Tactical Combat Casualty Care

Journal Article Abstracts

Committee on Tactical Combat Casualty Care
May 2014

References

Bailey A, Baker S, Weant K: Tranexamic acid for trauma-related hemorrhage. Adv Emerg Nurs J 2014;36:123-131

Bennett B, Littlejohn L: Review of new topical hemostatic dressings for combat casualty care. Mil Med 2014;179:497-514

Boscarino C, Tien H, Acker J, et al: Feasibility and transport of packed red blood cells into Special Forces operational conditions. J Trauma Acute Care Surg 2014;76:1013-1019

Bulger E, Snyder D, Schoelles K, et al: An evidence-based prehospital guideline for external hemorrhage control: American College of Surgeons Committee on Trauma. Prehosp Emerg Care 2014;18:163-173

Butler F, Kotwal R, Buckenmaier C, et al: A triple-option analgesia plan for Tactical Combat Casualty Care: TCCC Guidelines change 13-04. J Spec Oper Med 2014;14:13-25

Cestero R, Song B: The effect of hemostatic dressings in a subclavian artery and vein transection porcine model. Naval Medical Research Unit San Antonio NAMRU-SA Final Report #2013-012. Naval Medical Research Unit San Antonio

Chang S, Ross S, Kiefer D, et al: Evaluation of 8.0-cm needle at the fourth anterior axillary line for needle chest decompression of tension pneumothorax. J Trauma Acute Care Surg 2014;76:1029-1034

Cordova C, Capp A, Spinella P: Fresh whole blood transfusion for a combat casualty in austere combat environment. J Spec Oper Med 2014;14:9-12

Dehghan N, de Mestral C, McKee M, et al: Fail Chest injuries: a review of outcomes and treatment practices from the National Trauma Data Bank. J Trauma Acute Care Surg 2014;76:462-468

Diggs L, Yusuf J, De Leo G; An update on out-of-hospital airway management practices in the United States. Resuscitation 2014;Epub ahead of print

Dries D: Fluid Resuscitation: less in more. Crit Care Med 2014;42:1005-1006
Escott ME, Gleisberg GR, Kimmel K, et al: Simple thoracostomy. Moving beyong needle decompression in traumatic cardiac arrest. JEMS. 2014 Apr;39:26-32.

Gaszynska E, Stankiewicz-Rudnicki M, Wieczorek A, et al: A comparison of conventional tube and EndoFlex tube for tracheal intubation in patients with a cervical spine immobilisation. Scand J Trauma Resusc Emerg Med 2013; 2013 Nov 22

Gates K, Baer L, Holcomb J: Prehospital emergency care: evaluation of the junctional emergency tourniquet tool with a perfused cadaver model. J Spec Oper Med 2014;14:40-44

Gerecht R: The lethal triad. Hypothermia, acidosis & coagulopathy create a deadly cycle for trauma patients. JEMS. 2014 Apr;39:56-60.

Hall A, Riojas R, Sharon D: Comparison of self-efficacy and its improvement after artificial simulator or live animal model emergency procedure training. Mil Med 2014;179:320-323

Harcke H, Mabry R, Mazuchowski E: Needle thoracentesis decompression: Observations from postmortem computed tomography and autopsy. JSOM 2013;13:53-58

Harvey V, Perrone J, Kim P: Does the use of tranexamic acid improve trauma mortality? Ann Emerg Med 2014;63:460-462

Hasegawa I, Heinemann A, Tzikas A, et al: Criminal gunshot wound and iatrogenic tension pneumothorax detected by post-mortem computed tomography. Leg Med 2014;Epub ahead of print

Hervig T, Doughty H, Ness P, et al: Prehospital use of plasma: the blood banker's perspective. Shock 2014;41 Suppl 1:39-43

Hoffmann C, Falzone E, Donat A, et al: in-flight risk of venous thromboembolism and use of tranexamic acid in trauma patients. Air-Med J 2014;33:48

Holcomb J, Pati S: Optimal trauma resuscitation with plasma as the primary resuscitative fluid: the surgeon's perspective. Hematology Am Soc Hematol Educ Program. 2013;2013:656-9.

Jacobs L, Wade D, McSwain N, et al: Hartford Consensus: a call to action for THREAT, a medical disaster preparedness concept. J Am Coll Surg 2014;218:467-475

Johnson D, Dial J, Ard J, et al: Effects of intraosseous and intravenous administration of hextend® on time of administration and hemodynamics in swine model. J Spec Oper Med 2014;14:79-85

Karam J, Bloomfield M, Diiorio T, et al: Evaluation of the efficacy and safety of tranexamic acid for reducing blood loss in bilateral total knee arthroplasty. J Arthroplasty 2013;Epub ahead of print

Karrer A, Monroe BJ, Gleisberg GR, Cosper J, Kimmel K, Escott ME. Simple thoracostomy. Moving beyond needle decompression in traumatic cardiac arrest. JEMS. 2014 Apr;39(4):26-32.

Khan S, Brohi K, Chana M, et al: Hemostatic resuscitation is neither hemostatic no resuscitative in trauma hemorrhage. J Trauma Acute Care Surg 2014;76:561-568

Kleber C, Giesecke M, Kollow G, et al: Reply letter to: Tactical Combat Casualty Care rules applied to civilian traumatic cardiopulmonary resuscitation. Resuscitation 2014;Epub ahead of print

Lee T, McCully S, McCully B, Sands C, et al: Comparison of the hemostatic efficacy of low-volume lyophilized plasma reconstituted using sterile water, lactated Ringer's, normal saline, and Hextend solutions. J Trauma Acute Care Surg 2014;76:264-272

Lykissas, Crawford A, Chan G, et al: The effect of tranexamic acid in blood loss and transfusion volume in adolescent idiopathic scoliosis surgery: a single-surgeon experience. J Child Orthop 2013;7:245-249

Mabry R, Delorenzo R: Challenges to improving combat casualty survival on the battlefield. Mil Med. 2014 May;179(5):477-82

McMullan J, Gerecht R, Bonomo J, et al: Airway management and out-of-hospital cardiac arrest outcome in the CARES registry. Resuscitation 2014;Epub ahead of print

Melcer T, Walker J, Sechriest V 2nd, et al: Glasgow coma scores, early opioids, and posttraumatic stress disorder among combat amputees. J Trauma Stress 2014;Epub ahead of print

Morgan T: Evaluation of fluid bolus administration rates using ruggedized field intravenous systems. Wilderness Environ Med 2014;Epub ahead of print

Mutschler M, Nienaber U, Wafaisade A, et al: The impact of severe traumatic brain injury on a novel base deficit-based classification of hypovolemic shock. Scand J Trauma Resusc Emerg Med 2014;22:28

Otten D, Liao M, Wolken R, et al: Comparison of bag-valve-mask hand-sealing techniques in a simulated model. Ann Emerg Med 2014;63:6-12

Pasquier P, Carbonnel N, Bensalah M, et al: Tactical Combat Casualty Care rules applied to civilian traumatic cardiopulmonary resuscitation. Resuscitation 2014;Epub ahead of print

Paul A, Gibson A, Robinson O, Koch J: The traffic light bougie: a study of a novel safety modification. Anaesthesia. 2014 Mar;69:214-8

Peev M, Rago A, Hwabejire J, et al: Self-expanding foam for prehospital treatment of severe intra-abdominal hemorrhage: dose finding study. J Trauma Acute Care Surg 2014;76:619-624

Pole T, Marcozzi D, Hunt R: Interrupting my shift: disaster preparedness and response. Ann Emerg Med 2014;63:584-588

Quibell R, Prommer E, Mihalyo M, et al: Ketamine. J Pain Symptom Manage. 2011 Mar;4:640-9.

Rai M: The humble bougie…forty years and still counting? Anaesthesia. 2014 Mar;69:199-203

Rhee P, Joseph B, Pandit V, et al: Increasing Trauma Deaths in the United States. Ann Surg. 2014;Epub ahead of print

Sheridan R, Shumaker P, King D, et al: Case records of the Massachusetts General Hospital. Case 15-2014. A man in the military who was injured by an improvised explosive device in Afghanistan. N Engl J Med. 2014;370:1931-40

Tang D, Olesnicky B, Eby M, et al: Auto-transfusion tourniquets: the next evolution of tourniquets. Open Access Emergency Medicine Dovepress 2013;Epub ahead of print

Tohme S, Delhumeau C, Zuercher M, et al: Prehospital risk factors of mortality and impaired consciousness after severe traumatic brain injury: an epidemiological study. Scand J Trauma Resusc Emerg Med 2014;22

Tran KP, Nguyen Q, Truong XN, et al: A comparison of ketamine and morphine analgesia in prehospital trauma care: a cluster randomized clinical trial in rural Quang Tri province, Vietnam. Prehosp Emerg Care. 2014;18:257-64

Weaver M, Rittenberger J, Patterson P, et al: Risk Factors for Hypothermia in EMS-treated Burn Patients. Prehosp Emerg Care. 2014;Epub ahead of print

Wright C: Battlefield administration of tranexamic acid by combat troops: a feasibility analysis. J R Army Med Corps 2013;Epub ahead of print

Young J, Sena M, Galante J: Physician roles in tactical emergency medical support: the first 20 years. J Emerg Med 2014;46:38-45

Abstracts

Adv Emerg Nurs J. 2014 Apr;36(2):123-31

Tranexamic Acid for trauma-related hemorrhage.

Bailey AM, Baker SN, Weant KA

Abstract:
Trauma-related deaths represent a leading cause of mortality among persons younger than 45 years. A significant percentage of these are secondary to hemorrhage. In trauma, massive and rapid loss of blood creates an imbalance in hemostasis. Mainstays of resuscitation include surgical interventions, restoring intravascular volume, and pharmacologic interventions. Providers continue to search for improved pharmacologic options for achieving hemostasis. Tranexamic acid is an antifibrinolytic and inhibits fibrinolysis by blocking the lysine-binding sites on plasminogen. Tranexamic acid works to stabilize and inhibit the degradation of existing clots. Tranexamic acid has been prospectively proven to reduce mortality in trauma-related hemorrhage. Its use will likely expand into such areas as resuscitation and massive transfusion protocols and the prehospital setting. Therefore, it is critical for emergency medicine providers to be familiar with appropriate use of tranexamic acid in order to maximize efficacy and decrease the potential adverse events.

