Tactical Combat Casualty Care

Journal Article Abstracts

Committee on Tactical Combat Casualty Care
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References

Abu-Zidan F, Balac K, Bhatia C: Surgeon-performed point-of-care ultrasound in severe eye trauma: report of two cases. World J Clin Cases 2016;16:344-350

Alarhayem A, Myers J, Dent D, et al: Time is the enemy: mortality in trauma patients with hemorrhage from torso injury occurs long before the “golden hour”. Am J Surg 2016;212:1101-1105

An J, Nam S, Seok J, et al: Comparison of the i-gel and other supraglottic airways in adult manikin studies. Medicine 2017;96:e5801

Anderson L, Granfeldt A, Callaway C, et al: Association between tracheal intubation during adult in-hospital cardiac arrest and survival. JAMA 2017;317:494-506

Baird E: Identification and management of obstetric hemorrhage. Anesthesiol Clin 2017;35:15-34

Beaucreux C, Martinez T, Pasquier P: Tourniquet use for treatment of vascular trauma in civilian casualties of terror-related explosions. J Trauma Acute Care Surg 2016;82:225

Bitter C, Erickson T: Management of burn injuries in the wilderness: lessons from low-resource management. Wilderness Environ Med 2016;Epub ahead of print

Bogert J, Patel B, Johnson D: Ultrasound optimization for resuscitative endovascular balloon occlusion of the aorta. J Trauma Acute Care Surg 2017;82:204-207

Bordes J, Joubert C, Esnault P, et al: Coagulopathy and transfusion requirements in war-related penetrating traumatic brain injury. A single centre study in a French Role 3 medical treatment facility in Afghanistan. Injury 2016;Epub ahead of print

Bowers K, McAllister K, Ray M, Heitz C: Ketamine as an adjunct to opioids for acute pain in the emergency department: a randomized controlled trial. Acad Emerg Med 2017;Epub ahead of print

Boysen S, Pang J, Mikler J, et al: Comparison of tranexamic acid plasma concentrations when administered via intraosseous and intravenous routes. Am J Emerg Med 2016;Epub ahead of print

Bradley M: Brief reports: systemic vascular access and resuscitation via corpus cavernosum. Mil Med 2016;181:e1491-e1494

Brasel K, Moore E, Albrecht R, et al: Western Trauma Association Critical decisions in trauma: management of rib fractures. J Trauma Acute Care Surg 2017;82:200-203

Braun C, Kisser U, Huber A, Stelter K: Bystander cricothyroidotomy with household devices- a fresh cadaveric feasibility study. Resuscitation 2016;110:37-41

Budidha K, Kyriacou P: In vivo investigation of ear canal pulse oximetry during hypothermia. J Clin Monit Comput 2017;Epub ahead of print

Caillot M, Hammad E, Le Baron M, et al: Pelvic trauma in multiple trauma: a 67-case series. Orthop Traumatol Surg Res 2016;102:1013-1016

Cakmak M, Mail Kandemir M: Study of 433 operated cases of thoracic trauma. Indian J Surg 2016;78:477-481

Callaway D: Don't let the word "myopic" blind you. J Spec Oper Med 2016;16:120-122

Cankaya D, Dasar U, Satilmis A, et al: The combined use of oral and topical tranexamic acid is a safe, efficient and low-cost method in reducing blood loss and transfusion rate in total knee arthroplasty. J Orthop Surg 2017;Epub ahead of print

Carfantan C, Goudard Y, Butin C, et al: Forward medevac during Serval and Barkhane operations in Sahel: a registry study. Injury 2016;Epub ahead of print

Chaturvedi A, Dowling M, Gustin J, et al: Hydrophobically modified chitosan gauze: a novel topical hemostat. J Surg Res. 2017 Jan;207:45-52

Choron R, Hazelton J, Hunter K, et al: Intra-abdominal packing with laparotomy pads and QuikClot™during damage control laparotomy: a safety analysis. Injury 2017;48:158-164

Cornelius B: Air medical administration of tranexamic acid. J Trauma Nurs 2017;24:30-33

Dainton C, Chu C: A review of electronic medical record keeping on mobile medical service trips in austere settings. Int J Med Inform 2017;98:33-40

Darby J, Halenda G, Chou C, et al: Emergency surgical airway following activation of a difficult airway management team in hospitalized critically ill patients: a case series. J Intensive Care Med 2016;Epub ahead of print

Davis A: When more is less efficacious: fibrinogen concentrate in complex cardiac surgery. Br J Anaesth 2016;117:415-417

De Vasconcelllos S, de Santana Santos T, Reinheimer D, et al: Topical application of tranexamic acid in anticoagulated patients undergoing minor oral surgery: a systematic review and meta-analysis of randomized clinical trials. J Craniomaxillofac Surg 2016;Epub ahead of print

Delmonaco B, Baker A, Clay J, Kilbourn J: Experience Of a US Air Force surgical and critical care team deployed in support of Special Operations Command Africa. J Spec Oper Med. 2016;16:103-8.

Driver B, Plummer D, Heegaard W, Reardon R: Tracheal malplacement of the King LT airway may be an important cause of prehospital device failure. J Emerg Med 2016;51:e133-e135

Driver B, Reardon R: Apnea after low-dose ketamine sedation during attempted delayed sequence intubation? Ann Emerg Med 2017;69:34-35

Etchill E, Sperry J, Zuckerbraun B, et al: The confusion continues: results from an American Association for the Surgery of Trauma survey on massive transfusion practices among United States trauma centers. Transfusion. 2016;56:2478-2486

Farnia M, Jalali A, Vahidi E, et al: Comparison of intranasal ketamine versus intravenous morphine in reducing pain in patients with renal colic. Am J Emerg Med 2016;Epub ahead of print

Friesgaard K, Christensen E, Kirkegaard H, et al: Prehospital intravenous fentanyl for patients with hip fracture: an observational cohort study of risk factors for analgesic non-treatment. Scand J Trauma Resusc Emerg Med 2017;25:5

Fröhlich M, Driessen A, Böhmer A, et al: Is the shock index based on classification of hypovolemic shock applicable in multiple injured patients with severe traumatic brain injury? – an analysis of the TraumaRegister DGU®. Scand J Trauma Resusc Emerg Med 2016;24:148

Gawlowski P, Smereka J, Madziala M, et al: Comparison of the Macintosh laryngoscope and blind intubation via the iGEL for intubation with cervical spine immobilization: a randomized, crossover, manikin trial. Am J Emerg Med 2016;Epub ahead of print

Ghadimi K, Levy J, Welsby I: Perioperative management of the bleeding patient. Br J Anaesth 2016;117:iii8-iii30

Gibson R, Aden J, Dubick M, Kragh J: Preliminary comparison of pneumatic models of tourniquet for prehospital control of limb bleeding in a manikin model. J Spec Oper Med 2016;16:21-7.

Haider A, Azim A, Rhee P, et al: Substituting systolic blood pressure with shock index in the National Trauma Protocol. J Trauma Acute Care Surg 2016;81:1136-1141

Halaweish I, Bambakidis T, Nikolian V, et al: Early resuscitation with lyophilized plasma provides equal neuroprotection compared with fresh frozen plasma in a large animal survival model of traumatic brain injury and hemorrhagic shock. J Trauma Acute Care Surg 2016;81:1080-1087

Hart D, Clinton J, Anders S, et al: Validation of an assessment tool for field endotracheal intubation. Mil Med 2016;181:e1484-e1490

Hata K, Propper B, Rich N: Fifty-year anniversary of the Vietnam Vascular Registry and a historic look at vascular registries. J Vasc Surg 2017;65:267-270

Heddle N, Cook D, Liu A, et al: Effect of short-term vs long-term blood storage on mortality after transfusion. N Engl J Med 2016;1937-1945

Helander E, Menard B, Harmon C, et al: Multimodal analgesia, current concepts, and acute pain considerations. Curr Pain Headache Rep 2017;21:3

Heldenberg E, Givon A, Simon D, et al: Civilian casualties of terror-related explosions: the impact of vascular trauma on treatment and prognosis. J Trauma Acute Care Surg 2016;81:435-440

Hernandez M, Zeb M, Heller S, et al: Tube thoracostomy complications increase cost. World J Surg 2017;Epub ahead of print

Holbery-Morgan L, Angel C, Murphy M, et al: Competence in the use of supraglottic airways by Australian surf lifesavers for cardiac arrest ventilation in a manikin. Emerg Med Australas 2017;29:63-68

Hollis G, Keene T, Ardlie R, et al: Prehospital ketamine use by paramedics in the Australian capitol territory: a 12 month retrospective analysis. Emerg Med Australas 2016;Epub ahead of print

Hood J: Life-saving hemorrhage control by tactical police using tourniquets and the iTClamp. JEMS 2016;on line publications Dec 22, 2016

Joseph B, Azim A, Zangbar B, et al: Improving mortality in trauma laparotomy through the evolution of damage control resuscitation: analysis of 1,030 consecutive trauma laparotomies. J Trauma Acute Care Surg 2017;82:328-333

Joseph B, Ibraheem K, Haider A, et al: Identifying potential utility of resuscitative endovascular balloon occlusion of the aorta: an autopsy study. J Trauma Acute Care Surg 2016;81:S128-S132

Kansagra A, Andrzejewski C, Krushell R, et al: Blood management strategies to reduce transfusion after elective lower-extremity joint arthroplasty surgeries. Am J Med Qual 2017;Epub ahead of print

Kaserer A, Stein P, Simmen H, et al: Failure rate of prehospital chest decompression after severe thoracic trauma. Am J Emerg Med 2016;Epub ahead of print

Kheirabadi B, Miranda N, Terrazas I, et al: Does small-volume resuscitation with crystalloids or colloids influence hemostasis and survival or rabbits subjected to lethal uncontrolled hemorrhage? J Trauma Acute Care Surg 2017;82:156-164

Koumpan Y, Murdoch J, Beyea J, et al: A case report: establishing a definitive airway in a trauma patient with a King Laryngeal Tube in Situ in the presence of a closed head injury and difficult airway: “between the devil and the deep blue sea”. A A Case Rep 2017;Epub ahead of print

Kragh J: “SWAT is a lifestyle - it’s a way of life” Ray Casillas on a career in operational medicine. J Spec Oper Med 2016;16:44-51

Kragh J, Mabry R, Parsons D, et al: Learning curves of emergency tourniquet use exploring for utility in training. J Spec Oper Med 2016;16:7-14.

Kumar K, Railton C, Tawfic Q: Tourniquet application during anesthesia: “What do we need to know?” J Anaesthesiol Clin Pharmacol 2016;32:424-430

Lau M, McCain S, Baker R, Harkin D: Belfast limb arterial and skeletal trauma (BLAST): the evolution of punishment shooting in Northern Ireland. Ir J Med Sci 2017;Epub ahead of print

Lechner R, Helm M, Mueller M, et al: Efficacy of hemostatic agents in humans with rotational thromboelastometry: an in-vitro study. Mil Med 2016;181:907-912

Li J, Li H, Zhao H, et al: Combined use of intravenous and topical versus intravenous tranexamic acid in primary total knee and hip arthroplasty: a meta-analysis of randomised controlled trails. J Orthop Surg Res 2017;12:22

Li L, Vlisides P: Ketamine: 50 Years of Modulating the Mind. Front Hum Neurosci. 2016 Nov 29;10:612.

Lidwell D, Meghoo C: A skeletal traction technique for proximal femur fracture management in an austere environment. J Spec Oper Med 2016;16:1-4

Lin C, Qi Y, Jie L: Is combined topical with intravenous tranexamic acid superior than topical, intravenous tranexamic acid alone and control groups for blood loss controlling after total knee arthroplasty: a meta-analysis. Medicine 2016;95:e5344

Liras I, Caplan H, Stensballe J, et al: Prevalence and impact of admission acute traumatic coagulopathy on treatment intensity, resource utilization, and mortality: an evaluation of 956 severely injured children and adolescents. J Am Coll Surg 2017;Epub ahead of print

Lockey D, Crewdson K, Davies G, et al: AAGBI: Safer pre-hospital anaesthesia 2017: Association of Anaesthetists of Great Britain and Ireland. Anaesthesia 2017;72:379-390

Lopez A, Agusti M, Gambus P, et al: A randomized comparison of the Ambu AuraGain versus the LMA supreme in patients undergoing gynaecologic laparoscopic surgery. J Clin Monit Comput 2016;Epub ahead of print

Maher D, Chen L, Mao J: Intravenous ketamine infusions for neuropathic pain management: a promising therapy in need of optimization. Anesth Analg 2017;124:661-674

Mahmood A, Roberts I, Shakur H, et al: Does tranexamic acid improve outcomes in traumatic brain injury? BMJ 2016;354:i4814

Martini W: Coagulation complications following trauma. Mil Med Res 2016;3:35

Matioc A: An anesthesiologist’s perspective on the history of basic airway management: the “artisanal anesthetic” era: 1846 to 1904. Anesthesiology 2017;Epub ahead of print

Mazhar F, Akram S, Haider N: Moxifloxacin-induced acute psychosis: a case report with literature review. J Res Pharm Pract 2016;5:294-296

McElnay P. Lim E: Modern techniques to insert chest drains. Thorac Surg Clin 2017;27:29-34

McKenzie M, Parrish E, Miles E, et al: A case of prehospital traumatic arrest in a US Special Operations Soldier. J Spec Oper Med 2016;16:93-96

Meena S, Benazzo F, Dwivedi S, Ghiara M: Topical versus intravenous tranexamic acid in total knee arthroplasty. J Orthop Surg 2017

Meusnier J, Dewar C, Mavrovi E, et al: Evaluation of two junctional tourniquets used on the battlefield: Combat Ready Clamp® versus SAM® junctional tourniquet. J Spec Oper Med 2016;16:41-46

Mitchell T, Herzig M, Fedyk C, et al: Traumatic hemothorax blood contains elevated levels of microparticles that are prothrombotic but inhibit platelet aggregation. Shock 2016;Epub ahead of print

Molnar T: Thoracic trauma: which chest tube when and where? Thorac Surg Clin 2017;27:13-23

Motov S, Rosenbaum S, Vilke G, et al: Is there a role for intravenous subdissociative-dose ketamine administered as an adjunct to opioids or as a single agent for acute pain management in the emergency department. J Emerg Med 2016;51:752-757

Myles O, Smith J, Forbes A, et al: Tranexamic acid in patients undergoing coronary-artery surgery. N Engl J Med 2017;376:136-148

Nakamura Y, Ishikura H, Kushimoto S, et al: Fibrinogen level on admission is a predictor for massive transfusion in patients with severe blunt trauma: analyses of a retrospective multicentere. Injury 2017;Epub ahead of print

Nakura N, Hirakawa K, Takayanagi S, et al: Additional intra-articular tranexamic acid further reduced postoperative blood loss compared to intravenous and topical bathed tranexamic acid in total hip arthroplasty: a retrospective sequential series study. Transfusion 2016;Epub ahead of print

Napolitano L: Prehospital tranexamic acid: what is the current evidence? BMJ 2017;Epub ahead of print

Nascimento B, Callum J, Tien H, et al: Fibrinogen in the initial resuscitation of severe trauma (FiiRST): a randomized feasibility trial. Br J Anaesth 2016;117:775-782

Noorman F, van Dongen T, Plat M, et al: Transfusion: -80°C frozen blood products are safe and effective in military casualty care. PLoS One 2016;11:e0168401

Olesnicky B, Rehak A, Bestic W, et al: A cadaver study comparing three fibreoptic-assisted techniques for converting a supraglottic airway to a cuffed tracheal tube. Anaesthesia 2016;Epub ahead of print

Ollivier J, Van Driessche S, Billuart F, et al: Tranexamic acid and total hip arthroplasty: optimizing the administration method. Ann Transl Med 2016;4:530

Payen J, Berthet M, Genty C: Reduced mortality by meeting guideline criteria before using recombinant activated factor VII in severe trauma patients with massive bleeding. Br J Anaesth 2016;117:470-476

Peiris D: A historical perspective on crush syndrome: the clinical application of its pathogenesis, established be the study of wartime crush injuries. J Clin Pathol 2016;Epub ahead of print

Petitpas F, Guenezan J, Vendeuvre T, et al: Use of intra-osseous access in adults: a systematic review. Crit Care. 2016 Apr 14;20:102.

Pinto M, Silva J, Chedid A, Chedid M: Use of tranexamic acid in trauma patients: an analysis of cost-effectiveness for use in Brazil. Arg Bras Cir Dig 2016;29:282-286

Pomeroy J, Marmura M, Nahas S, Viscusi E: Ketamine infusions for treatment refractory headache. Headache 2016;Epub ahead of print

Purvis T, Carlin B, Driscoll P: The definite risk and questionable benefits of liberal pre-hospital spinal immobilization. Am J Emerg Med 2017;Epub ahead of print

Ramirez R, Spinella P, Bochichio G: Tranexamic acid update in trauma. Crit Care Clin 2017;33:85-99

Roberts I, Edwards P, Prieto D, et al: Tranexamic acid in bleeding trauma patients: an exploration of benefits and harms. Trails 2017;18:48

Robertson C, Kesselheim A: Regulating off-label promotion - a critical test. N Engl J Med. 2016;375:2313-2315

Rybak M, Huffman L, Nahourali R, et al: Ultraportable oxygen concentrator use in U.S. Army Special Operations forward area surgery: a proof of concept in multiple environments. Mil Med 2017;182:e1649-e1652

Salem M, Khorasani A, Zeidan A, Crystal G: Cricoid pressure controversies: narrative review. Anesthesiology 2017;Epub ahead of print

Schleien C, Brandwein A: Ketamine again outside the operating room? Yes it works. Pediatr Crit Care Med 2016;17:1179-1180

Shang J, Wang H, Zheng B, et al: Combined intravenous and topical tranexamic acid versus intravenous use alone in primary total knee and hip arthroplasty: a meta-analysis of randomized controlled trials. Int J Surg 2016;36:324-329

Shenkman B, Budnik I, Einav Y, et al: Model of trauma-induced coagulopathy including hemodilution, fibrinolysis, acidosis, and hypothermia: impact on blood coagulation and platelet function. J Trauma Acute Care Surg 2017;82:287-292

Simmons J, Powell M: Acute traumatic coagulopathy: pathophysiology and resuscitation. Br J Anaesth 2016;117:iii31-iii43

Sokol K, Black G, Willey S, et al; There's an app for that: a handheld smartphone-based infrared imaging device to assess adequacy and level of aortic occlusion during REBOA. J Trauma Acute Care Surg 2017;82:102-108

Spaite D, Hu C, Bobrow B, et al: Mortality and prehospital blood pressure in patients with major traumatic brain injury: implications for the hypotension threshold. JAMA Surg 2016;Epub ahead of print

Spaite D, Hu C, Bobrow B, et al: The effect of combined out-of-hospital hypotension and hypoxia on mortality in major traumatic brain injury. Ann Emerg Med 2017 Jan;69:62-72

Steele J, Atkins J, Vizcaychipi M: Factors at scene and in transfer related to the development of hypothermia in major burns. Ann Burns Fire Disasters 2016;29:103-107

Stensballe J, Ostrowski S, Johansson P: Haemostatic resuscitation in trauma: the next generation. Curr Opin Crit Care 2016;22:591-597

Stocker R: "Normal" saline and CO: what is normal? Crit Care Med 2016;44:2282-2283

Swartz J, Vaidya R, Hudson I, et al: The effect of pelvic binder placement on OTA classification of pelvic ring injuries using computed tomography: does it mask the injury? J Orthop Trauma 2016 Jun;30:325-30

Tan T, Ng L, Kwang L, et al: Clinical characteristics and antimicrobial susceptibilities of anaerobic bacteremia in an acute care hospital. Anaerobe 2016;Epub ahead of print

Tourtier J: Combat casualty care improvement: a quality process. Anaesth Crit Care Pain Med 2017;Epub ahead of print

Tran T, Brasel K, Karmy-Jones R, et al: Western Trauma Association critical decisions in trauma: management of pelvic fracture with hemodynamic instability-2016 updates. J Trauma Acute Care Surg 2016;81:1171-1174

Tresson P, Touma J, Gaudric J, et al: Management of vascular trauma during the Paris terrorist attack of November 13, 2015. Ann Vasc Surg 2017;Epub ahead of print

Ullman M, Midgley K, Kim J, Ullman S: Anaphylactic reaction secondary to topical preoperative moxifloxacin. J Cataract Refract Surg 2016;42:1836-1837

Upchurch C, Grijalva C, Russ S, et al: Comparison of etomidate and ketamine for induction during rapid sequence intubation of adult trauma patients. Ann Emerg Med 2017;69:24-33

Vaidya R, Roth M, Zarling B, et al: Application of circumferential compression device (binder) in pelvic injuries: room for improvement. West J Emerg Med 2016;17:766-774

Van Berkel M, Exline M, Cape K, et al: Increased incidence of clinical hypotension with etomidate compared to ketamine for intubation in septic patients: a propensity matched analysis. J Crit Care 2016;38:209-214

Vara A, Koueiter D, Pinkas D, et al: Intravenous tranexamic acid reduces total blood loss in reverse total shoulder arthroplasty: a prospective, double-blinded, randomized, controlled trial. J Shoulder Elbow Surg 2017;Epub ahead of print

Ventua F, Diso D, Anile M, et al: Chest tubes: generalities. Thorac Surg Clin 2017; 27:1-5

Williams T, Neff L, Johnson M, et al: Automated variable aortic control vs. complete aortic occlusion in a swine model of hemorrhage. J Trauma Acute Care Surg 2017;Epub ahead of print

Winearls J, Campbell D, Hurn C, et al: Fibrinogen in traumatic haemorrhage: a narrative review. Injury 2017;48:230-242

Wordsworth M, Thomas R, Breeze J, et al: The surgical management of facial trauma in British soldiers during combat operations in Afghanistan. Injury 2017;48:70-74

Zampieri F, Ranzani O, Azevedo L, et al: Lactacted ringer is associated with reduced mortality and less acute kidney injury in critically ill patients: a retrospective cohort analysis. Crit Care Med 2016;44:2163-2170

Zhang P, Liang Y, Chen P, et al: Intravenous versus topical tranexamic acid in primary total hip replacement: a meta-analysis. Medicine 2016;95:e5573

Zhang X, Ni J, Ge W: Combined use of intravenous and topical versus intravenous tranexamic acid in primary total joint arthroplasty: a meta-analysis of randomized controlled trials. Int J Surg 2017; 38:15-20

Abstracts

World J Clin Cases. 2016 Oct 16;4(10):344-350.

