References


Clarke J, Davis P: Medical evacuation and triage of combat casualties in Helmand Province, Afghanistan: October 2010-April 2011. Mil Med 2012;177:1261-1266


Konkle B: Acquired disorders of platelet function. Hematology 2012;391-396


Abstracts


Education and experience of Army flight medics in Iraq and Afghanistan.

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OBJECTIVE: Adequate training levels and an appropriate amount of continuing education for Army flight medics (AFM) is a highly contested topic. We sought to obtain a cross-section of the education, experience, and time spent by flight medics on patient care before and in between deployments. We also sought the opinions of AFM regarding training, transport staffing, and medical oversight.

METHODS: This was a prospective survey study administered electronically via SurveyMonkey.com to AFM deployed or recently deployed. This study was conducted under a protocol reviewed and approved by the U.S. Army Medical Research and Materiel Command Institutional Review Board, and in accordance with the approved protocol.

RESULTS: Of the 53 AFM that participated, 57% stated they spend less than 10 h/moon patient care and 28% reported getting no exposure to patients at all when not deployed. A majority (85%) felt that training to the paramedic level was optimal for their mission. Regarding time between deployments, 77% disagreed that they spent enough time on patient care and 96% agreed they would benefit from medical rotations. Almost half agreed they had been in situations while deployed they felt unprepared for medically.

DISCUSSION: Results from this study seem to indicate AFM feel their training and patient contact is too limited prior to and in between deployments. These findings support a need for the reassessment of initial and ongoing training standards for AFM in order to best take care of our sick and wounded service members.
ABSTRACT: Treatment of combined traumatic brain injury and hypovolemic shock poses a particular challenge due to the possible conflicting consequences. While restoring diminished volume is the treatment goal for hypovolemia, maintaining and adequate cerebral perfusion pressure and avoidance of secondary damage remain a treatment goal for the injured brain. Various treatment modalities have been proposed, but the optimal resuscitation fluid and goals have not yet been clearly defined. In this study, we investigate the physiological and neurological outcomes in a rat model of combined traumatic brain injury and hypovolemic shock, submitted to treatment with varying amounts of fresh blood. Forty-eight male Lewis rats were divided into control and treatment groups. Traumatic brain injury was inflicted by a free-falling rod on the exposed cranium. Hypovolemia was induced by controlled hemorrhage of 30% blood volume. Treatment groups were treated by fresh whole blood with varying volumes, reaching resuscitation goals of a mean arterial blood pressure (MAP) of 80, 100, and 120 mmHg at 15 min. Mean arterial blood pressure was assessed at 60 min and neurological outcomes and mortality in the subsequent 48 h. At 60 min, MAP was highest for the group resuscitated most aggressively. Neurological outcomes and mortality inversely correlated with the aggressiveness of resuscitation. In this study, we find that mild resuscitation with goals of restoring MAP to 80 mmHg (which is lower than baseline) provided best results when considering hemodynamic stability, survival, and neurological outcomes. An aggressive resuscitation may be detrimental, inducing processes that eventually cause a significant decrease in survival.
Battlefield Trauma care then and now: A Decade of Tactical Combat Casualty Care.

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**Introduction**: Maughon noted in 1970 that very little had changed with the respect to the management of casualties on the battlefield in the last 100 years. In the mid-1990’s however, a Special Operations medical research effort developed a new concept for battlefield trauma care called Tactical Combat Casualty Care (TCCC). Thought the combined effort of the U.S. Special Operations Command, the Naval Operational Medicine Institute, the service combat medical schoolhouses, the U.S. Army Institute of Surgical Research, the Joint Trauma System, the U.S. Central Command, the Office of the Surgeon General of the Army, the Prehospital Trauma Life Support Executive Council, and the Defense Health Board, TCCC has now become the standard of care for managing casualties in the prehospital combat environment.

**Discussion**: The decade of war that the United States and its coalition partners have just experienced has seen the introduction of a remarkable array of innovations designed to improve battlefield trauma care. The coordination required to introduce these advances to the military services has been provided largely through the efforts of the Committee on Tactical Combat Casualty Care (CoTCCC). The CoTCCC is a tri-service committee that includes combat medics, corpsmen, and pararescuemen as well as civilian trauma experts. It functions as a working group of the Trauma and Injury Subcommittee of the Defense Health Board.