Mil Med. 2014 May;179(5):497-514

Review of new topical hemostatic dressings for combat casualty care.

Bennett BL, Littlejohn L

Abstract:
This review analyzes the new (2008-2013) hemostatic agents and dressings for enhanced efficacy in preclinical studies, and investigates supportive findings among case reports of effectiveness and safety in hospital and prehospital literature. A literature search was conducted using PubMed, National Library of Medicine using key words and phrases. The search revealed a total of 16 articles that fit the criteria established for third-generation hemostatic dressings. There were a total of 9 preclinical, 5 clinical, and 2 prehospital studies evaluated. Evaluation of these third-generation studies reveals that mucoadhesive (chitosan) dressings, particularly Celox Gauze and ChitoGauze, clearly show equal efficacy to Combat Gauze across many dependent variables. Chitosan-based products are ideal prehospital dressings because they are shown to work independently from the physiological clotting mechanisms. Many first-, second-, and third-generation chitosan-based dressings have been in use for years by the United States and other NATO militaries at the point of injury, and during tactical evacuation, in Operation Enduring Freedom and Operation Iraqi Freedom without reported complications or side effects. Based on the reported efficacy and long-term safety of chitosan-based products, increased use of Celox Gauze and ChitoGauze within the Department of Defense and civilian venues merits further consideration and open debate.

J Trauma Acute Care Surg. 2014 Apr;76(4):1013-9

Feasibility and transport of packed red blood cells into Special Forces operational conditions.

Boscarino C, Tien H, Acker J, Callum J, Hansen AL, Engels P, Glassberg E, Nathens A, Beckett A

BACKGROUND: Transfusing packed red blood cells (PRBCs) into Special Forces may provide a survival advantage from hemorrhage-induced battlefield injuries; however, the effect of the unique operational stressors on RBC integrity is not known.

METHODS: Pooled PRBCs (20 U) (7 days old), stored in Golden Hour containers, were exposed to the following simulated operational stressors: High-Altitude Low-Opening parachute descent from 30,000 ft, followed by a simulated soldier presence patrol in a climatic chamber set to 48 °C and 9% humidity for 12 hours (test). Biochemical (pH, lactate, potassium, and adenosine triphosphate) and biomechanical (percent hemolysis, deformability, and morphology) were measured to determine the integrity of PRBCs.

RESULTS: The simulated parachute descent significantly raised pH ($p = 0.025$) and potassium ($p = 0.014$) levels compared with the control; however, this was not clinically significant. Lactate (mmol/L) and adenosine triphosphate levels (μmol/g Hgb) were unaffected ($p > 0.05$). Potassium and pH levels increased with time but not significantly compared with controls. Lactate levels were unaffected with time. Mechanical agitation of PRBCs from the simulated soldier presence patrol did not significantly affect the biochemical ($p \geq 0.08$) or biomechanical ($p \geq 0.33$) parameters compared with control. Hemolysis was found to be less than 0.8% at the end of 12 hours. No significant difference in RBC morphology and RBC deformability were noted.

CONCLUSION: Carrying PRBCs into the austere Special Forces environment is feasible as biochemical and biomechanical markers of RBC stress remain within published transfusion safety parameters when PRBCs were stored in new cold technology containers for 12 hours at 48°C during a simulated Special Forces operation.

Prehosp Emerg Care. 2014 Apr-Jun;18(2):163-73

An evidence-based prehospital guideline for external hemorrhage control: American College of Surgeons Committee on Trauma.

Bulger EM, Snyder D, Schoelles K, Gotschall C, Dawson D, Lang E, Sanddal ND, Butler FK, Fallat M, Taillac P, White L, Salomone JP, Seifarth W, Betzner MJ, Johannigman J, McSwain N Jr.

Abstract:
This report describes the development of an evidence-based guideline for external hemorrhage control in the prehospital setting. This project included a systematic review of the literature regarding the use of tourniquets and hemostatic agents for management of life-threatening extremity and junctional hemorrhage. Using the GRADE methodology to define the key clinical questions, an expert panel then reviewed the results of the literature review, established the quality of the evidence and made recommendations for EMS care. A clinical care guideline is proposed for adoption by EMS systems. Key words: tourniquet; hemostatic agents; external hemorrhage.

J Spec Oper Med. 2014 Spring;14(1):13-25.

A Triple-Option Analgesia Plan for Tactical Combat Casualty Care: TCCC Guidelines Change 13-04.

Butler FK, Kotwal RS, Buckenmaier CC 3rd, Edgar EP, O'Connor KC, Montgomery HR, Shackelford SA, Gandy JV 3rd, Wedmore IS, Timby JW, Gross KR, Bailey JA

Abstract:
Although the majority of potentially preventable fatalities among U.S. combat forces serving in Afghanistan and Iraq have died from hemorrhagic shock, the majority of U.S. medics carry morphine autoinjectors for prehospital battlefield analgesia. Morphine given intramuscularly has a delayed onset of action and, like all opioids, may worsen hemorrhagic shock. Additionally, on a recent assessment of prehospital care in Afghanistan, combat medical personnel noted that Tactical Combat Casualty Care (TCCC) battlefield analgesia recommendations need to be simplified?there are too many options and not enough clear guidance on which medication to use in specific situations. They also reported that ketamine is presently being used as a battlefield analgesic by some medics in theater with good results. This report proposes that battlefield analgesia be achieved using one or more of three options: (1) the meloxicam and Tylenol in the TCCC Combat Pill Pack for casualties with relatively minor pain who are still able to function as effective combatants; (2) oral transmucosal fentanyl citrate (OTFC) for casualties who have moderate to severe pain, but who are not in hemorrhagic shock or respiratory distress and are not at significant risk for developing either condition; or (3) ketamine for casualties who have moderate to severe pain but who are in hemorrhagic shock or respiratory distress or are at significant risk for developing either condition. Ketamine may also be used to increase analgesic effect for

Naval Medical Research Unit San Antonio NAMRU-SA Final Report #2013-012.

The effect of hemostatic dressings in a subclavian artery and vein transection porcine model

Cestero R, Song B

Conclusion:
Using a porcine subclavian injury model, XSTAT, QuikClot Combat Gauze with compression, and QuikClot Combat Gauze without compression did not exhibit significant differences between each other with respect to survival and hemostasis. However, XSTAT required significantly less time to apply compared to both Combat Gauze groups and was associated with significantly lower blood loss during application.

J Trauma Acute Care Surg. 2014 Apr;76(4):1029-34.

Evaluation of 8.0-cm needle at the fourth anterior axillary line for needle chest decompression of tension pneumothorax.

Chang SJ, Ross SW, Kiefer DJ, Anderson WE, Rogers AT, Sing RF, Callaway DW

BACKGROUND: Five-centimeter needles at the second intercostal space midclavicular line (2MCL) have high failure rates for decompression of tension pneumothorax. This study evaluates 8-cm needles directed at the fourth intercostal space anterior axillary line (4AAL).

METHODS: Retrospective radiographic analysis of 100 consecutive trauma patients 18 years or older from January to September 2011. Measurements of chest wall thickness (CWT) and depth to vital structure (DVS) were obtained at 2MCL and 4AAL. 4AAL measurements were taken based on two angles: closest vital structure and perpendicular to the chest wall. Primary outcome measures were radiographic decompression (RD) (defined as CWT < 80 mm) and radiographic noninjury (RNI) (DVS > 80 mm) of 8-cm needles at 4AAL. Secondary outcome measures are effect of angle of entry on RNI at 4AAL, RD and RNI of 8-cm needles at 2MCL, and comparison of 5-cm needles with 8-cm needles at both locations.

RESULTS: Eighty-four percent of the patients were male, with mean Injury Severity Score (ISS) of 17.7 (range, 1.0-66.0) and body mass index of 26.8 (16.5-48.4). Mean CWT at 4AAL ranged from 37.6 mm to 39.9 mm, significantly thinner than mean CWT at 2MCL (43.3-46.7 mm). Eight-centimeter needle RD was more than 96% at both 4AAL and 2MCL. Five-centimeter RD ranged from 66% to 81% at all sites. Mean DVS at 4AAL ranged from 91.8 mm to 128.0 mm. RNI at all sites was more than 91% except at left 4AAL, when taken to the closest vital structure (mean DVS, 91.8 mm), with 68% RNI. Perpendicular entry increased DVS to 109.4 mm and subsequent RNI to 91%. Five-centimeter RNI at all sites was more than 99%.

CONCLUSION: CWT at 4AAL is significantly thinner than 2MCL. Based on radiographic measurements, 8-cm catheters have a higher chance of pleural decompression when compared with 5-cm catheters. Steeper angle of entry at 4AAL improves 8-cm noninjury rates to more than 91%.

LEVEL OF EVIDENCE: Therapeutic/care management study, level IV.

J Spec Oper Med. 2014 Spring;14(1):9-12.

Fresh whole blood transfusion for a combat casualty in austere combat environment.

Cordova CB, Capp AP, Spinella PC

Abstract:
There are many challenges to treating life-threatening injuries for a healthcare provider deployed to a remote location in a combat setting. Once conventional treatment protocols for exsanguinating hemorrhage have been exhausted and no medical evacuation platform is available, a nonconventional method of treatment to consider is a fresh whole blood (FWB) transfusion. A FWB transfusion can be a life-saving or life-prolonging intervention in the appropriate setting. The authors present the case of a combat casualty in hypovolemic shock and coagulopathy with delayed medical evacuation to a surgical team. While the ultimate outcome was death in this case report, the patient arrived to a surgical team 15 hours after his injury, alert and oriented. In this scenario, FWB transfusion gave this patient the best chance of survival.

