Trauma Airway Management Guidelines
Draft 5/11/09

Purpose:
To provide a standardized and interdisciplinary approach to airway management of trauma patients. These guidelines were created through a collaborative effort between the Departments of Anesthesia, Emergency Medicine, and Trauma Surgery.

Approach to airway management:
Early recognition of the difficult airway and a methodical, prepared approach will assist in establishing a safe and successful intubation. The emergency airway management algorithms endorsed by the American Society of Anesthesiologists, Walls et al. and Dunham et al. are included in this guideline. They are referenced and attached as appendices (1-3).

Indications for intubation:
Airway management is a critical component of resuscitation of the trauma patient. Clinical indications for endotracheal intubation may include:
- Airway Obstruction or high risk for airway obstruction
- More severe nasal, pharyngeal, or upper airway hemorrhage
- Altered mental status or traumatic brain injury or aspiration risk with severe cognitive impairment (GCS < 8)
- Cardiac Arrest
- Refractory or severe hypoventilation
- Refractory or severe hypoxia
- Hemorrhagic shock with incipient respiratory failure
- Severe smoke inhalation or major burns
- Anticipated clinical course that includes any of the above

Guidelines:
The following guidelines are acceptable best practices for airway management in trauma patients:

1. Roles, Experience & Training in emergency airway management:
   1. Physicians performing intubation of trauma patients should have prior training in emergency airway management and the approach to the difficult airway.
   2. The physician should also have familiarity with the available equipment (Appendix 4), personnel, and protocols of trauma airway management in the Emergency Department.
   3. Physicians should have knowledge of indications and contra-indications of the available airway devices
   4. The decision to intubate a patient will ultimately be made by the responsible attending staff from Trauma, Anesthesiology or Emergency Medicine, resuscitation leader in conjunction with the EM attending, Trauma Surgery, and Anesthesia attendings.
   5. The specific primary team responsible for performing intubation will be determined by the prior written policy between the Departments of Emergency Medicine, Anesthesia, and Trauma Surgery
      1. As of August 2008:
         Monday 6:00 AM until Saturday 6:00 AM:
            1. Anesthesia team has the primary responsibility for the trauma airway
         Saturday 6:00 AM until Monday 6:00 AM:
            2. Emergency Medicine team has the primary responsibility for the trauma airway
   6. When the EM team is primarily managing the airway, the Anesthesia team will support the EM airway team as a consultant in case of difficulties. Ideally, a short
briefing between the EM team and the anesthesia consultant is performed prior to the arrival of the patient.

2. Preparation:
   1. The equipment available for airway management will be regularly checked and re-stocked per Emergency Department Protocol. The physician managing the airway will be responsible for verifying:
      1. Functioning and appropriately sized laryngoscopes, blades and endotracheal tubes (Adults: size 6.5-8.0; Pediatrics: size 3.5-6.0; stylet and balloon tested)
      2. Oral and nasal airways
      3. Intravenous access
      4. Cardiac monitoring
      5. Oximetry and Capnography
      6. Suction (Yankauer, endotracheal suction)
      7. Bag-Valve-Mask (BVM)
      8. Supraglottic device (LMA / Combitube)
      9. Cricothyrotomy kit

3. Assessment:
   1. In order to identify the anticipated difficult airway, the airway team should perform early examination (when feasible), including Mallampati score and assessment of thyromental distance (i.e. LEMON, Appendix 5).
   2. When a difficult airway is encountered or anticipated, a call for additional equipment and resources and the anesthesia team should be made. The anesthesia team should be called if not already present.

4. Positioning:
   1. If there is concern of cervical spine injury, cervical spine immobilization should be maintained prior to intubation and after the airway is secured.
   2. During the procedure, the cervical spine collar (if used) should be opened and an assistant designated by the airway physician will provide in-line cervical spine stabilization
   3. Cricoid pressure should be applied when the patient is unconscious. If an inadequate view is encountered, the intubating physician may manually reposition the larynx, or direct the assistant to release cricoid pressure.

5. Preoxygenation:
   1. If feasible, patients will be administered 100% oxygen for at least 3 minutes, or 8 vital capacity breaths by BVM prior to intubation

6. Medications:
   1. A standard intubating drug (Appendix 6) kit will be requested with any 900/911-trauma activation
   2. In case of peri-intubation hemodynamic collapse vasoactive drugs (ACLS) should be available, including atropine, phenylephrine, and epinephrine.
   3. The medications given for rapid sequence induction and intubation will be under the direction of the attending physician supervising airway management
   4. As medications are administered, they will be announced and recorded by the nursing scribe during the resuscitation
   5. Upon successful intubation, post-intubation sedation medications will be ordered by the airway physician