**Conclusion**: The success of TCCC at reducing preventable deaths in combat has been unprecedented. The incidence of preventable deaths among U.S. combat fatalities has been documented to be approximately one in four. Groups that have trained all unit members in TCCC have dramatically reduced the incidence of preventable deaths and TCCC is now used throughout the U.S. military and by many coalition partner nations.
Medical evacuation and triage of combat casualties in Helmand Province, Afghanistan: October 2010-April 2011.

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Medical evacuation of combat casualties in Operation Enduring Freedom-Afghanistan is achieved primarily by helicopter, because of distances involved as well as ground-based threats. In Helmand Province, evacuation from the point of injury may occur on a variety of helicopter evacuation platforms with disparate levels of attendant medical expertise. Furthermore, triage to a medical treatment facility may involve varying echelons of care before definitive management. Consequently, considerable differences in medical care may be encountered between point of injury and definitive treatment. We discuss the role of helicopter-based medical evacuation in Helmand, Afghanistan, as well as triage and timelines to the most appropriate medical facilities. Based on our experience and available evidence, we have made recommendations to regional commanders which favor the utilization of prehospital critical care teams aboard helicopter-based evacuation platforms and direct triage to the highest echelon of care available when feasible.
Low-volume resuscitation for severe intra-operative hemorrhage: a step in the right direction.


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The impact on outcomes resulting from crystalloids used with hemostatic close ratio resuscitation (HCRR) in intra-operative hemorrhage (IOH) has not been analyzed. We hypothesize a survival advantage in patients with IOH managed with a low-volume resuscitation (LVR) protocol during HCRR. A 4-year case-control study was conducted to determine the impact on mortality of LVR versus conventional resuscitation efforts (CRE) during HCRR. A total of 45 patients managed with a HCRR + LVR protocol (combination Hextend® and 3% hypertonic saline) and 55 historical cohorts managed with HCRR + CRE (lactated Ringer's) were included. Patient demographics, number of intra-operative units of packed red blood cells (PRBCs) and fresh-frozen plasma (FFP) received, and FFP:PRBC ratio were similar between groups. The mean intra-operative fluid volume was 0.76 L in the HCRR + LVR group versus 4.7 L in the HCRR + CRE group (P = 0.003). In a linear regression model HCRR + LVR versus HCRR + CRE, mean trauma intensive care unit length of stay was 6 versus 11 days (P = 0.009); 30-day overall mortality was 11.1 versus 32.7 per cent (P = 0.009); peri-operative mortality was 2.2 to 10.9 per cent (P = 0.13); and intensive care unit mortality 8.8 to 21.8 per cent (P = 0.07). LVR protocol conveyed a survival benefit to patients undergoing HCRR (odds ratio for mortality, 0.07 [95% confidence interval 0.07-0.54]). This is the first civilian study to analyze the impact of LVR in patients managed with HCRR during IOH. Patients with IOH managed with HCRR and a predefined LVR protocol with Hextend® and 3 per cent hypertonic saline had an overall survival advantage and shorter trauma intensive care unit length of stay. LVR can be an effective alternative to CRE when used in combination with HCRR in patients with IOH.
Restrictive fluid resuscitation in combination with damage control resuscitation: time for adaptation.


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BACKGROUND: Damage control resuscitation (DCR) conveys a survival advantage in patients with severe hemorrhage. The role of restrictive fluid resuscitation (RFR) when used in combination with DCR has not been elucidated. We hypothesize that RFR, when used with DCR, conveys an overall survival benefit for patients with severe hemorrhage.

METHODS: This is a retrospective analysis from January 2007 to May 2011 at a Level I trauma center. Inclusion criteria included penetrating torso injuries, systolic blood pressure less than or equal to 90 mm Hg, and managed with DCR and damage control surgery (DCS). There were two groups according to the quantity of fluid before DCS: (1) standard fluid resuscitation (SFR) greater than or equal to 150 mL of crystalloid; (2) RFR less than 150 mL of crystalloid. Demographics and outcomes were analyzed.

RESULTS: Three hundred seven patients were included. Before DCS, 132 (43%) received less than 150 mL of crystalloids, grouped under RFR; and 175 (57%) received greater than or equal to 150 mL of crystalloid, grouped under SFR. Demographics and initial clinical characteristics were similar between the study groups. Compared with the SFR group, RFR patients received less fluid pre-operatively (129 mL vs. 2,757 mL; p < 0.001), exhibited a lower intra-operative mortality (9% vs. 32%; p < 0.001), and had a shorter hospital length of stay (13 vs. 18 days; p = 0.02). Patients in the SFR group had a lower trauma intensive care unit mortality (5 vs. 12%; p = 0.03) but exhibited a higher overall mortality. Patients receiving RFR demonstrated a survival benefit, with an odds ratio for mortality of 0.69 (95% confidence interval, 0.37-0.91).

