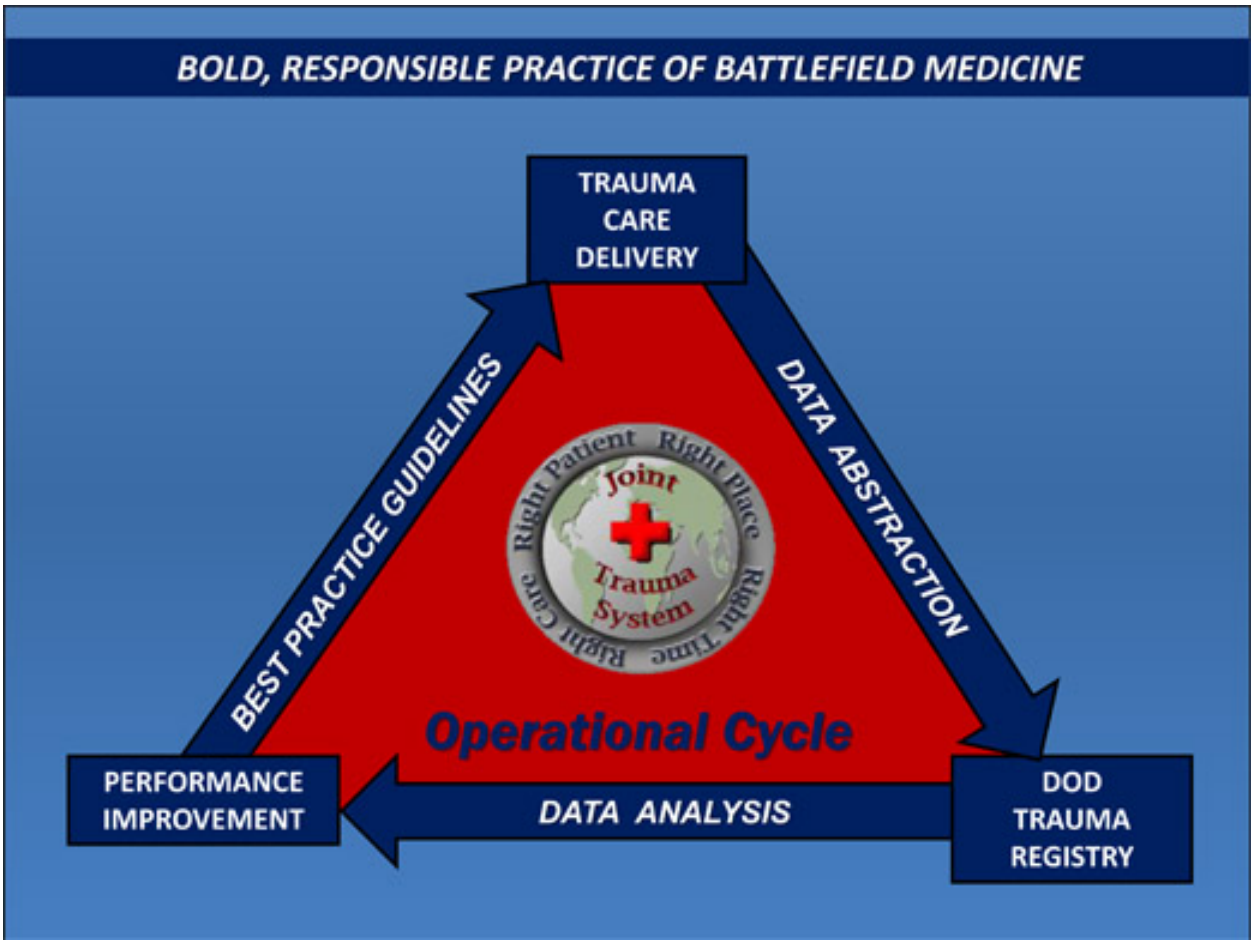
Committee on En Route Combat Casualty Care (CoERCCC)



Journal Watch

2nd Quarter

2017

Journal Watch Key Terminology Searched:

Emergency medical services
Acute coronary syndrome
Emergency care
Aeromedical evacuation
Traumatic brain injury
Substances for disinfection
Standardized operating procedures
Forward MEDEVAC
Trauma
Helicopter
Transportation Vibration
Spinal cord injury
Physically demanding occupation
Resuscitation
Myocardial infarction
Telemedicine
Inflammation
Air traffic
Highly infectious diseases
Combat
Joint trauma system
MRAP
Porcine model
Airway management
ST-segment elevation
Task analysis
Treatment efficacy
Pre-hospital
Hypobaria
Neuronal cell death
Disinfection of aircraft
Stabilization
FLYP
PECC
SCI
Shock
Guideline
Employment standards
Vibration

Laryngeal mask airway as a rescue device for failed endotracheal intubation during scene-to-hospital air transport of combat casualties.