Surgeon-performed point-of-care ultrasound in severe eye trauma: Report of two cases.

Abu-Zidan FM, Balac K, Bhatia CA

ABSTRACT:
The indications of point-of-care ultrasound (POCUS) in the management of multiple trauma patients have been expanding. Although computed tomography (CT) scan of the orbit remains the gold standard for imaging orbital trauma, ultrasound is a quick, safe, and portable tool that can be performed bedside. Here we report two patients who had severe eye injuries with major visual impairment where surgeon-performed POCUS was very useful. One had a foreign body injury while the other had blunt trauma. POCUS was done using a linear probe under sterile conditions with minimum pressure on the eyes. Ultrasound showed a foreign body at the back of the left eye globe touching the eye globe in the first patient, and was normal in the second patient. Workup using CT scan, fundoscopy, optical coherence tomography, and magnetic resonance imaging of the orbits confirmed these findings. The first patient had vitreous and sub retinal haemorrhage and a full thickness macular hole of the left eye, while the second had traumatic optic neuropathy. POCUS gave accurate information concerning severe eye injuries. Trauma surgeons and emergency physicians should be trained in performing ocular ultrasound for eye injuries.

Am J Surg. 2016 Dec;212(6):1101-1105.

Time is the enemy: Mortality in trauma patients with hemorrhage from torso injury occurs long before the "golden hour".

Alarhayem A, Myers J, Dent D, Liao L, Muir M, Mueller D, Nicholson S, Cestero R, Johnson M, Stewart R, O'Keefe G, Eastridge B.

INTRODUCTION: The concept of the "Golden Hour" has been a time-honored tenet of prehospital trauma care, despite a paucity of data to substantiate its validity. non-compressible torso hemorrhage has been demonstrated to be a significant cause of mortality in both military and civilian settings. We sought to characterize the impact of prehospital time and torso injury severity on survival. Furthermore, we hypothesized that time would be a significant determinant of mortality in patients with higher Abbreviated Injury Scale (AIS) grades of torso injury (AIS ≥ 4) and field hypotension (prehospital SBP ≤ 110 mmHg) as these injuries are commonly associated with hemorrhage.

METHODS: Data for this analysis was generated from a registry of 2,523,394 injured patients entered into the National Trauma Data Bank Research Data Set from 2012 to 2014. Patients with torso injury were identified utilizing Abbreviated Injury Scale (AIS) for body regions 4 (Thorax) and 5 (Abdomen). Specific inclusion criteria for this study included pre-hospital time, prehospital SBP ≤110 mmHg, torso injury qualified by AIS and mortality. Patients with non-survivable torso injury (AIS = 6), severe head injuries (AIS ≥ 3), no signs of life in the field (SBP = 0), interfacility transfers, or those with any missing data elements were excluded. This classification methodology identified a composite cohort of 42,135 adult patients for analysis.

RESULTS: The overall mortality rate of the study population was 7.9% (3326/42,135); Torso AIS and prehospital time were noted to be strong independent predictors of patient mortality in all population strata of the analysis ($P < 0.05$). The data demonstrated a profound incremental increase in mortality in the early time course after injury associated with torso AIS ≥4.

CONCLUSION: In patients with high-grade torso injury, AIS grades ≥4, the degree anatomic disruption is associated with significant hemorrhage. In our study, a precipitous rise in patient mortality was exhibited in this high-grade injury group at prehospital times <30 min. Our data highlight the critical nature of prehospital time in patients with non-compressible torso hemorrhage. However, realizing that evacuation times ≤30 min may not be realistic, particularly in rural or austere environments, future efforts should be directed toward the development of therapies to increase the window of survival in the prehospital environment.

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Comparison of the i-gel and other supraglottic airways in adult manikin studies: Systematic review and meta-analysis.

An J, Nam SB, Lee JS, Lee J, Yoo H, Lee HM, Kim MS.

BACKGROUND: The i-gel has a gel-like cuff composed of thermoplastic elastomer that does not require cuff inflation. As the elimination of cuff inflation may shorten insertion time, the i-gel might be a useful tool in emergency situations requiring prompt airway care. This systematic review and meta-analysis of previous adult manikin studies for inexperienced personnel was performed to compare the i-gel with other supraglottic airways.

METHODS: We searched PubMed, the Cochrane Library, and EMBASE for eligible randomized controlled trials (RCTs) published before June 2015, including with a crossover design, using the following search terms: "i-gel," "igel," "simulation," "manikin," "manikins," "mannequin," and "mannequins." The primary outcomes of this review were device insertion time and the first-attempt success rate of insertion.

RESULTS: A total of 14 RCTs were included. At the initial assessment without difficult circumstances, the i-gel had a significantly shorter insertion time than the LMA Classic, LMA Fastrach, LMA Proseal, LMA Unique, laryngeal tube, Combitube, and EasyTube. However, a faster insertion time of the i-gel was not observed in comparisons with the LMA Supreme, aura-i, and air-Q. In addition, the i-gel did not show better results for the insertion success rate when compared to other devices.

CONCLUSION: The findings of this meta-analysis indicated that inexperienced volunteers placed the i-gel more rapidly than other supraglottic airways with the exception of the LMA Supreme, aura-i, and air-Q in manikin studies. However, the quicker insertion time is clinically not relevant. The unapparent advantage regarding the insertion success rate and the inherent limitations of the simulation setting indicated that additional evidence is necessary to confirm these advantages of the i-gel in an emergency setting.

JAMA. 2017 Feb 7;317(5):494-506.

Association Between Tracheal Intubation During Adult In-Hospital Cardiac Arrest and Survival.

Andersen LW, Granfeldt A, Callaway C, Bradley S, Soar J, Nolan J, Kurth T, Donnino M

Importance: Tracheal intubation is common during adult in-hospital cardiac arrest, but little is known about the association between tracheal intubation and survival in this setting.

Objective: To determine whether tracheal intubation during adult in-hospital cardiac arrest is associated with survival to hospital discharge. Design, Setting, and Participants: Observational cohort study of adult patients who had an in-hospital cardiac arrest from January 2000 through December 2014 included in the Get With The Guidelines-Resuscitation registry, a US-based multicenter registry of in-hospital cardiac arrest. Patients who had an invasive airway in place at the time of cardiac arrest were excluded. Patients intubated at any given minute (from 0-15 minutes) were matched with patients at risk of being intubated within the same minute (ie, still receiving resuscitation) based on a time-dependent propensity score calculated from multiple patient, event, and hospital characteristics.

Main Outcomes and Measures: The primary outcome was survival to hospital discharge. Secondary outcomes included return of spontaneous circulation (ROSC) and a good functional outcome. A cerebral performance category score of 1 (mild or no neurological deficit) or 2 (moderate cerebral disability) was considered a good functional outcome.

Results: The propensity-matched cohort was selected from 108 079 adult patients at 668 hospitals. The median age was 69 years (interquartile range, 58-79 years), 45 073 patients (42%) were female, and 24 256 patients (22.4%) survived to hospital discharge. Of 71 615 patients (66.3%) who were intubated within the first 15 minutes, 43 314 (60.5%) were matched to a patient not intubated in the same minute. Survival was lower among patients who were intubated compared with those not intubated: 7052 of 43 314 (16.3%) vs 8407 of 43 314 (19.4%), respectively (risk ratio [RR] = 0.84; 95% CI, 0.81-0.87; P < .001). The proportion of patients with ROSC was lower among intubated patients than those not intubated: 25 022 of 43 311 (57.8%) vs 25 685 of 43 310 (59.3%), respectively (RR = 0.97; 95% CI, 0.96-0.99; P < .001). Good functional outcome was also lower among intubated patients than those not intubated: 4439 of 41 868 (10.6%) vs 5672 of 41 733 (13.6%), respectively (RR = 0.78; 95% CI, 0.75-0.81; P < .001). Although differences existed in prespecified subgroup analyses, intubation was not associated with improved outcomes in any subgroup.

Conclusions and Relevance: Among adult patients with in-hospital cardiac arrest, initiation of tracheal intubation within any given minute during the first 15 minutes of resuscitation, compared with no intubation during that minute, was associated with decreased survival to hospital discharge. Although the study design does not eliminate the potential for confounding by indication, these findings do not support early tracheal intubation for adult in-hospital cardiac arrest.

Anesthesiol Clin. 2017 Mar;35(1):15-34.

Identification and Management of Obstetric Hemorrhage.

Baird E.

ABSTRACT:
Obstetric hemorrhage remains the leading cause of maternal death and severe morbidity worldwide. Although uterine atony is the most common cause of peripartum bleeding, abnormal placentation, coagulation disorders, and genital tract trauma contribute to adverse maternal outcomes. Given the inability to reliably predict patients at high risk for obstetric hemorrhage, all parturients should be considered susceptible, and extreme vigilance must be exercised in the assessment of blood loss and hemodynamic stability during the peripartum period. Obstetric-specific hemorrhage protocols, facilitating the integration and timely escalation of pharmacologic, radiological, surgical, and transfusion interventions, are critical to the successful management of peripartum bleeding.

J Trauma Acute Care Surg. 2017 Jan;82(1):225.

Tourniquet use for treatment of vascular trauma in civilian casualties of terror-related explosions.

Beaucreux C, Martinez T, Pasquier P.

Quotes:

"Tourniquet use reliably stops bleeding from limb wounds and prevents mortality in prehospital settings; moreover, brief tourniquet use appears to be safe. These two lessons have become so evident that civilian emergency medical systems have begun using them, albeit unevenly. (2,3) A recent systematic nationwide assessment of emergency medical services prehospital extremity exsanguination control protocols hypothesized that most states within the United States lack a detailed uniform extremity exsanguination protocol that includes tourniquet use.(3) It has revealed considerable discrepancy and frequent deficiencies in extremity bleeding control recommendations. Only 13 statewide protocols (31%) referred to ''commercial'' or ''approved'' tourniquets, and only three (7%) recommended a particular commercial device."

"….the majority of TKs were appropriately applied to civilians who had vascular injuries or required operative intervention for hemorrhage control (15/22) tourniquet ''eligible'' patients).(4) Regardless of the circumstances of tourniquet application, there were no adverse sequelae related to emergency tourniquet use among any patient who received a tourniquet in this study. The liberal use of TKs in the civilian setting posed a much lower risk for adverse sequelae than the risk of fatal exsanguination in the setting of uncontrolled extremity hemorrhage."

Wilderness Environ Med. 2016 Oct 28. pii: S1080-6032(16)30216-2.

Management of Burn Injuries in the Wilderness: Lessons from Low-Resource Settings.

Bitter C, Erickson T

ABSTRACT:
Burns are a common source of injuries worldwide, with a high burden of disease in low- and middle-income countries. Burns also account for 2%-8% of wilderness injuries. Although many are minor, the potential for serious morbidity and mortality exists, and standard treatments used in high-resource settings are not readily available in the backcountry. A literature review was performed to find evidence from low-resource settings that supports alternative or improvised therapies that may be adapted to care of burns in the wilderness. There is good evidence for use of oral rehydration to support volume status in burn patients. There is moderate evidence to support cold therapy as first aid and adjunct for pain control. Some evidence supports use of alternative dressings such as boiled potato peel, banana leaf, aloe vera, honey, sugar paste, and papaya when standard therapies are not available.

J Trauma Acute Care Surg. 2017 Jan;82(1):204-207. doi: 10.1097/TA.0000000000001293.

Ultrasound optimization for resuscitative endovascular balloon occlusion of the aorta.

Bogert JN, Patel BM, Johnson DJ.

Quote:

"In this report, we show that the role of bedside emergency department ultrasonography can be expanded by guiding proper anatomic placement of an endovascular aortic occlusion balloon as well as guiding adequate and safe inflation volumes. However, challenges exist in transitioning this cadaver-based model to the care of the actively hemorrhaging patient where differences in body habitus and the potential for hemoperitoneum may affect the accuracy of this method. It is well known that ultrasonography is user dependent. In this study, ultrasonography was performed by an experienced ultrasonographer (B.M.P.) who was able to identify the pertinent landmarks without difficulty. However, it is unknown what level of proficiency beyond the basic focused assessment with sonography for trauma examination is needed to perform this task on the actively bleeding trauma patient."

Injury. 2016 Nov 21. pii: S0020-1383(16)30762-8. doi:10.1016/j.injury.2016.11.023. [Epub ahead of print]

Coagulopathy and transfusion requirements in war related penetrating traumatic brain injury. A single centre study in a French role 3 medical treatment facility in Afghanistan.

Bordes J, Joubert C, Esnault P, Montcriol A, Nguyen C, Meaudre E, Dulou R, Dagain A

INTRODUCTION: Traumatic brain injury associated coagulopathy is frequent, either in isolated traumatic brain injury in civilian practice and in combat traumatic brain injury. In war zone, it is a matter of concern because head and neck are the second most frequent site of wartime casualty burden. Data focusing on transfusion requirements in patients with war related TBI coagulopathy are limited.

MATERIALS AND METHODS: A descriptive analysis was conducted of 77 penetrating traumatic brain injuries referred to a French role 3 medical treatment facility in Kabul, Afghanistan, deployed on the Kabul International Airport (KaIA), over a 30 months period.

RESULTS: On 77 patients, 23 died during the prehospital phase and were not included in the study. Severe traumatic brain injury represented 50% of patients. Explosions were the most common injury mechanism. Extracranial injuries were present in 72% of patients. Traumatic brain injury coagulopathy was diagnosed in 67% of patients at role 3 admission. Red blood cell units (RBCu) were transfused in 39 (72%) patients, French lyophilized plasma (FLYP) in 41 (76%), and fresh whole blood (FWB) in 17 (31%).

CONCLUSION: The results of this study support previous observations of coagulopathy as a frequent complication of traumatic brain injury. The majority of patients with war related penetrating traumatic brain injury presented with extracranial lesions. Most of them required a high level of transfusion capacity.

Acad Emerg Med. 2017 Feb 8. doi: 10.1111/acem.13172. [Epub ahead of print]

Ketamine as an Adjunct to Opioids for Acute Pain in the Emergency Department: A randomized controlled trial.

Bowers KJ, McAllister KB, Ray M, Heitz C

OBJECTIVES: This study had five objectives: 1) to measure and compare total opioid use and number of opioid doses in patients treated with opioids versus ketamine in conjunction with opioids. 2) To measure pain scores up to 2 hours after presentation in the ED patient with pain, comparing standard opioid pain control to ketamine in conjunction with opioids. 3) To compare patient satisfaction with pain control using opioids alone versus ketamine in conjunction with opioids. 4) To monitor and compare side effects in patients treated with opioids versus ketamine in conjunction with opioids. 5) To identify effect variation between different subgroups of patients, with the purpose of focusing future research. We hypothesized that low-dose ketamine, compared to placebo, as an adjunctive treatment to opioids would result in better pain control over 2 hours and greater patient satisfaction with pain control; further, this protocol will result in a lower opioid dosage over 2 hours.

METHODS: This was a randomized, double-blinded, placebo-controlled trial at a single academic emergency department evaluating the use of ketamine versus placebo in conjunction with opioids for moderate to severe pain. Subjects with a continued high level of pain after an initial dose of opioid analgesia were randomized to receive either 0.1 mg/kg of ketamine or placebo prior to protocol-based dosing of additional opioid analgesia, if required. Over 120 minutes, subjects were assessed for pain level (0-10), satisfaction with pain control (0-4), side effects, sedation level and need for additional pain medication. Total opioid dose, including the initial dose, was compared between groups.

RESULTS: Sixty-three subjects were randomized to the placebo group and 53 to the ketamine group. No significant differences were found in demographics between the groups. Patients receiving ketamine reported lower pain scores over 120 minutes than patients receiving placebo ($p = 0.015$). Total opioid dose was lower in the ketamine group (9.95 mg, SD 4.83) compared to placebo (12.81 mg, SD 6.81), $p = 0.02$. Satisfaction did not differ between groups. Fewer patients in the ketamine group required additional opioid doses. More patients reported light-headedness and dizziness in the ketamine group.

CONCLUSIONS: Ketamine, as an adjunct to opioid therapy, was more effective at reducing pain over 120 minutes and resulted in a lower total opioid dose as well as fewer repeat doses of analgesia. More side effects were reported in the ketamine group (51% vs 19%), but the side effect profile appears tolerable.

Am J Emerg Med. 2017 Feb;35(2):227-233.

Comparison of tranexamic acid plasma concentrations when administered via intraosseous and intravenous routes.

Boysen S, Pang J, Mikler J, Knight C, Semple H, Caulkett N

INTRODUCTION: There is a lack of information regarding intraosseous (IO) administration of tranexamic acid (TXA). Our hypothesis was that a single bolus IO injection of TXA will have a similar pharmacokinetic profile to TXA administered at the same dose IV.

METHODS: Sixteen male Landrace cross swine (mean body weight 27.6±2.6kg) were divided into an IV group (n=8) and an IO group (n=8). Each animal received 30mg/kg TXA via an IV or IO catheter, respectively. Jugular blood samples were collected for pharmacokinetic analysis over a 3h period. The maximum TXA plasma concentration (Cmax) and corresponding time as well as distribution half-life, elimination half-life, area under the curve, plasma clearance and volume of distribution were calculated. One- and two-way analysis of variance for repeated measures (time, group) with Tukey's and Bonferonni post hoc tests were used to compare TXA plasma concentrations within and between groups, respectively.

RESULTS: Plasma concentrations of TXA were significantly higher ($p<0.0001$) in the IV group during the TXA infusion. Cmax occurred at 4min after initiation of the bolus in the IV group (9.36±3.20ng/μl) and at 5min after initiation of the bolus in the IO group (4.46±0.49ng/μl). Plasma concentrations were very similar from the completion of injection onwards. There were no significant differences between the two administration routes for any other pharmacokinetic variables measured.

CONCLUSION: The results of this study support pharmacokinetic bioequivalence of IO and IV administration of TXA.

Mil Med. 2016 Nov;181(11):e1491-e1494.

Brief Report: Systemic Vascular Access and Resuscitation via Corpus Cavernosum.

Bradley M

BACKGROUND: Pre-hospital systemic vascular access with early resuscitation in the hypovolemic trauma patient can be problematic and is attempted through venous cut-downs, peripheral IV lines, and/or interosseous routes. This brief report examines an alternative for males via the corpus cavernosum (CC).

METHODS: A systematic literature review using certain inclusion criteria including, but not limited to, corpus cavernosum access and resuscitation was conducted and a summary table created.

FINDINGS: The six articles that met criteria revealed quick and easy CC access with rapid flow rates and resuscitation times in both humans and in animal models using either fluids or blood products. Only one article revealed a complication which was a shaft hematoma that resolved spontaneously over a period of a few days.

DISCUSSION/IMPACT/RECOMMENDATIONS: Systemic vascular access and resuscitation via the CC could be considered as a safe and effective alternative if more traditional techniques fail in an appropriate pre-hospital hypovolemic male casualty (i.e., no genital or pelvic trauma that could interfere with the technique). If further studies are conducted and the technique more robustly validated it could be considered as a possible addition to pre-hospital treatment protocols such as TCCC. Possible publication bias could have been a limitation of this study.

J Trauma Acute Care Surg. 2017 Jan;82(1):200-203

Western Trauma Association Critical Decisions in Trauma: Management of rib fractures.