J Trauma Acute Care Surg. 2014 Feb;76(2):462-8

Flail chest injuries: a review of outcomes and treatment practices from the National Trauma Data Bank.

Dehghan N, de Mestral C, McKee MD, Schemitsch EH, Nathens A

BACKGROUND: Flail chest injuries are associated with severe pulmonary restriction, a requirement for intubation and mechanical ventilation, and high rates of morbidity and mortality. Our goals were to investigate the prevalence, current treatment practices, and outcomes of flail chest injuries in polytrauma patients.

METHODS: The National Trauma Data Bank was used for a retrospective analysis of the injury patterns, management, and clinical outcomes associated with flail chest injuries. Patients with a flail chest injury admitted from 2007 to 2009 were included in the analysis. Outcomes included the number of days on mechanical ventilation, days in the intensive care unit (ICU), days in the hospital, and rates of pneumonia, sepsis, tracheostomy, chest tube placement, and death.

RESULTS: Flail chest injury was identified in 3,467 patients; the mean age was 52.5 years, and 77% of the patients were male. Significant head injury was present in 15%, while 54% had lung contusions. Treatment practices included epidural catheters in 8% and surgical fixation of the chest wall in 0.7% of the patients. Mechanical ventilation was required in 59%, for a mean of 12.1 days. ICU admission was required in 82%, for a mean of 11.7 days. Chest tubes were used in 44%, and 21% required a tracheostomy. Complications included pneumonia in 21%, adult respiratory distress syndrome in 14%, sepsis in 7%, and death in 16%. Patients with concurrent severe head injury had higher rates of ventilator support and ICU stay and had worse outcomes in every category compared with those without a head injury.

CONCLUSION: Patients who have sustained a flail chest have significant morbidity and mortality. More than 99% of these patients were treated nonoperatively, and only a small proportion (8%) received aggressive pain management with epidural catheters. Given the high rates of morbidity and mortality in patients with a flail chest injury, alternate methods of treatment including more consistent use of epidural catheters for pain or surgical fixation need to be investigated with large randomized controlled trials.

LEVEL OF EVIDENCE: Epidemiologic/prognostic study, level IV.

Resuscitation. 2014 Mar 15. [Epub ahead of print]

An update on out-of-hospital airway management practices in the United States.

Diggs LA, Yusuf JE, De Leo G

OBJECTIVE: We characterized out-of-hospital airway management interventions, outcomes, and complications using the 2012 NEMSIS Public-Release Research Data Set containing almost 20 million Emergency Medical Services activations from 40 states and two territories. We compared the outcomes with a previous study that used 2008 NEMSIS data containing 16 states with 4 million EMS activations.

METHODS: Patients who received airway management interventions including endotracheal intubation (ETI), alternate airways (Combitube, Laryngeal Mask Airway (LMA), King LT, Esophageal-Obturator Airway (EOA)), and cricothyroidotomy (needle and surgical) were identified. Using descriptive statistics, airway management success and complications were examined in the full cohort and key subsets including cardiac arrest, non-arrest medical, non-arrest injury, children<10 years, children 10-19 years, rapid sequence intubation (RSI), population setting, US census region, and US census division.

RESULTS: Among 19,831,189 EMS activations, there were 74,993 ETIs, 21,990 alternate airways, and 1332 cricothyroidotomies. ETI success rates were: overall 63,956/74,993 (85.3%; 95% CI: 85.0-85.5), cardiac arrest 33,558/39,270 (85.5%), non-arrest medical 12,215/13,611 (89.7%), non-arrest injury (90.1%), children<10 years 2069/2468 (83.8%), children 10-19 years 1647/1900 (86.7%), adults>19 years 58,965/69,144 (85.3%), and rapid sequence intubation 5265/5658 (93.1%). Major complications included bleeding 677 (4.4 per 1000 interventions), vomiting 1221 (8 per 1000 interventions), esophageal intubation immediately detected 874 (5.7 per 1000 interventions), and esophageal intubations other 219 (1.4 per 1000 interventions).

CONCLUSIONS: Low out-of-hospital ETI and alternate airway success rates were observed. These data may guide national efforts to improve out-of-hospital airway management quality leading efforts to better educate providers on ETI.

Crit Care Med. 2014 Apr;42(4):1005-6

Fluid resuscitation: less is more.

Dries D

Quote:

“Administration of IV products other than blood components will change the composition of circulating blood with consequences measured in coagulopathy, disruption of endothelium, loss of membrane integrity, and extracellular edema.
Resuscitation is required but how best to accomplish it remains unclear. An old adage in shock management is to replace what the patient has lost. If blood is lost, then blood should be replaced. The dehydrated patient is a good candidate for crystalloids. Aggressive administration of crystalloids to the bleeding patient may create acute respiratory distress syndrome and hepatic and renal failure.”

Scand J Trauma Resusc Emerg Med. 2013 Nov 22;21:79

A comparison of conventional tube and EndoFlex tube for tracheal intubation in patients with a cervical spine immobilisation.

Gaszynska E, Stankiewicz-Rudnicki M, Wieczorek A, Gaszynski T

BACKGROUND: The EndoFlex is a new type of tracheal tube with an adjustable distal tip that can be bent without the use of a stylet. The aim of this study was to compare a standard endotracheal tube with the EndoFlex tracheal tube for intubation in patients with simulated cervical spine injury.

METHODS: A group of 60 patients without any kind of the cervical spine injury, classified as the ASA physiological scale I or II and qualified for elective surgery procedures were intubated with the use of classical Macintosh laryngoscope, and either a standard endotracheal tube with the intubation stylet in it or EndoFlex tube without stylet. The subjects were randomized into two subgroups. All patients have had the cervical collar placed on their neck for the simulation of intubation procedure in case of the spinal injury.

RESULTS: The intubation procedure was performed by 16 anesthetists with different experience (5-19 yrs). Time of intubation with the use of EndoFlex tube was similar to that with a the use of standard endotracheal tube and intubation stylet: Me (median) 19.5 s [IQR (interquatile range) 18-50] vs. Me 20 s [IQR17-60] respectively ($p = 0.9705$). No significant additional maneuvers were necessary during intubation with the use of EndoFlex tube in comparison with standard endotracheal tube (70% vs. 56.6%) ($p = 0.4220$). Subjective assessment of the usability of both tubes revealed that more anesthesiologists found intubations with the use of EndoFlex more demanding than intubation with conventional tracheal tube and intubation stylet. The assessment of usability: very easy 3.3% vs. 20%, easy 83.4% vs. 56.7%, difficult 10% vs. 20% and very difficult 3.3% vs. 3.3% for standard endotracheal tube with stylet and EndoFlex, respectively.

CONCLUSION: In conclusion we asses, that the EndoFlex tube does not improve intubation success rate, in fact it requires more maneuvers facilitating intubation and was found to be more difficult to use.

J Spec Oper Med. 2014 Spring;14(1):40-4.

Prehospital emergency care: evaluation of the junctional emergency tourniquet tool with a perfused cadaver model.

Gates KS, Baer L, Holcomb JB

Objective: Junctional bleeding from the groin is a leading cause of potentially preventable death on the battlefield. To address this problem, a novel device called the Junctional Emergency Treatment Tool (JETT™) was developed. The JETT was designed to stabilize pelvic ring fractures while controlling lower extremity bleeding sustained during high-energy traumatic events on the battlefield and in the civilian environment. Our purpose was to assess the effectiveness of the JETT in the control of simulated life threatening hemorrhage from proximal injuries in the groin of a perfused cadaver.

Methods: The JETT was compared with the standard issue combat tourniquet and a Food and Drug Administration (FDA)-cleared junctional hemorrhage control clamp (CRoC™) in a perfused human cadaver model. The JETT's ability to stop pulsatile flow at the common femoral artery was assessed through proximal aorta and distal measurements of arterial flow rates and pressures.

Results: In three cadavers, when the JETT or the CRoC was applied in the groin, there was an immediate cessation of fluid flow from the common femoral artery while the inlet flow aortic pulsatile pressure was maintained. However, the time to bilateral application of the JETT was faster (10 seconds vs. 68 seconds) than bilateral sequential application of two CRoC devices.

Conclusions: The JETT is a single device capable of effectively and quickly controlling bilateral lower extremity junctional hemorrhage at normal physiological blood pressures.

JEMS. 2014 Apr;39(4):56-60.

The lethal triad. Hypothermia, acidosis & coagulopathy create a deadly cycle for trauma patients.

Gerecht R

Quote:
“Dilutional coagulopathy occurs when we resuscitate a bleeding trauma patient with fluid or blood products that don’t contain the same clotting factors lost in the acutely hemorrhaged whole blood. Crystalloids such as normal saline and packed red blood cells dilute the remaining clotting factors circulating in the trauma victim’s blood.”

Mil Med. 2014 Mar;179(3):320-3

Comparison of self-efficacy and its improvement after artificial simulator or live animal model emergency procedure training.

Hall AB, Riojas R, Sharon D

Abstract:
The objective of this study is to compare post-training self-efficacy between artificial simulators and live animal training for the performance of emergency medical procedures. Volunteer airmen of the 81st Medical Group, without prior medical procedure training, were randomly assigned to two experimental arms consisting of identical lectures and training of diagnostic peritoneal lavage, thoracostomy (chest tube), and cricothyroidotomy on either the TraumaMan (Simulab Corp., Seattle, Washington) artificial simulator or a live pig (Sus scrofa domestica) model. Volunteers were given a postlecture and postskills training assessment of self-efficacy. Twenty-seven volunteers that initially performed artificial simulator training subsequently underwent live animal training and provided assessments comparing both modalities. The results were first, postskills training self-efficacy scores were significantly higher than postlecture scores for either training mode and for all procedures ($p < 0.0001$). Second, post-training self-efficacy scores were not statistically different between live animal and artificial simulator training for diagnostic peritoneal lavage ($p = 0.555$), chest tube ($p = 0.486$), and cricothyroidotomy ($p = 0.329$). Finally, volunteers undergoing both training modalities indicated preference for live animal training ($p < 0.0001$). We conclude that artificial simulator and live animal training produce equivalent levels of self-efficacy after initial training, but there is a preference in using a live animal model to achieve those skills.

