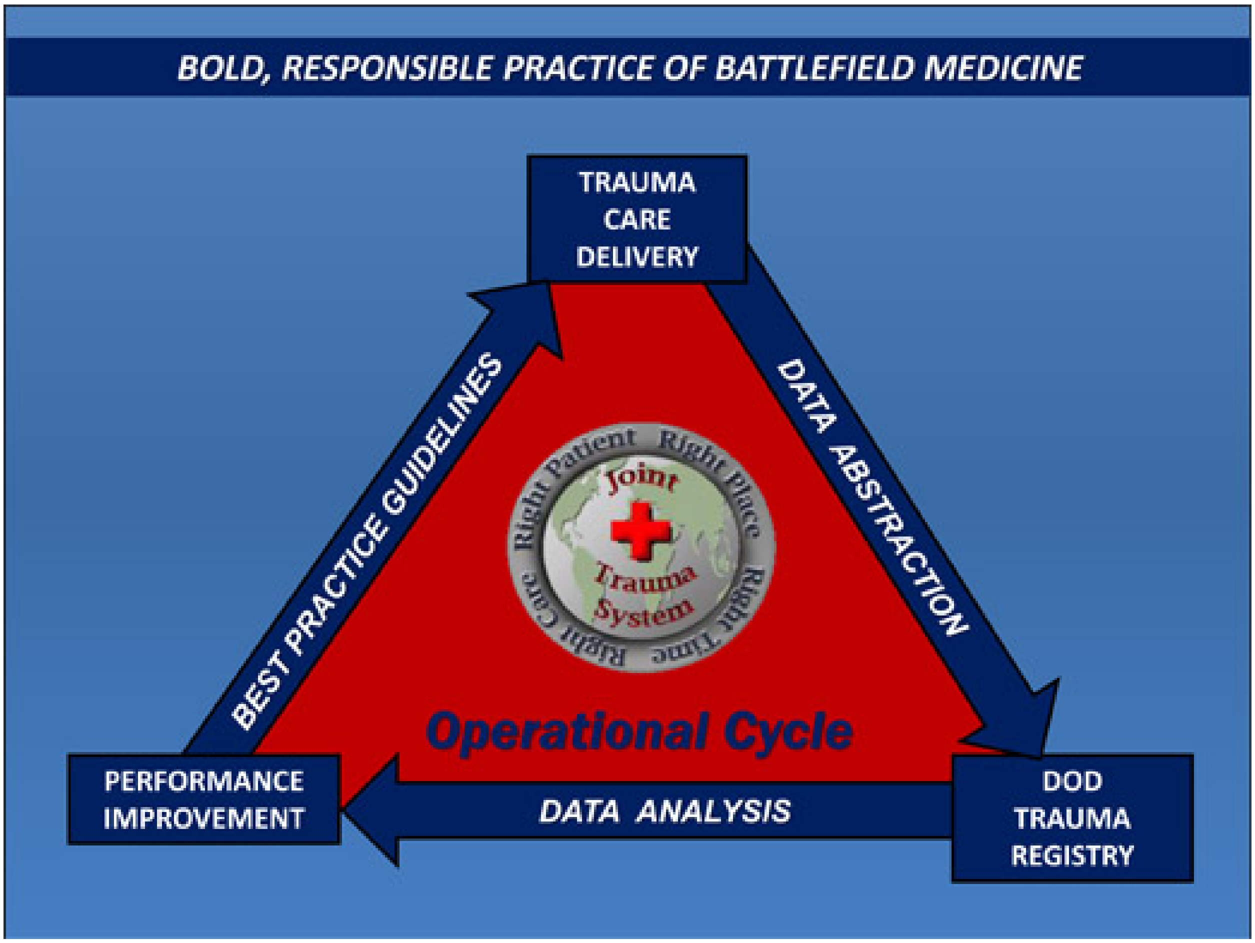
Committee on En Route Combat Casualty Care

(CoERCCC)



Journal Watch

2nd Quarter

2018

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
Casualty Distribution

Resuscitation
Myocardial infarction
Telemedicine
Inflammation
Air traffic
Highly infectious diseases
Combat
Joint trauma system
MRAP
Porcine model
Airway management
ST-segment elevation
Task analysis
Casualty Evacuation

Treatment efficacy
Pre-hospital
Hypobaria
Neuronal cell death
Disinfection of aircraft
Stabilization
FLYP
PECC
SCI
Shock
Guideline
Employment standards
Vibration

J Trauma Acute Care Surg. 2018 Jan;84(1):11-18. doi: 10.1097/TA.0000000000001727.