Brasel K, Moore E, Albrecht R, deMoya M, Schreiber M, Karmy-Jones R, Rowell S, Namias N, Cohen M, Shatz DV, Biffl W

ABSTRACT:
This is a recommended management algorithm from the Western Trauma Association addressing the management of adult patients with rib fractures. Because there is a paucity of published prospective randomized clinical trials that have generated Class I data, these recommendations are based primarily on published observational studies and expert opinion of Western Trauma Association members. The algorithm and accompanying comments represent a safe and sensible approach that can be followed at most trauma centers. We recognize that there will be patient, personnel, institutional, and situational factors that may warrant or require deviation from the recommended algorithm. We encourage institutions to use this as a guideline to develop their own local protocols.

Resuscitation. 2017 Jan;110:37-41.

Bystander cricothyroidotomy with household devices - A fresh cadaveric feasibility study.

Braun C, Kisser U, Huber A, Stelter K

INTRODUCTION: In various motion pictures, medical TV shows and internet chatrooms, non-medical devices were presented as tools for life-saving cricothyroidotomies. However, there is uncertainty about whether it is possible for a bystander to perform a cricothyroidotomy and maintain gas exchange using improvised household items. This study examines the ability of bystanders to carry out an emergency cricothyroidotomy in fresh human cadavers using only a pocket knife and a ballpoint pen.

MATERIALS AND METHODS: Two commonly available pens and five different pocket knives were used. Ten participants with no or only basic anatomical knowledge had to choose one of the pens and one of the knives and were asked to perform a cricothyroidotomy as quickly as possible after a short introduction. Primary successful outcome was a correct placement of the pen barrel and was determined by the thoracic lifting in a mouth-to-pen resuscitation.

RESULTS: Eight (80%) participants performed a successful approach to the upper airway with a thoracic lifting at the end. Five participants performed a cricothyroidotomy and three performed an unintentional tracheotomy. Injuries to muscles and cartilage were common, but no major vascular damage was seen in the post-procedural autopsy. However, mean time in the successful group was 243s.

CONCLUSION: In this cadaveric model, bystanders with variable medical knowledge were able to establish an emergency cricothyroidotomy in 80% of the cases only using a pocketknife and a ballpoint pen. No major complications (particularly injuries of arterial blood vessels or the oesophagus) occurred. Although a pocket knife and ballpoint pen cricothyroidotomy seem a very extreme procedure for a bystander, the results of our study suggest that it is a feasible option in an extreme scenario. For a better outcome, the anatomical landmarks of the neck and the incision techniques should be taught in emergency courses.

J Clin Monit Comput. 2017 Jan 27. doi: 10.1007/s10877-017-9975-4. [Epub ahead of print]

In vivo investigation of ear canal pulse oximetry during hypothermia.

Budidha K, Kyriacou P

ABSTRACT:
Pulse oximeters rely on the technique of photoplethysmography (PPG) to estimate arterial oxygen saturation (SpO[Formula: see text]). In conditions of poor peripheral perfusion such as hypotension, hypothermia, and vasoconstriction, the PPG signals detected are often weak and noisy, or in some cases unobtainable. Hence, pulse oximeters produce erroneous SpO[Formula: see text] readings in these circumstances. The problem arises as most commercial pulse oximeter probes are designed to be attached to peripheral sites such as the finger or toe, which are easily affected by vasoconstriction. In order to overcome this problem, the ear canal was investigated as an alternative site for measuring reliable SpO[Formula: see text] on the hypothesis that blood flow to this central site is preferentially preserved. A novel miniature ear canal PPG sensor was developed along with a state of the art PPG processing unit to investigate PPG measurements from the bottom surface of the ear canal. An in vivo study was carried out in 15 healthy volunteers to validate the developed technology. In this comparative study, red and infrared PPGs were acquired from the ear canal and the finger of the volunteers, whilst they were undergoing artificially induced hypothermia by means of cold exposure (10 [Formula: see text]C). Normalised Pulse Amplitude (NPA) and SpO[Formula: see text] was calculated from the PPG signals acquired from the ear canal and the finger. Good quality baseline PPG signals with high signal-to-noise ratio were obtained from both the PPG sensors. During cold exposure, significant differences were observed in the NPA of the finger PPGs. The mean NPA of the red and infrared PPGs from the finger have dropped by >80%. Contrary to the finger, the mean NPA of red and infrared ear canal PPGs had dropped only by 0.2 and 13% respectively. The SpO[Formula: see text]s estimated from the finger sensor have dropped below 90% in five volunteers (failure) by the end of the cold exposure. The ear canal sensor, on the other hand, had only failed in one volunteer. These results strongly suggest that the ear canal may be used as a suitable alternative site for monitoring PPGs and arterial blood oxygen saturation at times were peripheral perfusion is compromised.

Orthop Traumatol Surg Res. 2016 Dec;102(8):1013-1016. doi: 10.1016/j.otsr.2016.08.018. Epub 2016 Nov 15.

Pelvic fracture in multiple trauma: A 67-case series.

Caillot M, Hammad E, Le Baron M, Villes V, Leone M, Flecher X

INTRODUCTION: Severe pelvic trauma remains associated with elevated mortality, largely due to hemorrhagic shock.

OBJECTIVE: The main study objective was to test for correlation between fracture type and mortality. The secondary objective was to assess the efficacy in terms of mortality of multidisciplinary management following a decision-tree in multiple trauma victims admitted to a level 1 trauma center.

MATERIAL AND METHODS: Between July 2011 and July 2013, 534 severe trauma patients were included in a single-center continuous prospective observational study. All patients with hemorrhagic shock received early treatment by pelvic binder. Patients with active bleeding on full-body CT or persisting hemorrhagic shock underwent arteriography with or without embolization. Pelvic trauma was graded on the Tile classification. The principle end-point was mortality.

RESULTS: Median age was 40 years (range, 26-48 years), with a 79% male/female sex ratio. Thirty-two of the 67 patients with pelvic trauma (48%) were in hemorrhagic shock at admission. Median injury severity score (ISS) was 36 (range, 24-43). On the Tile classification, 22 patients (33%) were grade A, 33 (49%) grade B and 12 (18%) grade C. Overall mortality was 19%, and 42% in case of hemorrhagic shock. Mortality was significantly higher with Tile C than A or B (58% vs. 9.1% and 12.1%, respectively; P=0.001).

CONCLUSION: Vertical shear fracture (Tile C) was associated with greater mortality from hemorrhagic shock.

Indian J Surg. 2016 Dec;78(6):477-481.

Study of 433 Operated Cases of Thoracic Trauma.

Çakmak M, Kandemir MN

ABSTRACT:
Patients with thoracic trauma constitute one third of all the trauma cases. Of traumatic patients, 20-25 % die because of thoracic trauma. Our aim was to compare our clinical experience and the results with the related literature. Four hundred thirty-three patients, who underwent surgical interventions due to thoracic trauma, were evaluated. The latest form of treatment applied were taken as the criteria for the quantitative detection of patients. Continuous variables were expressed as mean ± standard deviation, while categorical variables were explained as number and percentage. The significance of the analysis results was evaluated using Fisher's exact test. p values <0.05 were considered as significant. Penetrating injuries were found in 258 (59 %) of the patients, and blunt trauma was identified in 175 (41 %). Depending on the trauma, pneumothorax was discovered in 130 patients (30.02 %), hemothorax in 117 (27.02 %), hemopneumothorax in 61 (14.08 %), pulmonary contusion in 110 (45 %), pneumomediastinum in 14 (3.23 %), and pericardial tamponade in 1 patient (0.23 %). It was demonstrated that 385 of 433 patients examined in the study underwent tube thoracostomy, 41 were treated with thoracotomy, while 6 of them underwent video-assisted thoracoscopic surgery (VATS), and 1 underwent sternotomy. No correlation was observed between mortality, morbidity, and gender and type of trauma and location of trauma ($p > 0.05$). However, statistically significant correlation was found between mortaxlity, morbidity, and the presence of concomitant injuries, the duration between injury and admission being more than 1 h ($p < 0.05$). Urgent intervention, early diagnosis, and fast transport are vital for patients with thoracic injuries.

J Spec Oper Med. 2016 fall;16(3):120-122.

Don't Let the Word "Myopic" Blind You.

Callaway D

Quotes:

"The Journal of Trauma and Acute Care Surgery article out of George Washington University titled, "The Profile of Wounding in Civilian Public Mass Shooting (CPMS) Fatalities" is currently one of the most hotly debated academic articles in the tactical community.1 The article uses some provocative language that reflects the authors' passion and frustration at the lack of data to inform public policy decisions. Thankfully, it has sparked motivation to solve some of the data collection challenges plaguing the civilian healthcare and prehospital systems. However, the unfortunate use of the word "myopic" in the article to describe some of the current initiatives may have blinded some readers to the authors' actual conclusions."

"In fact, the ACEP Task Force in partnership with the ACS COT is using the Smith et al. article as support to call for a comprehensive national preventable death analysis of high-threat civilian mass casualties (e.g., active shooter incidents, civilian public mass shootings and targeted acts of terror)."

"Unfortunately, I have also recently listened to a small group of learned and influential individuals speak about the damaging nature of this article. In the same breath, they bring attention to the methodological flaws of the trial (which are clear and not insignificant) and concurrently argue that this one study will somehow threaten everything that has been established in civilian high-threat response. Anchoring on the word "myopic," they argue that the article will be used to counter calls for prehospital tourniquets and unravel all ongoing national hemorrhage control initiatives. These individuals state with certainty that medical directors across the nation will cite this article in support of removing tourniquets from EMS, Fire, and Law Enforcement. In essence, they are arguing that medical directors will blindly change their practice based on a flawed interpretation of a flawed study."

"There should exist no doubt that hemorrhage control remains a critical component of civilian high-threat response both during active shooter incidents and "routine" operations. Tourniquets are a great tool; put them on high and tight and get the victim to the trauma center. Hemorrhage control is easy to teach and well-designed programs will have a major return on investment in terms of lives saved. But, prehospital systems must do more than stop the bleeding. This is the conclusion of the "Smith Paper," of C-TECC, of CoTCCC, and even of the Hartford Consensus. We must continue to ask hard questions and look critically at the results. We must have passionate and informed debates. However, to attack a researcher for asking the question is intellectually dangerous and not in our community's best interest."

J Orthop Surg (Hong Kong). 2017 Jan;25(1):2309499016684725. doi: 10.1177/2309499016684725.

The combined use of oral and topical tranexamic acid is a safe, efficient and low-cost method in reducing blood loss and transfusion rates in total knee arthroplasty.

Cankaya D, Dasar U, Satilmis A, Basaran S, Akkaya M, Bozkurt M

AIMS: The combined (IV (intravenous) + topical) use of tranexamic acid (TXA) has been shown to be a safe method and more effective than single (IV or topical) application. The optimal administration method of TXA is still being investigated and safety, efficiency and cost are the three main crucial parameters in achieving the best administration method. We aimed to determine whether combined (oral + topical) use of TXA reduced blood loss and transfusion rates more than single (topical) administration in TKA and whether oral + topical use is as safe and efficient as the IV + topical use, in addition to the main advantage of relatively low cost.

METHODS: In this prospective, randomized study, 100 patients were randomly assigned to either the topical TXA group or the combined (oral + topical) TXA group. There were no significant differences between the groups in age, body mass index or gender. The haemoglobin and haematocrit levels of each patient were recorded preoperatively and on post-operative days 0, 1, 2 and 3. The post-operative suction drainage and blood transfusion volumes were also recorded.

RESULTS: There were statistically significant differences between the groups in haemoglobin and haematocrit levels on post-operative days 0, 1, 2 and 3 ($p < 0.05$) in favour of the combined group. The post-operative drainage amounts ($p = 0.0001$), measured blood loss volume ($p = 0.003$) and transfusion rates ($p = 0.03$) were lower in the combined (oral + topical) group compared to the topical group.

CONCLUSIONS: Of the different methods of TXA administration, the combined use of oral and topical TXA is a safe, efficient and low-cost method in reducing blood loss and transfusion rates after TKA.

Injury. 2017 Jan;48(1):58-63.

Forward medevac during Serval and Barkhane operations in Sahel: A registry study.

Carfantan C, Goudard Y, Butin C, Duron-Martinaud S, Even J, Anselme A, Dulaurent E, Géhant M, Vitalis V, Bay C, Bancarel J, Bordes J

INTRODUCTION: The French army has been deployed in Mali since January 2013 with the Serval Operation and since July 2014 in the Sahel-Saharan Strip (SSS) with the Barkhane Operation where the distances (up to 1100km) can be very long. French Military Medical Service deploys an inclusive chain from the point of injury (POI) to hospital in France. A patient evacuation coordination cell (PECC) has been deployed since February 2013 to organise forward medical evacuation (MEDEVAC) in the area between the POI and three forward surgical units. The purpose of this work was to study the medical evacuation length and duration between the call for Medevac location accidents and forward surgical units (role 2) throughout the five million square kilometers French joint operation area.

MATERIALS AND METHODS: Our retrospective study concerns the French patients evacuated by MEDEVAC from February 2013 to July 2016. The PECC register was analysed for patients' characteristics, NATO categorisation of gravity (Alpha, Bravo or Charlie who must be respectively at hospital facility within 90min, 4h or 24h), medical motive for MEDEVAC and the time line of each MEDEVAC (from operational commander request to entrance in role 2).

RESULTS: A total of 1273 French military were evacuated from February to 2013 to July 2016; 533 forward MEDEVAC were analysed. 12,4% were Alpha, 28,1% Bravo, 59,5% Charlie. War-related injury represented 18,2% of MEDEVAC. The median time for Alpha category MEDEVAC patients was 145min [100-251], for Bravo category patients 205min [125-273] and 310min [156-669] for Charlie. The median distance from the point of injury to role 2 was 126km [90-285] for Alpha patients, 290km [120-455] km for Bravo and 290km [105-455] for Charlie.

CONCLUSIONS: Patient evacuation in such a large area is a logistic and human challenge. Despite this, Bravo and Charlie patients were evacuated in NATO recommended time frame. However, due to distance, Alpha patients time frame was longer than this recommended by NATO organisation. That's where French doctrine with forward medical teams embedded in the platoons is relevant to mitigate this distance and time frame challenge.

J Surg Res. 2017 Jan;207:45-52.

Hydrophobically modified chitosan gauze: a novel topical hemostat.

Chaturvedi A, Dowling M, Gustin J, Scalea T, Raghavan S, Pasley J, Narayan M

BACKGROUND: Currently, the standard of care for treating severe hemorrhage in a military setting is Combat Gauze (CG). Previous work has shown that hydrophobically modified chitosan (hm-C) has significant hemostatic capability relative to its native chitosan counterpart. This work aims to evaluate gauze coated in hm-C relative to CG as well as ChitoGauze (ChG) in a lethal in vivo hemorrhage model.

METHODS: Twelve Yorkshire swine were randomized to receive either hm-C gauze (n = 4), ChG (n = 4), or CG (n = 4). A standard hemorrhage model was used in which animals underwent a splenectomy before a 6-mm punch arterial puncture of the femoral artery. Thirty seconds of free bleeding was allowed before dressings were applied and compressed for 3 min. Baseline mean arterial pressure was preserved via fluid resuscitation. Experiments were conducted for 3 h after which any surviving animal was euthanized.

RESULTS: hm-C gauze was found to be at least equivalent to both CG and ChG in terms of overall survival (100% versus 75%), number of dressing used (6 versus 7), and duration of hemostasis (3 h versus 2.25 h). Total post-treatment blood loss was lower in the hm-C gauze treatment group (4.7 mL/kg) when compared to CG (13.4 mL/kg) and ChG (12.1 mL/kg) groups.

CONCLUSIONS: hm-C gauze outperformed both CG and ChG in a lethal hemorrhage model but without statistical significance for key endpoints. Future comparison of hm-C gauze to CG and ChG will be performed on a hypothermic, coagulopathic model that should allow for outcome significance to be differentiated under small treatment groups.

Injury. 2017 Jan;48(1):158-164.

Intra-abdominal packing with laparotomy pads and QuikClot™ during damage control laparotomy: A safety analysis.

Choron R, Hazelton J, Hunter K, Capano-Wehrle L, Gaughan J, Chovanes J, Seamon M

BACKGROUND: Intra-abdominal packing with laparotomy pads (LP) is a common and rapid method for hemorrhage control in critically injured patients. Combat Gauze™ and Trauma Pads™ ([QC] Z-Medica QuikClot(®)) are kaolin impregnated hemostatic agents, that in addition to LP, may improve hemorrhage control. While QC packing has been effective in a swine liver injury model, QC remains unstudied for human intra-abdominal use. We hypothesized QC packing during damage control laparotomy (DCL) better controls hemorrhage than standard packing and is safe for intracorporeal use.

METHODS: A retrospective review (2011-2014) at a Level-I Trauma Center reviewed all patients who underwent DCL with intentionally retained packing. Clinical characteristics, intraoperative and postoperative parameters, and outcomes were compared with respect to packing (LP vs. LP+QC). All complications occurring within the patients' hospital stays were reviewed. A $p \leq 0.05$ was considered significant.

RESULTS: 68 patients underwent DCL with packing; (LP n=40; LP+QC n=28). No difference in age, BMI, injury mechanism, ISS, or GCS was detected (Table 1, all $p>0.05$). LP+QC patients had a lower systolic blood pressure upon ED presentation and greater blood loss during index laparotomy than LP patients. LP+QC patients received more packed red blood cell and fresh frozen plasma resuscitation during index laparotomy (both $p<0.05$). Despite greater physiologic derangement in the LP+QC group, there was no difference in total blood products required after index laparotomy until abdominal closure (LP vs LP+QC; $p>0.05$). After a median of 2 days until abdominal closure in both groups, no difference in complications rates attributable to intra-abdominal packing (LP vs LP+QC) was detected.

CONCLUSION: While the addition of QC to LP packing did not confer additional benefit to standard packing, there was no additional morbidity identified with its use. The surgeons at our institution now select augmented packing with QC for sicker patients, as we believe this may have additional advantage over standard LP packing. A randomized controlled trial is warranted to further evaluate the intra-abdominal use of advanced hemostatic agents, like QC, for both hemostasis and associated morbidity.

J Trauma Nurs. 2017 Jan/Feb;24(1):30-33.

Air Medical Administration of Tranexamic Acid.

Cornelius B

ABSTRACT:
Traumatic injury is a significant cause of morbidity and mortality in the United States. Massive hemorrhage is responsible for the vast majority of deaths. Evolution in trauma treatment has resulted in major improvements to emergency care. Tranexamic acid (TXA), an antifibrinolytic agent, is synthetically derived from amino acids. The CRASH-2 study demonstrated that the early administration of TXA results in significant decreases in morbidity and mortality. Experiences by coalition forces in Southwest Asia found a substantial increase in survival of trauma patients with early TXA administration. The PAMPer trial has demonstrated the success of taking plasma to the scene of the incident by helicopter; TXA offers additional benefits when transported by the same means. Air medical utilization of TXA can take battlefield trauma care to the scene of civilian traumatic injuries and save lives.

Int J Med Inform. 2017 Feb;98:33-40.

A review of electronic medical record keeping on mobile medical service trips in austere settings.

Dainton C, Chu C

INTRODUCTION: Electronic medical records (EMRs) may address the need for decision and language support for Western clinicians on mobile medical service trips (MSTs) in low resource settings abroad, while providing improved access to records and data management. However, there has yet to be a review of this emerging technology used by MSTs in low-resource settings. The aim of this study is to describe EMR systems designed specifically for use by mobile MSTs in remote settings, and accordingly, determine new opportunities for this technology to improve quality of healthcare provided by MSTs.

METHODS: A MEDLINE, EMBASE, and Scopus/IEEE search and supplementary Google search were performed for EMR systems specific to mobile MSTs. Information was extracted regarding EMR name, organization, scope of use, platform, open source coding, commercial availability, data integration, and capacity for linguistic and decision support. Missing information was requested by email.

RESULTS: After screening of 122 abstracts, two articles remained that discussed deployment of EMR systems in MST settings (iChart, SmartList To Go), and thirteen additional EMR systems were found through the Google search. Of these, three systems (Project Buendia, TEBOW, and University of Central Florida's internally developed EMR) are based on modified versions of Open MRS software, while three are smartphone apps (QuickChart EMR, iChart, NotesFirst). Most of the systems use a local network to manage data, while the remaining systems use opportunistic cloud synchronization. Three (TimmyCare, Basil, and Backpack EMR) contain multilingual user interfaces, and only one (QuickChart EMR) contained MST-specific clinical decision support.

DISCUSSION: There have been limited attempts to tailor EMRs to mobile MSTs. Only Open MRS has a broad user base, and other EMR systems should consider interoperability and data sharing with larger systems as a priority. Several systems include tablet compatibility, or are specifically designed for smartphone, which may be helpful given the environment and low resource context. Results from this review may be useful to non-government organizations (NGOs) considering modernization of their medical records practices as EMR use facilitates research, decreases paper administration costs, and improves perceptions of professionalism; however, most MST-specific EMRs remain in their early stages, and further development and research is required before reaching the stage of widespread adoption.