CONCLUSION: To the best of our knowledge, this is the first civilian study that analyzes the impact of RFR in patients managed with DCR. Its use in conjunction with DCR for hypotensive trauma patients with penetrating injuries to the torso conveys an overall and early intra-operative survival benefit.

LEVEL OF EVIDENCE: Therapeutic study, level IV.


BACKGROUND: Critical evaluation of all aspects of combat casualty care, including mortality, with a special focus on the incidence and causes of potentially preventable deaths among US combat fatalities, is central to identifying gaps in knowledge, training, equipment, and execution of battlefield trauma care. The impetus to produce this analysis was to develop a comprehensive perspective of battlefield death, concentrating on deaths that occurred in the pre-medical treatment facility (pre-MTF) environment.

METHODS: The Armed Forces Medical Examiner Service Mortality Surveillance Division was used to identify Operation Iraqi Freedom and Operation Enduring Freedom combat casualties from October 2001 to June 2011 who died from injury in the deployed environment. The autopsy records, peri-mortem records, photographs on file, and Mortality Trauma Registry of the Armed Forces Medical Examiner Service were used to compile mechanism of injury, cause of injury, medical intervention performed, Abbreviated Injury Scale (AIS) score, and Injury Severity Score (ISS) on all lethal injuries. All data were used by the expert panel for the conduct of the potential for injury survivability assessment of this study.

RESULTS: For the study interval between October 2001 and June 2011, 4,596 battlefield fatalities were reviewed and analyzed. The stratification of mortality demonstrated that 87.3% of all injury mortality occurred in the pre-MTF environment. Of the pre-MTF deaths, 75.7% (n = 3,040) were classified as non-survivable, and 24.3% (n = 976) were deemed potentially survivable (PS). The injury/physiologic focus of PS acute mortality was largely associated with hemorrhage (90.9%). The site of lethal hemorrhage was truncal (67.3%), followed by junctional (19.2%) and peripheral-extremity (13.5%) hemorrhage.

CONCLUSION: Most battlefield casualties died of their injuries before ever reaching a surgeon. As most pre-MTF deaths are non-survivable, mitigation strategies to impact outcomes in this population need to be directed toward injury prevention. To significantly impact the outcome of combat casualties with PS injury, strategies must be developed to mitigate hemorrhage and optimize airway management or reduce the time interval between the battlefield point of injury and surgical intervention. Understanding battlefield mortality is a vital component of the military trauma system. Emphasis on this analysis should be placed on trauma system optimization, evidence-based improvements in Tactical Combat Casualty Care guidelines, data-driven research, and development to remediate gaps in care and relevant training and equipment enhancements that will increase the survivability of the fighting force.
The Effect of Ketamine on Intraocular Pressure in Pediatric Patients During Procedural Sedation.

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ABSTRACT:

Objectives: Ketamine is one of the most commonly used procedural sedation and analgesia (PSA) agents in pediatric emergency departments (PEDs). It is considered a very safe and reliable agent, with limited respiratory suppression, hemodynamic effects, and adverse outcomes. However, physicians are often reluctant to use ketamine for patients with eye injuries due to a concern that ketamine might increase intraocular pressure (IOP). The objective was to measure IOP in previously healthy children receiving ketamine for PSA for a reason other than eye injury.

Methods: This was a prospective non-inferiority study of patients seen in an academic tertiary care children's hospital emergency department (ED) who required ketamine for PSA. The authors measured IOP in the right eye as soon as possible after ketamine had been administered and then at 2.5, 5, and 10 minutes after ketamine had been administered.