Reexamination of a Battlefield Trauma Golden Hour Policy.

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Abstract

BACKGROUND: Most combat casualties who die, do so in the prehospital setting. Efforts directed toward alleviating prehospital combat trauma death, known as killed in action (KIA) mortality, have the greatest opportunity for eliminating preventable death.

METHODS: Four thousand five hundred forty-two military casualties injured in Afghanistan from September 11, 2001, to March 31, 2014, were included in this retrospective analysis to evaluate proposed explanations for observed KIA reduction after a mandate by Secretary of Defense Robert M. Gates that transport of injured service members occur within 60 minutes. Using inverse probability weighting to account for selection bias, data were analyzed using multivariable logistic regression and simulation analysis to estimate the effects of (1) gradual improvement, (2) damage control resuscitation, (3) harm from inadequate resources, (4) change in wound pattern, and (5) transport time on KIA mortality.

RESULTS: The effect of gradual improvement measured as a time trend was not significant (adjusted odds ratio [AOR], 0.99; 95% confidence interval [CI], 0.94-1.03; $p = 0.58$). For casualties with military Injury Severity Score of 25 or higher, the odds of KIA mortality were 83% lower for casualties who needed and received prehospital blood transfusion (AOR, 0.17; 95% CI, 0.06-0.51; $p = 0.002$); 33% lower for casualties receiving initial treatment by forward surgical teams (AOR, 0.67; 95% CI, 0.58-0.78; $p < 0.001$); 70%, 74%, and 87% lower for casualties with dominant injuries to head (AOR, 0.30; 95% CI, 0.23-0.38; $p < 0.001$), abdomen (AOR, 0.26, 95% CI, 0.19-0.36; $p < 0.001$) and extremities (AOR, 0.13; 95% CI, 0.09-0.17; $p < 0.001$); 35% lower for casualties categorized with blunt injuries (AOR, 0.65; 95% CI, 0.46-0.92; $p = 0.01$); and 39% lower for casualties transported within one hour (AOR, 0.61; 95% CI, 0.51-0.74; $p < 0.001$). Results of simulations in which transport times had not changed after the mandate indicate that KIA mortality would have been 1.4% higher than observed, equating to 135 more KIA deaths (95% CI, 105-164).

CONCLUSION: Reduction in KIA mortality is associated with early treatment capabilities, blunt mechanism, select body locations of injury, and rapid transport.

LEVEL OF EVIDENCE: Therapy, level III. PMID: 29266051 DOI: 10.1097/TA.0000000000001727

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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 and 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. After 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 1,086 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 Injury Severity Score 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: Therapeutic/care management, level IV. PMID: 28570350
DOI:10.1097/TA.0000000000001607

Air Med J. 2018 Mar - Apr;37(2):124-125. doi: 10.1016/j.amj.2017.11.010. Epub 2017 Dec 25.

Should Helicopters Transport Patients Who Become Sick After a Chemical, Biological, Radiological, Nuclear, and Explosive Attack?

Yanagawa Y, Ishikawa K, Takeuchi I, Nagasawa H, Jitsuiki K, Ohsaka H, Omori K.

Abstract

The local fire department executed a training simulation for chemical and explosive incidents at a large sports facility. In this training simulation, a physician-staffed helicopter arrived at the request of the fire department and landed just outside the cold zone in the parking area. The doctor and nurse of the helicopter were escorted to a red area in the cold zone, which was selected based on the results of postdecontamination triage. After the patients had been treated, they were air medically evacuated to the base hospital. In the Tokyo subway sarin attack in 1995, St Luke's International Hospital admitted over 600 victims. During this incident, 23.2% of medical staff suffered secondary injury from sarin exposure. If air medial crews respond with subsequent postexposure effects during flight, an affected pilot could lose control of the helicopter, resulting in a fatal crash. Based on potential safety concerns for air medical and ground personnel, our recommendation would be that air medical helicopters not be dispatched to sites of chemical, biological, radiological, nuclear, and explosive incidents.

