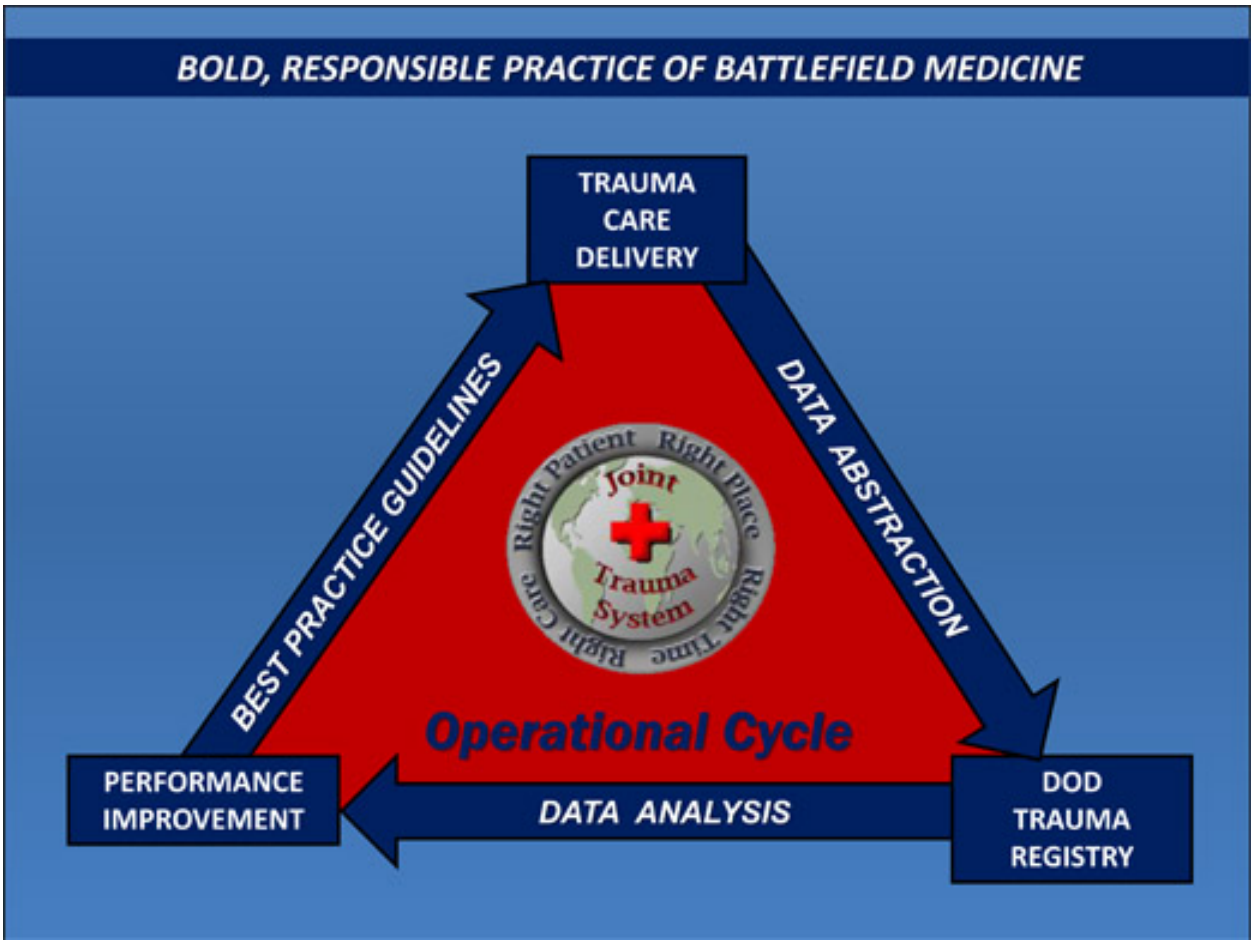
Committee on En Route Combat Casualty Care (CoERCCC)