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Abstract

BACKGROUND
Advanced airway management of combat casualties during scene-to-hospital air transport is challenging. Because of the short transport time, flight physicians of the Israeli military airborne combat evacuation unit are approved for the use of a laryngeal mask airway (LMA) in the event of failed endotracheal intubation (ETI). The aim of this study was to assess the effectiveness of LMA use during scene-to-hospital transport of combat casualties in Israel.

PATIENTS AND METHODS
A retrospective cohort analysis of all combat casualties treated with ETI during scene-to-hospital transport over a 3-year period was carried out. Successful LMA insertion was defined as satisfactory placement of the device on the basis of adequate chest expansion with bag-mask ventilation.

RESULTS
The median flight time from scene to hospital was 13 min [interquartile range (IQR): 9-15 min]. Sixty-five casualties underwent ETI attempts, 47 successful and 18 failed. All 18 casualties who had failed ETI underwent LMA insertion as a rescue treatment. Six casualties suffered from traumatic brain injury, six had firearm injuries, two had blast injuries, and two had inhalational injuries. LMA insertion was successful in 16/18 (88.9%) casualties, 14 survived to hospital discharge, whereas two were declared dead upon hospital arrival. Two cases of LMA insertion were unsuccessful, but patients survived to hospital discharge. Among the 16 successful cases, the median oxygen saturation on scene-pickup before LMA insertion and on hospital-handover with LMA in place were 90% (IQR: 84-96%) and 98% (IQR: 96-99%), respectively (P<0.0001, the 95% confidence interval for difference between medians was 4-11).

CONCLUSION
The findings of this study suggest that in the event of failed ETI, combat casualties can be treated effectively with LMA during a short scene-to-hospital transport time.
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Impact of Critical Care Air Transport Team (CCATT) ventilator management on combat mortality.

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Abstract

BACKGROUND
Aeromedical evacuation platforms such as Critical Care Air Transport Teams (CCATTs) play a vital role in the transport and care of critically injured and ill patients in the combat theater. Mechanical ventilation is used to support patients with failing respiratory function and patients requiring high levels of sedation. Mechanical ventilation, if not managed appropriately, can worsen or cause lung injury, as well as contribute to increased morbidity.The purpose of this study was to evaluate the impact of ARDSNet protocol compliance during aeromedical evacuation of ventilated combat injured patients.

METHODS
We performed a retrospective chart review of combat injured patients transported by CCATTs from Afghanistan to Landstuhl Regional Medical Center (LRMC) in Germany between January 2007 and January 2012. Following univariate analyses, we performed regression analyses to assess compliance and post-flight outcomes. Cox proportional hazard models were used to evaluate associations between the risk factor of non-compliance with increased number of ventilator, ICU, or hospital days. Nominal logistic regression models were performed to evaluate the association between non-compliance and mortality.

RESULTS
Sixty-two percent (n=669) of 1086 patients required mechanical ventilation during transport. A total of 650 patients required volume controlled mechanical ventilation and were included in the analysis. Of the 650 subjects, 62% (n=400) were non-compliant per tidal volume and ARDSNet table recommendations. The groups were similar in all demographic variables, except the Non-compliant group had a higher ISS compared to the Compliant group. Subjects in the Compliant group were less likely to have an incidence of acute respiratory distress, acute respiratory failure, and ventilator associated pneumonia when combing the variables (2% vs 7%, p<0.0069).The Non-compliant group had an increased incidence of in-flight respiratory events, required more days on the ventilator and in the ICU, and had a higher mortality rate.

CONCLUSIONS
Compliance with the ARDSNet guidelines was associated with a decrease in ventilator days, ICU days, and 30-day mortality.
LEVEL OF EVIDENCE: Level III: Therapeutic/Care Management.
PMID: 28570350 DOI: 10.1097/TA.0000000000001607

Relative device stability of anterior versus axillary needle decompression for tension pneumothorax during casualty movement: Preliminary analysis of a human cadaver model.