J Spec Oper Med. 2013 Winter;13(4):53-8.

Needle thoracentesis decompression: observations from postmortem computed tomography and autopsy.

Harcke HT, Mabry RL, Mazuchowski EL

Background: Needle thoracentesis decompression (NTD) is a recommended emergency treatment for tension pneumothorax. Current doctrine recognizes two suitable sites: the second intercostal space in the midclavicular line and the fourth or fifth intercostal space in the anterior axillary line.

Methods: A review was conducted of postmortem computed tomography and autopsy results in 16 cases where NTD was performed as an emergency procedure.

Results: In 16 cases with 23 attempted procedures, the outcome was confirmed in 17 attempts. In 7 placements, the catheter was in the pleural cavity; in 7 placements, the catheter never entered the pleural cavity; and in 3 placements, cavity penetration was verified at autopsy even though the catheter was no longer in the cavity. Success was noted in 6 of 13 anterior attempts and 4 of 4 lateral attempts, for an overall success rate of 59% (10 of 17). In the remaining 6 attempted procedures, a catheter was noted in the soft tissue on imaging; however, presence or absence of pleural cavity penetration was equivocal. All placements were attempted in the combat environment; no information is available about specifically where or by whom.

Conclusion: NTD via a lateral approach was more successful than that via an anterior approach, although it was used in fewer cases. This supports the revision of the Tactical Combat Casualty Care Guidelines specifying the lateral approach as an alternative to an anterior approach.

Ann Emerg Med. 2014 Apr;63(4):460-2

Does the use of tranexamic acid improve trauma mortality?

Harvey V, Perrone J, Kim P

Quote

“BOTTOM LINE: According to the available evidence, tranexamic acid has been shown to significantly decrease mortality in bleeding trauma patients, with no significant increase in serious prothrombotic complications if administered within 3 hours of injury. There is, however, no evidence of benefit in patients with traumatic brain injury. As such, we recommend early treatment with tranexamic acid in trauma patients without isolated brain injuries who have or are at risk for significant hemorrhage and in patients who receive resuscitation with blood products, particularly if they require massive transfusion or have a high risk of death at baseline.”

Leg Med (Tokyo). 2014 May;16(3):154-6.

Criminal gunshot wound and iatrogenic tension pneumothorax detected by post-mortem computed tomography.

Hasegawa I, Heinemann A, Tzikas A, Vogel H, Püschel K

Abstract:
Post-mortem imaging at autopsy is gradually increasing in popularity among forensic practitioners. The objective of the present paper was to demonstrate that it is essential to survey the cadaver using computed tomography (CT) before autopsy. This case report presents an iatrogenic tension pneumothorax caused by left subclavian vein puncture undertaken during treatment for a gunshot-related wound. The victim, a 64-year-old woman, was shot by her husband at home, and transferred to the hospital emergency unit. Before surgical procedures were carried out, left subclavian vein puncture was performed; however, during the operation, the victim experienced sudden cardiac arrest. Subsequent intensive resuscitation was unsuccessful. The clinical cause of death was recorded as traumatic shock caused by the gunshot injury. However, before the legal autopsy took place, CT clarified the existence of tension pneumothorax not on the same side as the gunshot wound, but on the side of the iatrogenic subclavian vein puncture. Because of this information gained prior to legal dissection, a typical dissection procedure for tension pneumothorax could be performed. Post-mortem imaging prior to regular dissection is essential as an adjunct diagnostic tool.

Shock. 2014 May;41 Suppl 1:39-43

Prehospital use of plasma: the blood bankers' perspective.

Hervig T, Doughty H, Ness P, Badloe JF, Berseus O, Glassberg E, Heier HE

Abstract:
At the 2013 Traumatic Hemostasis and Oxygenation Research Network's Remote Damage Control Resuscitation symposium, a panel of senior blood bankers with both civilian and military background was invited to discuss their willingness and ability to supply prehospital plasma for resuscitation of massively bleeding casualties and to comment on the optimal preparations for such situations. Available evidence indicates that prehospital use of plasma may improve remote damage control resuscitation, although level I evidence is lacking. This practice is well established in several military services and is also being introduced in civilian settings. There are few, if any, clinical contraindications to the prehospital use of plasma, except for blood group incompatibility and the danger of transfusion-induced acute lung injury, which can be circumvented in various ways. However, the choice of plasma source, plasma preparation, and logistics including stock management require consideration. Staff training should include hemovigilance and traceability as well as recognition and management of eventual adverse effects. Prehospital use of plasma should occur within the framework of clinical algorithms and prospective clinical studies. Clinicians have an ethical responsibility to both patients and donors; therefore, the introduction of new clinical capabilities of transfusion must be safe, efficacious, and sustainable. The panel agreed that although these problems need further attention and scientific studies, now is the time for both military and civilian transfusion systems to prepare for prehospital use of plasma in massively bleeding casualties.

Air Med J. 2014 Mar-Apr;33(2):48

In-flight risk of venous thromboembolism and use of tranexamic acid in trauma patients.

Hoffmann C, Falzone E, Donat A, Leclerc T, Donat N, Tourtier JP

Quote:
“To conclude, we believe that the harm-benefit balance of TXA is favorable in severe bleeding after major trauma and should be administered as soon as possible in the prehospital setting, ideally < 1 hour from the time of injury. However, when bleeding is not life threatening, especially when an air medical evacuation is planned, the thrombotic risk is too poorly documented to justify exposing patients to a plausible risk. Strict compliance with an established administration protocol is essential, pending further studies focused on the use of TXA during air medical evacuations and thrombosis in trauma patients.”

Hematology Am Soc Hematol Educ Program. 2013;2013:656-9. doi: 10.1182/asheducation-2013.1.656.

Optimal trauma resuscitation with plasma as the primary resuscitative fluid: the surgeon's perspective.

Holcomb JB, Pati S

Abstract:
Over the past century, blood banking and transfusion practices have moved from whole blood therapy to components. In trauma patients, the shift to component therapy was achieved without clinically validating which patients needed which blood products. Over the past 4 decades, this lack of clinical validation has led to uncertainty on how to optimally use blood products and has likely resulted in both overuse and underuse in injured patients. However, recent data from both US military operations and civilian trauma centers have shown a survival advantage with a balanced transfusion ratio of RBCs, plasma, and platelets. This has been extended to include the prehospital arena, where thawed plasma, RBCs, and antifibrinolytics are becoming more widely used. The Texas Trauma Institute in Houston has followed this progression by putting RBCs and thawed plasma in the emergency department and liquid plasma and RBCs on helicopters, transfusing platelets earlier, and using thromboelastogram-guided approaches. These changes have not only resulted in improved outcomes, but have also decreased inflammatory complications, operations, and overall use of blood products. In addition, studies have shown that resuscitating with plasma (instead of crystalloid) repairs the "endotheliopathy of trauma," or the systemic endothelial injury and dysfunction that lead to coagulation disturbances and inflammation. Data from the Trauma Outcomes Group, the Prospective Observational Multicenter Major Trauma Transfusion (PROMMTT) study, and the ongoing Pragmatic Randomized Optimal Platelet and Plasma Ratios (PROPPR) trial represent a decade-long effort to programmatically determine optimal resuscitation practices, balancing risk versus benefits. With injury as the leading cause of death in patients age 1 to 44 years and hemorrhage the leading cause of potentially preventable death in this group, high-quality data must be obtained to provide superior care to the civilian and combat injured.

J Am Coll Surg. 2014 Mar;218(3):467-75. doi: 10.1016/j.jamcollsurg.2013.12.009. Epub 2013 Dec 14.

Hartford Consensus: a call to action for THREAT, a medical disaster preparedness concept.

Jacobs LM, Wade D, McSwain NE, Butler FK, Fabbri W, Eastman A, Conn A, Burns KJ

Quote:

"Tactical Combat Casualty Care in the civilian sector

Tactical Combat Casualty Care, as currently trained and executed throughout the US military, contains a number of interventions that are gaining increasing acceptance in civilian trauma care systems. The Committee for Tactical Emergency Casualty Care (C-TECC) has created guidelines to adapt TCCC principles for use in high threat civilian tactical and rescue operations. These guidelines are referred to as Tactical Emergency Casualty Care (TECC). Although it may not be practical for the civilian sector to adopt all of the strategies used by TCCC to control hemorrhage, certain of the TCCC interventions seem likely to be helpful in improving survival from active shooter incidents or terrorist bombings. These interventions that should be easy to adopt in the civilian sector include:

1. Tourniquets to control extremity hemorrhage
2. Hemostatic dressings to control bleeding from sites not amenable to a tourniquet
3. "Sit up and lean forward" posture for casualties with direct maxillofacial trauma that results in either airway obstruction or bleeding into the airway. In addition, TCCC guidelines have been recognized by the civilian community as a beginning point for the standardization of protocols for Tactical Emergency Medical Support (TEMS), which was initiated in the 1960s to support SWAT operations. A goal of TEMS is to maximize survival of victims and minimize the threat to medical providers while supporting the law enforcement mission in hostile situations. Widespread support for TEMS now exists in the law enforcement and medical communities. The National Tactical Officers Association (NTOA) recognizes TEMS as the standard of care for law enforcement special operations and views the TCCC guidelines as the foundation for TEMS protocols, practices, and training. Further, the position of the National Tactical Officers Association is that every police officer should possess basic medical skills and equipment to save lives. These skills include the control of life-threatening hemorrhage, triage of victims, security of casualty collection points and coordination with EMS. This stance of the National Tactical Officers Association coincides with the recommendations of the Hartford Consensus."

