Trauma Airway Management. The Do's, Don't and Maybes

Greg Chapman BS, RRT, CCEMT-P

Introductions

Greg Chapman


SANTA CRUZ
34
FOX

Goals for today

- Review of the history of Airway Management in the USA
- ALS-BLS-ILS
- When is experience really experience
- Management techniques, which ones fits your needs
- Current research or Expert Opinion
- Critical Thinking
- Your toolbox and your patients needs

What we are not going to do Today

National Registry of Emergency Medical Technicians®
Emergency Medical Technician Psychomotor Examination

BVM VENTILATION OF AN APNEIC ADULT PATIENT

Candidate: _____ Examiner: _____

Date: _____ Signature: _____

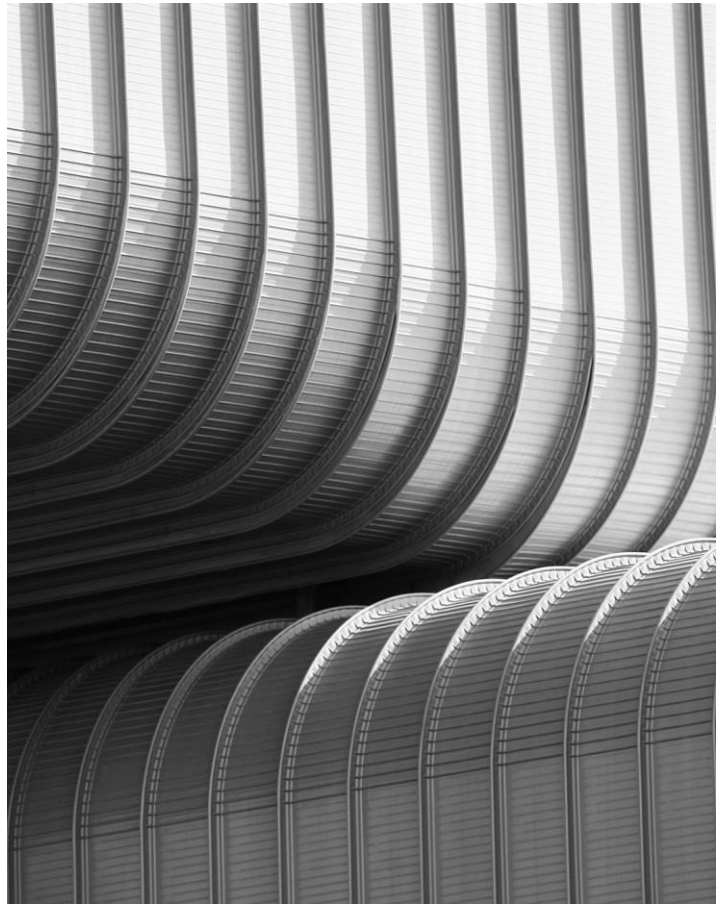
Actual Time Started: _____	**Possible Points**	**Points Awarded**
Takes or verbalizes appropriate PPE precautions	1	
Checks responsiveness	1	
Requests additional EMS assistance	1	
Checks breathing and pulse simultaneously	1	
NOTE: After checking responsiveness, then checking breathing and pulse for no more than 10 seconds, examiner informs candidate, "The patient is unresponsive, apneic and has a weak pulse of 60."		
Opens airway properly	1	
NOTE: The examiner must now inform the candidate, "The mouth is full of secretions and vomitus."		
Prepares rigid suction catheter	1	
Turns on power to suction device or retrieves manual suction device	1	
Inserts rigid suction catheter without applying suction	1	
Suctions the mouth and oropharynx	1	
NOTE: The examiner must now inform the candidate, "The mouth and oropharynx are clear."		
Opens the airway manually	1	
Inserts oropharyngeal airway	1	
NOTE: The examiner must now inform the candidate, "No gag reflex is present and the patient accepts the airway adjunct."		
Ventilates the patient immediately using a BVM device unattached to oxygen [Award this point if candidate elects to ventilate initially with BVM attached to reservoir and oxygen so long as first ventilation is delivered within 30 seconds.]	1	
NOTE: The examiner must now inform the candidate that ventilation is being properly performed without difficulty.		
Re-checks pulse for no more than 10 seconds	1	
Attaches the BVM assembly [mask, bag, reservoir] to oxygen [15 L/minute]	1	
Ventilates the patient adequately -Proper volume to cause visible chest rise (1 point) -Proper rate [10 – 12/minute (1 ventilation every 5 – 6 seconds)] (1 point)	2	
Note: The examiner must now ask the candidate, "How would you know if you are delivering appropriate volumes with each ventilation?"		
Actual Time Ended: _____ **TOTAL**	16	

CRITICAL CRITERIA

____ After suctioning the patient, failure to initiate ventilations within 30 seconds or interrupts ventilations for greater than 30 seconds at any time
____ Failure to take or verbalize appropriate PPE precautions
____ Failure to suction airway **before** ventilating the patient
____ Suctions the patient for an excessive and prolonged time

To secure the airway or not?

Goal	Goal to provide a passageway for ventilation • Provide oxygenation • Eliminate Co^2
Prevent	Prevent aspiration



The First Airway

Assessment of the Airway

- The View from the door
- Lemons
- MOANs
- Breath sounds
- Chest Wall

MOANs

- Mask Seal
- Obstruction or Obesity
- Advanced age (more than 55 years old)
- No teeth
- Stiffness of the lungs

Difficult Airway Assessment

LEMON

LOOK at the patient's anatomy

- small mandible
- large tongue
- short bull neck
- obese
- abnormal facial/neck anatomy

