Committee on Surgical Combat Casualty Care (CoSCCC)

Journal Watch

2nd Quarter

FY 2024

Journal Watch Key Terminology Searched:

Microcirculation
Shock
Human subject research
Haemorrhagic shock
Traumatic brain injury
Plasma
Transfusion
RBCs
Stability
Blast
Amputation
Traumatic Clinical outcomes
Injury
Coagulopathy
Fibrinogen concentrate
Viscoelastic haemostatic assays
Guidelines
Fractures
REBOA
Orthopaedic trauma
Wound ballistics
Cause of injury
Damage Control Resuscitation
Tension pneumothorax
Blast Injury
Combat casualty care
Surgical skills
Novel Coronavirus
Predictions
Limb Salvage
Whole Blood
Trauma Management
Sublingual
IDF
Multiple trauma
Coagulopathy
Pre-hospital
Trauma
Resuscitation
Ultrasound
Facial trauma
Multiple
Clinical parameters
Pelvic fracture
Cryoprecipitate
Massive transfusion
Angiography
Internal fixation
X-ray
Antibiotic prophylaxis
Perioperative antibiotics
Faecal diversion
Head injuries
Battlefield Injury
Thoracotomy
Died of Wounds
Medical treatment facility
Emergency surgery
COVID-19
Vital Signs
Temporary Shunts
Walking Blood Bank
Haemorrhage
Ethics committees
Institutional review board
Shock index
Diagnostic accuracy
Thrombelastography (TEG)
Imaging
Severe trauma
Afghanistan
War
Transfusion
Damage control Surgery
Battlefield Trauma
Fibrinogen
ABO
External fixation
Pelvic ring
Pre-peritoneal pelvic packing
Long bone fractures
Surgical site infection
Primary repair
Poly-trauma
Prolonged field care
Military Medicine
Killed in Action
Mortality
Infection prevention
Hypocalcemia
Global Surgery
Ukraine

Trauma Surg Acute Care Open. 2024 Feb 21;9(1):e001302. doi: 10.1136/tsaco-2023-001302. eCollection 2024.

Developing the Ready Military Medical Force: military-specific training in Graduate Medical Education

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Abstract

Introduction: Graduate Medical Education plays a critical role in training the next generation of military physicians, ensuring they are ready to uphold the dual professional requirements inherent to being both a military officer and a military physician. This involves executing the operational duties as a commissioned leader while also providing exceptional medical care in austere environments and in harm's way. The purpose of this study is to review prior efforts at developing and implementing military unique curricula (MUC) in residency training programs.

Methods: We performed a literature search in PubMed (MEDLINE), Embase, Web of Science, and the Defense Technical Information Center through August 8, 2023, including terms "graduate medical education" and "military." We included articles if they specifically addressed military curricula in residency with terms including "residency and operational" or "readiness training", "military program", or "military curriculum".

Results: We identified 1455 articles based on title and abstract initially and fully reviewed 111. We determined that 64 articles met our inclusion criteria by describing the history or context of MUC, surveys supporting MUC, or military programs or curricula incorporated into residency training or military-specific residency programs.

Conclusion: We found that although there have been multiple attempts at establishing MUC across training programs, it is difficult to create a uniform curriculum that can be implemented to train residents to a single standard across services and specialties.

Keywords: graduate medical education.

BMJ Mil Health. 2024 Mar 20;170(2):146-149.doi: 10.1136/bmjmilitary-2021-002060.

Lessons from the use of telemedicine in the austere military environment and the implications for deployed surgical teams

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Abstract

Over the last 20 years, there have been significant changes in UK surgical training. Civilian surgical training may no longer prepare military surgeons for the range of skills they require on operations. One method to address gaps in knowledge or experience is to use telemedicine to facilitate specialist consultations from UK-based specialists to deployed medical teams. In the UK Defence Medical Services (DMS), this capability is called real-time clinical support (RTCS). RTCS provides a direct audio-visual link from a deployed location anywhere in the world to a supporting medical specialist in the UK. RTCS is currently delivered via a combination of off-the-shelf hardware and commercially available software. This article will outline the current use of RTCS, with emphasis on deployed surgical teams in austere environments, and discuss the advantages and limitations of this capability. However, it must be emphasised that no technology can be a substitute for clinical training and experience. Although several limitations remain, the authors believe that RTCS offers potential benefits for the DMS and could be an important tool aiding deployed clinicians. It can also be argued that by engaging with the concept now, the DMS can shape future developments in this sphere.

Keywords: SURGERY; Telemedicine; Trauma management; WOUND MANAGEMENT.

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Winds of war and military surgeon readiness: Commentary on 'Developing the Ready Military Medical Force: military-specific training in Graduate Medical Education'

Joshua Dilday [1], Matthew J Martin [2]

No abstract available

Keywords: Education, Medical; Multiple Trauma; War-Related Injuries.

