Evaluating Success of Endotracheal Intubation in Trauma vs Non-Trauma Patients at a Level One Trauma Center

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Background

- Ensuring a patent airway is a critical first step when evaluating and treating a trauma patient in the Emergency Department.
- Intubation of a trauma patient is time sensitive and can be necessary prior to other critical workup and treatment
- In existing literature, patients intubated for trauma comprise less than 30% of Emergency Department intubations and are associated with increased predicted and confirmed difficult airways
- Published studies show varied rates of first pass success for emergency department patients ranging from 79.8% to high 90%s and have not looked specifically at trauma patients
- Multiple attempts are associated with an increased frequency of cardiac arrest and death in both ED and ICU patients, particularly in critically ill patients
- Monitoring rates of first pass success and adverse events after intubation is critical to maintaining high quality care for emergency room patients and identifying further steps for improving emergency department protocols and processes

Objectives

- To evaluate rates of first pass success, as well as complications of intubation in trauma patients
- To compare the trauma patients to the non-trauma patients to evaluate function of existing airway protocols when applied to trauma patients, in setting of increased difficulty of securing the airway in trauma described in existing literature

Methods

Data Collection

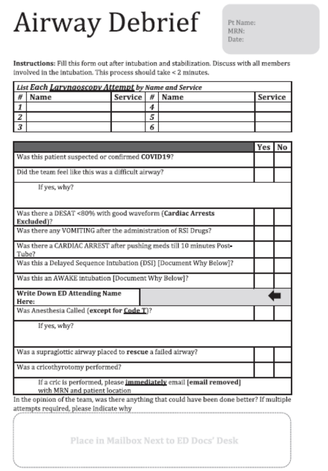
- IRB approved data collection system using the airway form, comprising of all patients intubated in the Emergency Department of one Level One Trauma Center from June 2017 to October 2024 with subsequent retrospective chart review
- Data collected using “Airway Form” in figure 1,
- Retrospective chart review performed by Dr. Malik, Dr. Tanzi, Dr. Weingardt, Dr. Rapoport, Dr. Townshend, Dr. Leibowitz, Dr. Scott, Dr. Corcoran and Dr. Niyazov

Data Classification

- Obtained patient classification as trauma patient or not, designation as a difficult airway, DSI vs RSI
- CODE T patients were included since study onset, with Trauma Alert patients included since Trauma Alert was established in 2020. Trauma classification criteria have changes since the onset of the study, most recent criteria are below.
- CODE T includes patients with cardiac arrest post trauma, RR<8, SBP <90, intubated prehospital, penetrating injury to head, neck, chest, abdomen, amputation above wrist or ankle, patients on vasopressors or receiving blood prehospital. For patient’s >65 years old, confirmed SBP <110 or HR>120
- Trauma Alert includes patients with penetrating injury concerning for vascular injury, femur deformity or fracture of 2 or more proximal long bones, fall >20 ft, burns >15% TBSA, amputation below the wrist, pedestrian struck at >15mph, motorcycle crash >20mph, separation from motor vehicle or horse, GCS 9-12, >20 weeks pregnant with significant mechanism or abdominal pain, transfer on ventilator due to head injury. For patients >65 years old, fall on anticoagulation or anti platelet except aspirin with head strike, GCS 13, any long bone fracture

Data

- Sample of 2590 patients requiring endotracheal intubation at one level one trauma center was collected between June 2017 and October 2024. 444 trauma patients and 2146 non-trauma patients were included in the sample.
- Trauma patients account for 17% of patients intubated during the duration of this data collection
- Outcomes measured include complications including cardiac arrest, vomiting, desaturation <80% after administration of RSI medications or within 10 minutes of intubation, as well as number of attempts required, whether a surgical cricothyroidotomy was performed as well as which service to successfully intubated the patient
- The Airway Debrief Form, filled out by physicians or nurses after each intubation performed in the Emergency Department was used for data collection
- Retrospective chart review data was incomplete, some information was not consistently recorded in the electronic medical record
- Chi-squared and Fisher exact tests used to compare rates of outcome measures



Airway Debrief

Pt Name:
MRN:
Date:

Instructions: Fill this form out after intubation and stabilization. Discuss with all members involved in the intubation. This process should take < 2 minutes.