J Spec Oper Med. 2014 Spring;14(1):79-85

Effects of intraosseous and intravenous administration of Hextend® on time of administration and hemodynamics in a Swine model.

Johnson D, Dial J, Ard J, Yourk T, Burke E, Paine C, Gegel B, Burgert J

Introduction: The military recommends that a 500mL bolus of Hextend® be administered via an intravenous (IV) 18-gauge needle or via an intraosseous (IO) needle for patients in hypovolemic shock.

Purposes: The purposes of this study were to compare the time of administration of Hextend and the hemodynamics of IV and IO routes in a Class II hemorrhage swine model.

Methods: This was an experimental study using 27 swine. After 30% of their blood volume was exsanguinated, 500mL of Hextend was administered IV or IO, but not to the control group. Hemodynamic data were collected every 2 minutes until administration was complete.

Results: Time for administration was not significant ($p = .78$). No significant differences existed between the IO and IV groups relative to hemodynamics ($p > .05$), but both were significantly different than the control group ($p < .05$).

Conclusions: The IO route is an effective method of administering Hextend.

J Arthroplasty. 2014 Mar;29(3):501-3

Evaluation of the efficacy and safety of tranexamic acid for reducing blood loss in bilateral total knee arthroplasty.

Karam JA, Bloomfield MR, Dilorio TM, Irizarry AM, Sharkey PF

Abstract:
Tranexamic acid (TA) has been reported to reduce blood loss after total joint arthroplasty; however, the literature is sparse in evaluating its efficacy in simultaneous bilateral total knee arthroplasty (TKA). In this retrospective study of consecutive patients, TA use in bilateral TKA was associated with a significant reduction in perioperative serum hemoglobin drop, as well as allogeneic blood transfusion needs from 50% to 11% of patients. No autologous blood donation or drains were used. There were no venous thromboembolic events reported. Implementation of a systematic intravenous TA protocol in simultaneous bilateral TKA appears highly effective in reducing transfusion requirements, potentially reducing healthcare resource utilization as well as the morbidity and complications associated with allogeneic blood transfusions.

JEMS. 2014 Apr;39(4):26-32.

Simple thoracostomy. Moving beyond needle decompression in traumatic cardiac arrest.

Karrer A, Monroe BJ, Gleisberg GR, Cosper J, Kimmel K, Escott ME

Conclusion:
"Simple thoracostomy in our system has been developed as a safe method for extensively trained paramedics to resolve the potentially life-threatening condition of tension pneumothorax and associated traumatic cardiac arrest. Effective deployment of this procedure in an EMS service is dependent on stakeholder buy-in, appropriate training, frequent retraining, and 100% quality review. In the future, we'll publish the result(s) from our research-developed protocol, training, deployment and quality review."

J Trauma Acute Care Surg. 2014 Mar;76(3):561-7

Hemostatic resuscitation is neither hemostatic nor resuscitative in trauma hemorrhage.

Khan S, Brohi K, Chana M, Raza I, Stanworth S, Gaarder C, Davenport R; International Trauma Research Network (INTRN)

BACKGROUND: Trauma hemorrhage continues to carry a high mortality rate despite changes in modern practice. Traditional approaches to the massively bleeding patient have been shown to result in persistent coagulopathy, bleeding, and poor outcomes. Hemostatic (or damage control) resuscitation developed from the discovery of acute traumatic coagulopathy and increased recognition of the negative consequences of dilutional coagulopathy. These strategies concentrate on early delivery of coagulation therapy combined with permissive hypotension. The efficacy of hemostatic resuscitation in correcting coagulopathy and restoring tissue perfusion during acute hemorrhage has not been studied.

METHODS: This is a prospective cohort study of ROTEM and lactate measurements taken from trauma patients recruited to the multicenter Activation of Coagulation and Inflammation in Trauma (ACIT) study. A blood sample is taken on arrival and during the acute bleeding phase after administration of every 4 U of packed red blood cells (PRBCs), up to 12 U. The quantity of blood products administered within each interval is recorded.

RESULTS: Of the 106 study patients receiving at least 4 U of PRBC, 27 received 8 U to 11 U of PRBC and 31 received more than 12 U of PRBC. Average admission lactate was 6.2 mEq/L. Patients with high lactate (≥5 mEq/L) on admission did not clear lactate until hemorrhage control was achieved, and no further PRBC units were required. On admission, 43% of the patients were coagulopathic (clot amplitude at 5 minutes ≤ 35 mm). This increased to 49% by PRBC 4; 62% by PRBC 8 and 68% at PRBC 12. The average fresh frozen plasma/PRBC ratio between intervals was 0.5 for 0 U to 4 U of PRBC, 0.9 for 5 U to 8 U of PRBC, 0.7 for 9 U to 12 U of PRBC. There was no improvement in any ROTEM parameter during ongoing bleeding.

CONCLUSION: While hemostatic resuscitation offers several advantages over historical strategies, it still does not achieve correction of hypoperfusion or coagulopathy during the acute phase of trauma hemorrhage. Significant opportunities still exist to improve management and improve outcomes for bleeding trauma patients.
\
LEVEL OF EVIDENCE: Epidemiologic study, level III.

Resuscitation. 2014 Jun;85(6):e87-8

Reply to Letter: Tactical combat casualty care rules applied to civilian traumatic cardiopulmonary resuscitation: Synergism of civilian and military trauma management.

Kleber C, Giesecke MT, Kollow G, Haas NP, Buschmann CT

Quote:
"….military trauma management has always significantly influenced and improved civilian trauma care, e.g. the tool of triage, use of tourniquets, haemostatic agents, chest-seal devices, intraosseous devices and hypotensive resuscitation. Interestingly, independent of the environment and predominant trauma mechanisms, the major problem remains that most of our trauma victims die before reaching a surgeon or sufficient trauma care."

J Trauma Acute Care Surg. 2014 Feb;76(2):264-1

Comparison of the hemostatic efficacy of low-volume lyophilized plasma reconstituted using sterile water, lactated Ringer's, normal saline, and Hextend solutions.

Lee TH, McCully SP, McCully BH, Sands C, Hampton DA, Louis SG, Rick B, Anderson N, Differding J, Schreiber MA

BACKGROUND: Low-volume ascorbic acid-buffered reconstituted lyophilized plasma (LP) provides logistic advantages, reduces the risks for large-volume resuscitation, modulates inflammation, and is equally effective for hemostatic resuscitation as full-volume LP. We compared the physiologic effects of resuscitation using LP reconstituted with sterile water (LP-SW), lactated Ringer's solution (LP-LR), normal saline (LP-NS), and Hextend (LP-Hx).

METHODS: Plasma was collected from swine, lyophilized, and then reconstituted into four test solutions: LP-SW, LP-LR, LP-NS, or LP-Hx. Forty swine were anesthetized and subjected to a validated model of polytrauma and hemorrhagic shock (including a Grade V liver injury), then randomized to receive one of the four test solutions. Physiologic parameters, blood loss, lactate, and hematocrit were followed up. Coagulation status was evaluated using thrombelastography. Inflammatory mediator expression was evaluated by multiplex serum assay.

RESULTS: Forty animals were included in the study (10 animals per group). One animal died following LP-Hx resuscitation. There was less blood loss in the LP-SW and LP-LR groups compared with the LP-NS and LP-Hx groups ($p < 0.05$). The LP-SW group exhibited less early coagulopathic changes by thrombelastography, and the LP-Hx group had persistently elevated international normalized ratios at the end of the study period ($p < 0.05$). Serum interleukin 6 was lower after 4 hours in the LP-SW group compared with LP-NS ($p < 0.05$).

CONCLUSION: Resuscitation using low-volume LP-SW and LP-LR buffered with ascorbic acid confers an anti-inflammatory benefit and results in less blood loss. Sterile water is a safe, cost-effective, and universally available fluid for creating a low-volume hemostatic LP resuscitation solution.

J Child Orthop. 2013 Jun;7(3):245-9

The effect of tranexamic acid in blood loss and transfusion volume in adolescent idiopathic scoliosis surgery: a single-surgeon experience.

Lykissas MG, Crawford AH, Chan G, Aronson LA, Al-Sayyad MJ

PURPOSE: Intraoperative blood loss in scoliosis surgery often requires transfusions. Autogenous blood decreases but does not eliminate risks typically associated with allogenic blood transfusion. Costs associated with transfusions are significant. Tranexamic acid (TXA) has been shown to decrease blood loss in cardiac and joint surgery. Few studies have examined its use in pediatric spine surgery, and the results are inconsistent. The aim of this study was to determine whether TXA decreases intraoperative blood loss and transfusion requirements in adolescent idiopathic scoliosis patients undergoing posterior spinal fusion by a single surgeon.

METHODS: The medical records and operative reports of surgically treated patients with adolescent idiopathic scoliosis between 2000 and 2009 were retrospectively reviewed. The inclusion criteria were: (1) patients who underwent instrumented posterior spinal fusion, (2) had complete medical records, and (3) were treated by the same surgeon. Forty-nine patients who met the inclusion criteria were divided into two groups: Group A (25 patients) received TXA, while Group B (24 patients) did not receive TXA.

RESULTS: After controlling for age at the time of surgery, gender, and number of vertebral levels fused, the mean intraoperative blood loss was significantly lower in Group A (537 ml) than in Group B (1,245 ml) ($p = 0.027$). The mean volume of blood transfused intraoperatively was 426 and 740 ml for Group A and Group B, respectively. The difference was not statistically significant after controlling for age, gender, and number of levels fused ($p = 0.078$).

CONCLUSION: TXA significantly decreased intraoperative blood loss in posterior spinal fusions performed for adolescent idiopathic scoliosis.