PMID: 29478577 DOI: 10.1016/j.amj.2017.11.010

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Red Tides: Mass casualty and whole blood at sea Red Tides.

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Abstract

BACKGROUND: The U.S. Navy's casualty-receiving ships provide remote damage control resuscitation (RDCR) platforms to treat injured combatants deployed afloat and ashore. We report a significant mass casualty incident aboard the USS Bataan, and the most warm fresh whole blood (WFWB) transfused at sea for traumatic hemorrhagic shock since the Vietnam War.

METHODS: Casualty-receiving ships have robust medical capabilities, including a frozen blood bank with packed red blood cells (pRBC) and fresh frozen plasma (FFP). The blood supply can be augmented with WFWB collected from a "walking blood bank" (WBB).

RESULTS: Following a helicopter crash, six patients were transported by MV-22 Osprey to the USS Bataan. Patient 1 had a pelvic fracture, was managed with a pelvic binder, and received 4 units of pRBC, 2 units of FFP, and 6 units of WFWB. Patient 2, with a comminuted tibia and fibula fracture, underwent lower extremity four-compartment fasciotomy, and received 4 units of WFWB. Patient 3 underwent several procedures, including left anterior thoracotomy, aortic cross-clamping, exploratory laparotomy, small bowel resection, and tracheostomy. He received 8 units of pRBC, 8 units of FFP, and 28 units of WFWB. Patients 4 and 5 had suspected spine injuries and were managed non-operatively. Patient 6, with open tibia and fibula fractures, underwent lower extremity four-compartment fasciotomy with tibia external fixation and received 1 unit of WFWB. All patients survived aeromedical evacuation to a Role 4 medical facility and subsequent transfer to local hospitals.

DISCUSSION: Maritime military mass casualty incidents are challenging, but the U.S. Navy's casualty-receiving ships are ready to perform RDCR at sea. Activation of the ship's WBB to transfuse WFWB is essential for hemostatic resuscitations afloat.

LEVEL OF EVIDENCE: V STUDY TYPE: Case series.PMID: 29443862
DOI:10.1097/TA.0000000000001831

Mil Med. 2018 Mar 14. doi: 10.1093/milmed/usx129. [Epub ahead of print]

An Evaluation of Navy En Route Care Training Using a High-Fidelity Medical Simulation Scenario of Interfacility Patient Transport.

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Abstract

Introduction: Military prehospital and en route care (ERC) directly impacts patient morbidity and mortality. Provider knowledge and skills are critical variables in the effectiveness of ERC. No Navy doctrine defines provider choice for patient transport or requires standardized provider training. Frequently, Search and Rescue Medical Technicians (SMTs) and Navy Nurses (ERC RNs) are tasked with this mission though physicians have also been used. Navy ERC provider training varies greatly by professional role. Historically, evaluations of ERC and patient outcomes have been based on retrospective analyses of incomplete data sets that provide limited insight on ERC practices. Little evidence exists to determine if current training is adequate to care for the most common injuries seen in combat trauma patients.

Materials and Methods: Simulation technology facilitates a standardized patient encounter to enable complete, prospective data collection while studying provider type as the independent variable. Information acquired through skill performance observation can be used to make evidence-based recommendations to improve ERC training. This IRB approved multi-center study funded through a Congressionally Directed Medical Research Program grant from the Combat Casualty Care Intramural Research Joint En Route Care portfolio evaluated Navy ERC providers. The study evaluated 84 SMT, ERC RN, and physician participants in the performance of critical and secondary actions during an immersive, high-fidelity, patient transport simulation scenario focused on the care during an interfacility transfer. Simulation evaluators with military ERC expertise, blinded to participant training and background, graded each participant's performance. Inter-rater reliability was calculated using Cohen's Kappa to evaluate concordance between evaluator assessments. Categorical data were reported as frequencies and percentages. Performance attempt and accuracy rates were compared with likelihood ratio chi-square or Fisher's exact test where appropriate. Tests were two-tailed and we considered results significant, that is, a difference not likely due to chance exists between groups, if $p < 0.05$. Confidence intervals were used to present overlap in performance between provider types.