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Management of non-compressible torso hemorrhage of the abdomen in civilian and military austere environments: a scoping review

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Abstract

Background: Non-compressible abdominal hemorrhage (NCAH) is the leading cause of potentially preventable deaths in both civilian and military austere environments, and an improvement in mortality due to this problem has not been demonstrated during the past quarter century. Several innovations have been developed to control hemorrhage closer to the point of injury.

Objective: This review assessed NCAH interventions in civilian and military settings, focusing on austere environments. It identified innovations, effectiveness, and knowledge gaps for future research.

Methodology: The Joanna Briggs Institute for Evidence Synthesis methodology guided this scoping review to completion. Studies evaluating NCAH with human participants in civilian and military austere environments that were eligible for inclusion were limited to English language studies published between December 1990 and January 2023. The PCC (Participant, Concept, Context) framework was used for data synthesis. Deductive and inductive thematic analyses were used to assess the literature that met inclusion criteria, identify patterns/themes to address the research questions and identify common themes within the literature. A stakeholder consultation was conducted to review and provide expert perspectives and opinions on the results of the deductive and inductive thematic analyses.

Results: The literature search identified 868 articles; 26 articles met the inclusion criteria. Textual narrative analysis of the 26 articles resulted in the literature addressing four main categories: NCAH, penetrating abdominal trauma, resuscitative endovascular balloon occlusion of the aorta (REBOA), and ResQFoam. The deductive thematic analysis aimed to answer three research questions. Research question 1 addressed the effectiveness of REBOA, damage control resuscitation, and damage control surgery in managing NCAH in austere environments. No effectiveness studies were found on this topic. Research question 2 identified three knowledge gaps in NCAH management in austere environments. The analysis identified early hemorrhage control, prehospital provider decision-making ability, and REBOA implementation as knowledge gaps in NCAH. Research question 3 identified five innovations that may affect the management of NCAH in the future: transport of patients, advanced resuscitative care, expert consultation, REBOA implementation, and self-expanding foam implementation. The inductive thematic analysis resulted in four recurrent themes from the literature: prehospital care, decision-making, hemorrhage control, and mortality in NCAH. During the stakeholders' consultation, the results of the deductive and inductive thematic analyses were reviewed and agreed on by the stakeholders. Special emphasis and discussion were given to prehospital management, expert opinions in the

prehospital environment, decision-making in the prehospital environment, transport and resuscitation in the prehospital setting, REBOA, alternative discussion for research, and research gaps.

Conclusion: NCAH is still a significant cause of preventable death in both military and civilian austere environments, even with ongoing research and interventions aimed at extending survival in such conditions. This scoping review has identified several potential concepts that could reduce the mortality associated with a preventable cause of death due to hemorrhage in austere environments.

Keywords: abdomen; hemorrhage; laparotomy.

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Use of Low-Titer O-Positive Whole Blood in Female Trauma Patients: A Literature Review, Qualitative Multidisciplinary Analysis of Risk/Benefit, and Guidelines for Its Use as a Universal Product in Hemorrhagic Shock

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Abstract

Background: Whole blood transfusion is associated with benefits including improved survival, coagulopathy, and decreased transfusion requirements. The majority of whole blood transfusion is in the form of low-titer O-positive whole blood (LTOWB). Practice at many trauma centers withholds the use of LTOWB in women of childbearing potential due to concerns of alloimmunization. The purpose of this article is to review the evidence for LTOWB transfusion in female trauma patients and generate guidelines for its application.

Study design: Literature and evidence for LTOWB transfusion in hemorrhagic shock are reviewed. The rates of alloimmunization and subsequent obstetrical outcomes are compared to the reported outcomes of LTOWB vs other resuscitation media. Literature regarding patient experiences and preferences in regards to the risk of alloimmunization is compared to current trauma practices.

Results: LTOWB has shown improved outcomes in both military and civilian settings. The overall risk of alloimmunization for Rhesus factor (Rh) - female patients in hemorrhagic shock exposed to Rh + blood is low (3% to 20%). Fetal outcomes in Rh-sensitized patients are excellent compared to historical standards, and treatment options continue to expand. The majority of female patients surveyed on the risk of alloimmunization favor receiving Rh + blood products to improve trauma outcomes. Obstetrical transfusion practices have incorporated LTOWB with excellent results.

Conclusions: The use of whole blood resuscitation in trauma is associated with benefits in the resuscitation of severely injured patients. The rate at which severely injured, Rh-negative patients develop anti-D antibodies is low. Treatments for alloimmunized pregnancies have advanced, with excellent results. Fears of alloimmunization in female patients are likely overstated and may not warrant the withholding of whole blood resuscitation. The benefits of whole blood resuscitation likely outweigh the risks of alloimmunization.

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Reflections on the US Withdrawal from Afghanistan: Insight into the Evolving Battlefield and the Need for Adaptive Responsiveness

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No abstract available

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Mortality in hypotensive combat casualties who require emergent laparotomy in the forward deployed environment

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Abstract

Introduction: Mortality rates among hypotensive civilian patients requiring emergent laparotomy exceed 40%. Damage control (DCR) principles were incorporated into the military's Clinical Practice Guidelines (CPG) in 2008. We examined combat casualties requiring emergent laparotomy to characterize how mortality rates compare to hypotensive civilian trauma patients.

