Committee on Surgical Combat Casualty Care (CoSCCC)

Journal Watch

1st Quarter

FY 2021

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
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
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

JAMA Surg

Tranexamic Acid During Prehospital Transport in Patients at Risk for Hemorrhage After Injury: A Double-blind, Placebo-Controlled, Randomized Clinical Trial

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Abstract

Importance: In-hospital administration of tranexamic acid after injury improves outcomes in patients at risk for hemorrhage. Data demonstrating the benefit and safety of the pragmatic use of tranexamic acid in the prehospital phase of care are lacking for these patients.

Objective: To assess the effectiveness and safety of tranexamic acid administered before hospitalization compared with placebo in injured patients at risk for hemorrhage.

Design, setting, and participants: This pragmatic, phase 3, multicenter, double-blind, placebo-controlled, superiority randomized clinical trial included injured patients with prehospital hypotension (systolic blood pressure ≤90 mm Hg) or tachycardia (heart rate ≥110/min) before arrival at 1 of 4 US level 1 trauma centers, within an estimated 2 hours of injury, from May 1, 2015, through October 31, 2019.

Interventions: Patients received 1 g of tranexamic acid before hospitalization (447 patients) or placebo (456 patients) infused for 10 minutes in 100 mL of saline. The randomization scheme used prehospital and in-hospital phase assignments, and patients administered tranexamic acid were allocated to abbreviated, standard, and repeat bolus dosing regimens on trauma center arrival.

Main outcomes and measures: The primary outcome was 30-day all-cause mortality.

Results: In all, 927 patients (mean [SD] age, 42 [18] years; 686 [74.0%] male) were eligible for prehospital enrollment (460 randomized to tranexamic acid intervention; 467 to placebo intervention). After exclusions, the intention-to-treat study cohort comprised 903 patients: 447 in the tranexamic acid

arm and 456 in the placebo arm. Mortality at 30 days was 8.1% in patients receiving tranexamic acid compared with 9.9% in patients receiving placebo (difference, -1.8%; 95% CI, -5.6% to 1.9%; P = .17). Results of Cox proportional hazards regression analysis, accounting for site, verified that randomization to tranexamic acid was not associated with a significant reduction in 30-day mortality (hazard ratio, 0.81; 95% CI, 0.59-1.11, P = .18). Prespecified dosing regimens and post-hoc subgroup analyses found that prehospital tranexamic acid were associated with significantly lower 30-day mortality. When comparing tranexamic acid effect stratified by time to treatment and qualifying shock severity in a post hoc comparison, 30-day mortality was lower when tranexamic acid was administered within 1 hour of injury (4.6% vs 7.6%; difference, -3.0%; 95% CI, -5.7% to -0.3%; P < .002). Patients with severe shock (systolic blood pressure ≤70 mm Hg) who received tranexamic acid demonstrated lower 30-day mortality compared with placebo (18.5% vs 35.5%; difference, -17%; 95% CI, -25.8% to -8.1%; P < .003).

Conclusions and relevance: In injured patients at risk for hemorrhage, tranexamic acid administered before hospitalization did not result in significantly lower 30-day mortality. The prehospital administration of tranexamic acid after injury did not result in a higher incidence of thrombotic complications or adverse events. Tranexamic acid given to injured patients at risk for hemorrhage in the prehospital setting is safe and associated with survival benefit in specific subgroups of patients.

Trial registration: ClinicalTrials.gov Identifier: NCT02086500.

Conflict of interest statement

Conflict of Interest Disclosures: Dr Guyette reported receiving grants from the US Department of Defense (DOD) during the conduct of the study. Dr Zenati reported receiving grants from the DOD during the conduct of the study and grants from the National Institutes of Health (NIH) and the DOD outside the submitted work. Dr Adams reported receiving grants from the DOD during the conduct of the study. Dr Callaway reported receiving grants from the DOD to the University of Pittsburgh during the conduct of the study and grants from the NIH outside the submitted work. Dr Neal reported receiving grants from the DOD, National Institute of General Medical Sciences, and the National Heart, Lung, and Blood Institute during the conduct of the study and grants and personal fees from Janssen Pharmaceuticals and Haemonetics, grants from Instrumentation Laboratories, funding from Haima Therapeutics, and personal fees from CSL Behring outside the submitted work. Dr Sperry reported receiving grants from the DOD during the conduct of the study and outside the submitted work. No other disclosures were reported.

Sensors (Basel)

Wearable Sensors Incorporating Compensatory Reserve Measurement for Advancing Physiological Monitoring in Critically Injured Trauma Patients

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Abstract

Vital signs historically served as the primary method to triage patients and resources for trauma and emergency care, but have failed to provide clinically-meaningful predictive information about patient clinical status. In this review, a framework is presented that focuses on potential wearable sensor technologies that can harness necessary electronic physiological signal integration with a current state-of-the-art predictive machine-learning algorithm that provides early clinical assessment of hypovolemia status to impact patient outcome. The ability to study the physiology of hemorrhage using a human model of progressive central hypovolemia led to the development of a novel machine-learning algorithm known as the compensatory reserve measurement (CRM). Greater sensitivity, specificity, and diagnostic accuracy to detect hemorrhage and onset of decompensated shock has been demonstrated by the CRM when compared to all standard vital signs and hemodynamic variables. The development of CRM revealed that continuous measurements of changes in arterial waveform features represented the most integrated signal of physiological compensation for conditions of reduced systemic oxygen delivery. In this review, detailed analysis of sensor technologies that include photoplethysmography, tonometry, ultrasound-based blood pressure, and cardiogenic vibration are identified as potential candidates for harnessing arterial waveform analog features required for real-time calculation of CRM. The integration of wearable sensors with the CRM algorithm provides a potentially powerful medical monitoring advancement to save civilian and military lives in emergency medical settings.