Results: Eighty patients were enrolled (28 between 1 and 5 years of age, 26 between 6 and 10 years, 26 between 11 and 15 years); 49 (61%) were male. Procedures requiring PSA included fracture/dislocation reduction (63%), abscess incision and drainage (16%), laceration repair (11%), dental abscess incision and drainage (6%), and other (4%). The mean total ketamine dosage was 1.6 mg/kg (95% confidence interval [CI] = 1.4 to 1.7). The mean initial IOP was 17.5 mm Hg (95% CI = 16.4 to 18.6 mm Hg) and at 2.5 minutes was 18.9 mm Hg (95% CI = 17.9 to 19.9 mm Hg). The mean difference was 1.4 mm Hg (95% CI = 0.4 to 2.4 mm Hg). Using a non-inferiority margin of 2.6 mm Hg (15%), non-inferiority (no significant elevation in IOP) was demonstrated with 95% confidence between the first and second readings.

Conclusions: Ketamine does not significantly increase IOP in pediatric patients without eye injuries receiving typical PSA dosages in the PED. Further study should assess its safety in patients with ocular injury.

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The Prospective, Observational, Multicenter, Major Trauma Transfusion (PROMMTT) Study: Comparative Effectiveness of a Time-Varying Treatment With Competing Risks.


OBJECTIVE To relate in-hospital mortality to early transfusion of plasma and/or platelets and to time-varying plasma:red blood cell (RBC) and platelet:RBC ratios.

DESIGN Prospective cohort study documenting the timing of transfusions during active resuscitation and patient outcomes. Data were analyzed using time-dependent proportional hazards models.

SETTING Ten US level I trauma centers. PATIENTS Adult trauma patients surviving for 30 minutes after admission who received a transfusion of at least 1 unit of RBCs within 6 hours of admission (n = 1245, the original study group) and at least 3 total units (of RBCs, plasma, or platelets) within 24 hours (n = 905, the analysis group).

MAIN OUTCOME MEASURE: In-hospital mortality.

RESULTS Plasma:RBC and platelet:RBC ratios were not constant during the first 24 hours (P < .001 for both). In a multivariable time-dependent Cox model, increased ratios of plasma:RBCs (adjusted hazard ratio = 0.31; 95% CI, 0.16-0.58) and platelets:RBCs (adjusted hazard ratio = 0.55; 95% CI, 0.31-0.98) were independently associated with decreased 6-hour mortality, when hemorrhagic death predominated. In the first 6 hours, patients with ratios less than 1:2 were 3 to 4 times more likely to die than patients with ratios of 1:1 or higher. After 24 hours, plasma and platelet ratios were unassociated with mortality, when competing risks from non-hemorrhagic causes prevailed.

CONCLUSIONS Higher plasma and platelet ratios early in resuscitation were associated with decreased mortality in patients who received transfusions of at least 3 units of blood products during the first 24 hours after admission. Among survivors at 24 hours, the subsequent risk of death by day 30 was not associated with plasma or platelet ratios.
Radiologic evaluation of alternative sites for needle decompression of tension pneumothorax.


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OBJECTIVE: To compare the distance to be traversed during needle thoracostomy decompression performed at the second intercostal space (ICS) in the mid-clavicular line (MCL) with the fifth ICS in the anterior axillary line (AAL).

DESIGN: Patients were separated into body mass index (BMI) quartiles, with BMI calculated as weight in kilograms divided by height in meters squared. From each BMI quartile, 30 patients were randomly chosen for inclusion in the study on the basis of a priori power analysis (n = 120). Chest wall thickness on computed tomography at the second ICS in the MCL was compared with the fifth ICS in the AAL on both the right and left sides through all BMI quartiles.

SETTING: Level I trauma center.

PATIENTS: Injured patients aged 16 years or older evaluated from January 1, 2009, to January 1, 2010, undergoing computed tomography of the chest.

RESULTS: A total of 680 patients met the study inclusion criteria (81.5% were male and mean age was 41 years [range, 16-97 years]). Of the injuries sustained, 13.2% were penetrating, mean (SD) Injury Severity Score was 15.5 (10.3), and mean BMI was 27.9 (5.9) (range, 15.4-60.7). The mean difference in chest wall thickness between the second ICS at the MCL and the fifth ICS at the AAL was 12.9 mm (95% CI, 11.0-14.8; P < .001) on the right and 13.4 mm (95% CI, 11.4- 5.3; P < .001) on the left. There was a stepwise increase in chest wall thickness across all BMI quartiles at each location of measurement. There was a significant difference in chest wall thickness between the second ICS at the MCL and the fifth ICS at the AAL in all quartiles on both the right and the left. The percentage of patients with chest wall thickness greater than the standard 5-cm decompression needle was 42.5% at the second ICS in the MCL and only 16.7% at the fifth ICS in the AAL.