EVALUATE – 3,3,2 finger widths between

- teeth
- hyoid and mentum
- hyoid and thyroid

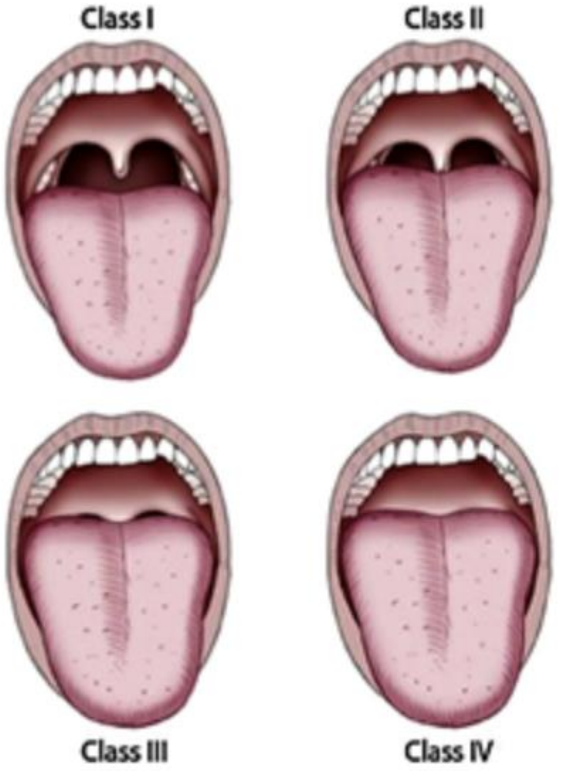
MALLAMPATI

OBSTRUCTION

- secretions, stridor, muffled voice, mass, foreign body

NECK MOBILITY

- in-line immobilisation, Rheumatoid Arthritis, Ankylosing Spondylitis

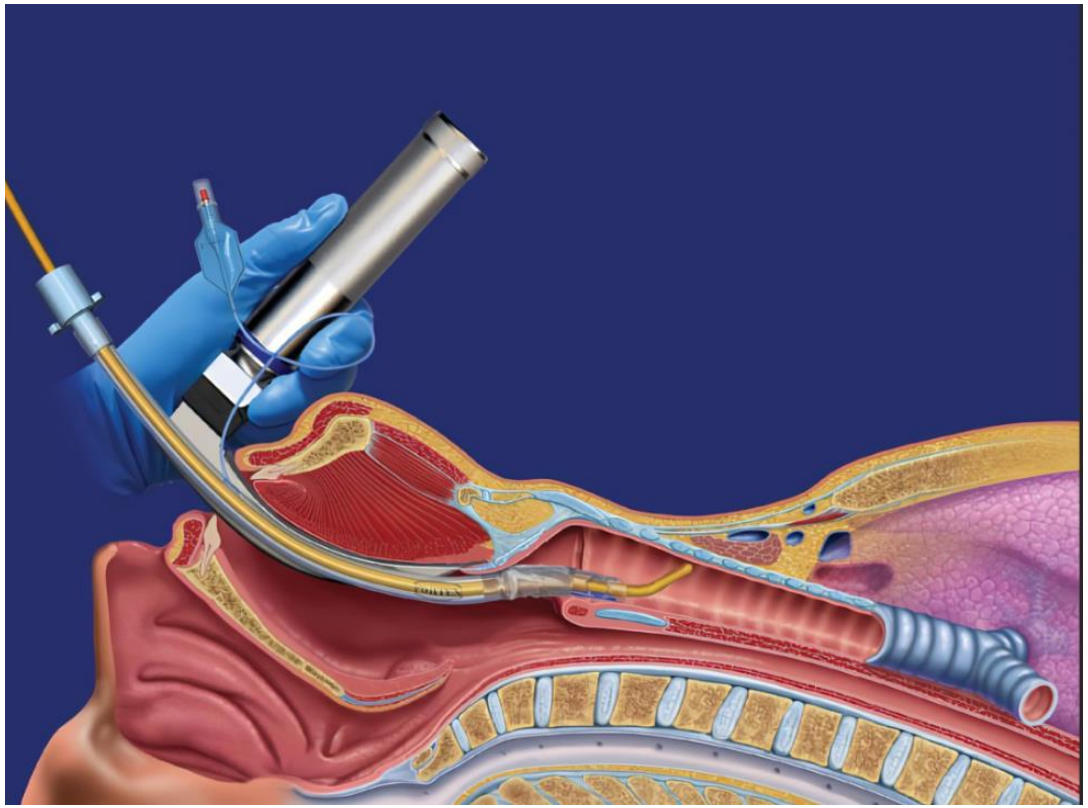


BLS airways are not just for BLS

Invasive Supraglottic Airways

Endotracheal Tube.

The Gold Standard?




Procedure Failure

Equipment Failure

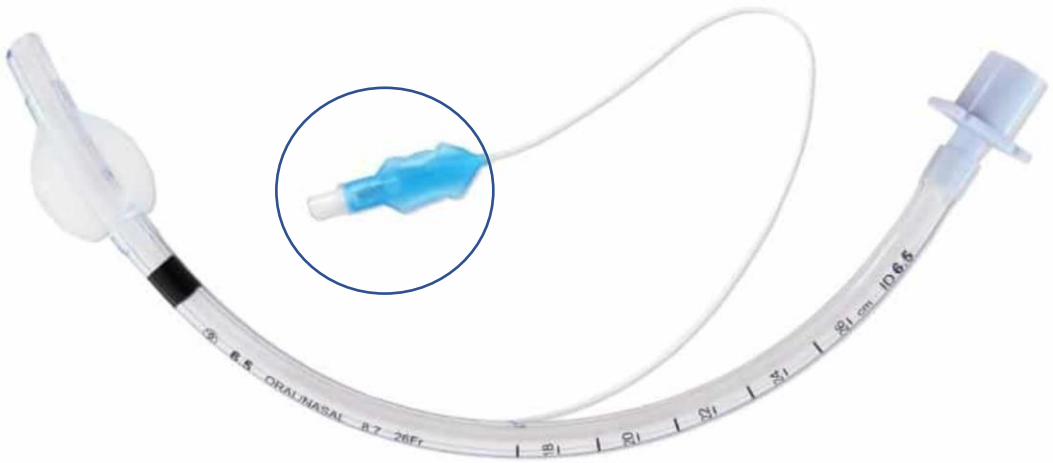
Equipment Failure

Equipment Failure

Equipment Failure

Equipment Failure

Equipment Failure



Equipment Failure

Master the Skill of Intubation

ıbstract

ackground: Many healthcare professionals are trained in direct laryngoscopic tracheal intubation EI), which is a potentially lifesaving procedure. This study attempts to determine the number of ıccessful LEI exposures required during training to assure competent performance, with special ıphasis on defining competence itself.

lethods: Analyses were based on a longitudinal study of novices under training conditions in the ɔerating room. The progress of 438 LEIs performed by the 20 nonanesthesia trainees was monitored ɣ observation and videotape analysis. Eighteen additional LEIs were performed by experienced ıesthesiologists to define the standard. A generalized linear, mixed-modelling approach was used to ientify key aspects of effective training and performance. The number of tracheal intubations that ıe trainees were required to perform before acquiring expertise in LEI was estimated.

esults: Subjects performed between 18 and 35 laryngoscopic intubations. However, statistical ıodeling indicates that a 90% probability of a "good intubation" required 47 attempts. Proper sertion and lifting of the laryngoscope were crucial to "good" or "competent" performance of LEI. ıaditional features, such as proper head and neck positions, were found to be less important under ıe study conditions.

onclusions: This study determined that traditional LEI teaching for nonanesthesia personnel using ıanikin alone is inadequate. A reevaluation of current standards in LEI teaching for nonanesthesia is ɛquired.

Experience

- Twenty years of repeating the same thing does not give you 20 years of experience.
- It gives you 1 year of experience repeated 20 times.