Mil Med. 2014 May;179(5):477-82

Challenges to improving combat casualty survival on the battlefield.

Mabry RL, Delorenzo R

Quote:
“As a call to action, the following steps offer a potential way forward to overcome the challenges described above (Table I): (1) Adopt the IDF or similar model of combat casualty care focus and make an institutional commitment to eliminating potentially preventable death. Allow careful study of these deaths to drive the training, research, and development agenda. (2) Leadership of battlefield care must be established at the most senior level and the service medical departments held accountable for improving it. (3) Data and metrics must be obtained from the point of injury and throughout the continuum of care, and this information should drive evidence-based decisions. (4) Commit to training physician, nursing, and allied health providers to become “combat medical specialists” and placing them in key operational and institutional positions to leverage improvements in training, doctrine, research and development. (5) Research funds should be directed towards solving prehospital clinical problems and balanced to include research on training, organization, and leadership, not just material solutions. (6) The current paradigm of military medicine needs to evolve from an organizational culture chiefly focused on full-time beneficiary care in fixed facilities and part-time combat casualty care, the “HMO that goes war,” toward an organizational culture that treats battlefield care delivery as its essential core mission. This need not lessen the importance or scope of beneficiary care and if agilely executed, could enhance the prestige and cache of the beneficiary mission.”

Resuscitation. 2014 May;85(5):617-22

Airway management and out-of-hospital cardiac arrest outcome in the CARES registry.

McMullan J, Gerecht, Bonomo J, Robb R, McNally B, Donnelly J, Wang HE; CARES Surveillance Group

BACKGROUND: Optimal out of hospital cardiac arrest (OHCA) airway management strategies remain unclear. We compared OHCA outcomes between patients receiving endotracheal intubation (ETI) versus supraglottic airway (SGA), and between patients receiving [ETI or SGA] and those receiving no advanced airway.

METHODS: We studied adult OHCA in the Cardiac Arrest Registry to Enhance Survival (CARES). Primary exposures were ETI, SGA, or no advanced prehospital airway placed Primary outcomes were sustained ROSC, survival to hospital admission, survival to hospital discharge, and neurologically-intact survival to hospital discharge (cerebral performance category 1-2). Propensity scores characterized the probability of receiving ETI, SGA, or no advanced airway. We adjusted for Utstein confounders. Multivariable random effects regression accounted for clustering by EMS agency. We compared outcomes between (1) ETI vs. SGA, and (2) [no advanced airway] vs. [ETI or SGA].

RESULTS: Of 10,691 OHCA, 5591 received ETI, 3110 SGA, and 1929 had no advanced airway. Unadjusted neurologically-intact survival was: ETI 5.4%, SGA 5.2%, no advanced airway 18.6%. Compared with SGA, ETI achieved higher sustained ROSC (OR 1.35; 95%CI 1.19-1.54), survival to hospital admission (1.36; 1.19-1.55), hospital survival (1.41; 1.14-1.76) and hospital discharge with good neurologic outcome (1.44; 1.10-1.88). Compared with [ETI or SGA], patients receiving no advanced airway attained higher survival to hospital admission (1.31; 1.16-1.49), hospital survival (2.96; 2.50-3.51) and hospital discharge with good neurologic outcome (4.24; 3.46-5.20).

CONCLUSION: In CARES, survival was higher among OHCA receiving ETI than those receiving SGA, and for patients who received no advanced airway than those receiving ETI or SGA.

J Trauma Stress. 2014 Apr;27(2):152-9

Glasgow Coma Scores, early opioids, and posttraumatic stress disorder among combat amputees.

Melcer T, Walker J, Sechriest VF 2nd, Lebedda M, Quinn K, Galarneau M

Abstract:
A recent study found that combat amputees had a reduced prevalence of posttraumatic stress disorder (PTSD) compared with nonamputees with serious extremity injuries. We hypothesized that an extended period of impaired consciousness or early treatment with morphine could prevent consolidation of traumatic memory and the development of PTSD. To examine this hypothesis, we retrospectively reviewed 258 combat casualty records from the Iraq or Afghanistan conflicts from 2001-2008 in the Expeditionary Medical Encounter Database, including medications and Glasgow Coma Scale (GCS) scores recorded at in-theater facilities within hours of the index injury. All patients sustained amputations from injuries. Psychological diagnoses were extracted from medical records for 24 months postinjury. None of 20 patients (0%) with GCS scores of 12 or lower had PTSD compared to 20% of patients with GCS scores of 12 or greater who did have PTSD. For patients with traumatic brain injury, those treated with intravenous morphine within hours of injury had a significantly lower prevalence of PTSD (6.3%) and mood disorders (15.6%) compared to patients treated with fentanyl only (prevalence of PTSD = 41.2%, prevalence of mood disorder = 47.1%). GCS scores and morphine and fentanyl treatments were not significantly associated with adjustment, anxiety, or substance abuse disorders.

Wilderness Environ Med. 2014 Mar 12 [Epub ahead of print]

Evaluation of Fluid Bolus Administration Rates Using Ruggedized Field Intravenous Systems.

Morgan TR.

OBJECTIVE: The purpose of this study was to evaluate 2 ruggedized field intravenous (IV) systems currently in use by US military medics and to determine their effect on fluid bolus administration rates.

METHODS: A series of 500 mL fluid boluses consisting of either Lactated Ringer's solution or Hextend were delivered to 2 artificial intravenous training arms using a standard 18G catheter (control) and 2 separate ruggedized field IV systems. Fluid boluses were delivered under both gravity force and pressure infusion (constant 300 mm Hg), and total bolus times were recorded.

RESULTS: Using Lactated Ringer's solution, the standard IV system took a mean time of 9:33 minutes (95% CI: 9:13-9:54) to deliver a 500 mL fluid bolus whereas the 2 ruggedized field systems took mean times of 14:50 minutes (95% CI: 14:00-15:40) and 12:20 minutes (95% CI: 11:54-12:45). Using Hextend, the mean bolus time for the control system was 24:39 minutes (95% CI: 22:47-26:32). The 2 ruggedized field systems required an average of 49:32 minutes (95% CI: 48:07-50:58) and 39:46 minutes (95% CI: 37:30-42:01) to deliver an equivalent bolus. Pressure infusion significantly increased flow rate in all systems.

CONCLUSIONS: Ruggedized field IV systems can significantly delay fluid bolus rates. In instances where ruggedized field systems are deemed necessary, pressure infusion devices should be considered to overcome the constrictive effects of the ruggedized system.

Emerg Med J. 2014 Jan;31(1):35-40

Assessment of hypovolaemic shock at scene: is the PHTLS classification of hypovolaemic shock really valid?

Mutschler M, Nienaber U, Münzberg M, Fabian T, Paffrath T, Wölfl C, Bouillon B, Maegele M.

OBJECTIVE: Validation of the classification of hypovolaemic shock suggested by the prehospital trauma life support (PHTLS) in its sixth student course manual.

METHODS: Adults, entered into the TraumaRegister DGU(®) database between 2002 and 2011, were classified into reference ranges for heart rate (HR), systolic blood pressure (SBP) and Glasgow coma scale (GCS) according to the PHTLS classification of hypovolaemic shock. First, patients were grouped by a combination of all three parameters (HR, SBP and GCS) as suggested by PHTLS. Second, patients were classified by only one parameter (HR, SBP or GCS) according to PHTLS and alterations in the remaining two parameters were assessed. Furthermore, subgroup analysis for trauma mechanism and traumatic brain injury (TBI) were performed.

RESULTS: Out of 46 689 patients, only 12 432 (26.5%) could be adequately classified according to PHTLS if a combination of all three criteria was assessed. In TBI patients, only 12.2% could be classified adequately, whereas trauma mechanism had no significant influence. When patients were grouped by HR, there was only a slight reduction in SBP. When grouped by SBP, GCS dropped from 14 to 8, while no significant tachycardia was observed in any group. In patients with a GCS less than 12, HR was unaltered whereas SBP was slightly reduced to 114 (±42) mm Hg. On average, GCS in TBI patients was lower within all shock groups. In penetrating trauma patients, changes in HR and SBP were more distinct, but still less than predicted by PHTLS.

CONCLUSIONS: The PHTLS classification of hypovolaemic shock displays substantial deficits in adequately risk-stratifying trauma patients.

Ann Emerg Med. 2014 Jan;63(1):6-12.e3.

Comparison of bag-valve-mask hand-sealing techniques in a simulated model.

Otten D, Liao MM, Wolken R, Douglas IS, Mishra R, Kao A, Barrett W, Drasler E, Byyny RL, Haukoos JS

STUDY OBJECTIVE: Bag-valve-mask ventilation remains an essential component of airway management. Rescuers continue to use both traditional 1- or 2-handed mask-face sealing techniques, as well as a newer modified 2-handed technique. We compare the efficacy of 1-handed, 2-handed, and modified 2-handed bag-valve-mask technique.

METHODS: In this prospective, crossover study, health care providers performed 1-handed, 2-handed, and modified 2-handed bag-valve-mask ventilation on a standardized ventilation model. Subjects performed each technique for 5 minutes, with 3 minutes' rest between techniques. The primary outcome was expired tidal volume, defined as percentage of total possible expired tidal volume during a 5-minute bout. A specialized inline monitor measured expired tidal volume. We compared 2-handed versus modified 2-handed and 2-handed versus 1-handed techniques.

RESULTS: We enrolled 52 subjects: 28 (54%) men, 32 (62%) with greater than or equal to 5 actual emergency bag-valve-mask situations. Median expired tidal volume percentage for 1-handed technique was 31% (95% confidence interval [CI] 17% to 51%); for 2-handed technique, 85% (95% CI 78% to 91%); and for modified 2-handed technique, 85% (95% CI 82% to 90%). Both 2-handed (median difference 47%; 95% CI 34% to 62%) and modified 2-handed technique (median difference 56%; 95% CI 29% to 65%) resulted in significantly higher median expired tidal volume percentages compared with 1-handed technique. The median expired tidal volume percentages between 2-handed and modified 2-handed techniques did not significantly differ from each other (median difference 0; 95% CI -2% to 2%).