CONCLUSIONS: In this computed tomography-based analysis of chest wall thickness, needle thoracostomy decompression would be expected to fail in 42.5% of cases at the second ICS in the MCL compared with 16.7% at the fifth ICS in the AAL. The chest wall thickness at the fifth ICS AAL was 1.3 cm thinner on average and may be a preferred location for needle thoracostomy decompression.
Acquired disorders of platelet function.

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Platelet dysfunction is commonly acquired due to medications, procedures, medical conditions, and underlying hematologic disease. These issues are presented, the data reviewed, and recommendations given herein. Many medications and dietary supplements have platelet-inhibitory effects in vitro, although the clinical effects on bleeding risks are unclear for many. Platelet-inhibitory drugs are key in the treatment of vascular disease. Data are available to aid in the management of these medications to prevent hemorrhagic complications. Bleeding in patients with renal failure has decreased with improved dialysis and the use of erythropoietin, but remains a challenge. Platelet dysfunction accompanies cardiac valvular disease and use of cardiopulmonary bypass (CPB) and extracorporeal membrane oxygenation. Hematologic disorders including myeloproliferative disorders (MPDs), myelodysplasia, paraproteinemias, and immune thrombocytopenia (ITP) can also be associated with hemorrhagic complications due to platelet dysfunction. Knowledge of which factors affect bleeding risk and how to treat individuals with acquired platelet dysfunction are important in optimizing patient care.
OBJECTIVE: To evaluate battlefield survival in a novel command-directed casualty response system that comprehensively integrates Tactical Combat Casualty Care guidelines and a pre-hospital trauma registry.

DESIGN: Analysis of battle injury data collected during combat deployments.


PATIENTS: Casualties from the 75th Ranger Regiment, US Army Special Operations Command.

MAIN OUTCOME MEASURES: Casualties were scrutinized for preventable adverse outcomes and opportunities to improve care. Comparisons were made with Department of Defense casualty data for the military as a whole.

RESULTS: A total of 419 battle injury casualties were incurred during 7 years of continuous combat in Iraq and 8.5 years in Afghanistan. Despite higher casualty severity indicated by return-to-duty rates, the regiment's rates of 10.7% killed in action and 1.7% who died of wounds were lower than the Department of Defense rates of 16.4% and 5.8%, respectively, for the larger US military population (P =.04 and P = .02, respectively). Of 32 fatalities incurred by the regiment, none died of wounds from infection, none were potentially survivable through additional prehospital medical intervention, and 1 was potentially survivable in the hospital setting. Substantial pre-hospital care was provided by nonmedical personnel.

CONCLUSIONS: A command-directed casualty response system that trains all personnel in Tactical Combat Casualty Care and receives continuous feedback from prehospital trauma registry data facilitated Tactical Combat Casualty Care performance improvements centered on clinical outcomes that resulted in unprecedented reduction of killed-in-action deaths, casualties who died of wounds, and preventable combat death. This data-driven approach is the model for improving prehospital trauma care and casualty outcomes on the battlefield and has considerable implications for civilian trauma systems.
Hydroxyethyl starch or saline for fluid resuscitation in intensive care.


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BACKGROUND: The safety and efficacy of hydroxyethyl starch (HES) for fluid resuscitation have not been fully evaluated, and adverse effects of HES on survival and renal function have been reported.

METHODS: We randomly assigned 7000 patients who had been admitted to an intensive care unit (ICU) in a 1:1 ratio to receive either 6% HES with a molecular weight of 130 kD and a molar substitution ratio of 0.4 (130/0.4, Voluven) in 0.9% sodium chloride or 0.9% sodium chloride (saline) for all fluid resuscitation until ICU discharge, death, or 90 days after randomization. The primary outcome was death within 90 days. Secondary outcomes included acute kidney injury and failure and treatment with renal-replacement therapy.

RESULTS: A total of 597 of 3315 patients (18.0%) in the HES group and 566 of 3336 (17.0%) in the saline group died (relative risk in the HES group, 1.06; 95% confidence interval [CI], 0.96 to 1.18; P=0.26). There was no significant difference in mortality in six predefined subgroups. Renal-replacement therapy was used in 235 of 3352 patients (7.0%) in the HES group and 196 of 3375 (5.8%) in the saline group (relative risk, 1.21; 95% CI, 1.00 to 1.45; P=0.04). In the HES and saline groups, renal injury occurred in 34.6% and 38.0% of patients, respectively (P=0.005), and renal failure occurred in 10.4% and 9.2% of patients, respectively (P=0.12). HES was associated with significantly more adverse events (5.3% vs. 2.8%, P<0.001).