Results: Critical and secondary actions were assessed. A majority of providers completed at least one of the critical life-saving actions; only one participant completed all critical actions. Evaluation of critical actions demonstrated that a tourniquet was applied by 64% of providers, blood products administered by 46%, needle decompression performed by 51%, and a complete handoff report performed by 48%.

Assessment of secondary actions demonstrated analgesic was accurately administered by 24% of all providers, and 44% reinforced the "hemorrhaging amputation site dressing."

Conclusion: Over 98% of participants failed to properly perform all critical actions during the interfacility transfer scenario, which in a real-life combat casualty transport scenario could result in a preventable death. Study results demonstrate serious skill deficits among all types of Navy ERC providers. These data can be used to improve the training of Navy ERC providers, ultimately improving care to injured soldiers, sailors, airmen, and marines.

PMID: 29547887 DOI: 10.1093/milmed/usx129

Air Med J. 2017 Nov - Dec;36(6):302-306. doi: 10.1016/j.amj.2017.05.002. Epub 2017 Jul 29.

Temperature-sensitive Medications in Interfacility Transport: The Ice Pack Myth.

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Abstract

INTRODUCTION: Critical Care Transport teams use various strategies to maintain temperature sensitive drugs and equipment at optimal temperature. The purpose of this study was to examine the effectiveness of current passive refrigeration of temperature sensitive transport medications/equipment.

METHODS: Initially, we performed a retrospective review of transport durations. Subsequently, an experimental paradigm was created using a temperature probe inside of the transport cooler packs utilizing various configurations and initial starting temperatures with high and low "in range" temperature margins of 8°C (max) and 2°C (min).

RESULTS: The mean round-trip transport time was 2.5 hours and over 15% of transports last longer than 4 hours. At a starting temperature of -3.9°C, the cooler and ice pack maintained "in range" temperatures for 3 hours. When the ice pack starting temperature was -12.9°C, high temperatures excursions weren't experienced until 6 hours 55 minutes, but initially low excursions fell below for up to 3 hours. iSTAT® cartridges remained within range between 1-4 hours at cooler and ice pack starting temperature of -3.9°C.

CONCLUSION: The current system of passive refrigeration does not appear to be sufficient for safely storing medications or point-of-care testing equipment for our transport services. This might reveal a flaw in the existing practices around medication refrigeration in transport.

PMID: 29122111 DOI: 10.1016/j.amj.2017.05.002

Air Med J. 2017 Sep - Oct;36(5):263-267. doi: 10.1016/j.amj.2017.05.003. Epub 2017 Jun 21.

Logistical Concerns for Prehospital Blood Product Use by Air Medical Services.

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Abstract Over the past few decades, reports have described favorable results from transfusion of blood products in helicopter EMS (HEMS). Nevertheless, the initiation of a HEMS transfusion program requires consideration of many factors, some unique to each clinical site. This paper describes our experience developing a HEMS transfusion program in an urban non-hospital based HEMS program with a history of long transport times. When considering blood use away from the hospital, major consideration must be given to safe storage and monitoring of blood products both on the ground and while in flight. PRBCs have been shown to generally be resilient to helicopter transit and have a prolonged storage duration. Transfusion of other blood products, such as plasma, involves additional challenges but has been achieved by some HEMS sites. Flight protocols should be developed addressing when and how many blood products should be transported, potentially considering patient factors, scene factors, and the regional availability of blood products during interfacility transport. Quality assurance and documentation protocols must also be developed for blood product use in flight. In our center's experience, we have so far transfused a limited number of patients with generally good results. Patient outcomes are described as below.

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