CONCLUSION: In a simulated model, both 2-handed mask-face sealing techniques resulted in higher ventilatory tidal volumes than 1-handed technique. Tidal volumes from 2-handed and modified 2-handed techniques did not differ. Rescuers should perform bag-valve-mask ventilation with 2-handed techniques.

Resuscitation 2014;Epub ahead of print

Tactical Combat Casualty Care rules applied to civilian traumatic cardiopulmonary resuscitation.

Pasquier P, Carbonnel N, Bensalah M, et al:

Quote:
“For the study interval between October 2001 and June 2011, 4596 battlefield fatalities in Operation Iraqi Freedom and Operation Enduring Freedom were reviewed and analyzed. 24.3% (n = 976) were deemed potentially survivable (PS).The injury/physiologic focus of PS acute mortality was largely associated with hemorrhage (90.9%) and airway compromise (8.0%).This analysis highlighted the importance of TCCC to impact the outcome of combat casualties with PS injury, including strategies developed to mitigate hemorrhage on the battlefield, optimize airway management, and decrease the time from point of injury to surgical intervention. Furthermore, also illustrated in the study of Kleber et al, some of the concepts and successes noted in TCCC are gaining increasing acceptance in civilian trauma care systems, including tourniquets, hemostatic agents, intraosseous devices andhypotensive resuscitation.

Anaesthesia. 2014 Mar;69(3)

The traffic light bougie: a study of a novel safety modification.

Paul A, Gibson AA, Robinson OD, Koch J.

Abstract:
Use of a bougie is not without risk, and insertion too far may cause airway injury. We designed a new bougie with a 'traffic light' system to indicate depth of insertion. Forty anaesthetists were randomly assigned to insert either aconventional single-coloured bougie or a novel traffic light bougie. Depth of insertion was measured before and after railroading a tracheal tube. Participants were not informed as to the purpose of the colouring system. The median (IQR [range]) insertion depth of the traffic light bougie was 22 (21-24 [19-27]) cm and for the conventional bougie was 28 (21-32 [20-35]) cm ($p = 0.011$). Median (IQR [range]) insertion depth after railroading for the traffic light bougie was 25 (25-28 [21-34]) cm and for the conventional bougie was 30.5 (27-35 [23-40]) cm ($p = 0.003$). This simple colouring system appears to allow intuitive use and significantly reduced the depth of bougie insertion. This system could be also used with other airway exchange devices to improve safety.

J Trauma Acute Care Surg. 2014 Mar;76(3):619-23

Self-expanding foam for prehospital treatment of severe intra-abdominal hemorrhage: dose finding study.

Peev MP, Rago A, Hwabejire JO, Duggan MJ, Beagle J, Marini J, Zugates G, Busold R, Freyman T, Velmahos GS, Demoya MA, Yeh DD, Fagenholz PJ, Sharma U, King DR.

BACKGROUND: Noncompressible abdominal bleeding is a significant cause of preventable death on the battlefield and in the civilian trauma environment, with no effective therapies available at point of injury. We previously described the development of a percutaneously administered, self-expanding, poly(urea)urethane foam that improved survival in a lethal Grade V hepatic and portal vein injury model in swine. In this study, we hypothesized that survival with foam treatment is dose dependent.

METHODS: A high-grade hepatoportal injury was created in a closed abdominal cavity, resulting in massive noncompressible hemorrhage. After injury, the animals were divided into five groups. The control group (n = 12) was treated only with fluid resuscitation, and four polymer groups received different dose volumes (Group 1, n = 6, 64 mL; Group 2, n = 6, 85 mL; Group 3, n = 18, 100 mL; and Group 4, n = 10, 120 mL) in addition to fluids. Ten minutes after injury, the foam was percutaneously administered, and animals were monitored for 3 hours.

RESULTS: Survival with hepatoportal injury was highest in Group 4 (90%) and decreased in a dose-dependent fashion (Group 3, 72%; Group 2, 33%; Group 1, 17%). All polymer groups survived significantly longer than the controls (8.3%). Hemorrhage rate was reduced in all groups but lowest in Group 4 versus the control group (0.34 [0.052] vs. 3.0 [1.3] mL/kg/min, $p < 0.001$). Increasing foam dose volume was associated with increased peak intra-abdominal pressure (88.2 [38.9] in Group 4 vs. 9.5 [3.2] in the controls, $p < 0.0001$) and increased incidence of focal bowel injuries.

CONCLUSION: The self-expanding foam significantly improves survival in a dose-dependent fashion in an otherwise lethal injury. Higher doses are associated with better survival but resulted in the need for bowel resection.

Ann Emerg Med. 2014 May;63(5):584-588

Interrupting My Shift: Disaster Preparedness and Response.

Pole T, Marcozzi D, Hunt RC

Quote:
“On April 15, 2013, 2 bombs exploded at the finish line of the Boston Marathon, wounding more than 260 and killing people. “The explosions took place at 2:50 P.M., twelve seconds apart. Medical personnel manning the runners’ first-aid tent swiftly converted it into a mass-casualty triage unit. Emergency medical teams mobilized en masse from around the city, resuscitated the injured, and somehow dispersed them to eight different hospitals in minutes, despite chaos and snarled traffic.” This citywide coordination was a result of long-term planning, a shared understanding of responsibility, and a well-executed use of medical volunteers who supported previous events.”

J Pain Symptom Manage. 2011 Mar;41(3):640-9

Ketamine

Quibell R, Prommer EE, Mihalyo M, Twycross R, Wilcock A

Quote:
"The analgesic effects of ketamine have been utilized in a wide range of clinical settings using various regimens and routes of administration.

Postoperative analgesia:

Two systematic reviews of 37 RCTs of subanesthetic doses of ketamine as an adjunct to opioid-based postoperative analgesia concluded that:
- IV and ED ketamine reduce opioid requirements and possibly chronic post-surgical pain
- CIVI (typically 120-600 microgram/kg/h) is best for surgery associated with high opioid requirements, although a single IV dose (typically 150 microgame1 mg/kg) may suffice for minor surgery
- adding ketamine to IV patient-controlled analgesia (PCA) is not effective.

Chronic non-cancer pain:

A review of subanesthetic doses of ketamine for chronic non-cancer pain (mostly neuropathic but also ischemic, fibromyalgia, post-whiplash, etc.) identified 29 RCTs and concluded that:
- ketamine provides relief
- undesirable effects can limit its use
- because of a lack of data, long-term use should be restricted to a controlled trial.

There is RCT evidence of benefit in complex regional pain syndrome type 1.

Cancer pain:

A systematic review of ketamine as an adjunct to opioids in cancer pain found only two studies of sufficient quality and concluded that there was insufficient robust evidence to reach a conclusion. Thus, in patients with cancer, evidence of ketamine's efficacy as an analgesic is mainly from case reports, retrospective surveys or uncontrolled studies in patients with refractory neuropathic, bone and mucositis-related pain. Generally, ketamine is used in addition to morphine or an alternative strong opioid when further opioid increments have been ineffective or precluded by unacceptable undesirable effects. When used in this way, ketamine is generally administered PO or SC/CSCI. It also can be administered IM, IV, SL, intranasally, PR and spinally (preservative-free formulation). However, for spinal routes, concerns have been raised about the potential for neurotoxicity with long-term use. Ketamine has been given by CIVI in adults and children in combination with opioids (fentanyl, morphine) and midazolam to control intractable cancer pain and agitation.

Miscellaneous:

Ketamine can provide analgesia during painful procedures, e.g., change of burns dressings. Topical ketamine has been applied to the skin in various non-cancer pains, and used as an oral rinse in radiation-induced mucositits.53

Anaesthesia. 2014 Mar;69(3):199-203

The humble bougie…forty years and still counting?

Rai MR

Quote:
“While challenging the need to elicit the hold-up sign, there are other important questions regarding the use of the bougie that need to be answered. Does there need to be a balance between the risk of infection and the risk of injury with the bougie, and is there sufficient evidence to suggest that the single-use bougie is ready to replace the reusable gum-elastic bougie? Is it time to have national guidelines on how we use, clean and sterilise the bougie, as there are for fibreoptic endoscopes? [68] There is no reason why something as important and as commonly used in anaesthetic practise as the humble bougie should not follow suit.”

Ann Surg. 2014 Mar 19

Increasing trauma deaths in the United States.

Rhee P, Joseph B, Pandit V, Aziz H, Vercruysse G, Kulvatunyou N, Friese RS.

OBJECTIVE: To determine the impact of the increasing aging population on trauma mortality relative to mortality from cancer and heart disease in the United States.

BACKGROUND: The population in the United States continues to increase as medical advancements allow people to live longer. The resulting changes in the leading causes of death have not yet been recognized.

METHODS: Data were obtained (2000-2010) from the Web-based Injury Statistics Query and Reporting System database of the Centers for Disease Control and Prevention. We defined trauma deaths as unintentional injuries, suicides, and homicides.

RESULTS: From 2000 to 2010, the US population increased by 9.7% and the number of trauma deaths increased by 22.8%. Trauma deaths and death rates deceased in individuals younger than 25 years but increased for those 25 years and older. During this period, death rates for cancer and heart disease decreased. The largest increases in trauma deaths were in individuals in their fifth and sixth decades of life. Since 2000, the largest proportional increase (118%) in crude trauma deaths occurred in 54-year-olds. Overall, in 2010, trauma was the leading cause of death in individuals 46 years and younger. Trauma remains the leading cause of years of life lost.

RESULTS: ***(sic)*** Trauma is now the leading cause of death for individuals 46 years and younger. The largest increase in the number of trauma deaths and the highest crude number of trauma deaths occurred in baby boomers. Policy makers allocating resources should be made aware of the larger impact of trauma on our aging and burgeoning US population.