CONCLUSIONS: In patients in the ICU, there was no significant difference in 90-day mortality between patients resuscitated with 6% HES (130/0.4) or saline. However, more patients who received resuscitation with HES were treated with renal-replacement therapy. (Funded by the National Health and Medical Research Council of Australia and others; CHEST ClinicalTrials.gov number, NCT00935168.).
Effect of tranexamic acid on mortality in patients with traumatic bleeding: prespecified analysis of data from randomised controlled trial.


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OBJECTIVES: To examine whether the effect of tranexamic acid on the risk of death and thrombotic events in patients with traumatic bleeding varies according to baseline risk of death. To assess the extent to which current protocols for treatment with tranexamic acid maximize benefits to patients.

DESIGN: Pre-specified stratified analysis of data from an international multicentre randomized controlled trial (the CRASH-2 trial) with an estimation of the proportion of premature deaths that could potentially be averted through the administration of tranexamic acid.

PARTICIPANTS: 13,273 trauma patients in the CRASH-2 trial who were treated with tranexamic acid or placebo within three hours of injury and trauma patients enrolled in UK Trauma and Audit Research Network, stratified by risk of death at baseline (<6%, 6-20%, 21-50%, >50%).

INTERVENTION: Tranexamic acid (1 g over 10 minutes followed by 1 g over eight hours) or matching placebo.

MAIN OUTCOME MEASURE: Odds ratios and 95% confidence intervals for death in hospital within four weeks of injury, deaths from bleeding, and fatal and non-fatal thrombotic events associated with the use of tranexamic acid according to baseline risk of death. Unless there was strong evidence against the null hypothesis of homogeneity of effects (P<0.001), the overall odds ratio was used as the most reliable guide to the odds ratios in all strata.

RESULTS: Tranexamic acid was associated with a significant reduction in all cause mortality and deaths from bleeding. In each stratum of baseline risk, there were fewer deaths among patients treated with tranexamic acid. There was no evidence of heterogeneity in the effect of tranexamic acid on all cause mortality (P=0.96 for interaction) or deaths from bleeding (P=0.98) by baseline risk of death. In those treated with tranexamic acid there was a significant reduction in the odds of fatal and non-fatal thrombotic events (odds ratio 0.69, 95% confidence interval 0.53 to 0.89; P=0.005) and a significant reduction in arterial thrombotic events (0.58, 0.40 to 0.83; P=0.003) but no significant reduction in venous thrombotic events (0.83, 0.59 to 1.17; P=0.295). There was no evidence of heterogeneity in the effect of tranexamic acid on the risk of thrombotic events (P=0.74). If the effect of tranexamic acid is assumed to be the same in all risk strata (<6%, 6-20%, 21-50%, >50% risk of death at baseline), the percentage of deaths that could be averted by administration of tranexamic acid within three hours of injury in each group is 17%, 36%, 30%, and 17%, respectively.

CONCLUSIONS: Tranexamic acid can be administered safely to a wide spectrum of patients with traumatic bleeding and should not be restricted to the most severely injured.

TRIAL REGISTRATION: ISRCTN86750102.
Effect of hetastarch bolus in trauma patients requiring emergency surgery.

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If blood products are not available, current military guidelines recommend a hetastarch bolus (HEX, Hextend 6% hetastarch in lactated electrolyte buffer, www.hospira.com) for initial treatment of hypovolemic shock in the field. We previously reported that a HEX bolus plus standard of care (SOC = crystalloid plus blood products) was safe during initial resuscitation in 1714 trauma patients. This study tests the hypothesis that HEX+SOC is more effective than SOC alone for volume expansion in trauma patients requiring urgent operation. Methods: From July 2009 to August 2010, the records from all adults who required emergency surgery within 4 hours of admission were screened for a retrospective cohort observational study. Burns, and those with primary neurosurgical or orthopedic indications, were excluded. The study population was comprised of 281 patients with blunt (n = 72) or penetrating (n = 209) trauma; 141 received SOC and 140 received SOC+HEX in the emergency room only (ER, n = 81) or the ER and operating room (OR, n = 59). Each case was reviewed with waiver of consent.