National Registry of Emergency Medical Technicians®
Emergency Medical Technician Psychomotor Examination

BVM VENTILATION OF AN APNEIC ADULT PATIENT

Candidate: _____ Examiner: _____

Date: _____ Signature: _____

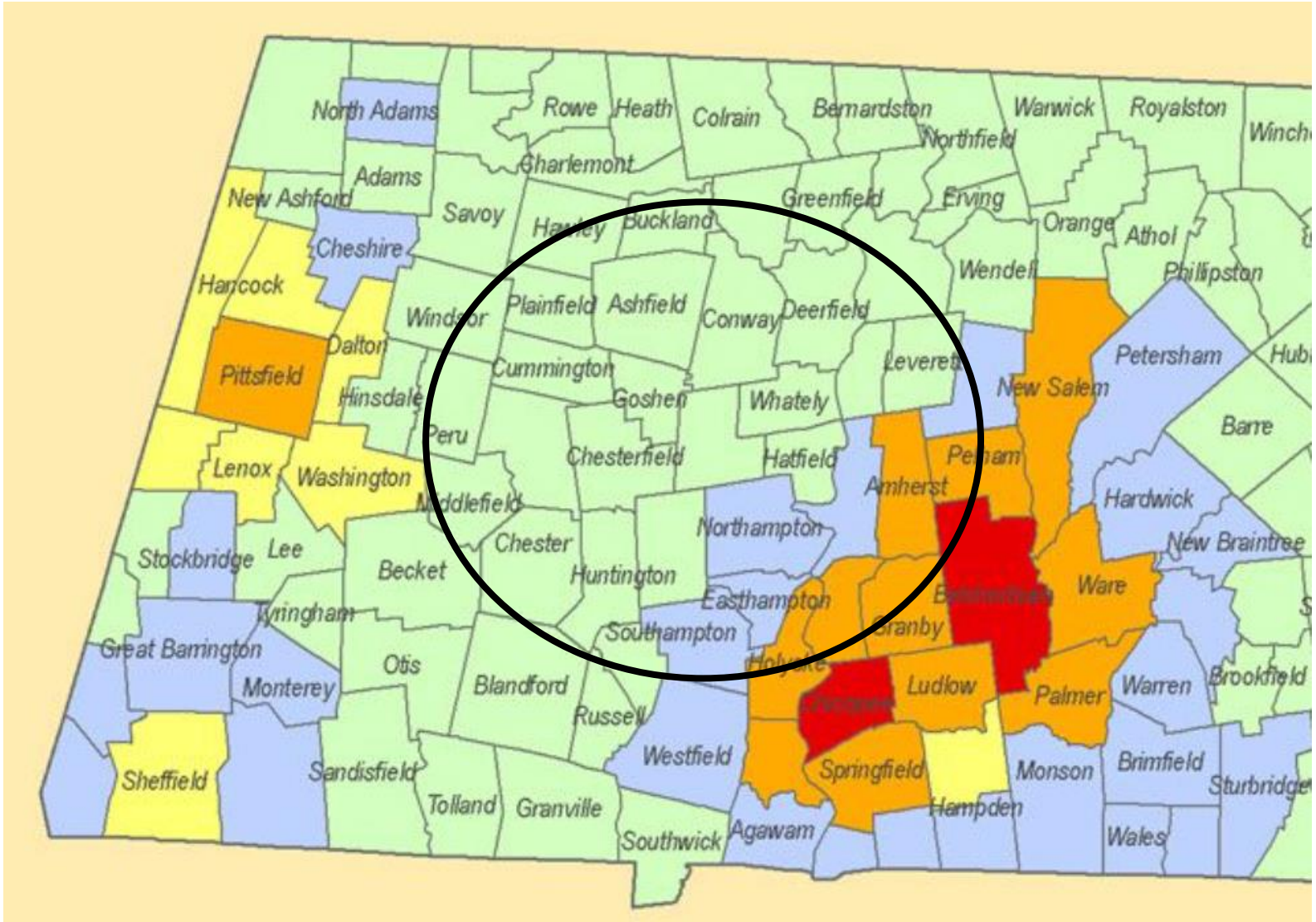
Actual Time Started: _____

	Possible Points	Points Awarded
Takes or verbalizes appropriate PPE precautions	1	
Checks responsiveness	1	
Requests additional EMS assistance	1	
Checks breathing and pulse simultaneously	1	
NOTE: After checking responsiveness, then checking breathing and pulse for no more than 10 seconds, examiner informs candidate, "The patient is unresponsive, apneic and has a weak pulse of 60."		
Opens airway properly	1	
NOTE: The examiner must now inform the candidate, "The mouth is full of secretions and vomitus."		
Prepares rigid suction catheter	1	
Turns on power to suction device or retrieves manual suction device	1	
Inserts rigid suction catheter without applying suction	1	
Suctions the mouth and oropharynx	1	
NOTE: The examiner must now inform the candidate, "The mouth and oropharynx are clear."		
Opens the airway manually	1	
Inserts oropharyngeal airway	1	
NOTE: The examiner must now inform the candidate, "No gag reflex is present and the patient accepts the airway adjunct."		
Ventilates the patient immediately using a BVM device unattached to oxygen [Award this point if candidate elects to ventilate initially with BVM attached to reservoir and oxygen so long as first ventilation is delivered within 30 seconds.]	1	
NOTE: The examiner must now inform the candidate that ventilation is being properly performed without difficulty.		
Re-checks pulse for no more than 10 seconds	1	
Attaches the BVM assembly [mask, bag, reservoir] to oxygen [15 L/minute]	1	
Ventilates the patient adequately -Proper volume to cause visible chest rise (1 point) -Proper rate [10 – 12/minute (1 ventilation every 5 – 6 seconds)] (1 point)	2	
Note: The examiner must now ask the candidate, "How would you know if you are delivering appropriate volumes with each ventilation?"		
Actual Time Ended: _____ **TOTAL**	16	

CRITICAL CRITERIA

____ After suctioning the patient, failure to initiate ventilations within 30 seconds or interrupts ventilations for greater than 30 seconds at any time
____ Failure to take or verbalize appropriate PPE precautions
____ Failure to suction airway **before** ventilating the patient
____ Suctions the patient for an excessive and prolonged time