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Abstract

BACKGROUND

Tension pneumothorax (tPTX) remains a significant cause of potentially preventable death in military and civilian settings. The current prehospital standard of care for tPTX is immediate decompression with a 14-gauge 8-cm angiocatheter; however, failure rates may be as high as 17% to 60%. Alternative devices, such as 10-gauge angiocatheter, modified Veress needle, and laparoscopic trocar, have shown to be potentially more effective in animal models; however, little is known about the relative insertional safety or mechanical stability during casualty movement.

METHODS

Seven soft-embalmed cadavers were intubated and mechanically ventilated. Chest wall thickness was measured at the second intercostal space at the midclavicular line (2MCL) and the fifth intercostal space along the anterior axillary line (5AAL). CO2 insufflation created a PTX, and needle decompression was then performed with a randomized device. Insertional depth was measured between hub and skin before and after simulated casualty transport. Thoracoscopy was used to evaluate for intrapleural placement and/or injury during insertion and after movement. Cadaver demographics, device displacement, device dislodgment, and injuries were recorded. Three decompressions were performed at each site (2MCL/5AAL), totaling 12 events per cadaver.

RESULTS

Eighty-four decompressions were performed. Average cadaver age was 59 years, and body mass index was 24 kg/m. The CWT varied between cadavers because of subcutaneous emphysema, but the average was 39 mm at the 2MCL and 31 mm at the 5AAL. Following movement, the 2MCL site was more likely to become dislodged than the 5AAL (67% vs. 17%, p = 0.001). Median displacement also differed between 2MCL and 5AAL (23 vs. 2 mm, p = 0.001). No significant differences were noted in dislodgement or displacement between devices. Five minor lung injuries were noted at the 5AAL position.

CONCLUSION

Preliminary results from this human cadaver study suggest the 5AAL position is a more stable and reliable location for thoracic decompression of tPTX during combat casualty transport.

LEVEL OF EVIDENCE: Therapeutic study, level III.

PMID:28383466 DOI: 10.1097/TA.0000000000001488

Field and en route REBOA: A feasible military reality?

J Trauma Acute Care Surg. 2017 Apr 27. doi: 10.1097/TA.0000000000001476. [Epub ahead of print]

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Abstract

BACKGROUND
Severe non-compressible torso hemorrhage (NCTH) remains a leading cause of potentially preventable death in modern military conflicts. Resuscitative endovascular occlusion of the aorta (REBOA) has demonstrated potential as an effective adjunct to the treatment of NCTH in the civilian early hospital and even pre-hospital settings - but the application of this technology for military pre-hospital use has not been well described. We aimed to assess the feasibility of both field and en route pre-hospital REBOA in the military exercise setting simulating a modern armed conflict.

METHODS
Two adult male Sus Scrofa underwent simulated junctional combat injury in the context of a planned military training exercise. Both underwent zone I REBOA in conjunction with standard tactical combat casualty care (TCCC) interventions - one during point of injury care and the other during en route flight care. Animals were sequentially evacuated to two separate Forward Surgical Teams (FSTs) by rotary wing platform where the balloon position was confirmed by chest X-Ray. Animals then underwent different damage control thoracic and abdominal procedures before euthanasia.

RESULTS
The first swine underwent immediate successful REBOA at the point of injury 7:30 minutes after the injury. It required 6 minutes total from initiation of procedure to effective aortic occlusion. Total occlusion time was 60 minutes. In the second animal, the REBOA placement procedure was initiated immediately after take-off (17:40 minutes after the injury). Although the movements and vibration of flight were not significant impediments, we only succeeded to put a 6-Fr sheath into a femoral artery during the 14 minutes flight due to lighting and visualization challenges. After the sheath had been upsized in the FST, the REBOA catheter was primarily placed in zone I followed by its replacement to zone III. Both animals survived to study completion and the termination of training. No complications were observed in either animal.

CONCLUSION
Our study demonstrates the potential feasibility of REBOA for use during tactical field and en route (flight) care of combat casualties. Further study is needed to determine the optimal training and utilization protocols required to facilitate the effective incorporation of REBOA into military pre-hospital care capabilities.

PMID: 28452882 DOI: 10.1097/TA.0000000000001476

Comparison of five video-assisted intubation devices by novice and expert laryngoscopists for use in the aeromedical evacuation environment.

Mil Med Res. 2017 Jun 14;4:20. doi: 10.1186/s40779-017-0129-2. eCollection 2017.