N Engl J Med. 2014 May 15;370(20):1931-40

Case records of the Massachusetts General Hospital. Case 15-2014. A man in the military who was injured by an improvised explosive device in Afghanistan.

Sheridan RL, Shumaker PR, King DR, Wright CD, Itani KM, Cancio LC

Quote:

"Guidelines for care on the battlefield — including self-aid, buddy-aid, care under fire, and care provided by the combat medic or corpsman — are summarized in the Tactical Combat Casualty Care document, which describes an evidence-based approach to the care of military casualties during wartime and is updated at least annually.

One of the greatest advances in the prevention of death on the modern battlefield is the rediscovery of the tourniquet, which was effectively used in this case (Fig. 1C and 1D). The use of tourniquets began in 1798 or earlier, but in the past 10 years, small, compact, lightweight tourniquets (such as the one used in this case) have been developed and are extremely effective and ubiquitous on the battlefield. The philosophy regarding tourniquet use has also changed; instead of being used as a last-ditch measure, they are being used early and often to prevent blood loss. In the past, junctional wounds were much more difficult to manage than wounds of the arms and legs, but current devices that compress junctional wounds have made hemorrhage control possible. The liberal use of tourniquets and the use of advanced topical hemostatic agents represent major progress in the prehospital care of military casualties, but gaps in care still exist."

Open Access Emergency Medicine Dovepress 2013; 13 DEC 2014 Epub ahead of print

Auto-transfusion tourniquets: the next evolution of tourniquets.

David H Tang, Bohdan T Olesnicky, Michael W Eby, Lawrence E Heiskell

Abstract:
In this article, we discuss the relationship between hemorrhagic shock and the pathophysiology of shock using conventional tourniquets. We will focus on corollary benefits with the use of HemaClear®, a self-contained, sterile, exsanguinating auto-transfusion tourniquet. This discussion will demonstrate that the use of auto-transfusion tourniquets is a practical evidence-based approach in fluid resuscitation: it shortens the duration of shock after hemorrhage and trauma compared with conventional tourniquets. Emphasis is placed on the use of the HemaClear® as an alternative fluid resuscitation tool which is more efficient in the battlefield, pre-hospital and in-hospital settings.

Scand J Trauma Resusc Emerg Med. 2014 Jan 7;22:1

Prehospital risk factors of mortality and impaired consciousness after severe traumatic brain injury: an epidemiological study.

Tohme S, Delhumeau C, Zuercher M, Haller G, Walder B

BACKGROUND: Severe traumatic brain injury (TBI) is a significant health concern and a major burden for society. The period between trauma event and hospital admission in an emergency department (ED) could be a determinant for secondary brain injury and early survival. The aim was to investigate the relationship between prehospital factors associated with secondary brain injury (arterial hypotension, hypoxemia, hypothermia) and the outcomes of mortality and impaired consciousness of survivors at 14 days.

METHODS: A multicenter, prospective cohort study was performed in dedicated trauma centres of Switzerland. Adults with severe TBI (Abbreviated Injury Scale score of head region (HAIS) >3) were included. Main outcome measures were death and impaired consciousness (Glasgow Coma Scale (GCS) ≤13) at 14 days. The associations between risk factors and outcome were assessed with univariate and multivariate regression models.

RESULTS: 589 patients were included, median age was 55 years (IQR 33, 70). The median GCS in ED was 4 (IQR 3-14), with abnormal pupil reaction in 167 patients (29.2%). Median ISS was 25 (IQR 21, 34). Three hundred seven patients sustained their TBI from falls (52.1%) and 190 from a road traffic accidents (32.3%). Median time from Out-of-hospital Emergency Medical Service (OHEMS) departure on scene to arrival in ED was 50 minutes (IQR 37-72); 451 patients had a direct admission (76.6%). Prehospital hypotension was observed in 24 (4.1%) patients, hypoxemia in 73 (12.6%) patients and hypothermia in 146 (24.8%). Prehospital hypotension and hypothermia (apart of age and trauma severity) was associated with mortality. Prehospital hypoxemia (apart of trauma severity) was associated with impaired consciousness; indirect admission was a protective factor.

CONCLUSION: Mortality and impaired consciousness at 14 days do not have the same prehospital risk factors; prehospital hypotension and hypothermia is associated with mortality, and prehospital hypoxemia with impaired consciousness.

Prehosp Emerg Care. 2014 Apr-Jun;18(2):257-64

A comparison of ketamine and morphine analgesia in prehospital trauma care: a cluster randomized clinical trial in rural Quang Tri province, Vietnam.

Tran KP, Nguyen Q, Truong XN, Le V, Le VP, Mai N, Husum H, Losvik OK.

BACKGROUND: The use of opioid analgesics in prehospital trauma care has been reported to have negative side effects on the airway and circulation. Several studies of urban trauma management have recommend ketamine as a safe and efficient nalgesic. To date, however, no controlled trials of prehospital opioid analgesics versus ketamine in rural trauma management have been published.

OBJECTIVE: This study aimed to compare the analgesic effects and side effects of ketamine and morphine in a prehospital, low-resource setting.

METHODS: The study was conducted with a prospective, cluster-randomized design. The Quang Tri province of Vietnam was divided into two sectors that alternated monthly between ketamine and morphine treatments. A total of 169 trauma patients were treated outside hospital settings with ketamine, while 139 patients were treated with morphine.

RESULTS: The treatment effects were measured by comparing the Visual Analogue Scale (VAS) ratings in the field to those upon on admission. The analgesic effects were positive and similar for the two drugs. The rate of vomiting was significantly lower in the ketamine group (5%) than in the morphine group (19%, 95% CI for difference 8-22%). The rate of hallucinations and agitation was higher in ketamine-treated patients (11%) than in the morphine-treated patients (1.5%, 95% CI for difference 4-16%). In this study, patients with head trauma (n = 57) showed no adverse effects on consciousness level after being treated with ketamine.

CONCLUSION: Ketamine had an analgesic effect similar to morphine and carried a lower risk of airway problems. The risk of hallucinations and agitation was increased in the ketamine group. These findings are of medical significance, particularly in rough and low-resource scenarios.

Prehosp Emerg Care. 2014 Jan 24. [Epub ahead of print]

Risk Factors for Hypothermia in EMS-treated Burn Patients.

Weaver MD, Rittenberger JC, Patterson PD, McEntire SJ, Corcos AC, Ziembicki JA, Hostler D

Objective. Hypothermia has been associated with increased mortality in burn patients. We sought to characterize the body temperature of burn patients transported directly to a burn center by emergency medical services (EMS) personnel and identify the factors independently associated with hypothermia.

Methods. We utilized prospective data collected by a statewide trauma registry to carry out a nested case-control study of burn patients transported by EMS directly to an accredited burn center between 2000 and 2011. Temperature at hospital admission ≤36.5°C was defined as hypothermia. We utilized registry data abstracted from prehospital care reports and hospital records in building a multivariable regression model to identify the factors associated with hypothermia.

Results. Forty-two percent of the sample was hypothermic. Burns of 20-39% total body surface area (TBSA) (OR 1.44; 1.17-1.79) and ≥40% TBSA (OR 2.39; 1.57-3.64) were associated with hypothermia. Hypothermia was also associated with age > 60 (OR 1.50; 1.30-1.74), polytrauma (OR 1.58; 1.19-2.09), prehospital Glasgow Coma Scale <8 (OR 2.01; 1.46-2.78), and extrication (OR 1.49; 1.30-1.71). Hypothermia was also more common in the winter months (OR 1.54; 1.33-1.79) and less prevalent in patients weighing over 90 kg (OR 0.63; 0.46-0.88).

Conclusions. A substantial proportion of burn patients demonstrate hypothermia at hospital arrival. Risk factors for hypothermia are readily identifiable by prehospital providers. Maintenance of normothermia should be stressed during prehospital care.

J R Army Med Corps. 2013 Oct 23.

Battlefield administration of tranexamic acid by combat troops: a feasibility analysis.

Wright C.

Abstract:
This paper suggests that 1 g tranexamic acid should be incorporated as an intramuscular auto-injector and issued to combat troops for self- or buddy-administration in the event of suffering severe injury. Early administration of tranexamic acid has shown to be beneficial in preventing death from bleeding in trauma patients in both the military and the civilian settings. Tranexamic acid is cheap, safe, easy to administer and saves lives. Future conflicts may be characterised by prolonged pre-hospital times and delayed access to advanced medical care. The use of this drug is the next logical step in reducing combat trauma deaths.

J Emerg Med. 2014 Jan;46(1):38-45

Physician roles in tactical emergency medical support: the first 20 years.

Young JB, Sena MJ, Galante JM

BACKGROUND: The benefits of Tactical Emergency Medical Support (TEMS) elements are providing injury prevention, immediate care of injuries, and medical augmentation of the success of dangerous law enforcement operations. TEMS is recognized by civilian Special Weapons and Tactics (SWAT) and various other law enforcement agencies around the country as a vital addition to such SWAT teams. The integration of specially trained TEMS personnel has become a key component of law enforcement special operations.

OBJECTIVE: Our aim was to review the published literature to identify if there is a role for physicians within TEMS elements with regard to its establishment and progression, and to characterize the level of physician-specific support provided in the tactical environment for civilian tactical law enforcement teams.

DISCUSSION: Physician presence as part of TEMS elements is increasing in number and popularity as the realization of the benefits provided by such physicians has become more apparent. The inclusion of physicians as active and participating members of TEMS elements is a critical measure to be taken for tactical law enforcement units. Physicians provide an added level of medical expertise to TEMS elements in rural and urban settings compared with law enforcement personnel with medic training.

CONCLUSIONS: Physician involvement is an essential element of a successful TEMS program. There is a need for more physicians to become involved as TEMS personnel for specialized tactical teams to spread the time commitment and increase their availability to tactical units on a daily basis.