Paramedic Density



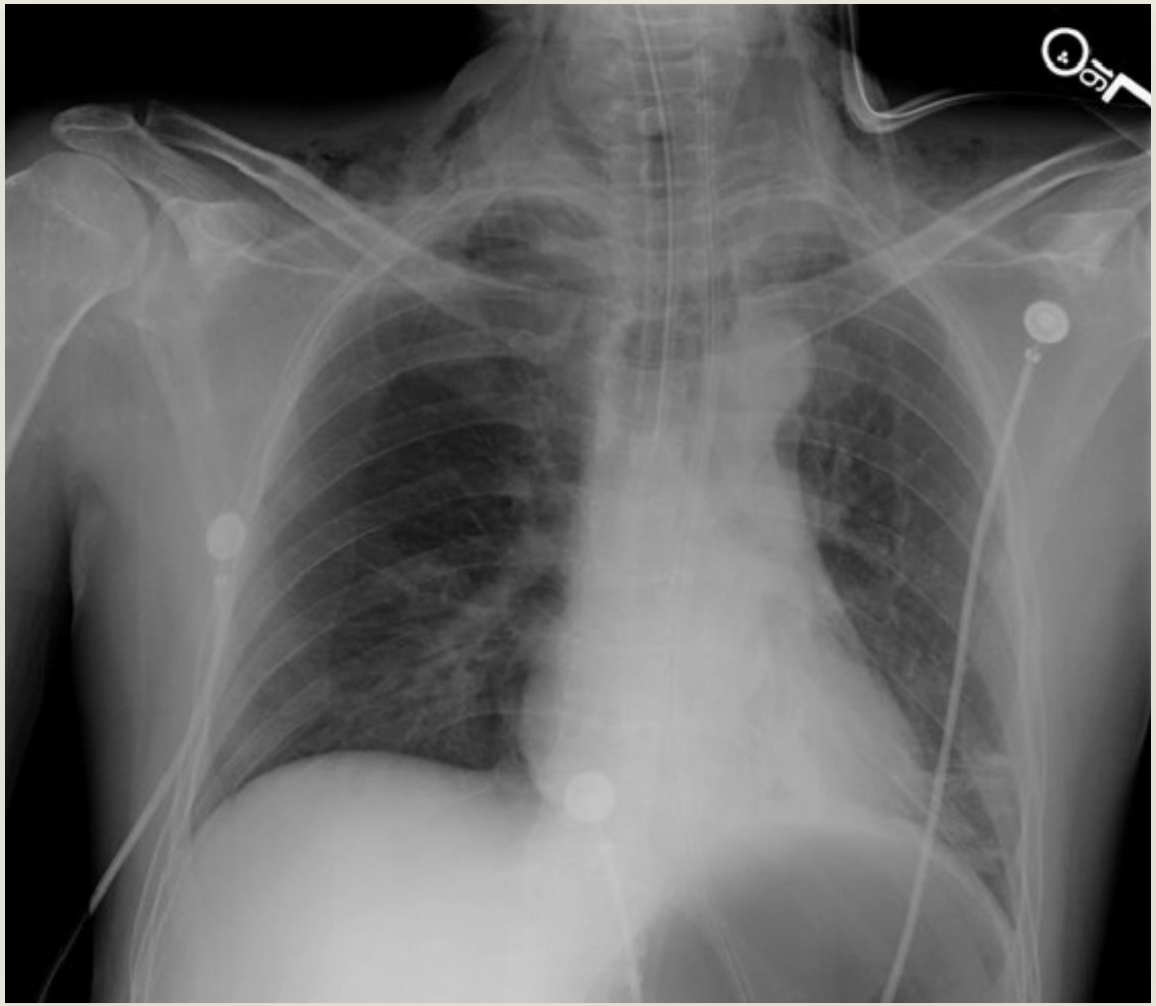
4. **Video Laryngoscopy versus Direct Laryngoscopy for Orotracheal Intubation in the Out-of-Hospital Environment: A Systematic Review and MetaAnalysis.** Kent ME, Sciavolino BM, Blickley ZJ, Pasichow SH. *Prehosp Emerg Care,* 2024;28:221-230.

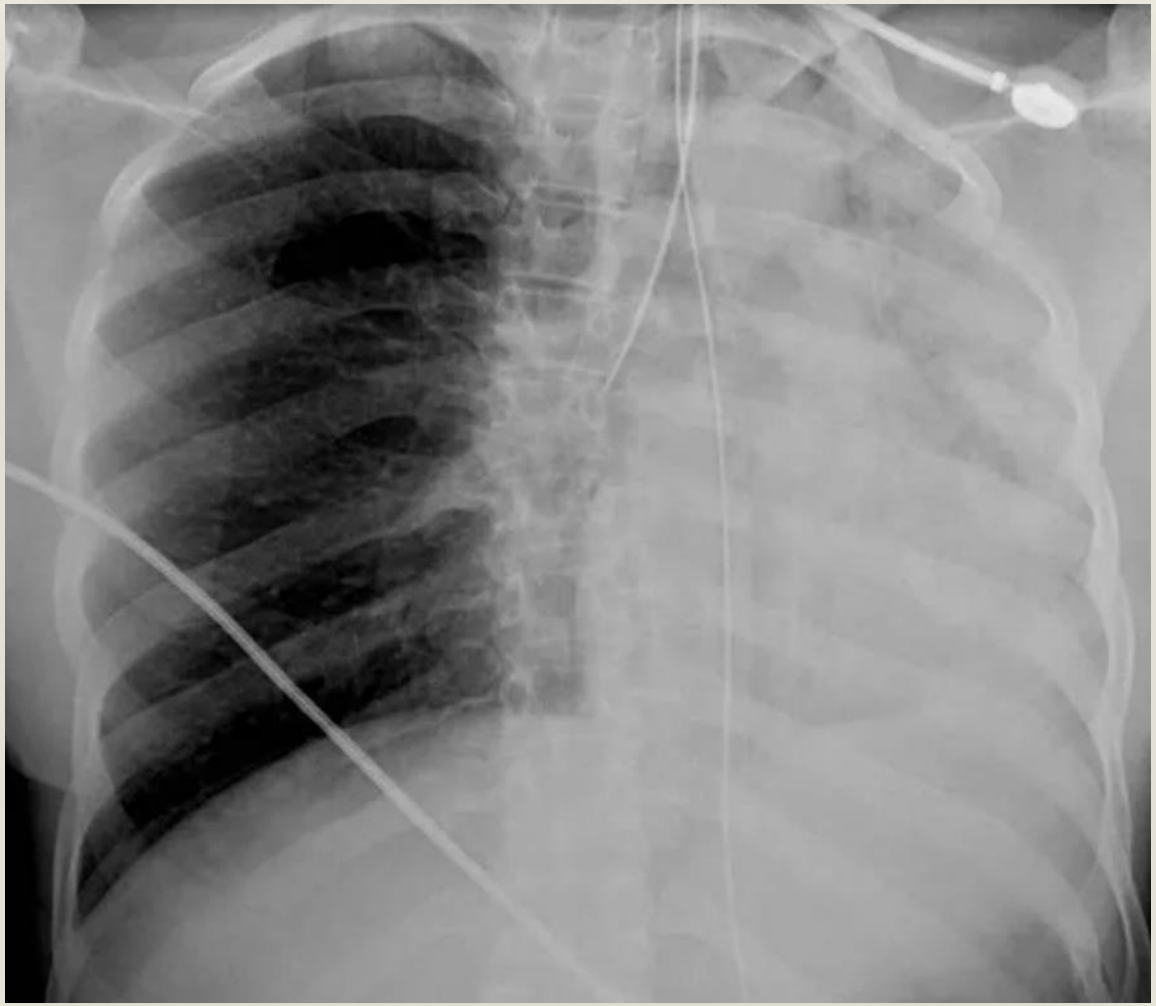
Effective airway management is a crucial intervention across all healthcare settings, but the out-of-hospital environment, in particular, presents unique challenges. First-pass success, indicating successful intubation on the initial attempt, is a key indicator of effective airway management due to its association with reduced complications such as hypoxia and cardiac arrest. However, success rates vary among providers and settings. Video laryngoscopy (VL) has emerged as a method that may improve first-pass success, particularly in critical scenarios.