List Each Laryngoscopy Attempt by Name and Service

#	Name	Service	#	Name	Service
1			4		
2			5		
3			6		

	Yes	No
Was this patient suspected or confirmed **COVID19**?		
Did the team feel like this was a difficult airway?		
If yes, why?		
Was there a DESAT <80% with good waveform (**Cardiac Arrests Excluded**)?		
Was there any VOMITING after the administration of RSI Drugs?		
Was there a CARDIAC ARREST after pushing meds till 10 minutes Post-Tube?		
Was this a Delayed Sequence Intubation (DSI) [Document Why Below]?		
Was this an AWAKE intubation [Document Why Below]?		
Write Down ED Attending Name Here:		
Was Anesthesia Called (**except for Code T**)?		
If yes, why?		
Was a supraglottic airway placed to **rescue** a failed airway?		
Was a cricothyrotomy performed?		
If a cric is performed, please **immediately** email **[email removed]** with MRN and patient location		

In the opinion of the team, was there anything that could have been done better? If multiple attempts required, please indicate why

Place in Mailbox Next to ED Docs' Desk

Results

Success rate and complication rate of endotracheal intubation between Trauma and Non-Trauma patients

	Trauma (n=444)	Non-Trauma (n=2146)	Statistic	P value
Was this a difficult airway	137/444 (30.9%)	536/2146 (25.0%)	X2=6.31	0.0120*
Was this a delayed sequence intubation	22/444 (5.0%)	185/2146 (8.6%)	X2=6.23	0.0125*
Was the airway secured by emergency medicine team	322/334 (96.4%)*	1250/1271 (98.3%)*	X2=4.03,	0.0447*
Intubation by 1st pass	410/444 (92.3%)	1961/2146 (91.4%)	X2=0.33	0.568
Intubation by 2nd pass	434/444 (97.7%)	2095/2146 (97.6%)	X2=1.4e-29	1.0
Intubation by 3rd pass	442/444 (99.5%)	2134/2146 (99.4%)	OR=1.24	1.0
Was a surgical cricothyroidotomy performed	2/444 (0.5%)	13/2146 (0.6%)	OR=0.74	1.0
Complications				
Desaturation with pulse ox <80%	19/444 (4.3%)	90/2146 (4.2%)	X2=4.2e-29	1.0
Vomiting after RSI medications	3/444 (0.7%)	13/2146 (0.6%)	OR=1.12	0.746
Cardiac Arrest after RSI Medications	1/334 (0.3%)*	10/1271 (0.8%) *	OR=0.38	0.477

- Trauma patients were more likely to be considered to have a difficult airway by emergency medicine providers when compared to non-trauma patients (30.9% compared to 25.0%)
- Trauma patients were less likely to have the emergency medicine team secure the airway, as opposed to anesthesia, when compared to non-trauma patients (96.4% compared to 98.3%)
- Delayed sequence intubation was performed less frequently for trauma patients, when compared to non-trauma patients (5.0% compared to 8.6%)
- First pass success rate for trauma patients was 92.3%, with no significant difference from non- trauma patients
- No difference was identified in rates of surgical cricothyroidotomy, number of attempts or complications of intubation including desaturation, vomiting and cardiac arrest

Discussion

- There was no difference in first pass success rate, complication rate or cricothyroidotomy identified despite perceived difficulty of the trauma airway.
- This study was a single center study in a department that had changes in its trauma classification system, as well as implementation of multiple quality improvement driven process changes during the duration of our data collection
- Compliance with “Airway Debrief” form and documentation in the EMR was not uniform throughout the duration of the study.
- Prior studies suggest that first pass success rate in trauma patient’s is unlikely to be equivalent to non-trauma patients due to established increased frequency of difficult airways in trauma patients that was consistent with our sample. The study does not indicate a deficiency in outcomes of endotracheal intubation in trauma patients when compared to non-trauma patients. No difference in outcome measures was found in our data set.
- It suggests that emergency department protocols address the unique needs of trauma patients as well as the needs of their non- trauma counterparts. First pass success rates in the 90%s throughout the study are in line with rates at other centers described in the literature.
- Identifying factors contributing to the greater rate of anesthesia team securing the airway in trauma patients is an area for future study but may be related to presence of the anesthesia team at every CODE-T per department protocol.

Future Directions

- Change in first pass success rate and complication rates over time, during implementation of multiple process changes and quality improvements is not explored in this study and is an area for further exploration of this dataset.
- Expanding the study to multiple centers would elucidate whether the likeness of outcomes between the trauma and non-trauma patients is generalizable to other systems with different protocols
- Evaluation of reasons for an airway being deemed to be difficult as well as reasons for teams besides emergency medicine securing the airway may reveal avenues for refining existing airway protocols

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