Journal Watch

3rd 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
CASEVAC
Tactical evacuation
High Altitude
Resuscitation
Myocardial infarction
Telemedicine
Inflammation
Air traffic
Highly infectious diseases
Combat
Joint trauma system
MRAP
Porcine model
Airway management
ST-segment elevation
Task analysis
Ground Evacuation
Inter-facility Transport
Treatment efficacy
Pre-hospital
Hypobaria
Neuronal cell death
Disinfection of aircraft
Stabilization
FLYP
PECC
SCI
Shock
Guideline
Employment standards
Vibration
Battlefield Evacuation
Drones

Mil Med. 2018 Mar 1;183(suppl_1):134-145. doi: 10.1093/milmed/usx211.

A Review of Casualties Transported to Role 2 Medical Treatment Facilities in Afghanistan.

Kotwal RS[1,2], Staudt AM[2], Trevino JD[2], Valdez-Delgado KK[2], Le TD[2], Gurney JM[1,2], Sauer SW[1], Shackelford SA[1], Stockinger ZT[1], Mann-Salinas EA[2].

Author information

1 Joint Trauma System, DoD Center of Excellence for Trauma, 3698 Chambers Road, Joint Base San Antonio-Fort Sam Houston, TX 78234.
2 U.S. Army Institute of Surgical Research, 3698 Chambers Road, Joint Base San Antonio-Fort Sam Houston, TX 78234.

Abstract Critically injured trauma patients benefit from timely transport and care. Accordingly, the provision of rapid transport and effective treatment capabilities in appropriately close proximity to the point of injury will optimize time and survival. Pre-transport tactical combat casualty care, rapid transport with en route casualty care, and advanced damage control resuscitation and surgery delivered early by small, mobile, forward-positioned Role 2 medical treatment facilities have potential to reduce morbidity and mortality from trauma. This retrospective review and descriptive analysis of trauma patients transported from Role 1 entities to Role 2 facilities in Afghanistan from 2008 to 2014 found casualties to be diverse in affiliation and delivered by various types and modes of transport. Air medical evacuation provided transport for most patients, while the shortest transport time was seen with air casualty evacuation. Although relatively little data were collected for air casualty evacuation, this rapid mode of transport remains an operationally important method of transport on the battlefield. For prehospital care provided before and during transport, continued leadership and training emphasis should be placed on the administration and documentation of tactical combat casualty care as delivered by both medical and non-medical first responders.

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Mil Med. 2018 Mar 1;183(suppl_1):203-206. doi: 10.1093/milmed/usx160.

Case Report of Extracorporeal Membrane Oxygenation and Aeromedical Evacuation at a Deployed Military Hospital.

Hamm MS[1], Sams VG[2,3], DellaVolpe MJD[2,4], Lantry JH[2,3], Mason PE[2,3].

Author information

1 Department of Aerospace Medicine, Mike O'Callaghan Federal Medical Center, 4700N Las Vegas Blvd, Nellis AFB, NV 89191.
2 59th Medical Wing Extracorporeal Life Support Program, 2200 Bergquist Dr, San Antonio, TX 78236.
3 Department of Trauma Critical Care, San Antonio Military Medical Center, 3551 Roger Brooke Dr, San Antonio, TX 78219.
4 Department of Medicine, San Antonio Military Medical Center, 3551 Roger Brooke Dr, San Antonio, TX 78219.

Abstract The U.S. Military no longer maintains overseas extracorporeal membrane oxygenation (ECMO) capability for patients with severe lung injury including acute respiratory distress syndrome (ARDS). The authors present a case of severe ARDS at a military hospital in Afghanistan with limited capability for rescue therapies to include presentation, treatment, transport, and use of ECMO in the deployed military environment at one Role 3 medical facility. Lack of ECMO in the overseas environment is a significant gap in U.S. Military medical capability. The authors propose a novel solution, "ECMO packs," for prepositioning at strategic Role 3 facilities for early intervention in patients with severe lung injury to close this lethal and unnecessary capability gap.

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Mil Med. 2018 Mar 1;183(suppl_1):189-192. doi: 10.1093/milmed/usx134.