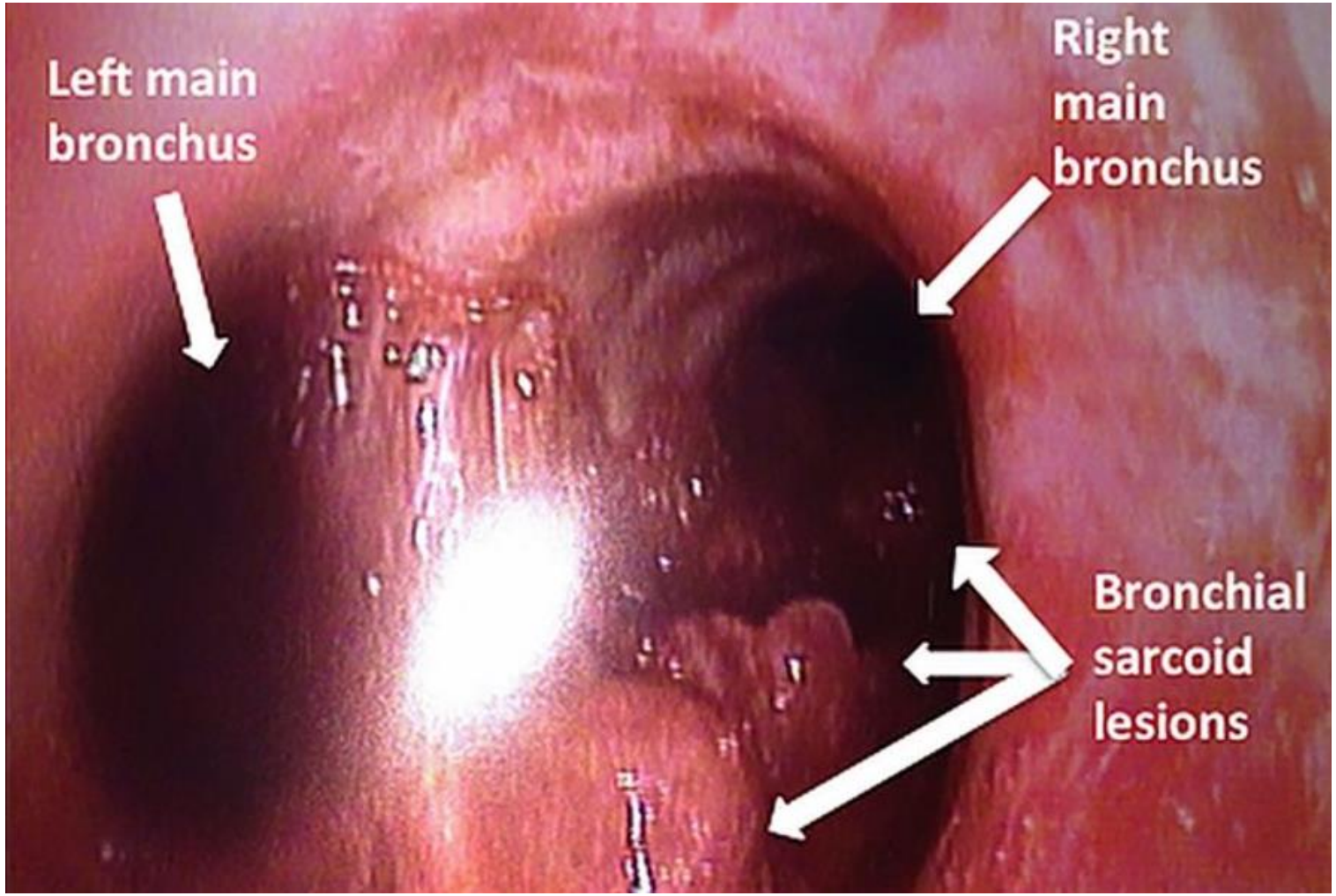
The authors performed a systematic review and metaanalysis of the literature. They included studies published in English that were conducted in the out-of-hospital setting and involved live human subjects aged 16 or older. These studies had direct laryngoscopy (DL) as the primary device for the control group, video laryngoscopy (VL) as the primary device for the experimental group, and reported either first-pass success or overall intubation success. The authors' primary outcome was determining the odds of achieving first-pass success using video laryngoscopy (VL) versus direct laryngoscopy (DL). The authors conducted subgroup analyses to assess how clinician type and the type of VL blade impacted the differences in first-pass success between VL and DL. A total of twenty-five (25) studies

Given that airway management significantly impacts outcome for critically ill and injured patients, it is imperative to explore all avenues for enhancing first-pass intubation success rates. While the optimal approach to prehospital airway management remains uncertain, the introduction of video laryngoscopy (VL) offers an additional option. It is worth noting that a study highlighted previously in our literature reviews found that 76% of surveyed paramedics had not performed an intubation in the past year. Furthermore, research suggests that mastering DL and intubation requires a substantial number of procedures, ranging from 36 to over 200, which have become increasingly difficult for paramedic students to obtain. There are no data indicating the number of VL procedures needed to become proficient. Additionally, there is a need for further investigation into the efficacy of using VL as the primary method of visualization versus its role as a backup device.

Rt Mainstem intubation






Left main bronchus
Right main bronchus
Bronchial sarcoid lesions

Tension Pneumothorax

FIND IT

EVALUATE IT

TREAT IT


EDIC

Sufficient catheter length for pneumothorax needle decompression: a meta-analysis

Brian M Clemency [1], Christopher T Tanski [2], Michael Rosenberg [3], Paul R May [1], Joseph D Consiglio [4], Heather A Lindstrom [1]

Affiliations + expand

PMID: 25857267 DOI: 10.1017/S1049023X15004653

Abstract

Introduction: Needle thoracostomy is the prehospital treatment for tension pneumothorax. Sufficient catheter length is necessary for procedural success. The authors of this study determined minimum catheter length needed for procedural success on a percentile basis.

Methods: A meta-analysis of existing studies was conducted. A Medline search was performed using the search terms: needle decompression, needle thoracentesis, chest decompression, pneumothorax