7. Pre-treatment:
   1. In selected patients with signs of increased intracranial pressure, aortic dissection, or
reactive airway disease the following medications may be considered as pre-treatment:
1. Lidocaine 1.5 mg/kg IV
2. Fentanyl 1-3 mcg/kg IV (caution: hypovolemia may cause hypotension)

8. Induction:
1. The following medications are recommended for induction
   1. Etomidate 0.2-0.3 mg/kg IV

9. Paralysis:
1. The following medications are recommended for paralysis
   1. Succinylcholine 1.0 - 1.5 mg/kg IV (*contraindications: appendix 7)
   2. Alternative: Rocuronium 1.0 - 1.2 mg/kg

10. Confirmation
    1. After placement of an endotracheal tube, confirmation of proper placement should be confirmed by:
       1. Capnography and
       2. Auscultation of breath sounds and absence of gastric sounds
    2. Additional methods of endotracheal tube verification include:
       1. Chest Radiography
       2. Fiberoptic visualization of endotracheal placement

11. Post Intubation Management
    1. After the placement of a cuffed endotracheal tube has been verified, the following medications are recommended for post-intubation sedation.
       1. Midazolam 0.01-0.05 mg/kg IV OR
       2. Alternative: Propofol 25-100 mcg/kg/min IV drip
    2. For pain control, the following medication is recommended:
       1. Fentanyl 1-3 mcg/kg IV
    3. If paralysis is required, the following medication is recommended:
       1. Rocuronium: 0.5 mg/kg IV

Appendices & References:


4. Airway Management Equipment List (in progress)

5. ASSESS the Airway: LEMON mnemonic
   1. L Look externally
   2. E Evaluate 3-3-2
   3. M Mallampati Score
   4. O Obstruction/Obesity
   5. N Neck mobility

6. Intubating Drug Kit Contents:
   1. Succinylcholine Prefilled syringe
   2. Etomidate
   3. Rocuronium
7. Succinylcholine contraindications include:
   1. Burns or crush injury >48 hours post initial injury
   2. Known or suspected myopathy
   3. Hyperkalemia
   4. Malignant Hyperthermia
Appendix 1:

**2003 DIFFICULT AIRWAY ALGORITHM (MODIFIED FOR TRAUMA)**

1. Assess the likelihood and clinical impact of basic management problems.
   - A. Difficult Ventilation
   - B. Difficult Intubation
   - C. Difficult Airway Access
   - D. Difficult Tracheostomy

2. Actively pursue opportunities to deliver supplemental oxygen throughout the process of difficult airway management.

3. Consider the relative merits and feasibility of basic management choices:
   - A. Awake Intubation
   - B. Non-Invasive Technique for Initial Approach to Intubation
   - C. Preservation of Spontaneous Ventilation

4. Develop primary and alternative strategies:

   **A. AIRWAY INTUBATION**
   
   **NON-EMERGENCY PATHWAY**
   - Ventilation Adequate, Intubation Unsuccessful
   - Alternative Approaches
   - Successful Intubation (more likely)
   - Failed Intubation (more likely)

   **EMERGENCY PATHWAY**
   - Ventilation Unadequate, Intubation Successful
   - Emergency Intubation

   **B. INTUBATION ATTEMPTS AFTER INDUCTION OF GENERAL ANESTHESIA**
   - Initial Intubation Attempts Successful
   - Initial Intubation Attempts UNSUCCESSFUL

   FROM THIS POINT ONWARDS CONSIDER:
   1. Calling for Help
   2. Returning to Spontaneous Ventilation
   3. Awakening the Patient

**FACE MASK VENTILATION ADEQUATE**

**FACE MASK VENTILATION NOT ADEQUATE**

**CONSIDERATE ATTEMPT LMA**

**LMA ADEQUATE**

**LMA NOT ADEQUATE OR NOT FEASIBLE**

**Call for Help**

**ETCO2**

**Rigid Bronchoscope**

**Tracheostomy**

**LMA TRIAL**

**LMA WITH EXCHANGE**

**Emergency Intubation**

- Confirm ventilation, tracheal intubation, or LMA placement with exhaled CO2.

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**Notes:**
- Other options include but are not limited to: surgery utilizing laryngoscope or LMA as the primary airway, local anesthesia intubation or regional nerve block.
- Pursuit of these options usually implies that mask ventilation will not be possible. Therefore, these options may be of limited value if this step in the algorithm has been reached via the Emergency Pathway. Judgment required. Highly appropriate for trauma patients.
- Consider the feasibility of laryngoscopic obturation.
- Other options for emergency non-invasive ventilation include: (AEC) rigid bronchoscope or esophageal-tracheal combitube ventilation (ETC), or transoral jet ventilation (TTJ).
- Intubation strategies include: evaluation of the airway with POE and intubation over an airway exchange catheter (AEC).
Appendix 3:

Fig. 1. Procedural options for trauma patients needing emergency tracheal intubation.