Continuous Veno-Venous Hemofiltration During Intercontinental Aeromedical Evacuation.

Driscoll IR[1,2], Wallace A[1], Rosario FA[1], Hensley S[1], Cline KD[1], Chung KK[1,2].

Author information

1 U.S. Army Institute of Surgical Research, 3698 Chambers Pass, Fort Sam Houston, TX 78234.
2 Uniformed Services University of the Health Sciences, 4301 Jones Bridge Road, Bethesda, MD 20814.

Abstract Overseas contingency operations which occur in areas lacking medical infrastructure pose challenges to the stabilization and transportation of critically ill patients. In particular, metabolic derangements resulting from acute kidney injury (AKI) make long-distance aeromedical evacuation risky. Here, we report the first modern use of in-flight continuous veno-venous hemofiltration (CVVH) for intercontinental aeromedical evacuation. Hospital and transport records were reviewed for a 31-yr-old male active duty service member who sustained 40% total body surface area full thickness burns after high-voltage electrical exposure in the southern Philippines. He was evacuated to the Burns Centre at Singapore General Hospital, where CVVH was initiated for anuric AKI secondary to rhabdomyolysis. The United States Army Institute of Surgical Research (USAISR) Burn Flight Team transported the patient to the USAISR Burn Center at Fort Sam Houston, TX, USA. CVVH was performed in-flight for 15 h out of 19.5 h of total flight time. CVVH settings were maintained as follows: blood flow 250 mL/min; replacement fluid rate 3,500 mL/h; and no ultra-filtrate removal. Unfractionated heparin at 500 units/h was utilized for regional anticoagulation. No filter clotting was encountered; a planned filter change was performed during a midway refueling stop. Pre-flight hyperkalemia was managed with low-potassium replacement fluid. No fluid was removed in the setting of large wound insensible losses. The patient remained hemodynamically stable and required no vasoactive medications. Continuous veno-venous hemofiltration can be used safely during high-altitude flight to evacuate casualties with AKI from distant contingency operations. The use of portable hemodialysis equipment in this case also proves the feasibility of deploying renal replacement therapies to more forward facilities than previously considered.

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Scand J Trauma Resusc Emerg Med. 2018 Apr 3;26(1):23. doi: 10.1186/s13049-018-0490-5.

Advanced airway management in hoist and longline operations in mountain HEMS - considerations in austere environments: a narrative review This review is endorsed by the International Commission for Mountain Emergency Medicine (ICAR MEDCOM).

Pietsch U[1,2,3], Knapp J[4,5], Kreuzer O[4], Ney L[4,6,7], Strapazzon G[8], Lischke V[4,6], Albrecht R[9,10], Phillips P[11], Rauch S[8].

BACKGROUND: Providing sufficient oxygenation and ventilation is of paramount importance for the survival of emergency patients. Therefore, advanced airway management is one of the core tasks for every rescue team. Endotracheal intubation is the gold standard to secure the airway in the prehospital setting. This review aims to highlight special considerations for advanced airway management preceding human external cargo (HEC) evacuations.

METHODS: We systematically searched MEDLINE, EMBASE, and PubMed in August 2017 for articles on airway management and ventilation in patients before hoist or longline operation in HEMS. Relevant reference lists were hand-searched.

RESULTS: Three articles with regard to advanced airway management and five articles concerning the epidemiology of advanced airway management in hoist or longline rescue missions were included. We found one case report regarding ventilation during hoist operations. The exact incidence of advanced airway management before evacuation of a patient by HEC is unknown but seems to be very low (< 5%). There are several hazards which can impede mechanical ventilation of patients during HEC extractions: loss of equipment, hyperventilation, inability to ventilate and consequent hypoxia, as well as inadequacy of monitoring.

CONCLUSIONS: Advanced airway management prior to HEC operation is rarely performed. If intubation before helicopter hoist operations (HHO) and human cargo sling (HCS) extraction is considered by the rescue team, a risk/benefit analysis should be performed and a clear standard operating procedure (SOP) should be defined. Continuous and rigorous training including the whole crew is required. An international registry on airway management during HEC extraction would be desirable.