J Intensive Care Med. 2016 Nov 28. pii: 0885066616680594. [Epub ahead of print]

Emergency Surgical Airways Following Activation of a Difficult Airway Management Team in Hospitalized Critically Ill Patients: A Case Series.

Darby J, Halenda G, Chou C, Quinlan J, Alarcon L, Simmons R

INTRODUCTION: An emergency surgical airway (ESA) is widely recommended for securing the airway in critically ill patients who cannot be intubated or ventilated. Little is known of the frequency, clinical circumstances, management methods, and outcomes of hospitalized critically ill patients in whom ESA is performed outside the emergency department or operating room environments.

METHODS: We retrospectively reviewed all adult patients undergoing ESA in our intensive care units (ICUs) and other hospital units from 2008 to 2012 following activation of our difficult airway management team (DAMT).

RESULTS: Of 207 DAMT activations for native airway events, 22 (10.6%) events culminated in an ESA, with 59% of these events occurring in ICUs with the remainder outside the ICU in the context of rapid response team activations. Of patients undergoing ESA, 77% were male, 63% were obese, and 41% had a history of a difficult airway (DA). Failed planned or unplanned extubations preceded 61% of all ESA events in the ICUs, while bleeding from the upper or lower respiratory tract led to ESA in 44% of events occurring outside the ICU. Emergency surgical airway was the primary method of airway control in 3 (14%) patients, with the remainder of ESAs performed following failed attempts to intubate. Complications occurred in 68% of all ESAs and included bleeding (50%), multiple cannulation attempts (36%), and cardiopulmonary arrest (27%). Overall hospital mortality for patients undergoing ESA was 59%, with 38% of deaths occurring at the time of the airway event.

CONCLUSION: An ESA is required in approximately 10% of DA events in critically ill patients and is associated with high morbidity and mortality. Efforts directed at early identification of patients with a difficult or challenging airway combined with a multidisciplinary team approach to management may reduce the overall frequency of ESA and associated complications.

Br J Anaesth. 2016 Oct;117(4):415-417

When more is less efficacious: fibrinogen concentrate in complex cardiac surgery.

Davis A

Quote:

"Perhaps counterintuitively, this study informs us that the use of fibrinogen concentrate increased the use of blood products in the bleeding patient undergoing elective aortic surgery. A puzzling question is the mechanism by which fibrinogen concentrate led to increased blood product use. The study raises several other remaining questions, including the most appropriate clinical scenario in which fibrinogen replacement may be efficacious, whether cryoprecipitate may be a superior source of fibrinogen, and what the threshold for treatment and the proper dose should be. The study's results should not only caution those clinicians who have adopted off-label use of fibrinogen concentrate, but also invite a re-examination of the evidence in those countries where it is already approved."

J Craniomaxillofac Surg. 2017 Jan;45(1):20-26.

Topical application of tranexamic acid in anti-coagulated patients undergoing minor oral surgery: A systematic review and meta-analysis of randomized clinical trials.

de Vasconcellos S, de Santana Santos T, Reinheimer D, Faria-E-Silva A, de Melo M, Martins-Filho P

PURPOSE: To perform a systematic review and meta-analysis of randomized clinical trials (RCTs) investigating the efficacy and safety of topical tranexamic acid (TXA) to prevent postoperative bleeding in anti-coagulated patients undergoing minor oral surgery.

MATERIAL AND METHODS: We analyzed RCTs comparing the use of topical TXA versus other topical hemostatic agents or placebo solutions for minor oral surgeries. We assessed the risk of bias and strength of evidence according to the Cochrane guidelines and GRADE rating system, respectively. The pooled relative risk (RR) was calculated for the effect of topical application of TXA on postsurgical bleeding.

RESULTS: Five RCTs were included in the study. The combined RR for the number of patients receiving TXA in comparison to the control group was 0.13 (95% CI 0.05-0.36; P = 0.01), indicating a protective effect of topical TXA on bleeding after minor oral surgeries. Subgroup analysis revealed that topical TXA was effective in preventing postsurgical bleeding compared to placebo and epsilon-aminocaproic acid. No cases of thromboembolic events were reported.

CONCLUSIONS: Currently available evidence suggests that surgical site irrigation with TXA followed by mouthwash during the first postoperative week is safe and may reduce the risk of bleeding after minor oral surgeries in anti-coagulated patients.

J Spec Oper Med. 2016 Spring;16(1):103-8.

Experience Of A US Air Force Surgical And Critical Care Team Deployed In Support Of Special Operations Command Africa.

Delmonaco B, Baker A, Clay J, Kilbourn J

ABSTRACT:
An eight-person team of conventional US Air Force (USAF) medical providers deployed to support US Special Operations Forces (SOF) in North and West Africa for the first time in November 2014. The pre-deployment training, operations while deployed, and lessons learned from the challenges of performing surgery and medical evacuations in the remote desert environment of Chad and Niger on the continent of Africa are described. The vast area of operations and far-forward posture of these teams requires cooperation between partner African nations, the French military, and SOF to make these medical teams effective providers of surgical and critical care in Africa. The continuous deployment of conventional USAF medical providers since 2014 in support of US Special Operations Command Africa is challenging and will benefit from more medical teams and effective air assets to provide casualty evacuation across the vast area of operations.

J Emerg Med. 2016 Dec;51(6):e133-e135.

Tracheal Malplacement of the King LT Airway May Be an Important Cause of Prehospital Device Failure.

Driver B, Plummer D, Heegaard W, Reardon R

BACKGROUND: The King LT airway (King Systems, Noblesville, IN) is a popular extraglottic device that is widely used in the prehospital setting. We report a case of tracheal malplacement of the King airway with a severe kink in the distal tube.

CASE REPORT: A 51-year-old unhelmeted motorcyclist collided with a freeway median and was obtunded when paramedics arrived. After bag mask ventilation, a King airway was placed uneventfully and the patient was transported to the emergency department. Because of the concern for an unstable cervical spine injury, a lateral cervical spine radiograph was obtained on arrival. No cervical injury was seen, but the King airway was noted to be malplaced; the King airway passed through the laryngeal inlet and became lodged on the anterior trachea, creating an acute kink between the two balloons. After reviewing the radiograph, ventilations were reassessed and remained adequate. Both balloons were deflated, and the King airway was removed; the patient was orotracheally intubated without complication.

WHY SHOULD AN EMERGENCY PHYSICIAN BE AWARE OF THIS?: The King airway is a valuable prehospital airway that can be placed quickly and blindly with high success rates by inexperienced providers; the King airway, however, is not without complication. Ventilation was not impaired in this patient, but tracheal malplacement may be an important cause of prehospital device failure. If a first placement attempt of a King airway device fails, it is reasonable to reattempt King airway placement with a new, unkinked device before abandoning King airway placement.

Ann Emerg Med. 2017 Jan;69(1):34-35

Apnea After Low-Dose Ketamine Sedation During Attempted Delayed Sequence Intubation.

Driver B, Reardon R

ABSTRACT:
Some patients are agitated and unable to tolerate conventional preoxygenation methods, including face mask oxygen or noninvasive positive-pressure ventilation. Sedation with ketamine for preoxygenation, also known as delayed sequence intubation, is a technique that can be used to achieve preoxygenation in this patient population. No complications of delayed sequence intubation have previously been reported. A 60-year-old woman presented with acute hypoxic respiratory failure. Despite application of high-flow oxygen (60 L/min) with a nonrebreather face mask, her oxygen saturation remained at 93%. She would not accept a noninvasive positive-pressure ventilation mask, although she remained alert, with vigorous respiratory effort. She received 25 mg of intravenous ketamine (0.31 mg/kg) to allow application of noninvasive positive-pressure ventilation. One minute after receiving ketamine, she developed apnea; bag-valve-mask ventilation was initiated, and she received succinylcholine and etomidate and was intubated on the first attempt, without complication. She had no respiratory effort between the onset of apnea and pharmacologic paralysis. Apnea can occur in critically ill patients who receive ketamine to facilitate preoxygenation. Sedation remains a valuable technique to enable optimal preoxygenation in agitated patients; however, clinicians should not perform this technique lightly and should be prepared to secure the patient's airway immediately.

Transfusion. 2016 Oct;56(10):2478-2486

The confusion continues: results from an American Association for the Surgery of Trauma survey on massive transfusion practices among United States trauma centers.

Etchill E, Sperry J, Zuckerbraun B, Alarcon L, Brown J, Schuster K, Kaplan L, Piper G, Peitzman A, Neal M

BACKGROUND: Massive transfusion practices have undergone several recent developments. We sought to examine institutional practices guiding hemostatic resuscitation in the setting of massive hemorrhage.

STUDY DESIGN AND METHODS: A 37-question online survey was sent to American Association for the Surgery of Trauma members.

RESULTS: A total of 191 surgeons from 125 institutions completed the survey. Level I and II centers composed 70 and 18% of responding sites, respectively. A total of 123 institutions have a massive transfusion protocol (MTP); 54% report having an MTP for less than 5 years. The number of coolers and units of red blood cells, plasma, and platelets are highly variable. Tranexamic acid is part of the MTP at 64% of centers; 26% continue to use recombinant activated Factor VII. MTP activation occurs more than five times per month at 32% of centers. MTPs are utilized for nontrauma patients in 82% of institutions. Point-of-care prothrombin time, international normalized ratio, and partial thromboplastin time testing is utilized in 37% of institutions. Only 9% routinely utilize thromboelastography or rotational thromboelastometry (TEG/ROTEM) within their MTP. Just 7% use a validated scoring system to guide MTP activation. The incorporation of TEG/ROTEM into the MTP is associated with the use of a scoring system in regression analysis ($p = 0.024$).

CONCLUSION: Most institutions regularly activate recently implemented MTPs for trauma and nontrauma indications; however, few use validated scoring systems for MTP activation. MTP content is highly variable. Few institutions use TEG, while most have incorporated tranexamic acid into their protocol. The lack of consistent practices underscores the need for outcome-based studies to guide transfusion practices.

Am J Emerg Med. 2016 Nov 22. pii: S0735-6757(16)30871-3. doi: 10.1016/j.ajem.2016.11.043. [Epub ahead of print]

Comparison of intranasal ketamine versus intravenous morphine in reducing pain in patients with renal colic.

Farnia M, Jalali A, Vahidi E, Momeni M, Seyedhosseini J, Saeedi M

BACKGROUND: Various drugs have been used to relieve abdominal pain in patients with renal colic. Ketamine is a popular choice as an analgesic.

OBJECTIVE: To compare the effectiveness of intranasal (IN) ketamine versus intravenous (IV) morphine in reducing pain in patients with renal colic.

METHODS: A randomized double-blind controlled trial was performed in 53 patients with renal colic recruited from the emergency department (ED) in 2015. Finally, 40 patients were enrolled in this study. Patients in the ketamine group received IN ketamine 1 mg/kg and IV placebo while patients in the control group received IV morphine 0.1mg/kg and IN placebo. Our goal was to assess visual analogue scale (VAS) changes between the 2 groups. Patients' VAS scores were reported before and 5, 15, 30min after drug injection.

RESULTS: Before drug administration, the mean±SD VAS score was 7.40±1.18 in the morphine group (group A) and 8.35±1.30 in the ketamine group (group B) (P-value=0.021). After adjustment by the appropriate analysis, the mean±SD VAS score in group (A) and (B) at 5min were (6.07±0.47 vs 6.87±0.47; mean difference -0.79, 95% confidence interval (CI) -1.48 to -1.04) (P-value=0.025), at 15 and 30min, the mean±SD VAS score in group (A) and (B) were (5.24±0.49 vs 5.60±0.49; mean difference -0.36, 95% CI -1.08 to 0.34) and (4.02±0.59 vs 4.17±0.59; mean difference -0.15, 95% CI -1.02 to 0.71) (P-value=0.304 and 0.719) respectively.

CONCLUSIONS: IN ketamine may be effective in decreasing pain in renal colic.

Scand J Trauma Resusc Emerg Med. 2017 Jan 19;25(1):5.

Prehospital intravenous fentanyl to patients with hip fracture: an observational cohort study of risk factors for analgesic non-treatment.

Friesgaard K, Christensen E, Kirkegaard H, Bendtsen M, Jensen F, Nikolajsen L

BACKGROUND: Patients with proximal femoral neck fracture have a high short-term mortality, a high risk of postoperative complications, and impaired quality of life. One of the challenges related to the prehospital treatment of these patients is to administer systemic opioids fast and properly. Effective analgesic prehospital treatment ought be initiated rapidly in order to alleviate the stress that follows acute pain, to facilitate transportation, and to improve quality of care. The objectives of this study were to explore the prevalence of prehospital administration of intravenous fentanyl to patients with proximal femoral neck fracture in the ambulances and to assess risk factors for analgesic non-treatment.

METHODS: This was a register-based observational cohort study of patients with proximal femoral neck fracture from the North Denmark Region transported by ambulance. The patients were identified via the Danish Interdisciplinary Hip Fracture Registry over a 3-year period from 1 July 2011 to 30 June 2014. This hospital registry contains data on several patient characteristics used for the risk factor analysis. Data on prehospital treatment (intravenous fentanyl) and patient monitoring were registered in an electronic prehospital patient record. A modified Poisson regression with robust standard errors was carried out with intravenous fentanyl as the primary binary outcome and the following explanatory variables: age, sex, Charlson Comorbidity Index score, housing, body mass index, type of fracture, fracture displacement, prior consultation with general practitioner, dispatch triage level, and time with ambulance personnel.

RESULTS: In total, 2,140 patients with proximal femoral neck fracture were transported by ambulance, of which 584 (27.3%, 95% CI: 25.4-29.2) were treated with intravenous fentanyl. Risk factors for non-treatment were: older age, male sex (RR 0.77, 95% CI: 0.64-0.91), institutional housing (RR 0.72, 95% CI: 0.56-0.92), medial fracture (RR 0.74, 95% CI: 0.60-0.92), short time with ambulance personnel, Charlson Comorbidity Index score > 1, year of fracture (2011), low levels of urgency at dispatch, and if seen by general practitioners prior to transport.

DISCUSSION: Education of ambulance personnel in assessing and treating patients with hip fracture seems to be required. Also, future studies should consider alternative or supportive pain treatment options with suitable analgesic effects and side effects.

CONCLUSIONS: Few patients with proximal femoral neck fracture were treated with intravenous fentanyl, and several risk factors were associated with prehospital analgesic non-treatment. Future prospective studies should explore covariates of socioeconomic, cultural, and psychological origin to provide further insight into the multifactorial causes of non-treatment of acute pain.

Scand J Trauma Resusc Emerg Med. 2016 Dec 12;24(1):148.

Is the shock index based classification of hypovolemic shock applicable in multiple injured patients with severe traumatic brain injury?-an analysis of the TraumaRegister DGU(®).

Fröhlich M, Driessen A, Böhmer A, Nienaber U, Igressa A, Probst C, Bouillon B, Maegele M, Mutschler M; and the TraumaRegister DGU.

BACKGROUND: A new classification of hypovolemic shock based on the shock index (SI) was proposed in 2013. This classification contains four classes of shock and shows good correlation with acidosis, blood product need and mortality. Since their applicability was questioned, the aim of this study was to verify the validity of the new classification in multiple injured patients with traumatic brain injury.

METHODS: Between 2002 and 2013, data from 40 888 patients from the TraumaRegister DGU(®) were analysed. Patients were classified according to their initial SI at hospital admission (Class I: SI < 0.6, class II: SI ≥0.6 to <1.0, class III SI ≥1.0 to <1.4, class IV: SI ≥1.4). Patients with an additional severe TBI (AIS ≥ 3) were compared to patients without severe TBI.

RESULTS: 16,760 multiple injured patients with TBI (AIShead ≥3) were compared to 24,128 patients without severe TBI. With worsening of SI class, mortality rate increased from 20 to 53% in TBI patients. Worsening SI classes were associated with decreased haemoglobin, platelet counts and Quick's values. The number of blood units transfused correlated with worsening of SI. Massive transfusion rates increased from 3% in class I to 46% in class IV. The accuracy for predicting transfusion requirements did not differ between TBI and Non TBI patients.

DISCUSSION: The use of the SI based classification enables a quick assessment of patients in hypovolemic shock based on universally available parameters. Although the pathophysiology in TBI and Non TBI patients and early treatment methods such as the use of vasopressors differ, both groups showed an identical probability of recieving blood products within the respective SI class.

CONCLUSION: Regardless of the presence of TBI, the classification of hypovolemic shock based on the SI enables a fast and reliable assessment of hypovolemic shock in the emergency department. Therefore, the presented study supports the SI as a feasible tool to assess patients at risk for blood product transfusions, even in the presence of severe TBI.

Am J Emerg Med. 2016 Nov 30. pii: S0735-6757(16)30899-3. doi: 10.1016/j.ajem.2016.11.064. [Epub ahead of print]

Comparison of the Macintosh laryngoscope and blind intubation via the iGEL for intubation with cervical spine immobilization: A randomized, crossover, manikin trial.

Gawlowski P, Smereka J, Madziala M, Szarpak L, Frass M, Robak O

INTRODUCTION: Endotracheal intubation (ETI) using a Macintosh laryngoscope (MAC) requires the head to be positioned in a modified Jackson position, slightly reclined and elevated. Intubation of trauma patients with an injured neck or spine is therefore difficult, since the neck usually cannot be turned or is already immobilized in order to prevent further injury. The iGEL supraglottic airway seems optimal for such conditions due to its blind insertion without the need of a modified Jackson position.

METHODS: Prospective, randomized, crossover study in 46 paramedics. Participants performing standard intubation and blind intubation via iGEL supraglottic airway device in three airway scenarios: Scenario A - normal airway; Scenario B – manual inline cervical immobilization, performed by an independent instructor; scenario C: cervical immobilization using a standard Patriot cervical extraction collar.

RESULTS: In Scenario A, nearly all participants performed ETI successfully both with MAC and iGEL (100% vs. 95.7%). The time to intubation (TTI) using the MAC and iGEL amounted to 19 [IQR, 18-21]s vs. 12 [IQR, 11-13]s ($P<0.001$). Head extension angle as well as tooth compression were significantly better with the iGEL compared to the MAC ($P<0.001$). In scenario B and C, the results with the iGEL were significantly better than with MAC for all analyzed variables (TTI, success of first intubation attempt, head extension angle, tooth compression and VAS scores).

CONCLUSION: We showed that blind intubation with the iGEL supraglottic airway was superior to ETI performed by paramedics in a simulated cervical immobilization scenario in a manikin in terms of success rate, time to definite tube placement, head extension angle, tooth compression, and rating.

Br J Anaesth. 2016 Dec;117(suppl 3):iii18-iii30.

Perioperative management of the bleeding patient.

Ghadimi K, Levy J, Welsby I

ABSTRACT:
Perioperative bleeding remains a major complication during and after surgery, resulting in increased morbidity and mortality. The principal causes of non-vascular sources of haemostatic perioperative bleeding are a preexisting undetected bleeding disorder, the nature of the operation itself, or acquired coagulation abnormalities secondary to haemorrhage, haemodilution, or haemostatic factor consumption. In the bleeding patient, standard therapeutic approaches include allogeneic blood product administration, concomitant pharmacologic agents, and increasing application of purified and recombinant haemostatic factors. Multiple haemostatic changes occur perioperatively after trauma and complex surgical procedures including cardiac surgery and liver transplantation. Novel strategies for both prophylaxis and therapy of perioperative bleeding include tranexamic acid, desmopressin, fibrinogen and prothrombin complex concentrates. Point-of-care patient testing using thromboelastography, rotational thromboelastometry, and platelet function assays has allowed for more detailed assessment of specific targeted therapy for haemostasis. Strategic multimodal management is needed to improve management, reduce allogeneic blood product administration, and minimize associated risks related to transfusion.

J Spec Oper Med. 2016 summer;16(2):21-7.

Preliminary Comparison of Pneumatic Models of Tourniquet for Prehospital Control of Limb Bleeding in a Manikin Model.

Gibson R, Aden JK 3rd, Dubick MA, Kragh JF Jr.

BACKGROUND: Emergency tourniquet use has been associated with hemorrhage control and improved survival during the wars since 2001, but little is known of the differential performance of pneumatic tourniquet models. The purpose of this study was to compare the performance of three models of pneumatic tourniquets in a laboratory setting to aid a possible decision to field test suitable models for medic preference.

METHODS: A laboratory experiment was designed to test the effectiveness of tourniquets on a manikin thigh. Three models (one Emergency and Military Tourniquet [EMT] and two Tactical Pneumatic Tourniquets differing in width: 2 in. and 3 in. [TPT3]) were compared with the standard-issue Combat Application Tourniquet of a strap-and-windlass design. Two users conducted 40 tests each on a right-thigh manikin (HapMed Leg Tourniquet Trainer) with a simulated above-knee amputation injury. Measurements included effectiveness in hemorrhage control, pulse stoppage distal to the tourniquet, time to stop bleeding, blood loss, and pressure.