Keywords: compensatory reserve; medical monitoring; physiology; vital signs; wearable sensors.

Conflict of interest statement The authors declare no conflict of interest.

Mil Med

Facing COVID-19: Early Recognition and Triage Tool for Medical Treatment Facilities With Limited Resources

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- PMCID: PMC7665611
- DOI: 10.1093/milmed/usaa296

Abstract

Introduction: Coronavirus Disease 2019 (COVID-19) is spreading all over the world. Health systems around the globe have to deal with decreased capabilities and exhausted resources because of the surge of patients. The need to identify COVID-19 patients to achieve a timely opportunity to treat and isolate them is an ongoing challenge for health care professionals everywhere. A lack of testing capabilities forces clinicians to make the crucial initial decision on the basis of clinical findings and routine diagnostic laboratory test. This article reviews the current literature and presents a new adapted protocol for diagnosing and triaging COVID-19 patients. A special emphasis lies on the stepwise approach guiding the medical provider to a triage decision that is suitable for the individual patient and the situation of the local medical treatment facility.

Materials and methods: On March 30, 2020, a PubMed based literature research on COVID-19 following the preferred reporting items for systematic reviews and meta-analyses guidelines was performed. A diagnostic and triage tool for COVID-19 was designed based on the major findings in the reviewed literature.

Results: After a selection process, focusing on the topics "epidemiology," "clinical characteristics," and "diagnostic tools," 119 out of a total amount of 1,241 publications were selected to get an overview of the growing evidence.

Conclusions: The designed Early Recognition and Triage Tool enables the medical provider to use the applicable modules of the protocol for capabilities of the local setting to get the most appropriate diagnostic and triage done. The tool should give guidance for the initial approach until specific testing for the COVID-19 virus is available.

Mil Med

Adding the Capacity for an Intensive Care Unit Dedicated to COVID 19, Preserving the Operational Capability of a French Golden Hour Offset Surgical Team in Sahel

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- DOI: 10.1093/milmed/usaa273

Abstract

Introduction: In April 2020, the military medical planning needs to be recalibrated to support the COVID-19 crisis during a large-scale combat operation carried out by the French army in Sahel.

Material and methods: Since 2019, proper positioning of Forward Surgical Teams (FSTs) has been imperative in peer-to-near-peer conflict and led to the development of a far-forward surgical asset: The Golden Hour Offset Surgical Team (GHOST). Dedicated to damage control surgery close to combat, GHOST made the FST aero-mobile again, with a light logistical footprint and a fast setting. On 19 and 25 March 2020, Niger and Mali confirmed their first COVID-19 cases, respectively. The pandemic was ongoing in Sahel, where 5,100 French soldiers were deployed in the Barkhane Operation.

Results: For the first time, the FST had to provide, continuously, both COVID critical care and surgical support to the ongoing operation in Liptako. Its deployment on a Main Operating Base had to be rethought on Niamey, to face the COVID crisis and support ongoing operations. This far-forward surgical asset, embedded with a doctrinal Role-1, sat up a 4-bed COVID intensive care unit while maintaining a casualty surgical care capacity. A COVID training package has been developed to prepare the FST for this innovative employment. This far-forward surgical asset was designed to support a COVID-19 intensive care unit before evacuation, preserving forward surgical capability for battalion combat teams.

Conclusion: Far-forward surgical assets like GHOST have demonstrated their mobility and effectiveness in a casualty care system and could be adapted as critical care facilities to respond to the COVID crisis in wartime.

Int Orthop

War surgery in Afghanistan: a model for mass causalities in terror attacks?

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- **DOI: 10.1007/s00264-020-04797-2**

Abstract

Purpose: The aim of the study was to identify solution strategies from a non-governmental (NGO) hospital in a war region for violence-related injuries and to show how high-income countries (HIC) might benefit from this expertise.

Methods: NGO trauma hospital in Lashkar Gah, Afghanistan. Four hundred eighty-four war victims admitted in a three month period (February 2016-May 2016) were included. Patients´ characteristics were analyzed.

Results: The mean age was 23.5 years. Four hundred thirty-four (89.9%) were male, and 50 (10.1%) were female. The most common cause of injury was bullet injuries, shell injuries, and mine injuries. The most common injured body region was the lower extremity, upper extremity, and the chest or the face. Apart from surgical wound care and debridement's, which were performed on every wound in the operation theatre, laparotomy was the most common surgical procedure, followed by installation of a chest drainage and amputation.

Conclusion: The surgical expertise and clear pathways outweigh modern infrastructure. In case of a mass casualty incident, fast decision-making with basic diagnostic means in order to take rapid measurements for life-saving therapies could make the difference.

Keywords: Low-income country; Trauma surgery; War surgery.

Conflict of interest statement: Nothing to declare.