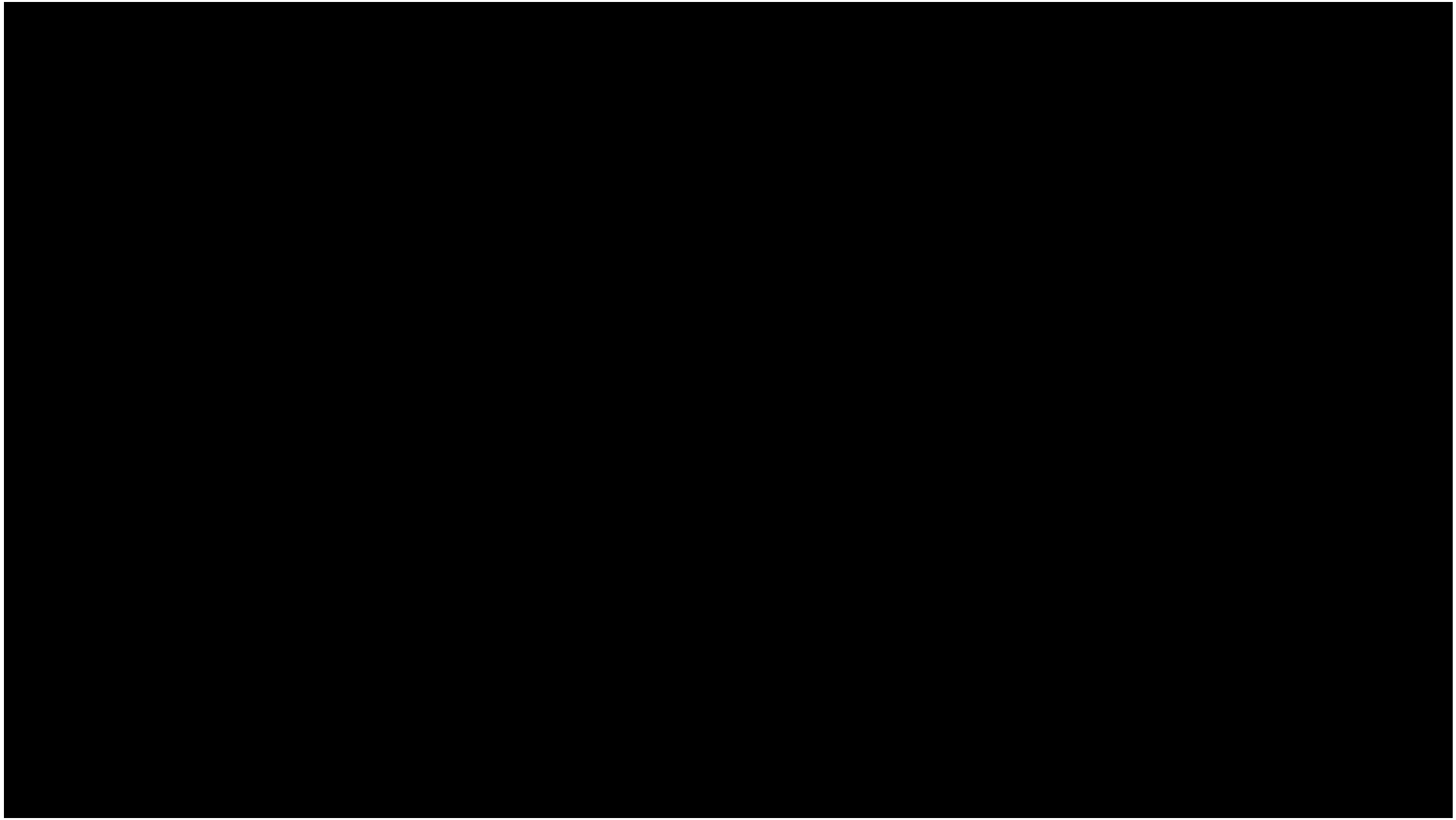
Association of Prehospital Needle Decompression With Mortality Among Injured Patients Requiring Emergency Chest Decompression

Daniel Muchnok, NRP; Allison Vargo, BS; Andrew-Paul Deeb, MD, MSc; Francis X. Guyette, MD, MPH; Joshua B. Brown, MD, MSc

AMA Surg. doi:10.1001/jamasurg.2022.3552
Published online August 17, 2022.

It is well established that trauma is a leading cause of death in younger age groups. Thoracic trauma proportionally makes up a large subset of this group. For over three decades paramedics have been trained and allowed to perform prehospital needle decompression (PHND) under most trauma protocols. In recent years, the efficacy of PHND has been questioned in the literature. Much of this literature was conducted in small cohorts and within a single system. The authors of this study attempt to examine the efficacy of PHND in a statewide EMS and Trauma system.

For this retrospective cohort the authors used the Pennsylvania Trauma Outcome Study based on the statewide trauma registry. The data used represents information from the forty-four (44) trauma centers located withing the state. In this cohort the treatment group was defined as those patients who received PHND and the control group was those patient who did not receive PHND but received emergent thoracotomy within 15 minutes of arrival at the trauma center. Trauma patients over the age of sixteen (16) years old were included in the study. The study excluded patients whose primary injury was burns and those were dead on arrival to the trauma center. The endpoint of the study was survival at twenty-four hours. During the study period from January 2000 to March of 2020 a total of nearly 8500 patients were included in the study 1337 (11%) patients receiving PHND prior to arrival at the trauma center. A total of 7132 patients



Finger Thorocostomy

- F Find Landmarks
- I Inject Lidocaine
- N No Infection Allowed
- G Generous Incision
- E Enter Plural Space
- R Reach in with Finger
  Reassess

Surgical Airways

Med J (Ft Sam Houst Tex). 2023 Jan-Mar;(Per 23-1/2/3):70-73.

Outcomes after Prehospital Cricothyrotomy

Ratna M Malkan [1], Cara M Borelli [1], Romeo R Fairley [1], Robert A De Lorenzo [1], Michael D April [2], Steven G Schauer [3]

Affiliations + expand

PMID: 36580527

Abstract

Background: Prehospital surgical cricothyrotomies and complications from placement are an important and under-evaluated topic for both the military and civilian prehospital populations. This study uses the Department of Defense Trauma Registry to identify complications and the incidence of complications in prehospital combat surgical cricothyrotomies.

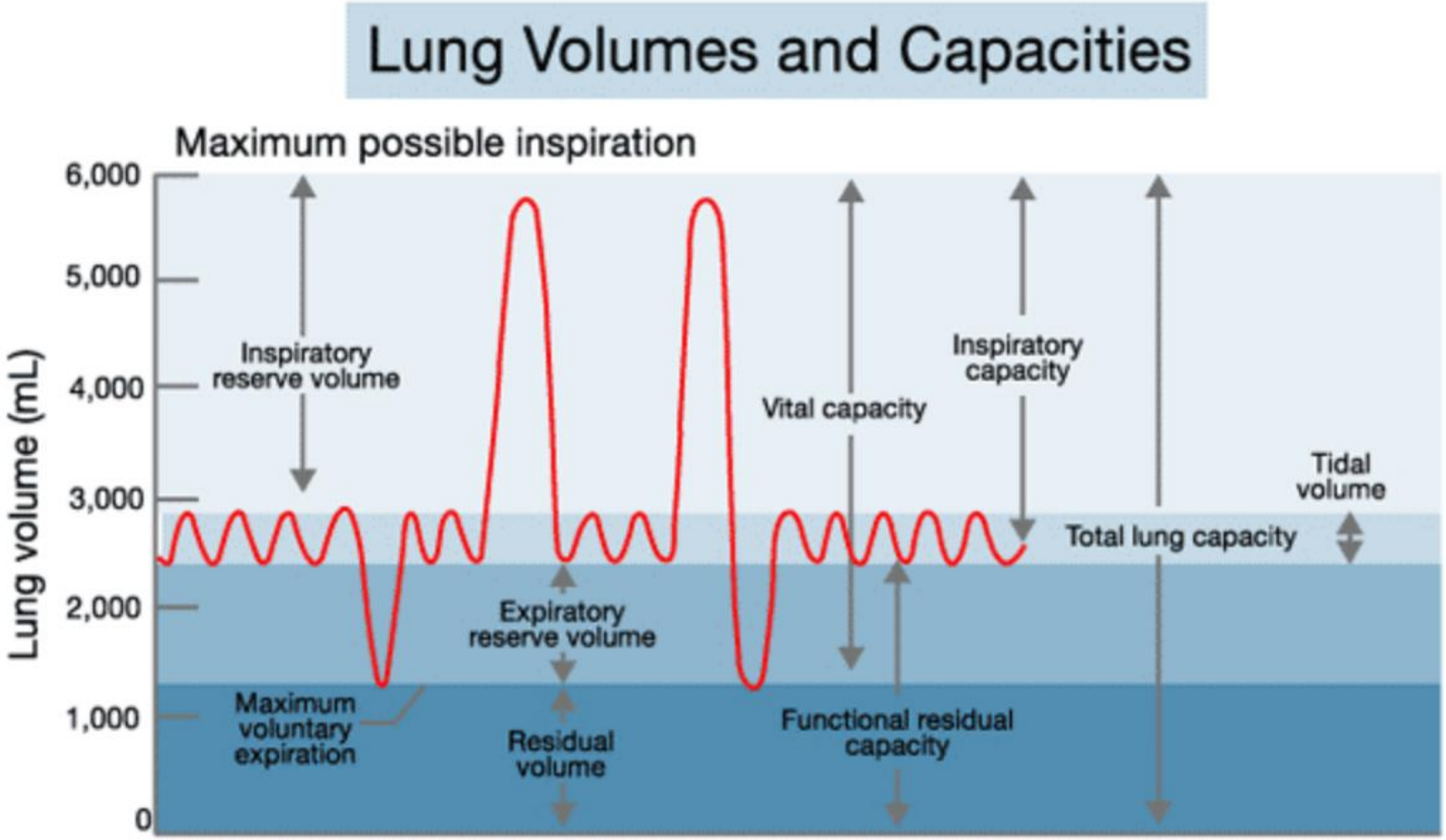
Methods: A secondary analysis of previously described prehospital-based dataset from the Department of Defense Trauma Registry (DODTR) was performed. Casualties who had a prehospital cricothyrotomy performed were isolated and assessed for documented airway injuries and surgical procedures after hospital admission.

