

JOINT TRAUMA SYSTEM



AIRWAY TRAUMA INJURY MANAGEMENT

CLINICAL PRACTICE GUIDELINE (CPG) TRAINING

Joint Trauma System Trauma Care Educational Program



DISCLOSURE/DISCLAIMER



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- ◆ The view(s) expressed herein are those of the author(s) and do not reflect the official policy or position of Brooke Army Medical Center, the U.S. Army or Air Force Medical Department, the U.S. Army or Air Force Office of the Surgeon General, or the Department of Defense or the U.S. Government.

AGENDA



- ◆ Purpose
- ◆ Summary
- ◆ Background
- ◆ Background
- ◆ Airway Trauma Management
- ◆ Performance improvement (PI) monitoring
- ◆ References
- ◆ Appendices
- ◆ Contributors

PURPOSE



- ◆ These slides are based on the JTS Airway Management of Traumatic Injuries CPG which aims to optimize the airway management for patients with traumatic injury in the operational medical treatment facility.
- ◆ CPG publication date: 17 Jul 2017
- ◆ JTS CPGs are evidence-based guidelines developed by subject matter experts in the military and civilian communities. CPGs are compiled from DoD Trauma Registry data, health data abstracted from patient records and after action reports.
- ◆ Information contained in this presentation is only a guideline and not a substitute for clinical judgment.

SUMMARY



- ◆ High risk of requiring intubation; be prepared for a difficult airway.
- ◆ Practice and prepare for alternatives other than rapid sequence intubation.

BACKGROUND



Airway obstruction was the second most common cause of potentially survivable death in all U.S. combat casualties from Oct 2001 to Jun 2011.

- ◆ Airway management is a critical step in the resuscitation of the trauma patient.
- ◆ All trauma airways are potentially high-risk; anticipate a difficult airway.

BACKGROUND



All injured patients who present with obtundation (GCS<8), apnea, respiratory distress or insufficiency, airway obstruction, or impending airway loss will have a secure and definitive airway established expeditiously upon arrival to a theater Military Treatment Facility (MTF).



Airway obstruction injury.
Photo by Col Stacy A Shackelford

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Standard Rapid Sequence Induction (RSI) and Intubation Pathway

- ◆ Confirm Equipment Availability and Function: IV, suction, self-inflating bag and mask, oxygen source, laryngoscope, Endotracheal tube with stylet and/or bougie, oral and nasal airways, surgical airway kit, drugs, monitors, other rescue equipment
- ◆ Pre-oxygenate the lungs: Prolongs tolerance of apneic period with goal of approximately 3 minutes at 90% FiO₂
- ◆ Maintain cervical spine stabilization.
- ◆ Remove front of cervical collar.
- ◆ Consider cricoid pressure simultaneous with medication administration.

AIRWAY TRAUMA MANAGEMENT



RSI and Intubation Pathway *(continued)*

- ◆ Administer medications: Sedative/hypnotic (ketamine first line) and neuromuscular blockade
- ◆ Perform laryngoscopic tracheal intubation.
 - ◆ If view is poor, apply external manipulation techniques.
 - ◆ Consider alternative visualization or supraglottic airway device.
- ◆ Confirm tracheal intubation.
 - ◆ Visualize passing through vocal cords (first line).
 - ◆ Wave form or digital capnography (second line).



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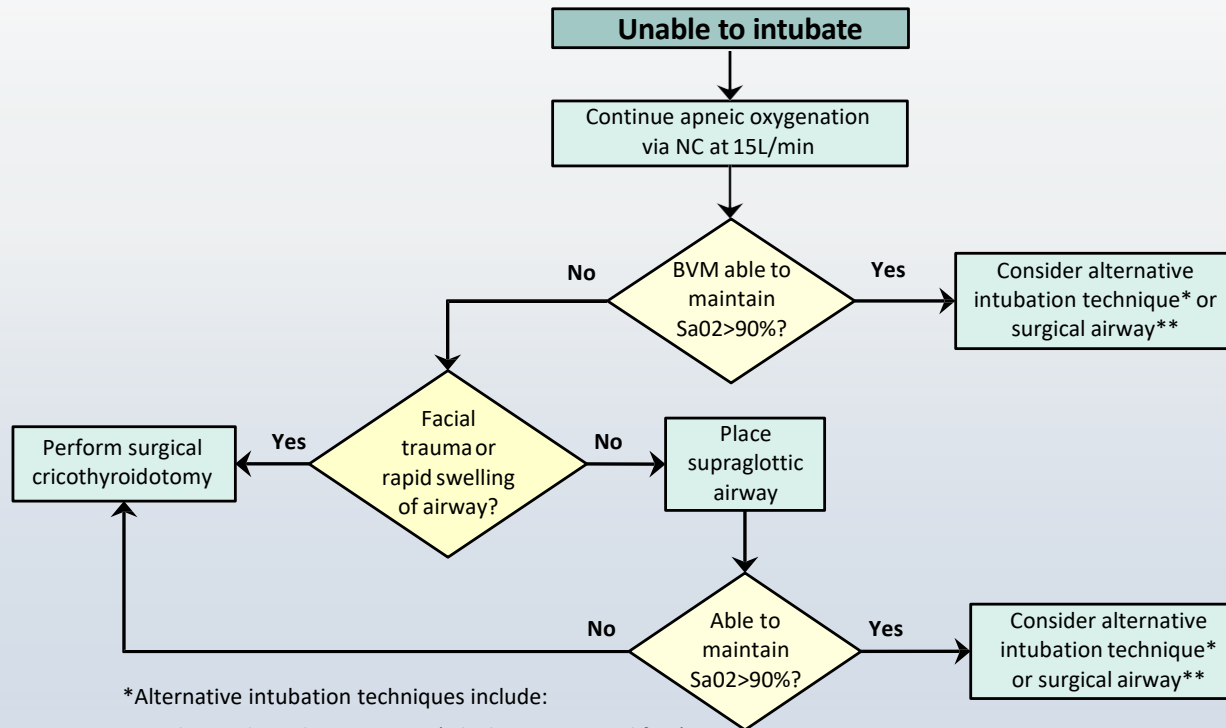
Highly algorithmic process with multiple options beyond the standard pathway requires review and practice by practitioners along with team members.