PMID: 29615073 PMCID: PMC5883516 DOI: 10.1186/s13049-018-0490-5

Crit Care Nurse. 2018 Apr;38(2):38-45. doi: 10.4037/ccn2018223.

Reducing the Risk for Pressure Injury During Combat Evacuation.

Bridges E[1,2,3,4], Whitney JD[5,6,7,8], Burr R[5,6,7,8], Tolentino E[5,6,7,8].

Abstract

BACKGROUND: Combat casualties undergoing aeromedical evacuation are at increased risk for pressure injuries. The risk factors pressure and shear are potentially modifiable via solutions appropriate for en route care.

OBJECTIVES: To compare transcutaneous oxygen levels and skin temperatures in healthy participants under offloaded (side lying) and loaded (supine or supine with 30° backrest elevation) under 4 conditions: control (no intervention), Mepilex sacral and heel dressings, LiquiCell pad, and Mepilex plus LiquiCell.

METHODS: Participants were randomly assigned to 4 groups according to ideal body weight. Backrest positions were randomized. Transcutaneous oxygen level and temperature were measured on the sacrum and the heel; skin interface pressure was measured with an XSensor pressure imaging system. Measurements were obtained for 5 minutes at baseline (offloaded), 40 minutes with participants supine, and 15 minutes offloaded.

RESULTS: In the 40 healthy participants, interface pressure, transcutaneous oxygen level, and skin temperature did not differ between the 4 groups. Peak interface pressures were approximately 43 mm Hg for the sacrum and 50 mm Hg for the heel. Sacral transcutaneous oxygen level differed significantly between unloaded (mean, 79 mm Hg; SD, 16.5) and loaded (mean, 57 mm Hg; SD, 25.2) conditions ($P < .001$) in a flat position (mean, 85.2 mm Hg; SD, 13.6) and with 30° backrest elevation (mean, 66.7 mm Hg; SD, 24.2) conditions ($P < .001$). Results for the heels and the sacrum were similar. Sacral skin temperature increased significantly across time (approximately 1.0°C).

CONCLUSIONS: The intervention strategies did not differ in prevention of pressure injuries.

PMID: 29606674 DOI: 10.4037/ccn2018223

Crit Care Nurse. 2018 Apr;38(2):e7-e15. doi: 10.4037/ccn2018532.

En Route Critical Care Transfer From a Role 2 to a Role 3 Medical Treatment Facility in Afghanistan.

Staudt AM, Savell SC, Biever KA, Trevino JD, Valdez-Delgado KK, Suresh M, Gurney JM, Shackelford SA, Maddry JK, Mann-Salinas EA.

Abstract

BACKGROUND: En route care is the transfer of patients requiring combat casualty care within the US military evacuation system. No reports have been published about en route care of patients during transfer from a forward surgical facility (role 2) to a combat support hospital (role 3) for comprehensive care.

OBJECTIVE: To describe patients transferred from a role 2 to a role 3 US military treatment facility in Afghanistan.

METHODS: A retrospective review of data from the Joint Trauma System Role 2 Database was conducted. Patient characteristics were described by en route care medical attendants.

RESULTS: More than one-fourth of patients were intubated at transfer (26.9%), although at transfer fewer than 10% of patients had a base deficit of more than 5 (3.5%), a pH of less than 7.3 (5.2%), an international normalized ratio of more than 2 (0.8%), or temporary abdominal or chest closure (7.4%). The en route care medical attendant was most often a nurse (35.5%), followed by technicians (14.1%) and physicians (10.0%). Most patients (75.3%) were transported by medical evacuation (on rotary-wing aircraft).

CONCLUSION: This is the first comprehensive review of patients transported from a forward surgical facility to a more robust combat support hospital in Afghanistan. Understanding the epidemiology of these patients will inform provider training and the appropriate skill mix for the transfer of postsurgical patients within a combat setting.