Results: There were 25,8976 casualties in the original dataset, of which 251 met inclusion for this analysis. The median age was 25 and most (98%) were male. Explosives were most frequent (55%) followed by firearm (33%) mechanisms. Most were host nation partner forces (35%) and humanitarian

Ventilation is what counts

- VT
- Rate
- MV
- Dead Space

Lung Volumes



BVM

Settings

- 6-8 ml per KG
- Rate 10-12
- Mode A/C or SIMV
- FiO2 as needed
- Peep 5 or as needed
- Adjust to maintain EtCO2 40

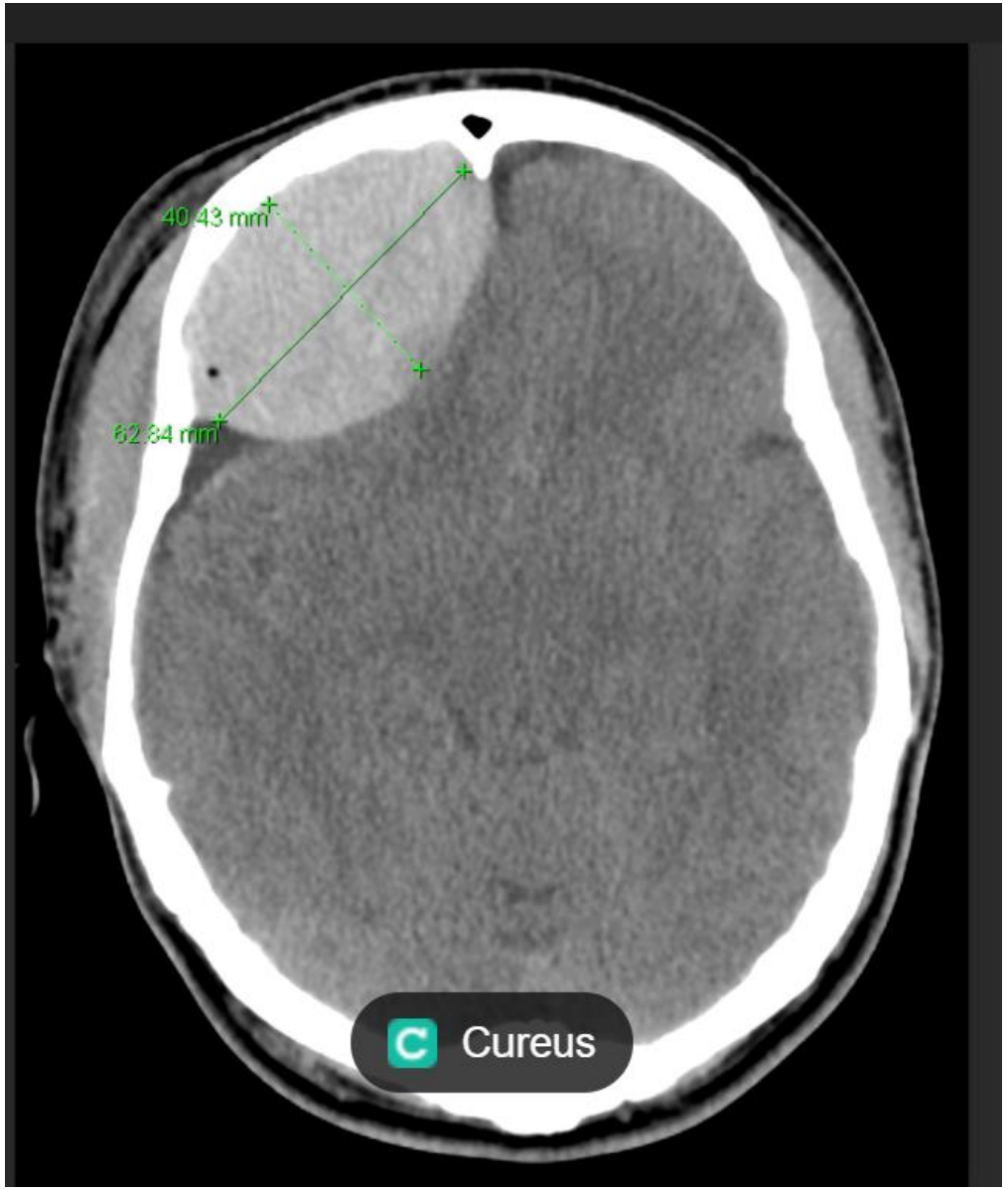
Tools for Assessment


%SpO2
PR bpm
96
60


Measured
EtCO2
III
β
Alveolar
plateau
α
0
II
I
Expiratory
upstroke
Inspiratory
downstroke
Respiratory
baseline
(should be
0 mmHg)


LIFEPAK 15 MONITOR/DEFIBRILLATOR
NETFLIX
ON
CPR
ANALYZE
LEAD
SYNC
ALARMS
OPTIONS
PACER
RATE
PAUSE
SPEED DIAL

Airway management in TBI



What do you think?

Review > PLoS One. 2015 Oct 23;10(10):e0141034. doi: 10.1371/journal.pone.0141034. eCollection 2015.

Experience in Prehospital Endotracheal Intubation Significantly Influences Mortality of Patients with Severe Traumatic Brain Injury: A Systematic Review and Meta-Analysis

Sebastiaan M Bossers [1], Lothar A Schwarte [2], Stephan A Loer [1], Jos W R Twisk [3], Christa Boer [4], Patrick Schober [2]

Affiliations + expand

PMID: 26496440 PMCID: PMC4619807 DOI: 10.1371/journal.pone.0141034

Free PMC article

Abstract

Background: Patients with severe traumatic brain injury (TBI) are at high risk for airway obstruction and hypoxia at the accident scene, and routine prehospital endotracheal intubation has been widely advocated. However, the effects on outcome are unclear. We therefore aim to determine effects of prehospital intubation on mortality and hypothesize that such effects may depend on the emergency medical service providers' skill and experience in performing this intervention.