Airway Management					
<ul style="list-style-type: none"> All trauma airways are potentially high-risk. Anticipate a difficult airway. Identify critical team members and verbalize role assignments. Initiate pre-oxygenation. Consider Ketamine (0.5-1.0 mg/kg IV/IO) for delayed sequence intubation if combative or otherwise uncooperative patient. Recall that the neutral position ("C-spine stabilization") degrades the laryngoscopic view. 					
Rapid Sequence Induction (RSI) and Intubation Pathway					
<ol style="list-style-type: none"> Confirm equipment availability and function IV/IO, suction, self-inflating bag and mask, oxygen source, laryngoscope-direct and video, ETT with stylet and/or gum elastic bougie, oral & nasal airways, surgical airway kit, drugs, CO2 detector, monitors, other rescue equipment Pre-Oxygenate (Denitrogenate) the lungs <ul style="list-style-type: none"> Prolongs tolerance of apneic period Goal is \approx 3 minutes of tidal volume breathing at 90% FIO2 With standard reservoir facemask set flow rate of oxygen as high as possible Recommend augmenting with nasal cannula at 15L/min oxygen in preparation for apneic oxygenation, leave in situ throughout procedure Elevate head of bed if not contraindicated Maintain cervical spine stabilization Remove front of cervical collar Consider cricoid pressure simultaneous w/ medication administration (9,10) Administer medications : Initiate RSI <table border="0" style="width: 100%;"> <tr> <td style="vertical-align: top;"> <p>Sedative/hypnotic</p> <ul style="list-style-type: none"> Ketamine (First Line): 2 mg/kg IV/IO Etomidate (Second Line): 0.3 mg/kg IV/IO Unstable patients require reduced dosage of induction agent. </td> <td style="vertical-align: top;"> <p>Neuromuscular Blockade</p> <ul style="list-style-type: none"> Rocuronium: 1.2 mg/kg IV/IO or Vecuronium: 0.1 mg/kg IV/IO or Succinylcholine: 1.5 mg/kg IV/IO </td> </tr> </table> Perform laryngoscopic tracheal intubation <ul style="list-style-type: none"> Following onset of neuromuscular blockade Recommend gum elastic bougie as primary ETT stylet If laryngoscopic view is poor: <ul style="list-style-type: none"> Apply external laryngeal manipulation technique(s) Consider alternative visualization method or Supraglottic airway device Confirm tracheal intubation <ul style="list-style-type: none"> Visualize tube passing between the vocal cords (First Line) Wave form or digital capnography when available (Second Line) Easy chest rise, equal axillary breath sounds/absence of gastric insufflation, CO2 Calorimeter, and "fog" in ETT Esophageal detector bulb or fiber optic confirmation during cardiac arrest Provide continuing care IAW Anesthesia CPG 		<p>Sedative/hypnotic</p> <ul style="list-style-type: none"> Ketamine (First Line): 2 mg/kg IV/IO Etomidate (Second Line): 0.3 mg/kg IV/IO Unstable patients require reduced dosage of induction agent. 	<p>Neuromuscular Blockade</p> <ul style="list-style-type: none"> Rocuronium: 1.2 mg/kg IV/IO or Vecuronium: 0.1 mg/kg IV/IO or Succinylcholine: 1.5 mg/kg IV/IO 		
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Recommendations for Pediatric Patients					
<ol style="list-style-type: none"> Train to expect pediatric patients. Have a dedicated pediatric airway cart, including Broselow tape or equivalent. Pre-dose with atropine IV/IO (0.02mg/kg, minimum dose 0.1mg, maximum dose 0.5mg) in all <1 years old, those <5 who are receiving succinylcholine, and in all who receive a 2nd dose of succinylcholine Induction <ul style="list-style-type: none"> Ketamine (first line) 2mg/kg IV/IO Etomidate (second line) 0.3mg/kg IV/IO Neuromuscular blockade - <ul style="list-style-type: none"> Succinylcholine 1.5mg/kg IV/IO (2mg/kg <5 years old) or Rocuronium 1mg/kg IV/IO Avoid surgical airway in <12 years old - use needle cricothyroidotomy (12-14 gauge), tracheostomy preferred over surgical cricothyroidotomy 					
Unable to Intubate: Can you Mask Ventilate?					
<p>Mask Ventilation Pearls</p> <ul style="list-style-type: none"> Skilled operator Good seal Jaw thrust Oral airway Nasal airway(s) Two operator mask ventilation 	<table border="1"> <tr> <td style="text-align: center;">YES</td> <td> <ul style="list-style-type: none"> Improve position, change blade/operator, laryngeal manipulation technique, gum elastic bougie. Attempt alternate technique: Fiber optic, video laryngoscope, tracheal trans illumination device. More than \approx 3 attempts at intubation may abolish your ability to mask ventilate due to edema caused by laryngoscopy. Surgical airway (Cricothyroidotomy or tracheostomy) </td> </tr> <tr> <td style="text-align: center;">NO</td> <td> <ul style="list-style-type: none"> Emergency pathway. Seconds matter. Supraglottic airway or Surgical cricothyroidotomy </td> </tr> </table>	YES	<ul style="list-style-type: none"> Improve position, change blade/operator, laryngeal manipulation technique, gum elastic bougie. Attempt alternate technique: Fiber optic, video laryngoscope, tracheal trans illumination device. More than \approx 3 attempts at intubation may abolish your ability to mask ventilate due to edema caused by laryngoscopy. Surgical airway (Cricothyroidotomy or tracheostomy) 	NO	<ul style="list-style-type: none"> Emergency pathway. Seconds matter. Supraglottic airway or Surgical cricothyroidotomy
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NO	<ul style="list-style-type: none"> Emergency pathway. Seconds matter. Supraglottic airway or Surgical cricothyroidotomy 				