RESULTS: All four models were 100% effective in both hemorrhage control and pulse stoppage distal to the tourniquet. The TPT3 had the slowest mean time to stop bleeding and the highest mean blood loss. The EMT had the least mean pressure. An interuser difference was found only for mean pressure.

CONCLUSIONS: All models of tourniquet performed equally well for both the critical outcome of effectiveness and the important outcome of pulse stoppage, whereas results for secondary outcomes (time, pressure, and blood loss) differed by model. The EMT had the best performance for every type of measurement.

J Trauma Acute Care Surg. 2016 Dec;81(6):1136-1141.

Substituting systolic blood pressure with shock index in the National Trauma Triage Protocol.

Haider A, Azim A, Rhee P, Kulvatunyou N, Ibraheem K, Tang A, O'Keeffe T, Iftikhar H, Vercruysse G, Joseph B.

INTRODUCTION: The National Trauma Triage Protocol (NTTP) is an algorithm that guides emergency medical services providers through four decision steps to identify the patients that would benefit from trauma center care. The NTTP defines a systolic blood pressure (SBP) of less than 90 mm Hg as one of the criteria for trauma center need. The aim of our study was to determine the impact of substituting SBP of less than 90 mm Hg with shock index (SI) on triage performance.

METHODS: A 2-year (2011-2012) retrospective analysis of all trauma patients 18 years or older in the National Trauma Databank was performed. Transferred patients, patients dead on arrival, and those with missing data were excluded. Our outcome measure was trauma center need defined by Injury Severity Score greater than 15, need for emergent operation, death in the emergency department, and intensive care unit stay of more than 1 day. Area under the characteristic curve and triage characteristics were compared between SBP of less than 90 mm Hg and SI of more than 1.0. Logistic regression analysis was performed to compare the mortality between patients triaged under current protocol of SBP of less than 90 mm Hg and patients triaged using the new defined protocol (SI >1.0).

RESULTS: A total of 505,296 patients were included. Compared with SBP of less than 90 mm Hg, SI of more than 1.0 had a higher sensitivity (44.4% vs. 41.7%) but lower specificity (80.2% vs. 82.4%). The area under the curve was significantly higher for SI of more than 1.0 (0.623 [95% confidence interval, 0.622-.625] vs. 0.620 [95% confidence interval, 0.619-0.622]). Substituting SBP of less than 90 mm Hg with SI of more than 1.0 resulted in a decrease in undertriage rate of 30,233 patients (5.9%) but an increase in overtriage of only 6,386 patients (1.3%).

CONCLUSION: Substituting the current criterion of SBP of less than 90 mm Hg in the NTTP with an SI of more than 1.0 results in significant reduction in undertriage rate without causing large increase in overtriage. Because of simplicity of use, better discrimination power, and minimal effect on overtriage rates, future studies should consider exploring the possibility of replacing the current SBP of less than 90 mm Hg criterion with SI of more than 1.0 in the NTTP.

LEVEL OF EVIDENCE: Prognostic study, level III; therapeutic study, level IV.

J Trauma Acute Care Surg. 2016 Dec;81(6):1080-1087.

Early resuscitation with lyophilized plasma provides equal neuroprotection compared with fresh frozen plasma in a large animal survival model of traumatic brain injury and hemorrhagic shock.

Halaweish I, Bambakidis T, Nikolian VC, Georgoff P, Bruhn P, Piascik P, Buckley L, Srinivasan A, Liu B, Li Y, Alam HB.

BACKGROUND: Combined traumatic brain injury (TBI) and hemorrhagic shock (HS) is highly lethal. In previous models of combined TBI + HS, we showed that early resuscitation with fresh frozen plasma (FFP) improves neurologic outcomes. Delivering FFP, however, in austere environments is difficult. Lyophilized plasma (LP) is a logistically superior alternative to FFP, but data are limited regarding its efficacy for treatment of TBI. We conducted this study to determine the safety and long-term outcomes of early treatment with LP in a large animal model of TBI + HS.

METHODS: Adult anesthetized swine underwent TBI and volume-controlled hemorrhage (40% blood volume) concurrently. After 2 hours of shock, animals were randomized (n = 5 per /group) to FFP or LP (1× shed blood) treatment. Serial blood gases were drawn, and thromboelastography was performed on citrated, kaolin-activated whole-blood samples. Five hours after treatment, packed red blood cells were administered, and animals recovered. A 32-point Neurologic Severity Score was assessed daily for 30 days (0 = normal, 32 = most severe injury). Cognitive functions were tested by training animals to retrieve food from color-coded boxes. Brain lesion size was measured on serial magnetic resonance imaging, and an autopsy was performed at 30 days.

RESULTS: The severity of shock and the degree of resuscitation were similar in both groups. Administration of FFP and LP was well tolerated with no differences in reversal of shock or thromboelastography parameters. Animals in both groups displayed the worst Neurologic Severity Score on postoperative Day 1 with rapid recovery and return to baseline within 7 days of injury. Lesion size on Day 3 in FFP-treated animals was 645 ± 85 versus 219 ± 20 mm in LP-treated animals ($p < 0.05$). There were no differences in cognitive functions or delayed treatment-related complications.

CONCLUSIONS: Early treatment with LP in TBI + HS is safe and provides neuroprotection that is comparable to FFP.

Mil Med. 2016 Nov;181(11):e1484-e1490.

Validation of an Assessment Tool for Field Endotracheal Intubation.

Hart D, Clinton J, Anders S, Reihsen T, McNeil M, Rule G, Sweet R

OBJECTIVES: Endotracheal intubation (ETI) is an important skill for all emergency providers; our ability to train and assess our learners is integral to providing optimal patient care. The primary aim of this study was to assess the inter-rater reliability (IRR) and discriminant validity of a novel field ETI assessment tool using a checklist-derived performance score (PS) and critical failure (CF) rate.

METHODS: Forty-three participants (18 paramedic students, 11 paramedics, and 14 emergency physicians [EPs]) performed ETI during a simulated trauma scenario on a pseudo-ventilated cadaver. Each participant was assessed by two experienced raters. IRR was calculated using the intraclass correlation coefficient. Regarding discriminant validity, a Kruskal-Wallis test was used to analyze PSs and a $\chi(2)$ test was used for CFs. Mean global rating scale (GRS) scores were compared using an analysis of variance.

RESULTS: The ETI assessment tool had excellent IRR, with an intraclass correlation coefficient of 0.94. There was a significant difference in PSs, CFs, and GRSs ($p < 0.05$) between cohorts.

CONCLUSION: The novel field ETI assessment tool has excellent reliability among trained raters and discriminates between experienced ETI providers (EPs) and less experienced ETI performers using PSs, CFs, and GRSs on a fresh cadaveric model.

J Vasc Surg. 2017 Jan;65(1):267-270.

Fifty-year anniversary of the Vietnam Vascular Registry and a historic look at vascular registries.

Hata K, Propper B, Rich N

ABSTRACT:
The management of arterial injuries has evolved from simple cauterization of the time of Ambrose Paré to the more complex repairs of today. Through history there has been much learned from combat regarding the management of vascular injuries. Starting in World War I, vascular registries have been established to further study and refine the management of these injuries. One of the most pivotal registries was the Vietnam Vascular Registry established by Dr Norman Rich. The lessons learned from these registries have been carried on to the current conflicts with the establishment of the Global War on Terror Vascular Initiative. We compare 100 lower extremity vascular injuries from the Vietnam Vascular Registry to 100 injuries in the Global War on Terror Vascular Initiative database as we continue to improve the future with lessons from our past.

N Engl J Med. 2016 Nov 17;375(20):1937-1945.

Effect of Short-Term vs. Long-Term Blood Storage on Mortality after Transfusion.

Heddle N, Cook R, Arnold D, Liu Y, Barty R, Crowther M, Devereaux P, Hirsh J, Warkentin T, Webert K, Roxby D, Sobieraj-Teague M, Kurz A, Sessler D, Figueroa P, Ellis M, Eikelboom J

Background: Randomized, controlled trials have suggested that the transfusion of blood after prolonged storage does not increase the risk of adverse outcomes among patients, although most of these trials were restricted to high-risk populations and were not powered to detect small but clinically important differences in mortality. We sought to find out whether the duration of blood storage would have an effect on mortality after transfusion in a general population of hospitalized patients.

Methods: In this pragmatic, randomized, controlled trial conducted at six hospitals in four countries, we randomly assigned patients who required a red-cell transfusion to receive blood that had been stored for the shortest duration (short-term storage group) or the longest duration (long-term storage group) in a 1:2 ratio. Only patients with type A or O blood were included in the primary analysis, since pilot data suggested that our goal of achieving a difference in the mean duration of blood storage of at least 10 days would not be possible with other blood types. Written informed consent was waived because all the patients received treatment consistent with the current standard of care. The primary outcome was in-hospital mortality, which was estimated by means of a logistic-regression model after adjustment for study center and patient blood type.

Results: From April 2012 through October 2015, a total of 31,497 patients underwent randomization. Of these patients, 6761 who did not meet all the enrollment criteria were excluded after randomization. The primary analysis included 20,858 patients with type A or O blood. Of these patients, 6936 were assigned to the short-term storage group and 13,922 to the long-term storage group. The mean storage duration was 13.0 days in the short-term storage group and 23.6 days in the long-term storage group. There were 634 deaths (9.1%) in the short-term storage group and 1213 (8.7%) in the long-term storage group (odds ratio, 1.05; 95% confidence interval [CI], 0.95 to 1.16; P=0.34). When the analysis was expanded to include the 24,736 patients with any blood type, the results were similar, with rates of death of 9.1% and 8.8%, respectively (odds ratio, 1.04; 95% CI, 0.95 to 1.14; P=0.38). Additional results were consistent in three prespecified high-risk subgroups (patients undergoing cardiovascular surgery, those admitted to intensive care, and those with cancer).

Conclusions: Among patients in a general hospital population, there was no significant difference in the rate of death among those who underwent transfusion with the freshest available blood and those who underwent transfusion according to the standard practice of transfusing the oldest available blood.

Curr Pain Headache Rep. 2017 Jan;21(1):3. doi: 10.1007/s11916-017-0607-y.

Multimodal Analgesia, Current Concepts, and Acute Pain Considerations.

Helander E, Menard B, Harmon C, Homra B, Allain A, Bordelon G, Wyche M, Padnos I, Lavrova A, Kaye A.

PURPOSE OF REVIEW: Management of acute pain following surgery using a multimodal approach is recommended by the American Society of Anesthesiologists whenever possible. In addition to opioids, drugs with differing mechanisms of actions target pain pathways resulting in additive and/or synergistic effects. Some of these agents include alpha 2 agonists, NMDA receptor antagonists, gabapentinoids, dexamethasone, NSAIDs, acetaminophen, and duloxetine.

RECENT FINDINGS: Alpha 2 agonists have been shown to have opioid-sparing effects, but can cause hypotension and bradycardia and must be taken into consideration when administered. Acetaminophen is commonly used in a multimodal approach, with recent evidence lacking for the use of IV over oral formulations in patients able to take medications by mouth. Studies involving gabapentinoids have been mixed with some showing benefit; however, future large randomized controlled trials are needed. Ketamine is known to have powerful analgesic effects and, when combined with magnesium and other agents, may have a synergistic effect. Dexamethasone reduces postoperative nausea and vomiting and has been demonstrated to be an effective adjunct in multimodal analgesia. The serotonin-norepinephrine reuptake inhibitor, duloxetine, is a novel agent, but studies are limited and further evidence is needed. Overall, a multimodal analgesic approach should be used when treating postoperative pain, as it can potentially reduce side effects and provide the benefit of treating pain through different cellular pathways.

J Trauma Acute Care Surg. 2016 Sep;81(3):435-40.

Civilian casualties of terror-related explosions: The impact of vascular trauma on treatment and prognosis.

Heldenberg E, Givon A, Simon D, Bass A, Almogy G, Peleg K; Israeli Trauma Group.

OBJECTIVES: A high prevalence (10%) of vascular trauma (VT) was previously described in terror-related trauma as compared with non-terror-related trauma (1%), in a civilian setting. No data regarding outcome of VT casualties of improvised explosive device (IED) explosions, in civilian settings, are available. The aim of the current study is to present the prognosis of civilian casualties of IED explosions with and without VT.

METHODS: A retrospective analysis of the Israeli National Trauma Registry was performed. All patients in the registry from September 2000 to December 2005 who were victims of explosions were included. These patients were subdivided into patients with VT (n = 109) and non-VT (NVT) (n = 1,152). Both groups were analyzed according to mechanism of trauma, type and severity of injury, and treatment.

RESULTS: Of 1,261 explosion casualties, there were 109 VT victims (8.6%). Patients with VT tended to be more complex, with a higher injury severity score (ISS): 17.4% with ISS 16 to 24 as compared with only 10.5%. In the group of critically injured patients (ISS, 25-75), 51.4% had VT compared with only 15.5% of the NVT patients. As such, a heavy share of hospitals' resources were used-trauma bay admission (62.4%), operating rooms (91.7%), and intensive care unit beds (55.1%). The percentage of VT patients who were admitted for more than 15 days was 2.3 times higher than that observed among the NVT patients. Lower-extremity VT injuries were the most prevalent. Although many resources are being invested in treating this group of patients, their mortality rate is approximately five times more than NVT (22.9% vs. 4.9%).

CONCLUSIONS: Vascular trauma casualties of IED explosions are more complex and have poorer prognosis. Their higher ISS markedly increases the hospital's resource utilization, and as such, it should be taken into consideration either upon the primary evacuation from the scene or when secondary modulation is needed in order to reduce the burden of the hospitals receiving the casualties.

LEVEL OF EVIDENCE: Prognostic/epidemiologic study, level V.

World J Surg. 2017 Jan 24. doi: 10.1007/s00268-017-3897-7. [Epub ahead of print]

Tube Thoracostomy Complications Increase Cost.

Hernandez M, Zeb M, Heller S, Zielinski M, Aho J

BACKGROUND: Tube thoracostomy (TT) can be an effective therapy for thoracic pathologies. Ineffective placement of TT is common and associated with significant complications. Complications require additional interventions to repair damaged tissues or replace dysfunctional TT. We hypothesize that complicated TT insertion increases cost to the hospital system.

METHODS: Adult trauma patients requiring TT at a level 1 trauma center (2012-2013) were reviewed. Intraoperative or image-guided TT placements were excluded. Baseline demographics and TT insertion cost (normalized and assigned by hospital billing records) were recorded. Costs included initial TT equipment, radiographs, and subsequent operative or radiologic intervention to correct TT complications. Complications were categorized using previously validated method. Secondary outcomes included: number of TT inserted, number of chest radiographs performed, and TT dwell time utilizing a standardized TT discontinuation protocol.

RESULTS: A total of 154 patients with 246 TT were included. Ninety TT (37%) had complication. Complication categories are postremoval (n = 15, 16.7%), insertional (n = 13, 14.4%), positional (n = 62, 68.9%). Overall median complicated TT cost was 9 times greater than uncomplicated TT insertion, p = 0.001. Insertional complications median cost 21 times greater than an uncomplicated, due to operative and radiologic interventions (p = 0.0001). Positional and postremoval complication rates increased median cost by 3 times compared to uncomplicated TT (p = 0.03). Operative or radiologic interventions (n = 10) were performed for organ injury or uncontrolled hemo-/pneumothorax. Increased dwell time median [IQR] was associated with complicated TT compared to uncomplicated 3 [1-5] versus 2 [1-3], p = 0.01.

CONCLUSION: TT is a common procedure. TT complications are often considered benign. However, patients with a complicated TT insertion, especially related to insertional subtypes, have markedly increased hospitalization costs due to need for operative or radiologic repair.

LEVEL OF EVIDENCE: Level V-retrospective study.

STUDY TYPE: This is a retrospective single-institution study.

Emerg Med Australas. 2017 Feb;29(1):63-68.

Competence in the use of supraglottic airways by Australian surf lifesavers for cardiac arrest ventilation in a manikin.

Holbery-Morgan L, Angel C, Murphy M, Carew J, Douglas F, Murphy R, Hood N, Rechtman A, Scarff C, Simpson N, Stewardson A, Steinfort D, Radford S, Douglas N, Johnson D

OBJECTIVES: Lifesavers in Australia are taught to use pocket mask (PM) rescue breathing and bag valve mask (BVM) ventilation, despite evidence that first responders might struggle with these devices. Novices have successfully used the Laryngeal Mask Airway (LMA) Supreme and iGel devices previously, but there has been no previous comparison of the ability to train lifesavers to use the supraglottic airways compared to standard techniques for cardiac arrest ventilation.

METHODS: The study is a prospective educational intervention whereby 113 lifesavers were trained to use the LMA and iGel supraglottic airways. Comparisons were made to standard devices on plastic manikins. Successful ventilation was defined as achieving visible chest rise.

RESULTS: The median time to first effective ventilation was similar between the PM (16 s, 95% confidence interval 16-17 s), BVM (17 s, 16-17 s) and iGel devices (18 s, 16-20 s), but longer for the LMA (36 s, 33-38 s). The iGel frequently failed to achieve ventilation (10%) compared with the PM (1%, $P < 0.01$) and LMA (3%, $P < 0.01$) but was not worse than the BVM (3%, $P < 0.57$). Hands-off time was similar between the BVM, LMA and iGel (10 s for each device), but worse for the PM (13 s, $P = 0.001$).

CONCLUSION: Lifesavers using the PM and BVM perform ventilation for cardiopulmonary resuscitation well. There appears to be a limited role for supraglottic airway devices because of limitations in terms of time to first effective ventilation and reliability. Clinical validation of manikin data with live resuscitation performance is required.

Emerg Med Australas. 2017 Feb;29(1):89-95.

Prehospital ketamine use by paramedics in the Australian Capital Territory: A 12 month retrospective analysis.

Hollis G, Keene T, Ardlie R, Caldicott D, Stapleton S

OBJECTIVE: The aim of this study was to describe prehospital use of ketamine by ACT Ambulance Service, and frequency of endotracheal intubation.

METHODS: This was a retrospective study of patients receiving prehospital ketamine between 1 January and 31 December 2013. Episodes were identified from the prehospital electronic patient care records, then linkage to ED records at two receiving hospitals. Demographics, dose, indication and occasions of intubation were analysed.

RESULTS: A total of 163 episodes were identified; 10 of these were excluded because of lack of identifying data or missing records (age 1-97 years [mean: 43, standard deviation: 21.7], 56% men). Median total dose was 60 mg (interquartile range 70; 5-400 mg) in three doses (interquartile range 3; 1-14 mg). For patients with a weight recorded (63%), median dose was 0.73 mg/kg. Indications were analgesia 68%, agitation/combative 25%, rapid sequence intubation 5% and others 2%. A total of 26 patients were endotracheally intubated, 11 prehospital (seven as an intended rapid sequence intubation and four combative patients with return of spontaneous circulation) and 15 in the ED. Of ED intubations, 10 were trauma patients and five were drug ingestion related. Patients receiving ketamine for combativeness were more likely to be intubated than those receiving it for analgesia (25 vs 7.2%; odds ratio: 3.46; 95% confidence interval: 1.12, 10.71). In those with a weight recorded, the mg/kg dose was not associated with subsequent intubation.

CONCLUSIONS: Median dose for analgesia was comparable with other studies; dose for sedation was less than reported elsewhere. Intubation rate for patients receiving prehospital ketamine was 17%. Further study is recommended to assess the ED course of the non-intubated group of patients, and consideration should be given to non-weight-based methods of dose selection.

JEMS 2016;on line publications Dec 22, 2016

Life-Saving Hemorrhage Control by Tactical Police Using Tourniquets and the iTClamp.

Hood J

Quotes:

"The White House and Department of Homeland Security considers rapid control of bleeding so critical to survival in trauma that they initiated the national "Stop The Bleed" campaign a year ago. The campaign's purpose is to provide non-medical first responders and even bystanders with tools and strategies to control bleeding, allowing them to fill the gap between the incident and the arrival of medical personnel, and reinforcing the recommendations of the Hartford Consensus. The application of tourniquet(s) and direct pressure are actively promoted in the campaign in continuance with tried-and-true techniques. However, the use of tourniquets and iTClamps (a mechanical direct-pressure device that stops bleeding by sealing the wound closed and using the back pressure of the hematoma to achieve hemostasis) is new to civilian application. While both techniques have been previously documented and proven to stop bleeding from 7.62 mm caliber injurie to the leg on the battlefield, the following is the first case report combining these two strategies stateside. The use of two tourniquets, in conjunction with the iTClamp, by tactical police stopped the bleeding from a life-threatening femoral artery and vein injury from a 7.62 mm round to the left thigh prior to paramedic arrival."

Conclusions

"Simple, easy-to-use hemorrhage control tools need to be made available to police and bystanders to enable them to control bleeding even before paramedics arrive. In this particular case, a combination of tourniquets and the iTClamp stopped a life-threatening femoral artery bleed from a 7.62 mm gunshot wound to the thigh before paramedics arrived."