Methods: The DoD Trauma Registry (2004-2020) was queried for adults who underwent combat laparotomy. Patients who were hypotensive were compared to normotensive patients. Mortality was the outcome of interest. Mortality rates before (2004-2007) and after (2009-2020) DCR CPG implementation were analyzed.

Results: 1051 patients were studied. Overall mortality was 6.5% for normotensive casualties and 28.7% for hypotensive casualties. Mortality decreased in normotensive patients but remained unchanged in hypotensive patients following the implementation of the DCR CPG.

Conclusion: Hypotensive combat casualties undergoing emergent laparotomy demonstrated a mortality rate of 29.5%. Despite many advances, mortality rates remain high in hypotensive patients requiring emergent laparotomy.

Keywords: Combat casualties; Emergency surgery; Global war on terror; Hemorrhagic shock; Hypotension; Laparotomy.

J Am Coll Surg. 2024 Apr 1;238(4):367-373. doi: 10.1097/XCS.0000000000000956. Epub 2024 Mar 15.

Impact of Prehospital Exsanguinating Airway-Breathing-Circulation Resuscitation Sequence on Patients with Severe Hemorrhage

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Abstract

Background: At the 2023 ATLS symposium, the priority of circulation was emphasized through the "x-airway-breathing-circulation (ABC)" sequence, where "x" stands for exsanguinating hemorrhage control. With growing evidence from military and civilian studies supporting an x-ABC approach to trauma care, a prehospital advanced resuscitative care (ARC) bundle emphasizing early transfusion was developed in our emergency medical services (EMS) system. We hypothesized that prioritization of prehospital x-ABC through ARC would reduce in-hospital mortality.

Study design: This was a single-year prospective analysis of patients with severe hemorrhage. These patients were combined with our institution's historic controls before prehospital blood implementation. Included were patients with systolic blood pressure (SBP) less than 90 mmHg. Excluded were patients with penetrating head trauma or prehospital cardiac arrest. Two-to-one propensity matching for x-ABC to ABC groups was conducted, and the primary outcome, in-hospital mortality, was compared between groups.

Results: A total of 93 patients (x-ABC = 62, ABC = 31) met the inclusion criteria. There was no difference in patient age, sex, initial SBP, initial Glasgow Coma Score, and initial shock index between groups. When compared with the ABC group, x-ABC patients had significant improvement in vitals at emergency department admission. Overall mortality was lower in the x-ABC group (13% vs 47%, $p < 0.001$). Multivariable regression revealed that prehospital circulation-first prioritization was independently associated with decreased in-hospital mortality (odds ratio 0.15, 95% CI 0.04 to 0.54, $p = 0.004$).

Conclusions: This is the first analysis to demonstrate a prehospital survival benefit of x-ABC in this subset of patient with severe injury and hemorrhagic shock. Standardization of prehospital x-ABC management in this patient population warrants special consideration.

Mil Med. 2024 Mar 30:usae123. doi: 10.1093/milmed/usae123. Online ahead of print.

Addressing Differences in Knowledge and Experience in Trauma Care Capabilities Among an International Team of Military Medical Care Providers in a Deployed Setting

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Abstract

Military medical personnel are crucial in providing life-saving care at the point of injury (POI) in challenging environments such as combat zones and disaster areas. This article examines the specialized training US Military medical personnel undergo before deployment and the increasing trend of deploying as part of multinational forces in operations like those in Afghanistan with NATO and non-NATO countries. Integrating medical teams from diverse backgrounds poses significant challenges in maintaining a cohesive and efficient team due to varying trauma management training standards and medical practices among the allied forces. Tactical Combat Casualty Care (TCCC) training and the development of clinical practice guidelines (CPG) by the US Joint Trauma Service have been key strategies by the US Military to standardize care. However, the variation in trauma management training among NATO allies and the differences in medical subspecialties and approaches can lead to inefficiencies and reduced effectiveness in a multinational trauma center setting. For instance, the approach to trauma care can significantly differ between the US and European countries, impacting the interoperability and teamwork in multinational medical teams. To address these challenges, the article highlights the importance of standardized medical training programs that include cultural awareness to enhance the effectiveness of multidisciplinary, multinational medical teams. It also underscores the necessity for standardized international trauma training in the face of increasing global conflicts and the potential for large-scale combat operations. The article discusses the "Trauma Tuesday" program implemented in Kabul, Afghanistan, as an example of how intensive training and simulation exercises can improve team dynamics, knowledge, and skills in trauma management among a diverse team from various nations. The need for ongoing education and developing a standard for managing trauma patients in international teams is emphasized to ensure effective communication and coordination. The article suggests that multinational trauma training can significantly improve team cohesion and critical life-saving skills, essential for future battlefields where access to definitive care may be delayed. Further research is recommended to explore the best methods for achieving effective multinational medical team integration and training standardization.