Results: After penetrating injury, with SOC, the injury severity score was 17 and mortality was 12%; the corresponding values in the HEX(ER) and HEX(OR) groups were 19?21 and 8%, but these apparent differences did not reach significance. However, in patients receiving HEX, initial heart rate was higher, base deficit was lower, and hematocrit was lower (consistent with relative hypovolemia), even though blood product requirements were reduced, and urine output was greater (all p < 0.05). These effects were absent in patients with blunt trauma. Platelet consumption was higher with HEX after either penetrating (p = 0.004) or blunt trauma (p = 0.045), but coagulation tests were unchanged. Conclusion: HEX is safe for initial resuscitation in young patients who required urgent operation after penetrating trauma, but there was no apparent effect after blunt trauma. A bolus of HEX reduced transfusion requirements without inducing coagulopathy or causing renal dysfunction, but a randomized controlled trial is necessary to eliminate the possibility of selection bias.

The death of another sacred cow: comment on "radiologic evaluation of alternative sites for needle decompression of tension pneumothorax".

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Comment on Arch Surg. 2012 Sep;147(9):813-8.
Traumatic brain injury (TBI) was chosen as an Emergency Neurological Life Support topic due to its frequency, the impact of early intervention on outcomes for patients with TBI, and the need for an organized approach to the care of such patients within the emergency setting. This protocol was designed to enumerate the practice steps that should be considered within the first critical hour of neurological injury.
Background: Junctional hemorrhage control device use on the battlefield might be lifesaving. But little experience is reported. The purpose of the present case report is to detail prehospital use of the Combat Ready Clamp (called the CRoC by its users, Combat Medical Systems, Fayetteville, NC; Instructions for Use, 2010) in casualty care in order to increase awareness of junctional hemorrhage control.

Methods: The CRoC was used to control difficult inguinal bleeding on the battlefield for an Afghani man with a hindquarter traumatic amputation.

Results: The device promptly controlled exsanguination from a critical injury when placed during rotary-wing casualty evacuation. The flight medic applied the device in 90 seconds. The device performed well without complications to control bleeding.

Discussion: The CRoC, a new junctional hemorrhage control device, was used as indicated on the battlefield with mechanical and physiologic success and without device problems. By controlling difficult inguinal bleeding resulting from battlefield trauma, the device facilitated the ability of new flight medic to focus his expertise on a critically injured battlefield casualty with demonstrable success.
Safety and efficacy of oral transmucosal fentanyl citrate for prehospital pain control on the battlefield.

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BACKGROUND: Acute pain, resulting from trauma and other causes, is a common condition that imposes a need for prehospital analgesia on and off the battlefield. The narcotic most frequently used for prehospital analgesia on the battlefield during the past century has been morphine. Intramuscular morphine has a delayed onset of pain relief that is suboptimal and difficult to titrate. Although intravenously administered morphine can readily provide rapid and effective prehospital analgesia, oral transmucosal fentanyl citrate (OTFC) is a safe alternative that does not require intravenous access. This study evaluates the safety and efficacy of OTFC in the prehospital battlefield environment.

METHODS: Data collected during combat deployments (Afghanistan and Iraq) from March 15, 2003, to March 31, 2010, were analyzed. Patients were US Army Special Operations Command casualties. Patients receiving OTFC for acute pain were evaluated. Pretreatment and post-treatment pain intensities were quantified by the verbal numeric rating scale (NRS) from 0 to 10. OTFC adverse effects and injuries treated were also evaluated.

RESULTS: A total of 286 patients were administered OTFC, of whom 197 had NRS pain evaluations conducted before and approximately 15 minutes to 30 minutes following treatment. The difference between NRS pain scores at 0 minutes (NRS, 8.0 [1.4]) and 15 minutes to 30 minutes (NRS, 3.2 [2.1]) was significant (p < 0.001). Only 18.3% (36 of 197) of patients were also administered other types of analgesics. Nausea was the most common adverse effect as reported by 12.7% (25 of 197) of patients. The only major adverse effect occurred in the patient who received the largest opioid dose, 3,200-µg OTFC and 20-mg morphine. This patient exhibited hypoventilation and saturation of less than 90% requiring low-dose naloxone.

CONCLUSION: OTFC is a rapid and noninvasive pain management strategy that provides safe and effective analgesia in the prehospital battlefield setting. OTFC has considerable implications for use in civilian prehospital and austere environments.

LEVEL OF EVIDENCE: Therapeutic study, level IV.