J Trauma Acute Care Surg. 2017 Feb;82(2):328-333.

Improving mortality in trauma laparotomy through the evolution of damage control resuscitation: Analysis of 1,030 consecutive trauma laparotomies.

Joseph B, Azim A, Zangbar B, Bauman Z, O'Keeffe T, Ibraheem K, Kulvatunyou N, Tang A, Latifi R, Rhee P.

BACKGROUND: The aim of this study was to evaluate the related change in outcomes (mortality, complications) in patients undergoing trauma laparotomy (TL) with the implementation of damage control resuscitation (DCR). We hypothesized that the implementation of DCR in patients undergoing TL is associated with better outcomes.

METHODS: We analyzed 1,030 consecutive patients with TL. Patients were stratified into three phases: pre-DCR (2006-2007), transient (2008-2009), and post-DCR (2010-2013). Resuscitation fluids (crystalloids and blood products), injury severity score (ISS), vital signs, and laboratory (hemoglobin, international normalized ratio, lactate) parameters were recorded. Regression analysis was performed after adjusting for age, ISS, laboratory and vital parameters, comorbidities, and resuscitation fluids to identify independent predictors for outcomes in each phase.

RESULTS: Patient demographics and ISS remained the same throughout the three phases. There was a significant reduction in the volume of crystalloid ($p = 0.001$) and a concomitant increase in the blood product resuscitation ($p = 0.04$) in the post-DCR phase compared to the pre-DCR and transient DCR phases. Volume of crystalloid resuscitation was an independent predictor of mortality in the pre-DCR (OR [95% CI]: 1.071 [1.03-1.1], $p = 0.01$) and transient (OR [95% CI]: 1.05 [1.01-1.14], $p = 0.01$) phases; however, it was not associated with mortality in the post-DCR phase (OR [95% CI]:1.01 [0.96-1.09], $p = 0.1$). Coagulopathy ($p = 0.01$) and acidosis ($p = 0.02$) were independently associated with mortality in all three phases.

CONCLUSION: The implementation of DCR was associated with improved outcome in patients undergoing TL. There was a decrease in the use of damage control laparotomy, with a decrease in the use of crystalloid and an increase in the use of blood products.

J Trauma Acute Care Surg. 2016 Nov;81(5 Suppl 2 Proceedings of the 2015 Military Health System Research Symposium):S128-S132.

Identifying potential utility of resuscitative endovascular balloon occlusion of the aorta: An autopsy study.

Joseph B, Ibraheem K, Haider AA, Kulvatunyou N, Tang A, O'Keeffe T, Bauman ZM, Green DJ, Latifi R, Rhee P.

BACKGROUND: Resuscitative thoracotomy (RT) has been the standard therapy in patients with acute arrest due to hemorrhagic shock. However, with the development of resuscitative endovascular balloon occlusion of the aorta (REBOA), its role as a potential adjunct to a highly morbid intervention such as RT is being discussed. The aim of this study was to identify patients who most likely would have potentially benefited from REBOA use based on autopsy findings.

METHODS: We performed a 4-year retrospective review of all RTs performed at our Level I trauma center. Patients with in-hospital mortality and who underwent subsequent autopsies were included. Patients were divided into blunt and penetrating trauma with and without thoracic injuries. Autopsy reports were reviewed to identify vascular and solid organ injuries. Outcome measure was potential benefit with REBOA. Potential benefit with REBOA was defined based on the ability to safely deploy REBOA. In patients without cardiac, aortic, and major pulmonary vasculature injuries, REBOA was considered potentially beneficial. In all other patients, it was considered as nonbeneficial.

RESULTS: A total of 98 patients underwent an RT, of whom 87 had subsequent autopsies and were reviewed. The mean age was 35.25 (SD, 17.85) years, mean admission systolic blood pressure was 51.38 (SD, 70.11) mm Hg, median Injury Severity Score was 29 (interquartile range [IQR], 25-42), and 44 had penetrating injury. Resuscitative endovascular balloon occlusion of the aorta would have been potentially beneficial in 51.2% of patients (22 of 43 patients) with blunt mechanism of trauma, whereas REBOA would have been potentially beneficial in 38.6% of patients (17 of 44 patients) with penetrating mechanism of trauma. A subgroup analysis showed that REBOA use would have been potentially beneficial in 50.0% of blunt thoracic and 33.3% of penetrating thoracic trauma patients.

CONCLUSIONS: There are a great enthusiasm and premature efforts to introduce REBOA as an alternative to RT. While there exists a great potential for benefit with REBOA use in the management of noncompressible torso hemorrhage, the current indications for REBOA need to be defined better. Patients with penetrating chest trauma in extremis should be considered an absolute contraindication for REBOA use. The majority of patients with blunt trauma in extremis may potentially benefit from REBOA. However, better criteria will help increase these patients who may potentially benefit from REBOA placement.

LEVEL OF EVIDENCE: Therapeutic study, level V.

Am J Med Qual. 2017 Jan 1:1062860616687035. doi: 10.1177/1062860616687035. [Epub ahead of print]

Blood Management Strategies to Reduce Transfusions After Elective Lower-Extremity Joint Arthroplasty Surgeries.

Kansagra A, Andrzejewski C, Krushell R, Lehman A, Greenbaum J, Visintainer P, McGirr J, Mahoney K, Cloutier D, Ehresman A, Stefan M

ABSTRACT:
Blood loss associated with lower-extremity total joint arthroplasty (TJA) often results in anemia and the need for red blood cell transfusions (RBCTs). This article reports on a quality improvement initiative aimed at improving blood management strategies in patients undergoing TJA. A multifaceted intervention (preoperative anemia assessment, use of tranexamic acid, discouragement of autologous preoperative blood collection, restrictive RBCT protocols) was implemented. The results were stratified into 3 intervention periods: 1, pre; 2, peri; and 3, post. Fractional logistic regression was used to describe differences between various intervention periods. During the study period, 2511 patients underwent TJA. Compared with the preintervention period, there was 81.8% decrease in total units of RBCT during the postintervention period. Using activity-based costing (~$1000/unit), the annualized saving in RBC expenditure was $480 000. A multidisciplinary approach can be successful and sustainable in reducing RBCT and its associated costs for patients undergoing TJA.

Am J Emerg Med. 2016 Nov 30. pii: S0735-6757(16)30892-0. doi:10.1016/j.ajem.2016.11.057. [Epub ahead of print]

Failure rate of prehospital chest decompression after severe thoracic trauma.

Kaserer A, Stein P, Simmen H, Spahn D, Neuhaus V

INTRODUCTION: Chest decompression can be performed by different techniques, like needle thoracocentesis (NT), lateral thoracostomy (LT), or tube thoracostomy (TT). The aim of this study was to report the incidence of prehospital chest decompression and to analyse the effectiveness of these techniques.

MATERIAL AND METHODS: In this retrospective case series study, all medical records of adult trauma patients undergoing prehospital chest decompression and admitted to the resuscitation area of a level-1 trauma center between 2009 and 2015 were reviewed and analysed. Only descriptive statistics were applied.

RESULTS: In a 6-year period 24 of 2261 (1.1%) trauma patients had prehospital chest decompression. Seventeen patients had NT, six patients TT, one patient NT as well as TT, and no patients had LT. Prehospital successful release of a tension pneumothorax was reported by the paramedics in 83% (5/6) with TT, whereas NT was effective in 18% only (3/17). In five CT scans all thoracocentesis needles were either removed or extrapleural, one patient had a tension pneumothorax, and two patients had no pneumothorax. No NT or TT related complications were reported during hospitalization.

CONCLUSION: Prehospital NT or TT is infrequently attempted in trauma patients. Especially NT is associated with a high failure rate of more than 80%, potentially due to an inadequate ratio between chest wall thickness and catheter length as previously published as well as a possible different pathophysiological cause of respiratory distress. Therefore, TT may be considered already in the prehospital setting to retain sufficient pleural decompression upon admission.

J Trauma Acute Care Surg. 2017 Jan;82(1):156-164.

Does small-volume resuscitation with crystalloids or colloids influence hemostasis and survival of rabbits subjected to lethal uncontrolled hemorrhage?

Kheirabadi B, Miranda N, Terrazas IB, Gonzales MD, Grimm RC, Dubick MA.

BACKGROUND: Prehospital, small-volume resuscitation of combat casualties with a synthetic colloid (6% hydroxyethyl starch [HES] 670/0.75) has been recommended when blood or blood components are unavailable. We studied hemostatic effects of a newer synthetic colloid (6% HES, 130/0.4) compared with either a natural colloid (albumin) or to crystalloids in an uncontrolled hemorrhage model.

METHODS: Spontaneously breathing New Zealand white rabbits (3.4 ± 0.1 kg) were anesthetized, instrumented, and subjected to a splenic injury with uncontrolled bleeding. Fifteen minutes after injury, rabbits were in shock (mean arterial pressure [MAP] = 26 ± 1.3 mm Hg, and received colloids (6% HES, 130/0.4 or 5% albumin at 15 mL/kg), or crystalloids (normal saline at 30 mL/kg or 5% hypertonic saline at 7.5 mL/kg) for resuscitation in two intravenous bolus injections (15 minutes apart) to raise their MAP to 65 mm Hg, n = 9/group. Animals were monitored for 2.5 hours or until death, and blood losses were measured. Blood samples were analyzed for arterial blood gas, complete blood count, and coagulation measures.

RESULTS: There were no differences among groups in baseline measures and initial hemorrhage volume (11.9 ± 0.6 mL/kg) at 15 minutes postinjury. Twenty minutes after fluid resuscitation (1 hour postinjury), MAP was higher, shock indices were lower, and blood pH was higher in colloids versus. crystalloids groups ($p < 0.05$). Administration of 6% HES 130/0.4 colloid produced the largest hemodilution (54% decrease in hematocrit, $p < 0.05$ vs. hypertonic saline). Activated partial thromboplastin time increased approximately 35% above baseline in all groups except in 6% HES 130/0.4 group in which it doubled. Clot strength was reduced (15%) only in the 6% HES 130/0.4 group. 6% HES 130/0.4 resuscitation produced the largest blood loss and 33% survival rate that was not different than the crystalloid groups. Albumin produced the best hemostatic and survival outcomes (78%).

CONCLUSION: Small-volume resuscitation with crystalloids appeared inadequate to treat hypovolemic shock and prevent death. 6% HES 130/0.4 was effective hemodynamically but detrimental to hemostasis. Albumin produced the best outcomes consistent with our previous observations. Further studies are needed to prove benefit of albumin solution as a possible resuscitation fluid for treating combat casualties at the point of injury.

A A Case Rep. 2017 Jan 20. doi: 10.1213/XAA.0000000000000446. [Epub ahead of print]

A Case Report: Establishing a Definitive Airway in a Trauma Patient With a King Laryngeal Tube In Situ in the Presence of a Closed Head Injury and Difficult Airway: "Between the Devil and the Deep Blue Sea".

Koumpan Y, Murdoch J, Beyea J, Kahn M, Colbeck J.

ABSTRACT:
Airway management in trauma is a crucial skill, because patients are at risk of aspiration, hypoxia, and hypoventilation, all of which may be fatal in the setting of increased intracranial pressure. The King Laryngeal Tube reusable supraglottic airway (King Systems, Noblesville, IN) allows for temporary management of a difficult airway but poses a challenge when an attempt is made to exchange the device for an endotracheal tube, often managed by emergency tracheostomy. We describe a novel fiberoptic, video laryngoscope-assisted approach to intubation in a difficult trauma airway with an in situ King Laryngeal Tube.

J Spec Oper Med 2016;16:44-51

“SWAT is a lifestyle: its’ a way of life” Ray Casillas on a career in operational medicine.

Kragh J

Quote:

“The SWAT team you work on, is it a full-time team or part-time team? How does it work?

Team members are collaterally assigned to SWAT, meaning that our primary assignments are other than-SWAT. As for the medics, all of us work full-time assignments on fire department engine companies. When we are called out for SWAT, we jump off our regular engine company assignments and work SWAT. The vacancy on the engine is back-filled. SWAT training is led by team leaders or by somebody who is being groomed to become a leader (within the team or elsewhere). Medically, we have used elements of TC3 (Tactical Combat Casualty Care) since 2000. Our local medical director, Sam Stratton, is a huge advocate for TEMS.”

“Any thoughts on the LEO community’s view of operational medicine?

Without going into all of the details, one of our guys was shot. The entire team pulled together darn near flawlessly. Things went so well during our interventions for a period of time, I thought we were just training. Today we can laugh, but at the time, it sucked! I know in the region, the story got out, it was on the local news, and caused a lot of other teams to pay closer attention to TC3 and a few other factors. This is exciting to see. I believe most LEOs have and are continuing to embrace it. The entire Committee on Tactical Combat Casualty Care has done a great job with sharing information. It is not uncommon for me to receive pictures of cops performing medical tasks on calls or sharing what they have done on calls.”

J Spec Oper Med. Winter 2016;16(4):7-14.

Learning Curves of Emergency Tourniquet Use Exploring for Utility in Training.

Kragh JF Jr, Mabry RL, Parsons DL, Broussard DW, Aden JK 3rd, Dubick MA.

BACKGROUND: Emergency tourniquet use to control hemorrhage from limb wounds is associated with improved survival and control of shock. In 2013, we introduced a way to measure learning curves of tourniquet users. With a dataset from an unrelated study, we had an opportunity to explore learning in detail. The study aim was to generate hypotheses about measurement methods in the learning of tourniquet users.

METHODS: We gathered data from a previous experiment that yielded a convenient sample of repeated tourniquet applications used as a marker of learning. Data on consecutive applications on a manikin were used in the current report and were associated with two users, three models of tourniquet, and six metrics (i.e., effectiveness, pulse cessation, blood loss, time to effectiveness, windlass turn number, and pressure applied). There were 840 tests (140 tests per user, two users, three models).

RESULTS: Unique characteristics of learning were associated with each user. Hypotheses generated included the following: trainee learning curves can vary in shape (e.g., flat, curved) by which metric of learning is chosen; some metrics may show much learning, whereas others show almost none; use of more than one metric may assess more comprehensively than using only one metric but may require more assessment time; number of uses required can vary by instructional goal (e.g., expertise, competence); awareness of the utility of specific metrics may vary by instructor; and some, but not all, increases in experience are associated with improved performance.

CONCLUSIONS: This first-aid study generated hypotheses about caregiver learning for further study of tourniquet education and standards.

J Anaesthesiol Clin Pharmacol. 2016 Oct-Dec;32(4):424-430. doi:10.4103/0970-9185.168174.

Tourniquet application during anesthesia: "What do we need to know?"

Kumar K, Railton C, Tawfic Q

ABSTRACT:
Tourniquets are routinely and safely used in limb surgeries throughout the world. Tourniquet application alters normal physiology. Healthy patients tolerate these physiological changes well, but the physiological changes may not be well-tolerated by patients with poor cardiac function. This review discusses the physiological changes associated with tourniquet use, safe practice and provides the latest updates regarding tourniquet use. A systematic literature search of PubMed, MEDLINE, ScienceDirect, and Google Scholar was done. The search results were limited to the randomized controlled trials and systemic reviews. The papers are summarized in this review.

Ir J Med Sci. 2017 Jan 21. doi: 10.1007/s11845-017-1561-8. [Epub ahead of print]

Belfast Limb Arterial and Skeletal Trauma (BLAST): the evolution of punishment shooting in Northern Ireland.

Lau M, McCain S, Baker R, Harkin D

INTRODUCTION: Northern Ireland has developed significant experience in specific punishment injuries due to its unique civil unrest. Simple gunshot wound (GSW) injuries have begun to evolve into more complex injuries.

CASE PRESENTATION: We describe three cases of young male victims who suffered from GSW injuries-from a single GSW injury to multiple GSW injuries involving all four limbs; the phenomenon of Belfast Limb Arterial and Skeletal Trauma. We describe the management of these injuries, with a review of current literature.

CONCLUSION: Due to the unique political situation of Northern Ireland, there has been significant development of surgical experience in GSW management. Historically, single knee-capping injuries were prevalent. However, these shootings have evolved into targeted injuries resulting in significant trauma as demonstrated by this case series.

Mil Med. 2016 Aug;181(8):907-12

Efficacy of Hemostatic Agents in Humans With Rotational Thromboelastometry: An in-vitro Study.

Lechner R, Helm M, Mueller M, Wille T, Friemert B

OBJECTIVES: Hemorrhage is the leading cause of preventable death in military conflicts. Different types of hemostatic dressings have been compared in animal studies for their ability to control bleeding. However, the effects of hemostatic agents in animals may be different from those in humans. The aim of this study was to assess the efficacy of hemostatic dressings in human blood.

METHODS: Clotting time, clot formation time, α-angle, maximum clot firmness, and lysis index of human blood incubated with QuikClot Gauze, Celox Gauze, QuikClot ACS+, and standard gauze, were compared using rotational thromboelastometry (ROTEM). Nonactivated, intrinsically activated, extrinsically activated, and fibrin-based ROTEM were used to elucidate different mechanisms of action of those dressings.

RESULTS: QuikClot Gauze was the most efficacious hemostatic dressing, followed by Celox Gauze and standard gauze. QuikClot ACS+ was clearly outperformed.

CONCLUSIONS: Modern hemostatic dressings such as QuikClot Gauze and Celox Gauze should be preferred to previous generations of hemostatic dressings, such as QuikClot ACS+. In vitro studies like ROTEM can provide valuable information about the mechanisms of action of hemostatic dressings. A combination of different mechanisms of action may increase the efficacy of hemostatic dressings.

J Orthop Surg Res. 2017 Feb 2;12(1):22.

Combined use of intravenous and topical versus intravenous tranexamic acid in primary total knee and hip arthroplasty: a meta-analysis of randomised controlled trials.

Li J, Li H, Zhao H, Wang J, Liu S, Song Y, Wu H

BACKGROUND: This meta-analysis aimed to evaluate the efficiency and safety of combined intravenous and topical methods of application versus single intravenous of tranexamic acid in primary total knee and hip arthroplasty.

METHODS: A systematic search was carried out in MEDLINE (from 1966 to 25 September 2016), PubMed (from 1966 to 25 September 2016), Embase (from 1980 to 25 September 2016), ScienceDirect (from 1985 to 25 September 2016) and the Cochrane Library. Only high-quality randomised controlled trials (RCT) were identified. Two authors independently performed data extraction and quality assessment of included studies. Meta-analysis was conducted using Review Manager 5.1 software.

RESULTS: Six RCTs that included 687 patients met the inclusion criteria. The present meta-analysis indicated that there were significant differences in terms of total blood loss (MD = -193.59, 95% CI -338.06 to -49.13, P = 0.009),transfusion rate (RD = -0.07, 95% CI -0.12 to -0.03, P = 0.001), haemoglobin decline (MD = -0.51, 95% CI -0.83 to -0.18, P = 0.01) and length of stay (MD = -0.20, 95% CI -0.38 to -0.02, P = 0.03) between groups.

CONCLUSIONS: Combined administration of tranexamic acid (TXA) in patients with total knee and hip arthroplasty was associated with significantly reduced total blood loss, transfusion requirements, postoperative haemoglobin decline and length of stay compared to single application alone but was not associated with prolonged operation time. Moreover, no adverse effects, such as superficial infection, deep vein thrombus (DVT) or pulmonary embolism (PE), were associated with TXA. We suggest that combined administration of TXA demonstrated excellent clinical efficacy and safety in patients with total knee and hip arthroplasty. More importantly, well-designed studies with larger sample size are needed to provide further reliable evidence for the combined use of TXA.

Front Hum Neurosci. 2016 Nov 29;10:612. eCollection 2016.

Ketamine: 50 Years of Modulating the Mind.

Li L, Vlisides P

ABSTRACT:
Ketamine was introduced into clinical practice in the 1960s and continues to be both clinically useful and scientifically fascinating. With considerably diverse molecular targets and neurophysiological properties, ketamine's effects on the central nervous system remain incompletely understood. Investigators have leveraged the unique characteristics of ketamine to explore the invariant, fundamental mechanisms of anesthetic action. Emerging evidence indicates that ketamine-mediated anesthesia may occur via disruption of corticocortical information transfer in a frontal-to-parietal ("top down") distribution. This proposed mechanism of general anesthesia has since been demonstrated with anesthetics in other pharmacological classes as well. Ketamine remains invaluable to the fields of anesthesiology and critical care medicine, in large part due to its ability to maintain cardiorespiratory stability while providing effective sedation and analgesia. Furthermore, there may be an emerging role for ketamine in treatment of refractory depression and Post-Traumatic Stress Disorder. In this article, we review the history of ketamine, its pharmacology, putative mechanisms of action and current clinical applications.

J Spec Oper Med 2016 fall;16(3):1-4.

A Skeletal Traction Technique for Proximal Femur Fracture Management in an Austere Environment.