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Abstract

BACKGROUND
The critically ill or injured patient undergoing military medical evacuation may require emergent intubation. Intubation may be life-saving, but it carries risks. The novice or infrequent laryngoscopist has a distinct disadvantage because experience is critical for the rapid and safe establishment of a secured airway. This challenge is compounded by the austere environment of the back of an aircraft under blackout conditions. This study determined which of five different video-assisted intubation devices (VAIDs) was best suited for in-flight use by U.S. Air Force Critical Care Air Transport Teams by comparing time to successful intubation between novice and expert laryngoscopists under three conditions, Normal Airway Lights on (NAL), Difficult Airway Lights on (DAL) and Difficult Airway Blackout (DAB), using manikins on a standard military transport stanchion and the floor with a minimal amount of setup time and extraneous light emission.

METHODS
A convenience sample size of 40 participants (24 novices and 16 experts) attempted intubation with each of the 5 different video laryngoscopic devices on high-fidelity airway manikins. Time to tracheal intubation and number of optimization maneuvers used were recorded. Kruskal-Wallis testing determined significant differences between the VAIDs in time to intubation for each particular scenario. Devices with significant differences underwent pair-wise comparison testing using rank-sum analysis to further clarify the difference. Device assembly times, startup times and the amount of light emitted were recorded. Perceived ease of use was surveyed.

RESULTS
Novices were fastest with the Pentax AWS in all difficult airway scenarios. Experts recorded the shortest median times consistently using 3 of the 5 devices. The AWS was superior overall in 4 of the 6 scenarios tested. Experts and novices subjectively judged the GlideScope Ranger as easiest to use. The light emitted by all the devices was less than the USAF-issued headlamp.

CONCLUSIONS
Novices intubated fastest with the Pentax AWS in all difficult airway scenarios. The GlideScope required the shortest setup time, and participants judged this device as the easiest to use. The GlideScope and AWS exhibited the two fastest total setup times. Both devices are suitable for in-flight use by infrequent and seasoned laryngoscopists.

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Inefficacy of standard vital signs for predicting mortality and the need for prehospital life-saving interventions in blunt trauma patients transported via helicopter: A repeated call for new measures.

https://www.ncbi.nlm.nih.gov/pubmed/28452878# 2017 Jul;83(1 Suppl 1):S98-S103. doi: 10.1097/TA.0000000000001482.

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Abstract

OBJECTIVE
The aim of this study was to investigate the efficacy of traditional vital signs for predicting mortality and the need for prehospital life-saving interventions (LSIs) in blunt trauma patients requiring helicopter transport to a Level I trauma center. Our hypothesis was that standard vital signs are not sufficient for identifying or determining treatment for those patients most at risk.

METHODS
This study involved prehospital trauma patients suffering from blunt trauma (motor vehicle/cycle collision) and transported from the point of injury via helicopter. Means and standard deviations for vital signs and Glasgow coma scale scores (GCS) were obtained for non-LSI versus LSI and survivor versus non-survivor patient groups and then compared using Wilcoxon statistical tests. Variables with statistically significant differences between patient groups were then used to develop multivariate logistic regression models for predicting mortality and/or the need for prehospital LSIs. Receiver-operating characteristic (ROC) curves were also obtained in order to compare these models.

RESULTS
A final cohort of 195 patients was included in the analysis. 30 (15%) patients received a total of 39 prehospital LSIs. Of these, 12 (40%) died. In total, 33 (17%) patients died. Of these, 21 (74%) did not receive prehospital LSIs. Model variables were field heart rate, lowest systolic blood pressure, shock index, pulse pressure, and GCS components. Using vital signs alone, ROC curves demonstrated poor prediction of LSI needs, mortality, and non-survivors who did not receive LSIs (area under the curve [AUC], AUCs: 0.72, 0.65, and 0.61). When using both vital signs and GCS, ROC curves still demonstrated poor prediction of non-survivors overall and non-survivors who did not receive LSIs (AUCs: 0.67, 0.74).

CONCLUSION
The major implication of this study was that traditional vital signs cannot identify or determine treatment for many prehospital blunt trauma patients who are at great risk. This study reiterated the need for new measures in order to improve blunt trauma triage and prehospital care.

LEVEL OF EVIDENCE Level IV Therapeutic/Care Management.
PMID: 28452878 DOI: 10.1097/TA.0000000000001482

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