PMID: 29606685 DOI: 10.4037/ccn2018532

Crit Care Nurse. 2018 Apr;38(2):69-75. doi: 10.4037/ccn2018853.

Resuscitative Endovascular Balloon Occlusion of the Aorta: A Bridge to Flight Survival.

Goforth C, Bradley M, Pineda B, See S, Pasley J.

Abstract Trauma endures as the leading cause of death worldwide, and most deaths occur in the first 24 hours after initial injury as a result of hemorrhage. Historically, about 90% of battlefield deaths occur before the injured person arrives at a theater hospital, and most are due to noncompressible hemorrhage of the torso. Resuscitative endovascular balloon occlusion of the aorta is an evolving technique to quickly place a balloon into the thoracic or abdominal aorta to efficiently block blood flow to distal circulation. Maneuvers, such as resuscitative endovascular balloon occlusion of the aorta, to control endovascular hemorrhage offer a potential intervention to control noncompressible hemorrhage. This technique can be performed percutaneously or open in prehospital environments to restore hemodynamic functions and serve as a survival bridge until the patient is delivered to a treatment facility for definitive surgical hemostasis. This article describes the indications, complications, and application of resuscitative endovascular balloon occlusion of the aorta to military and civilian aeromedical transport.

PMID: 29606678 DOI: 10.4037/ccn2018853

Crit Care Nurse. 2018 Apr;38(2):46-51. doi: 10.4037/ccn2018851.

Factors That Affect Pain Management in Aeromedical Evacuation: An Ethnographic Approach.

Hatzfeld J[1,2,3], Serres J[4,5,6], Dukes S[4,5,6].

Abstract

BACKGROUND: Pain management is a challenge in the transport setting, but actual factors that influence pain have not been assessed systematically.

OBJECTIVE: To describe the environmental factors and social context that affect pain management in military aeromedical evacuation.

METHODS: Field notes were taken throughout flight, including observational measures of pain, environmental factors, and interactions between the patient and crew. Data collection was completed on 8 missions and 16 patients; common themes were identified that should be considered in the management of pain in aeromedical evacuation.

RESULTS: Communication was a key problem primarily to aircraft noise, the reluctance of patients to speak with crew members while they were wearing headsets, and limited time to assess for pain and provide patient education. Seating and litters appeared to be uncomfortable for ambulatory and litter patients, and preparatory guidance on pain management did not address the stressors of flight or transportation phases. Another compounding factor was the psychological distress, particularly among those leaving a combat zone before the anticipated end of a deployment. Throughout the flight, the military culture of independence, stoicism, and camaraderie also was clearly evident.

CONCLUSIONS: Barriers to communication, comfort, and patient education are well known to transport nurses, but it is important to understand the overall effect they have on the management of pain. Developing solutions to address these factors should be a priority to ensure pain is adequately managed throughout transport.

PMID: 29606675 DOI: 10.4037/ccn2018851

Crit Care Nurse. 2018 Apr;38(2):30-36. doi: 10.4037/ccn2018993.

Pressure Injury Development in Patients Treated by Critical Care Air Transport Teams: A Case-Control Study.

Dukes SF, Maupin GM, Thomas ME, Mortimer DL

Abstract

BACKGROUND: The US Air Force transports critically ill patients from all over the world, with transport times commonly ranging from 6 to 11 hours. Few outcome measures have been tracked for these patients. Traditional methods to prevent pressure injuries in civilian hospitals are often not feasible in the military transport environment.

OBJECTIVES: The incidence rate and risk factors are described of en route-related pressure injuries for patients overseen by the Critical Care Air Transport Team.

METHODS: This retrospective, case-control, medical records review investigated risk factors for pressure injury in patients who developed a pressure injury after their transport flight compared with those with no documented pressure injuries.

RESULTS: The pressure injury rate was 4.9%. Between 2008 and 2012, 141 patients in whom pressure injuries developed and who had received care by the team were matched with 141 patients cared for by the team but did not have pressure injury. According to regression analysis, body mass index and 2 or more Critical Care Air Transport Team transports per patient were associated with pressure injury development.