Lidwell D, Meghoo C

ABSTRACT:
Skeletal traction is a useful technique for managing proximal femur fractures in austere environments where fracture stabilization for this injury is difficult. We present a technique and a construct appropriate for field use that facilitates patient evacuation, and we provide guidelines for the use of this technique by an advanced medical provider managing these injuries. The objectives of this article are to enable to reader to (1) recognize the role of skeletal traction in managing proximal femur fractures in an austere environment, (2) identify the key steps in placing transfemoral skeletal traction pins, and (3) identify options and requirements for building a traction construct in resource-limited environments.

Medicine (Baltimore). 2016 Dec;95(51):e5344.

Is combined topical with intravenous tranexamic acid superior than topical, intravenous tranexamic acid alone and control groups for blood loss controlling after total knee arthroplasty: A meta-analysis.

Lin C, Qi Y, Jie L, Li HB, Zhao XC, Qin L, Jiang XQ, Zhang ZH, Ma L

BACKGROUND: The purpose of this systematic review and meta-analysis of randomized controlled trials (RCTs) was to evaluate the efficacy and safety of combined topical with intravenous tranexamic acid (TXA) versus topical, intravenous TXA alone or control for reducing blood loss after a total knee arthroplasty (TKA).

METHODS: In May 2016, a systematic computer-based search was conducted in the PubMed, Embase, Cochrane Library, Web of Science, and Chinese Wanfang database. This systematic review and meta-analysis were performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement criteria. Only patients prepared for primary TKA that administration combined topical with intravenous TXA with topical TXA, intravenous (IV) TXA, or control group for reducing blood loss were included. Eligible criteria were published RCTs about combined topical with intravenous TXA with topical alone or intravenous alone. The primary endpoint was the total blood loss and need for transfusion. The complications of deep venous thrombosis (DVT) were also compiled to assess the safety of combined topical TXA with intravenous TXA. Relative risks (RRs) with 95% CIs were estimated for dichotomous outcomes, and mean differences (MDs) with 95% CIs for continuous outcomes. The Cochrane risk of bias tool was used to appraise a risk of bias. Stata 12.0 software was used for meta-analysis.

RESULTS: Fifteen studies involving 1495 patients met the inclusion criteria. The pooled meta-analysis indicated that combined topical TXA with intravenous TXA can reduce the total blood loss compared with placebo with a mean of 458.66 mL and the difference is statistically significant (MD=-458.66, 95% CI: -655.40 to 261.91, P<0.001). Compared with intravenous TXA, combined administrated TXA can decrease the total blood loss, and the difference is statistically significant (MD=-554.03, 95% CI: -1066.21 to -41.85, P=0.034). Compared with the topical administration TXA, the pooled meta-analysis indicated that combined TXA can decrease the amount of total blood loss with mean 107.65 mL with statistically significant (MD=-107.65, 95% CI: -525.55 to -239.9141.85, P=0.001). The pooled results indicated that combined topical with intravenous TXA can decrease the need for transfusion (RR=0.34, 95% CI: 0.23-0.50, P<0.001). There is no significant difference between combined topical with intravenous TXA with topical or intravenous TXA (P>0.05) in terms of need for transfusion and the occurrence of DVT.

CONCLUSION: Compared with topical, intravenous TXA alone or control group, combined topical with TXA, can decrease the total blood loss and subsequent need for transfusion without increasing the occurrence of DVT. The dose and timing to administration TXA is different, and more randomized controlled trials are warranted to clarify the optimal dosing and time to administration TXA.

J Am Coll Surg. 2017 Jan 25. pii: S1072-7515(17)30085-6. doi: 10.1016/j.jamcollsurg.2016.12.046. [Epub ahead of print]

Prevalence and Impact of Admission Acute Traumatic Coagulopathy on Treatment Intensity, Resource Use, and Mortality: An Evaluation of 956 Severely Injured Children and Adolescents.

Liras I, Caplan H, Stensballe J, Wade C, Cox C, Cotton B

BACKGROUND: Acute coagulopathy of trauma in children is of potential importance to clinical outcomes, but knowledge is limited and has only been investigated using conventional coagulation testing. The purpose of this study was to assess the prevalence and impact of arrival coagulopathy, determined by viscoelastic hemostatic testing, in severely injured children.

STUDY DESIGN: Pediatric patients (younger than 17 years of age) who were admitted January 2010 to May 2016 and met highest-level trauma activation were included. Patients were divided into 2 groups (coagulopathy and controls) based on arrival rapid thrombelastography values. Coagulopathy was defined as the presence of any of the following on rapid thrombelastography: activated clotting time ≥128 seconds, α-angle ≤65 degrees, maximum amplitude ≤55 mm, and lysis at 30 minutes from 20-mm amplitude ≥3%. Logistic regression was used to adjust for age, sex, blood pressure, mechanism, and injury severity.

RESULTS: Nine hundred and fifty-six patients met inclusion; 507 (57%) were coagulopathic and 449 (43%) were not (noncoagulopathic and control cohort). Coagulopathic patients were younger (median 14 vs 15 years) and more likely to be male (68% vs 60%) and Hispanic (38% vs 31%) (all $p < 0.05$). Coagulopathic patients received more RBC and plasma transfusions and had fewer ICU and ventilator-free days and higher mortality (12% vs 3%; all $p < 0.05$). Of these 956, 197 (21%) sustained severe brain injury-123 (62%) were coagulopathic and 74 (38%) were noncoagulopathic. The mortality difference was even greater for coagulopathic head injuries (31% vs 10%; $p = 0.002$). Adjusting for confounders, admission coagulopathy was an independent predictor of death, with an odds ratio of 3.67 (95% CI 1.768 to 7.632; $p < 0.001$).

CONCLUSIONS: Almost 60% of severely injured children and adolescents arrive with evidence of acute traumatic coagulopathy. The presence of admission coagulopathy is associated with high mortality in children, especially among those with head injuries.

Anaesthesia. 2017 Mar;72(3):379-390. doi: 10.1111/anae.13779. Epub 2017 Jan 3.

AAGBI: Safer pre-hospital anaesthesia 2017: Association of Anaesthetists of Great Britain and Ireland.

Lockey D, Crewdson K, Davies G, Jenkins B, Klein J, Laird C, Mahoney P, Nolan J, Pountney A, Shinde S, Tighe S, Russell M, Price J, Wright C

ABSTRACT:
Pre-hospital emergency anaesthesia with oral tracheal intubation is the technique of choice for trauma patients who cannot maintain their airway or achieve adequate ventilation. It should be carried out as soon as safely possible, and performed to the same standards as in-hospital emergency anaesthesia. It should only be conducted within organisations with comprehensive clinical governance arrangements. Techniques should be straightforward, reproducible, as simple as possible and supported by the use of checklists. Monitoring and equipment should meet in-hospital anaesthesia standards. Practitioners need to be competent in the provision of in-hospital emergency anaesthesia and have supervised pre-hospital experience before carrying out pre-hospital emergency anaesthesia. Training programmes allowing the safe delivery of pre-hospital emergency anaesthesia by non-physicians do not currently exist in the UK. Where pre-hospital emergency anaesthesia skills are not available, oxygenation and ventilation should be maintained with the use of second-generation supraglottic airways in patients without airway reflexes, or basic airway manoeuvres and basic airway adjuncts in patients with intact airway reflexes.

J Clin Monit Comput. 2016 Nov 26. [Epub ahead of print]

A randomized comparison of the Ambu AuraGain versus the LMA supreme in patients undergoing gynaecologic laparoscopic surgery.

Lopez A, Agusti M, Gambus P, Pons M, Anglada T, Valero R

ABSTRACT:
Second generation supraglottic airway devices providing high seal airway pressures are suitable for patients undergoing gynecologic laparoscopy. We compared the seal pressure achieved by the new Ambu AuraGain™ versus LMA Supreme™ following pneumoperitoneum in the Trendelenburg position. Sixty female patients were randomly allocated to ventilation with either the AuraGain or the Supreme. A target-controlled system was used to administer total intravenous anesthesia. Intracuff pressure was maintained below 60 cm H2O. The following parameters were registered: Time, number of attempts and manoeuvres required for insertion; seal pressure and peak inspiratory pressure at four time points; ease of gastric tube insertion, flexible scope view, complications and postoperative morbidity. Both devices were quick and easily inserted, although the Supreme required less rotation manoeuvres (16 in AuraGain vs. 6 in LMA Supreme; p = 0.01). The AuraGain achieved higher seal pressures (34 ± 5 in AuraGain vs. 29 ± 5 in LMA Supreme; p = 0.0002). Following pneumoperitoneum in head-down position, peak airway pressure increased 9 ± 3 cm H2O in both groups, exceeding seal pressure in 3 patients in the Supreme group (p = 0.06). The vocal cords were seen through all AuraGain and 90% of the Supreme devices; epiglottis was often visible inside the tube (68%). No differences were found in the incidence of traces of blood on the mask or postoperative symptoms. Both devices allowed effective ventilation in patients undergoing gynaecologic laparoscopic surgery with a low rate of complications. The Ambu AuraGain provided higher seal pressures and a clear view of glottic inlet in all patients offering the possibility to guide direct tracheal intubation if required.

Anesth Analg. 2017 Feb;124(2):661-674

Intravenous Ketamine Infusions for Neuropathic Pain Management: A Promising Therapy in Need of Optimization.

Maher D, Chen L, Mao J

ABSTRACT:
Intravenous ketamine infusions have been used extensively to treat often-intractable neuropathic pain conditions. Because there are many widely divergent ketamine infusion protocols described in the literature, the variation in these protocols presents a challenge for direct comparison of one protocol with another and in discerning an optimal protocol. Careful examination of the published literature suggests that ketamine infusions can be useful to treat neuropathic pain and that certain characteristics of ketamine infusions may be associated with better clinical outcomes. Increased duration of relief from neuropathic pain is associated with (1) higher total infused doses of ketamine; (2) prolonged infusion durations, although the rate of infusion does not appear to be a factor; and (3) coadministration of adjunct medications such as midazolam and/or clonidine that mitigate some of the unpleasant psychomimetic side effects. However, there are few studies designed to optimize ketamine infusion protocols by defining what an effective infusion protocol entails with regard to a respective neuropathic pain condition. Therefore, despite common clinical practice, the current state of the literature leaves the use of ketamine infusions without meaningful guidance from high-quality comparative evidence. The objectives of this topical review are to (1) analyze the available clinical evidence related to ketamine infusion protocols and (2) call for clinical studies to identify optimal ketamine infusion protocols tailored for individual neuropathic pain conditions. The Oxford Center for Evidence-Based Medicine classification for levels of evidence was used to stratify the grades of clinical recommendation for each infusion variable studied.

BMJ. 2016 Sep 28;354:i4814.

Does tranexamic acid improve outcomes in traumatic brain injury?

Mahmood A, Roberts I, Shakur H, Harris T, Belli A

Quotes:

"What you need to know

• The effectiveness and safety of tranexamic acid in traumatic brain injury is uncertain, although randomised trials are under way to investigate the problem

• Tranexamic acid could reduce intracranial bleeding but might increase the risk of cerebral thrombosis and ischaemia

• We believe that tranexamic acid should not be used in routine clinical practice unless these trials show benefit"

"What should we do in light of the uncertainty?

The authors recommend that patients with isolated traumatic brain injury should not receive tranexamic acid outside the context of a randomised trial, and clinicians should consider enrolling their patients in one of the relevant trials wherever possible."

Mil Med Res. 2016 Nov 22;3:35

Coagulation complications following trauma.

Martini W

ABSTRACT:
Traumatic injury is one of the leading causes of death, with uncontrolled hemorrhage from coagulation dysfunction as one of the main potentially preventable causes of the mortality. Hypothermia, acidosis, and resuscitative hemodilution have been considered as the significant contributors to coagulation manifestations following trauma, known as the lethal triad. Over the past decade, clinical observations showed that coagulopathy may be present as early as hospital admission in some severely injured trauma patients. The hemostatic dysfunction is associated with higher blood transfusion requirements, longer hospital stay, and higher mortality. The recognition of this early coagulopathy has initiated tremendous interest and effort in the trauma community to expand our understanding of the underlying pathophysiology and improve clinical treatments. This review discusses the current knowledge of coagulation complications following trauma.

Anesthesiology. 2017 Mar;126(3):394-408.

An Anesthesiologist's Perspective on the History of Basic Airway Management: The "Artisanal Anesthetic" Era: 1846 to 1904.

Matioc A

ABSTRACT:
This second installment of the history of basic airway management covers the early-artisanal-years of anesthesia from 1846 to 1904. Anesthesia was invented and practiced as a supporting specialty in the context of great surgical and medical advances. The current-day anesthesia provider tends to equate the history of airway management with the history of intubation, but for the first 58 yr after the introduction of ether anesthesia, airway management was provided by basic airway techniques with or without the use of a face mask. The jaw thrust and chin lift were described in the artisanal years and used primarily with inhalation anesthesia in the spontaneously breathing patient and less often with negative-pressure ventilation in the apneic victim. Positive-pressure ventilation and intubation stayed at the fringes of medical practice, and airway techniques and devices were developed by trial and error. At the beginning of the 20th century, airway management and anesthetic techniques lagged behind surgical requirements.

J Res Pharm Pract. 2016 Oct-Dec;5(4):294-296.

Moxifloxacin-induced acute psychosis: A case report with literature review.

Mazhar F, Akram S, Haider N

ABSTRACT:
Third generation quinolones are extensively used to treat a variety of common bacterial infections. Due to their extensive use in clinical practice, an increase in neuropsychiatric events has been reported. We report the case of psychotic symptoms occurs after three doses of moxifloxacin in a healthy adult male with no underlying risk factors. After the discontinuation of moxifloxacin treatment, there was a complete resolution of patient's symptoms. The case draws attention to a rare side effect of a commonly used drug and alerts clinicians to be cautious in those patients that have a baseline risk factors which makes the patient more susceptible to such adverse drug effect.

Thorac Surg Clin. 2017 Feb;27(1):29-34

Modern Techniques to Insert Chest Drains.

McElnay P, Lim E

ABSTRACT:
Both physicians and surgeons insert chest drains by various techniques-including Seldinger and "wide-bore" methods. The indications include hemothorax, pneumothorax, pleural effusion, and postoperative care in thoracic surgery. Given their invasive nature, there is significant potential for complications; however, this can be minimized by following a meticulous technique, which is herein described for both Seldinger and "wide-bore" drain insertion.

J Spec Oper Med. 2016 fall;16(3):93-96.

A Case of Prehospital Traumatic Arrest in a US Special Operations Soldier: Care From Point of Injury to Full Recovery.

McKenzie MR, Parrish EW, Miles EA, Spradling JC, Littlejohn LF, Quinlan MD, Barbee GA, King DR.

ABSTRACT:
During an assault on an extremely remote target, a US Special Operations Soldier sustained multiple gunshot and fragmentation wounds to the thorax, resulting in a traumatic arrest and subsequent survival. His care, including care under fire, tactical field care, tactical evacuation care, and Role III, IV, and V care, is presented. The case is used to illustrate the complex dynamics of Special Operations care on the modern battlefield and the exceptional outcomes possible when evidence-based medicine is taken to the warfighter with effective, far forward, expeditionary medical-force projection.

J Orthop Surg (Hong Kong). 2017 Jan;25(1):2309499016684300. doi: 10.1177/2309499016684300.

Topical versus intravenous tranexamic acid in total knee arthroplasty.

Meena S, Benazzo F, Dwivedi S, Ghiara M

PURPOSE: The aim of this meta-analysis is to examine the efficacy and safety of intra-articular tranexamic acid (TXA) when compared to intravenous (IV) route.

METHODS: The literature search was conducted using PubMed, Cochrane Library, MEDLINE, EMBASE and China National Knowledge Infrastructure (CNKI). All randomized controlled trials evaluating the effectiveness of topical route and IV route of TXA administration were included.

RESULTS: Eight randomized clinical trials comprising of 857 patients were included in this analysis. We found no statistically significant difference in terms of total blood loss, drain output, transfusion requirement, thromboembolic complication, tourniquet time and surgical duration.

CONCLUSION: Topical TXA has a similar efficacy to IV-TXA in reducing total blood loss, drain output, transfusion rate and haemoglobin drop without any increase in thromboembolic complications.

J Spec Oper Med. 2016 fall;16(3):41-46.

Evaluation of Two Junctional Tourniquets Used on the Battlefield: Combat Ready Clamp® versus SAM® Junctional Tourniquet.

Meusnier J, Dewar C, Mavrovi E, Caremil F, Wey P, Martinez J

BACKGROUND: Junctional hemorrhage (i.e., between the trunk and limbs) are too proximal for a tourniquet and difficult to compress. These hemorrhages are responsible for 20% of preventable deaths by bleeding on the battlefield. The majority of these involve the groin area. Devices allowing a proximal compression for arterial axes have been recently developed.

OBJECTIVE: The purpose of this study was to compare the use of two junctional-tourniquet models, the Combat Ready Clamp (CRoC®) and the SAM® Junctional Tourniquet (SJT), in simulated out-of-hospital trauma care when tourniquets were ineffective to stop the arterial flow.

METHODS: During our clinical study, 84 healthy volunteers wearing battle dress performed a physical exercise to come approximate the operational context. The volunteers were randomly divided into two groups according to the device (the CRoC or SJT) used as supplement to a tourniquet self-applied to the root of the thigh. The primary study end point was the complete interruption of popliteal arterial flow, measured with Doppler auscultation. Time to effectiveness and subjective questionnaire data to evaluate the devices' application were also collected.

RESULTS: Junctional device effectiveness was almost 90% for both the CRoC and the SJT, and did not differ between them, either used with a tourniquet ($\rho = .36$) or alone ($\rho = .71$). The time to effectiveness of the SJT was significantly shorter than that of the CRoC ($\rho = .029$).

CONCLUSION: The SJT and the CRoC were equally effective. The SJT was faster to apply and preferred by the users. Our study provides objective evidence to the French Tactical Casualty Care Committee for improving junctional hemorrhage treatment.

Shock. 2016 Dec 9. [Epub ahead of print]

Traumatic Hemothorax Blood Contains Elevated Levels of Microparticles that are Prothrombotic but Inhibit Platelet Aggregation.

Mitchell T, Herzig M, Fedyk C, Salhanick M, Henderson A, Parida B, Prat N, Dent D, Schwacha M, Cap A

OBJECTIVES: Autotransfusion of shed blood from traumatic hemothorax is an attractive option for resuscitation of trauma patients in austere environments. However, previous analyses revealed that shed hemothorax (HX) blood is defibrinated, thrombocytopenic, and contains elevated levels of D-dimer. Mixing studies with normal pooled plasma demonstrated hypercoagulability, evoking concern for potentiation of acute traumatic coagulopathy. We hypothesized that induction of coagulopathic changes by shed HX blood may be due to increases in cellular microparticles (MP) and that these may also affect recipient platelet function.

METHODS: Shed HX blood was obtained from 17 adult trauma patients under an Institutional Review Board approved prospective observational protocol. Blood samples were collected every hour up to 4 hours after thoracostomy tube placement. The corresponding plasma was isolated and frozen for analysis. The effects of shed HX frozen plasma (HFP) and isolated HX microparticles (HMP) on coagulation and platelet function were assessed through mixing studies with platelet rich plasma at various dilutions followed by analysis with thromboelastometry (ROTEM), platelet aggregometry (Multiplate), enzyme-linked immunosorbent assays (ELISA), and flow cytometry. Furthermore, HFP was assessed for von Willebrand factor antigen levels and multimer content, and plasma free hemoglobin.

RESULTS: ROTEM analysis demonstrated that diluted HFP and isolated HMP samples decreased clotting time, clotting formation time, and increased α angle, irrespective of sample concentrations, when compared to diluted control plasma. Isolated HMP inhibited platelet aggregation in response to adenosine diphosphate, arachidonic acid and collagen. HFP contained elevated levels of fibrin-degradation products and tissue factor compared to control fresh frozen plasma samples. MP concentrations in HFP were significantly increased and enriched in events positive for phosphatidylserine, tissue factor, CD235, CD45, CD41a and CD14. vWF multimer analysis revealed significant loss of high molecular weight multimers in HFP samples. Plasma free hemoglobin levels were eight-fold higher in HFP compared to fresh frozen plasma.

CONCLUSION: HFP induces plasma hypercoagulability which is likely related to increased tissue factor and phosphatidylserine expression originating from cell-derived MP. In contrast, platelet dysfunction is induced by HMP, potentially aggravated by depletion of high molecular weight multimers of vWF. Thus, autologous transfusion of shed traumatic hemothorax blood may induce a range of undesirable effects in patients with acute traumatic coagulopathy.

Thorac Surg Clin. 2017 Feb;27(1):13-23. doi: 10.1016/j.thorsurg.2016.08.003.

Thoracic Trauma: Which Chest Tube When and Where?

