Ventilator Management
 - 1. Consider end-tidal CO2 monitoring
 - 2. Avoid Hyperoxia
 - a. Titrate to pulse ox of 94-99%
 - 3. Maintain TV of 6-8 cc/kg IBW^[10]
 - a. Consider lower tidal volume ventilation in hemorrhagic shock
 - iv. Richmond Agitation Sedation Scale (RASS)
 - 1. Initial goal of -3 to -2
 - 2. Goal of (-2 to 1) after initial evaluation and proceduralization (chest tube, CVL, orthopedic intervention, etc)
 - 3. Deeper sedation may be required in the acute phase for vent dyssynchrony, management of acute illness, proceduralization
 - d. References:
 - i. Devlin, John W. et al. Clinical Practice Guidelines for the Prevention and Management of Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption in Adult Patients in the ICU. Critical Care Medicine 46(9):p e825-e873, September 2018. | DOI: 10.1097/CCM.0000000000003299

“We will intend to track major adverse peri-intubation events defined as at least 1 of the following events occurring within 30 minutes from the start of the intubation procedure:

1. Cardiovascular instability [Defined as: systolic pressure <65 mm Hg at least once, <90 mm Hg for >30 minutes, new or increase need of vasopressors, fluid bolus >15 mL/kg, or new transfusion requirement]
2. Severe hypoxemia [Defined as: persistent peripheral oxygen saturation <80%]
3. Cardiac arrest
4. Failed First-Attempt [Defined as: removal of the laryngoscope]
5. Need for Surgical Airway
6. Inadequate post-intubation sedation [Defined as: hypertension and tachycardia in the absence of recent sedative administration]”

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Difficult Airway Flowchart

In the situation where endotracheal intubation is unable to be performed for initial operator

1. Continue apneic oxygenation by via 15L NC
2. Assess whether with BVM able to maintain Sat>90%
 - a. If able, then consider alternative intubation techniques*
3. If BVM unable to maintain Sat>90%
 - a. If facial trauma or rapid deterioration
 - i. Perform cricothyroidotomy**
 - b. If no facial trauma place supraglottic airway
 - i. If able to maintain Sats >90%
 1. Alternative intubation technique
 2. Operating room for tracheostomy

*Alternative intubation techniques

Changing Providers
Patient Positioning
Blade size/Geometry
Fiberoptic Scope

**Cricothyroidotomy

Primary Operator: Trauma Senior assisted by Trauma Fellow/Attending or ED Attending
Backup Operator: ED Senior assisted by Trauma Fellow/Attending or ED Attending