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Difficult Airway Management



*Alternative intubation techniques include:

- Video or direct laryngoscopy (whichever not used first)
- Fiberoptic scope
- Transtracheal illumination device
- Retrograde wire with Magill forceps
- Changing providers

**Surgical airway includes both tracheostomy and surgical cricothyroidotomy will be performed.

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Significant Pearls

- ◆ Ketamine is the first line agent for RSI.
- ◆ Apply principles of apneic oxygenation.
- ◆ Utilize device name rather than brand-name when possible.
- ◆ Eliminate blind nasal intubation; anticipate fiber optic guidance.
- ◆ Use waveform or digital capnography as primary tool to verify tube placement.

AIRWAY TRAUMA MANAGEMENT



Significant Pearls

- ◆ No recommendation for use of an intubating laryngeal mask airway
- ◆ Surgical cricothyroidotomy or tracheostomy are surgical airway options.
- ◆ Separate traumatic brain injury algorithm not required.
- ◆ Pediatric patients have alterations to the main algorithm.
- ◆ Trauma airway management should be rehearsed with your trauma team on a regular basis.

PI MONITORING



◆ Population of Interest

- ◆ All patients who received ETT/cricothyroidotomy/supraglottic airway/NPA
- ◆ All patients with compromised airway (initial GCS < 8 or AIS head and neck \geq 3 or AIS face \geq 3, arrival/transport or initial ED SpO₂ < 90%, arrival/transport or initial ED ETCO₂ > 50).

◆ Intent (expected outcomes)

- ◆ All injured patients who present with obtundation (GCS<8), apnea, respiratory distress or insufficiency, airway obstruction, or impending airway loss will have a secure and definitive airway established expeditiously upon arrival to a Role 2 or Role 3.
- ◆ SpO₂ is maintained between \geq 90% and 96%. SpO₂ >96% is not necessary.

PI MONITORING



- ◆ Performance/adherence metrics
 - ◆ Number and percentage of patients in the population of interest who had a secure and definitive airway (endotracheal tube, cricothyroidotomy, tracheostomy) established or verified on arrival to Role 2 or 3, or documentation of appropriate intervention.
 - ◆ Number and percentage of patients in the population of interest with initial ED SpO₂ < 90%, < 80%, <70%, <60%.
 - ◆ Number and percentage of patients who had definitive airway (endotracheal tube, cricothyroidotomy, tracheostomy) with ETCO₂ documented at the same role of care where the procedure is done.
- ◆ Data source
 - ◆ Patient Record
 - ◆ DoD Trauma Registry

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APPENDICES IN CPG



- ◆ **Appendix A: Trauma Airway Assessment**
- ◆ **Appendix B: Difficult Airway Management Algorithm**
- ◆ **Appendix C: Additional Information Regarding Off-label Uses in CPGs**

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