Methods and findings: PubMed, Embase and Web of Science were searched without restrictions up to July 2015. Studies comparing effects of prehospital intubation versus non-invasive airway management on mortality in non-paediatric patients with severe TBI were selected for the systematic review. Results were pooled across a subset of studies that met predefined quality criteria. Random effects meta-analysis, stratified by experience, was used to obtain pooled estimates of the effect of prehospital intubation on mortality. Meta-regression was used to formally assess differences between experience groups. Mortality was the main outcome measure, and odds ratios refer to the odds of

NAEMSP Prehospital Airway Position Papers

Prehospital Trauma Airway Management: An NAEMSP Position Statement and Resource Document

Sabina Braithwaite, Christopher Stephens, Kyle Remick, Whitney Barrett, Francis X. Guyette, Michae

...show all

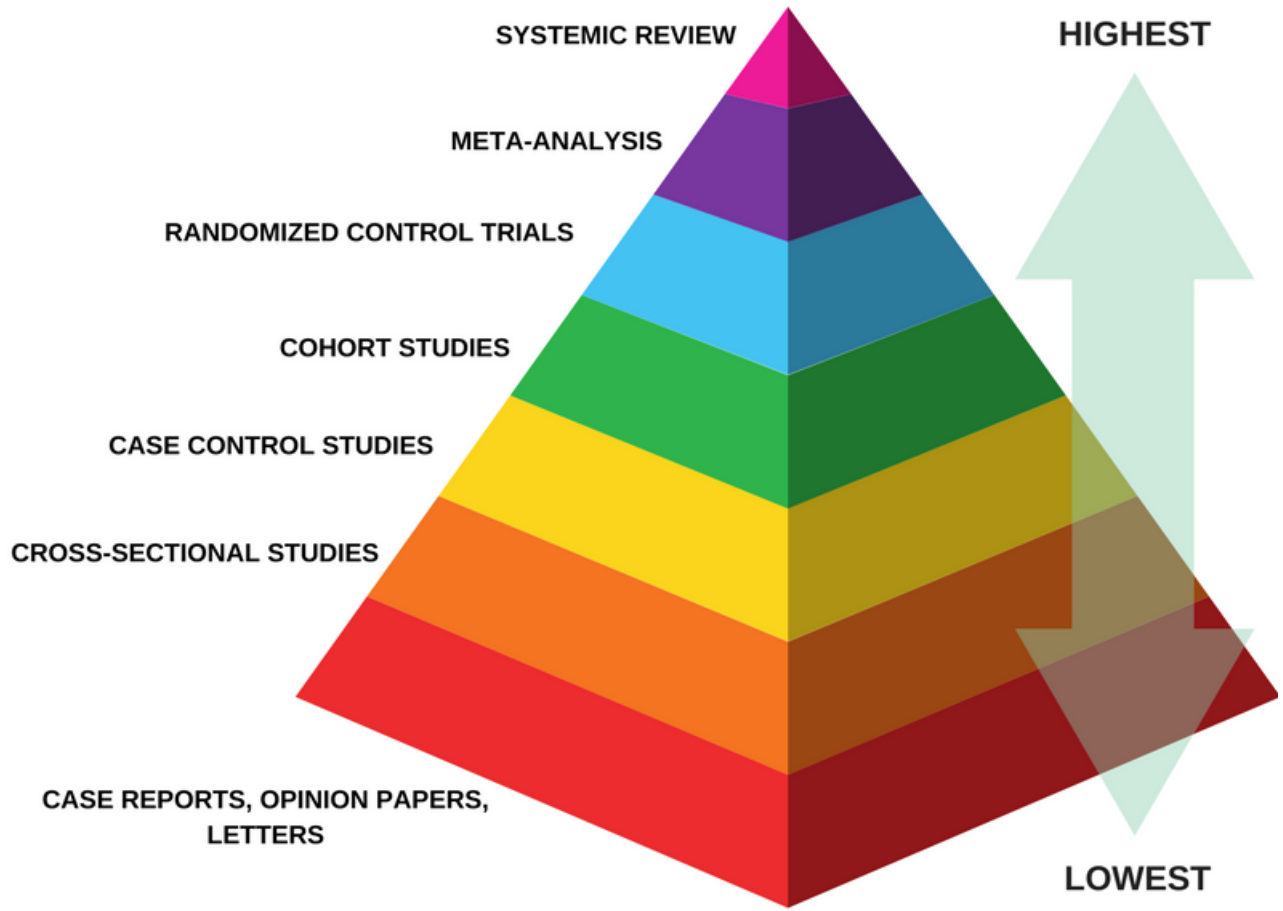
Pages 64-71 | Received 04 Sep 2021, Accepted 12 Oct 2021, Published online: 10 Jan 2022

Download citation https://doi.org/10.1080/10903127.2021.1994069 Check for updates

Abstract

Definitive management of trauma is not possible in the out-of-hospital environment. Rapid treatment and transport of trauma casualties to a trauma center are vital to improve survival and outcomes. Prioritization and management of airway, oxygenation, ventilation, protection from gross aspiration, and physiologic optimization must be balanced against timely patient delivery to definitive care. The optimal prehospital airway management strategy for trauma has not been clearly defined; the best choice

Medical Research



The pyramid of evidence

Strength	Level	Design	Randomization	Control
High	Level 1	Randomized control trial (RCT)	Yes	Yes
		Meta-analysis of RCT with homogeneous results	No	
	Level 2	Prospective comparative study (therapeutic)	No	Yes
		Meta-analysis of Level 2 studies or Level 1 studies with inconsistent results	No	
	Level 3	Retrospective Cohort Study	No	Yes
		Case-control Study	No	Yes
		Meta-analysis of Level 3 studies	No	
	Level 4	Case Series	No	No
	Level 5	Case Report	No	No
		Expert Opinion	No	No
Low		Personal Observation	No	No

Critical thinking in the realm of Airway management of the trauma patient

Questions?

Case study #1

- 24-Year-old male involved in MCA
- GCS of 8
- No breath sounds on the left
- Pelvic and femur injuries on the left
- Abdominal guarding

Case Study #2

- 68-year-old female
- Involved in a shooting incident
- Abdominal GSW's x 3
- Chest GSW x 1
- GCS 7

CAPCE CE

CAPCE Mobile App

First Step

Download CAPCE app in the Apple or Android app store. The download is free.

- Click Register and complete the information on the registration page
- Your email address is your username
- Create a Password: must be 8 or more digits consisting of at least 1 upper-case letter, 1 lower-case letter, numbers and at least 1 special character
- Sign in on the app home page with your username (email) and password
- Click Settings to add Address and License information
- Log out and then log back in again

Second Step

After you attend any CAPCE Accredited lesson, scan the QR code provided:

Log in to your app:

- Click Scan Q/R code and scan your code presented at the end of the class
- The Dashboard page will display your course completion data.
- Click "Download certificate" to view your completion certificate.
- To view your certificate immediately, be sure your phone has a pdf reader.

Evaluation

Adjourn