CONCLUSION: Although the pressure injury rate of 4.9% in this cohort of patients is consistent with that reported by civilian critical care units, the rate must be interpreted with caution, because civilian study data frequently represent the entire intensive care unit length of stay. Targeted interventions for patients with increased body mass index and 2 or more critical care air transports per patient may help decrease the development of pressure injury in these patients.

PMID: 29606673 DOI: 10.4037/ccn2018993

Crit Care Nurse. 2018 Apr;38(2):18-29. doi: 10.4037/ccn2018700.

Critical Care Performance in a Simulated Military Aircraft Cabin Environment.

McNeill MM[1].

Abstract

BACKGROUND: Critical Care Air Transport Teams care for 5% to 10% of injured patients who are transported on military aircraft to definitive treatment facilities. Little is known about how the aeromedical evacuation environment affects care.

OBJECTIVES: To determine the effects of 2 stressors of flight, altitude-induced hypoxia and aircraft noise, and to examine the contributions of fatigue and clinical experience on cognitive and physiological performance of the Critical Care Air Transport Team.

METHODS: This repeated measures 2 × 2 × 4 factorial study included 60 military nurses. The participants completed a simulated patient care scenario under aircraft cabin noise and altitude conditions. Differences in cognitive and physiological performance were analyzed using repeated measures analysis of variance. A multiple regression model was developed to determine the independent contributions of fatigue and clinical experience.

RESULTS: Critical care scores ($P = .02$) and errors and omissions ($P = .047$) were negatively affected by noise. Noise was associated with increased respiratory rate ($P = .02$). Critical care scores ($P < .001$) and errors and omissions ($P = .002$) worsened with altitude-induced hypoxemia. Heart rate and respiratory rate increased with altitude-induced hypoxemia; oxygen saturation decreased ($P < .001$ for all 3 variables).

CONCLUSION: In a simulated military aircraft environment, the care of critically ill patients was significantly affected by noise and altitude-induced hypoxemia. The participants did not report much fatigue and experience did not play a role, contrary to most findings in the literature.

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Crit Care Nurse. 2018 Apr;38(2):e1-e6. doi: 10.4037/ccn2018630.

En Route Care Provided by US Navy Nurses in Iraq and Afghanistan.

Blackman VS, Walrath BD, Reeves LK, Mora AG, Maddry JK, Stockinger ZT.

Erratum in Corrections. [Crit Care Nurse. 2018]

Abstract

BACKGROUND: US Navy nurses provide en route care for critically injured combat casualties without having a formal program for training, utilization, or evaluation. Little is known about missions supported by Navy nurses.

OBJECTIVES: To characterize the number and types of patients transported and skill sets required by Navy nurses during 2 combat support deployments.

METHODS: All interfacility casualty transfers between 2 separate facilities in Iraq and Afghanistan were assessed. Number of patients treated, number transported, en route care provider type, transport priority level and duration, injury severity, indication for critical care transport, en route care interventions, and vital signs were evaluated.

RESULTS: Of 1550 casualties, 630 required medical evacuation to a higher level of care. Of those, 133 (21%) were transported by a Navy nurse, with 131 (98.5%) classified as "urgent," accounting for 46% of all urgent transports. The primary indication for en route care nursing was mechanical ventilation of intubated patients (97%). Mean (SD) patient transport time was 29.8 (7.9) minutes (range, 17-61 minutes). The most common en route care interventions were administration of intravenous sedation (80%), neuromuscular blockade (79%), and opioids (48%); transfusions (18%); and ventilation changes (11%). No intubations, cricothyroidotomies, chest tube placements, or needle decompressions were performed en route. No deaths occurred during transport.

CONCLUSIONS: US Navy nurses successfully transported critically injured patients without observed adverse events. Establishing en route care as a program of record in the Navy will facilitate continuous process improvement to ensure that future casualties receive optimized en route care.

PMID: 29606684 DOI: 10.4037/ccn2018630

Crit Care Nurse. 2018 Apr;38(2):38-45. doi: 10.4037/ccn2018223.

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