Molnar TF

ABSTRACT:
Clinical suspicion of hemo/pneumothorax: when in doubt, drain the chest. Stable chest trauma with hemo/pneumothorax: drain and wait. Unstable patient with dislocated trachea must be approached with drain in hand and scalpel ready. Massive hemo/pneumothorax may be controlled by drainage alone. The surgeon should not hesitate to open the chest if too much blood drains over a short period. The chest drainage procedure does not end with the last stitch; the second half of the match is still ahead. The drained patient is in need of physiotherapy and proper pain relief with an extended pleural space: control the suction system.

J Emerg Med. 2016 Dec;51(6):752-757

Is There a Role for Intravenous Subdissociative-Dose Ketamine Administered as an Adjunct to Opioids or as a Single Agent for Acute Pain Management in the Emergency Department?

Motov S, Rosenbaum S, Vilke G, Nakajima Y

BACKGROUND: Whether acute or chronic, emergency physicians frequently encounter patients reporting pain. It is the responsibility of the emergency physician to assess and evaluate, and if appropriate, safely and effectively reduce pain. Recently, analgesics other than opioids are being considered in an effort to provide safe alternatives for pain management in the emergency department (ED). Opioids have significant adverse effects such as respiratory depression, hypotension, and sedation, to say nothing of their potential for abuse. Although ketamine has long been used in the ED for procedural sedation and rapid sequence intubation, it is used infrequently for analgesia. Recent evidence suggests that ketamine use in subdissociative doses proves to be effective for pain control and serves as a feasible alternative to traditional opioids. This paper evaluates ketamine's analgesic effectiveness and safety in the ED.

METHODS: This is a literature review of randomized controlled trials, systematic reviews, meta-analyses, and observational studies evaluating ketamine for pain control in the ED setting. Based on these search parameters, eight studies were included in the final analysis and graded based on the American Academy of Emergency Medicine Clinical Practice Committee manuscript review process.

RESULTS: A total of eight papers were reviewed in detail and graded. Recommendations were given based upon this review process.

CONCLUSIONS: Subdissociative-dose ketamine (low-dose ketamine) is effective and safe to use alone or in combination with opioid analgesics for the treatment of acute pain in the ED. Its use is associated with higher rates of minor, but well-tolerated adverse side effects.

N Engl J Med. 2017 Jan 12;376(2):136-148.

Tranexamic Acid in Patients Undergoing Coronary-Artery Surgery.

Myles P, Smith J, Forbes A, Silbert B, Jayarajah M, Painter T, Cooper D, Marasco S, McNeil J, Bussières J, McGuinness S, Byrne K, Chan M, Landoni G, Wallace S; ATACAS Investigators of the ANZCA Clinical Trials Network.

Background: Tranexamic acid reduces the risk of bleeding among patients undergoing cardiac surgery, but it is unclear whether this leads to improved outcomes. Furthermore, there are concerns that tranexamic acid may have prothrombotic and proconvulsant effects. Methods In a trial with a 2-by-2 factorial design, we randomly assigned patients who were scheduled to undergo coronary-artery surgery and were at risk for perioperative complications to receive aspirin or placebo and tranexamic acid or placebo. The results of the tranexamic acid comparison are reported here. The primary outcome was a composite of death and thrombotic complications (nonfatal myocardial infarction, stroke, pulmonary embolism, renal failure, or bowel infarction) within 30 days after surgery.

Results: Of the 4662 patients who were enrolled and provided consent, 4631 underwent surgery and had available outcomes data; 2311 were assigned to the tranexamic acid group and 2320 to the placebo group. A primary outcome event occurred in 386 patients (16.7%) in the tranexamic acid group and in 420 patients (18.1%) in the placebo group (relative risk, 0.92; 95% confidence interval, 0.81 to 1.05; P=0.22). The total number of units of blood products that were transfused during hospitalization was 4331 in the tranexamic acid group and 7994 in the placebo group (P<0.001). Major hemorrhage or cardiac tamponade leading to reoperation occurred in 1.4% of the patients in the tranexamic acid group and in 2.8% of the patients in the placebo group (P=0.001), and seizures occurred in 0.7% and 0.1%, respectively (P=0.002 by Fisher's exact test).

Conclusions: Among patients undergoing coronary-artery surgery, tranexamic acid was associated with a lower risk of bleeding than was placebo, without a higher risk of death or thrombotic complications within 30 days after surgery. Tranexamic acid was associated with a higher risk of postoperative seizures.

Injury. 2017 Jan 16. pii: S0020-1383(17)30030-X.

Fibrinogen level on admission is a predictor for massive transfusion in patients with severe blunt trauma: Analyses of a retrospective multicentre observational study.

Nakamura Y, Ishikura H, Kushimoto S, Kiyomi F, Kato H, Sasaki J, Ogura H, Matsuoka T, Uejima T, Morimura N, Hayakawa M, Hagiwara A, Takeda M, Kaneko N, Saitoh D, Kudo D, Maekawa K, Kanemura T, Shibusawa T, Hagihara Y, Furugori S, Shiraishi A, Murata K, Mayama G, Yaguchi A, Kim S, Takasu O, Nishiyama K

INTRODUCTION: In the early phase of trauma, fibrinogen (Fbg) plays an important role in clot formation. However, to the best of our knowledge, few studies have analysed methods of predicting the need for massive transfusion (MT) based on Fbg levels using multiple logistic regression. Therefore, the present study aimed to evaluate whether Fbg levels on admission can be used to predict the need for MT in patients with trauma.

METHODS: We conducted a retrospective multicentre observational study. Patients with blunt trauma with ISS ≥16 who were admitted to 15 tertiary emergency and critical care centres in Japan participating in the J-OCTET were enrolled in the present study. MT was defined as the transfusion of packed red blood cells (PRBC) ≥10 units or death caused by bleeding within 24h after admission. Patients were divided into non-MT and MT groups. Multiple logistic-regression analysis was used to assess the predictive value of the variables age, sex, vital signs, Glasgow Coma Scale (GCS) score, and Fbg levels for MT. We also evaluated the discrimination threshold of MT prediction via receiver operating characteristic curve (ROC) analysis for each variable.

RESULTS: Higher heart rate (HR; per 10 beats per minutes [bpm]), systolic blood pressure (SBP; per 10mm Hg), GCS, and Fbg levels (per 10mg/dL) were independent predictors of MT (odds ratio [OR] 1.480, 95% confidence interval [CI] 1.326-1.668; OR 0.851, 95% CI 0.789-0.914; OR 0.907, 95% CI 0.855-0.962; and OR 0.931, 95% CI 0.898-0.963, respectively). The optimal cut-off values for HR, SBP, GCS, and Fbg levels were ≥100 bpm (sensitivity 62.4%, specificity 79.8%), ≤120mm Hg (sensitivity 61.5%, specificity 70.5%), ≤12 points (sensitivity 63.3%, specificity 63.6%), and ≤190mg/dL (sensitivity 55.1%, specificity 78.6%), respectively.

CONCLUSIONS: Our findings suggest that vital signs, GCS, and decreased Fbg levels can be regarded as predictors of MT. Therefore, future studies should consider Fbg levels when devising models for the prediction of MT.

Transfusion. 2016 Dec 30. doi: 10.1111/trf.13968. [Epub ahead of print]

Additional intraarticular tranexamic acid further reduced postoperative blood loss compared to intravenous and topical bathed tranexamic acid in total hip arthroplasty: a retrospective sequential series study.

Nakura N, Hirakawa K, Takayanagi S, Saito A, Tsuji K, Tamaki Y, Ochiai S, Mihara M

BACKGROUND: Topical tranexamic acid (TXA) administration has been described to be effective in decreasing blood loss in total hip arthroplasty (THA). The aim of this retrospective study was to evaluate whether topical intraarticular TXA administration in addition to intravenous (IV) and topical bathed TXA further reduces blood loss in THA patients.

STUDY DESIGN AND METHODS: Four-hundred patients were enrolled in this sequential series study with two different phases during four different time periods. Patients were divided based on TXA usage and route of administration: those with and without IV TXA (IVTA-I and no-IVTA groups, respectively) and those with and without intraarticular TXA (TITA and IVTA-II groups, respectively). Both IVTA-II and TITA groups had IV TXA, and all four groups used topical bathed TXA. These four groups had 100 cases each. The primary outcomes were evaluated with total blood loss and postoperative hemoglobin level.

RESULTS: The total blood loss was 1106 and 875 mL in the no-IVTA and IVTA-I groups, respectively ($p < 0.05$). Postoperative Hb was 10.9 and 11.51 g/dL in the no-IVTA and IVTA-I groups, respectively ($p < 0.05$). Total blood loss was 813 and 646 mL in the IVTA-II and TITA groups, respectively ($p < 0.05$). Intraarticular with IV and bathed TXA administration was more effective than IV and bathed TXA in reducing blood loss.

CONCLUSION: This study suggests that the combined administration of topical intraarticular, bathed, and IV TXA was effective in reducing blood loss in THA patients.

BMJ 2017;Epub ahead of print

Prehospital tranexamic acid: what is the current evidence?

Napolitano L

CONCLUSION

Although we have made significant advances in the understanding of trauma-induced coagulopathy, there is still lack of clarity regarding links between diagnostic and laboratory coagulation testing and clinical bleeding risk.[38] It is therefore evident that there is still significant controversy as to how best to manage trauma patients with severe injury and hemorrhage, including which patients would benefit most from TXA administration. At present, there is no definitive evidence to support efficacy of prehospital TXA administration in improving trauma outcomes. Data are lacking regarding which trauma patients might benefit, optimal dosing and timing and potential complications in the prehospital setting. Prehospital TXA protocols have not been adopted in most trauma centers. If prehospital TXA protocols are desired, issues to consider include time to definitive trauma care, feasibility of TXA intravenous administration, and how best to determine which patients would potentially benefit in the prehospital phase. The ongoing prehospital and in-hospital TXA randomized trials will provide additional high-quality evidence to support optimal clinical protocols for TXA use in the future. At present, the focus of prehospital care of the bleeding trauma victim should be hemorrhage control, hemostatic resuscitation and rapid transport to definitive hemorrhage control and definitive trauma care.

Br J Anaesth. 2016 Dec;117(6):775-782.

Fibrinogen in the initial resuscitation of severe trauma (FiiRST): a randomized feasibility trial.

Nascimento B, Callum J, Tien H, Peng H, Rizoli S, Karanicolas P, Alam A, Xiong W, Selby R, Garzon A, Colavecchia C, Howald R, Nathens A, Beckett A

BACKGROUND: Decreased plasma fibrinogen concentration shortly after injury is associated with higher blood transfusion needs and mortality. In North America and the UK, cryoprecipitate transfusion is the standard-of-care for fibrinogen supplementation during acute haemorrhage, which often occurs late during trauma resuscitation. Alternatively, fibrinogen concentrate (FC) can be beneficial in trauma resuscitation. However, the feasibility of its early infusion, efficacy and safety remain undetermined. The objective of this trial was to evaluate the feasibility, effect on clinical and laboratory outcomes and complications of early infusion of FC in trauma.

METHODS: Fifty hypotensive (systolic arterial pressure ≤100 mm Hg) adult patients requiring blood transfusion were randomly assigned to either 6 g of FC or placebo, between Oct 2014 and Nov 2015 at a tertiary trauma centre. The primary outcome, feasibility, was assessed by the proportion of patients receiving the intervention (FC or placebo) within one h of hospital arrival. Plasma fibrinogen concentration was measured, and 28-day mortality and incidence of thromboembolic events were assessed.

RESULTS: Overall, 96% (43/45) [95% CI 86-99%] of patients received the intervention within one h; 95% and 96% in the FC and placebo groups, respectively (P=1.00). Plasma fibrinogen concentrations remained higher in the FC group up to 12 h after admission with the largest difference at three h (2.9 mg dL (-) (1) vs. 1.8 mg dL (-) (1); P<0.01). The 28-day mortality and thromboembolic complications were similar between groups.

CONCLUSIONS: Early infusion of FC is feasible and increases plasma fibrinogen concentration during trauma resuscitation. Larger trials are justified.

PLoS One. 2016 Dec 13;11(12):e0168401.

Transfusion: -80°C Frozen Blood Products Are Safe and Effective in Military Casualty Care.

Noorman F, van Dongen T, Plat M, Badloe J, Hess J, Hoencamp R

INTRODUCTION: The Netherlands Armed Forces use -80°C frozen red blood cells (RBCs), plasma and platelets combined with regular liquid stored RBCs, for the treatment of (military) casualties in Medical Treatment Facilities abroad. Our objective was to assess and compare the use of -80°C frozen blood products in combination with the different transfusion protocols and their effect on the outcome of trauma casualties.

MATERIALS AND METHODS: Hemovigilance and combat casualties data from Afghanistan 2006-2010 for 272 (military) trauma casualties with or without massive transfusions (MT: ≥6 RBC/24hr, N = 82 and non-MT: 1-5 RBC/24hr, N = 190) were analyzed retrospectively. In November 2007, a massive transfusion protocol (MTP; 4:3:1 RBC:Plasma:Platelets) for ATLS® class III/IV hemorrhage was introduced in military theatre. Blood product use, injury severity and mortality were assessed pre- and post-introduction of the MTP. Data were compared to civilian and military trauma studies to assess effectiveness of the frozen blood products and MTP.

RESULTS: No ABO incompatible blood products were transfused and only 1 mild transfusion reaction was observed with 3,060 transfused products. In hospital mortality decreased post-MTP for MT patients from 44% to 14% (P = 0.005) and for non-MT patients from 12.7% to 5.9% (P = 0.139). Average 24-hour RBC, plasma and platelet ratios were comparable and accompanying 24-hour mortality rates were low compared to studies that used similar numbers of liquid stored (and on site donated) blood products.

CONCLUSION: This report describes for the first time that the combination of -80°C frozen platelets, plasma and red cells is safe and at least as effective as standard blood products in the treatment of (military) trauma casualties. Frozen blood can save the lives of casualties of armed conflict without the need for in-theatre blood collection. These results may also contribute to solutions for logistic problems in civilian blood supply in remote areas.

Anaesthesia. 2017 Feb;72(2):223-229.

A cadaver study comparing three fibreoptic-assisted techniques for converting a supraglottic airway to a cuffed tracheal tube.

Olesnicky B, Rehak A, Bestic W, Brock J, Watterson L

ABSTRACT:
After rescuing an airway with a supraglottic airway device, a method to convert it to a cuffed tracheal tube is often needed. The best method to do this has never been directly studied. We compared three techniques for conversion of a standard LMA(®) Unique airway to a cuffed endotracheal tube using a fibrescope. The primary endpoint was time to intubation, with secondary endpoints of success rate, perceived difficulty and preferred technique. We also investigated the relationship between level of training and prior training and experience with the techniques on the primary outcome. The mean (95% CI) time to intubation using a direct tracheal tube technique of 37 (31-42) s was significantly shorter than either the Aintree intubation catheter technique at 70 (60-80) s, or a guidewire technique at 126 (110-141) s ($p < 0.001$). Most (13/24) participants rated the tracheal tube as their preferred technique, while 11/24 preferred the Aintree technique. In terms of perceived difficulty, 23/24, 21/24 and 9/24 participants rated the tracheal tube technique, Aintree technique and guidewire technique, respectively, as either very easy or easy. There was no relationship between prior training, prior experience or level of training on time to completion of any of the techniques. We conclude the tracheal tube and Aintree techniques both provide a rapid and easy method for conversion of a supraglottic airway device to a cuffed tracheal tube. The guidewire technique cannot be recommended.

Ann Transl Med. 2016 Dec;4(24):530.

Tranexamic acid and total hip arthroplasty: optimizing the administration method.

Ollivier J, Van Driessche S, Billuart F, Beldame J, Matsoukis J

Quote"

"In summary, combined IV and topical TXA administration during THA appears to significantly reduce the total blood loss and transfusion rate. In addition, this reduction is significantly greater than when TXA is administered by IV only. Lastly, the risk of thromboembolic complications is not higher in the short and medium term. This makes TXA a simple, low-cost, effective solution for controlling postoperative blood loss. Nevertheless, other studies with a high level of evidence and ones that focus solely on THA must be performed to confirm the superiority of combined TXA administration in the context of this surgical procedure and to achieve consensus as to the administered dose."

Br J Anaesth. 2016 Oct;117(4):470-476. doi: 10.1093/bja/aew276.

Reduced mortality by meeting guideline criteria before using recombinant activated factor VII in severe trauma patients with massive bleeding.

Payen J, Berthet M, Genty C, Declety P, Garrigue-Huet D, Morel N, Bouzat P, Riou B, Bosson JL; Novoseven Trauma investigators.

BACKGROUND: Management of trauma patients with severe bleeding has led to criteria before considering use of recombinant activated factor VII (rFVIIa), including haemoglobin >8 g dl(-1), serum fibrinogen ≥1.0 g l(-1), platelets >50,000 x 10(9) l(-1), arterial pH ≥ 7.20, and body temperature ≥34 °C. We hypothesized that meeting these criteria is associated with improved outcomes.

METHODS: In this prospective cohort study of 26 French trauma centres, subjects were included if they received rFVIIa for persistent massive bleeding despite appropriate care after severe blunt and/or penetrating trauma.

RESULTS: After surgery and/or embolization as haemostatic interventions, 112 subjects received a first dose of 103 μg kg(-1) rFVIIa (82-200) (median, 25(th)-75(th) percentile) at 420 min (285-647) post-trauma. Of these, 71 (63%) "responders" were still alive at 24h post-trauma and had their transfusion requirements reduced by > 2 packed red blood cell units after rFVIIa treatment. Mortality was 54% on day 30 post-trauma. There were 21%, 44% and 35% subjects who fulfilled 0-1, 2-3 or 4-5, respectively, of the guidelines before receiving rFVIIa. Survival at day 30 was 13%, 49% and 64% and the proportion of responders was 39%, 64% and 82%, when subjects fulfilled 0-1, 2-3 or 4-5 conditions, respectively (both P <0.01).

CONCLUSIONS: In actively bleeding trauma patients, meeting guideline criteria before considering rFVIIa was associated with lower mortality and a higher proportion of responders to the rFVIIa.

J Clin Pathol. 2016 Dec 5. pii: jclinpath-2016-203984. doi: 10.1136/jclinpath-2016-203984. [Epub ahead of print]

A historical perspective on crush syndrome: the clinical application of its pathogenesis, established by the study of wartime crush injuries.

Peiris D.

ABSTRACT:
Crush syndrome is a fine example of how pathology can play a direct role in revealing the best treatment and management for diseases. It can occur when crush injuries are sustained. Skeletal muscle becomes damaged under the weight of a heavy object, and victims experience severe shock and renal failure. The discovery of the pathology of crush syndrome belongs to two individuals: Seigo Minami and Eric Bywaters. They separately helped to define the pathogenesis of crush syndrome during World Wars I and II. Seigo Minami is believed to have been the first to record the pathogenesis of crush syndrome. In 1923, he described the cases of three soldiers who died of renal failure caused by crush injury during World War I. Using microscopic studies to investigate the pathology of their kidneys, he found the soldiers had died due to 'autointoxication' caused by rhabdomyolysis. This discovery was not known to Eric Bywaters, who described crush syndrome in 1941, having studied victims of the London Blitz during World War II. He defined the 'autointoxication' as the release of rhabdomyolysis products via reperfusion. He therefore established the need for emergency fluid replacement to treat crush syndrome. The findings made by Minami and Bywaters highlight a remarkable achievement in clinical pathology, despite the adversity of war. It is these findings on which current guidelines are based. By reviewing their work, it is hoped that the role of pathology can be better appreciated as a valuable resource for delineating the treatment and management of diseases.

Crit Care. 2016 Apr 14;20:102. doi: 10.1186/s13054-016-1277-6.

Use of intra-osseous access in adults: a systematic review.

Petitpas F, Guenezan J, Vendeuvre T, Scepi M, Oriot D, Mimoz O

BACKGROUND: Indications for intra-osseous (IO) infusion are increasing in adults requiring administration of fluids and medications during initial resuscitation. However, this route is rarely used nowadays due to a lack of knowledge and training. We reviewed the current evidence for its use in adults requiring resuscitative procedures, the contraindications of the technique, and modalities for catheter implementation and skill acquisition.

METHODS: A PubMed search for all articles published up to December 2015 was performed by using the terms "Intra-osseous" AND "Adult". Additional articles were included by using the "related citations" feature of PubMed or checking references of selected articles. Editorials, comments and case reports were excluded. Abstracts of all the articles that the search yielded were independently screened for eligibility by two authors and included in the analysis after mutual consensus. In total, 84 full-text articles were reviewed and 49 of these were useful for answering the following question "when, how, and for which population should an IO infusion be used in adults" were selected to prepare independent drafts. Once this step had been completed, all authors met, reviewed the drafts together, resolved disagreements by consensus with all the authors, and decided on the final version.

RESULTS: IO infusion should be implemented in all critical situations when peripheral venous access is not easily obtainable. Contraindications are few and complications are uncommon, most of the time bound to prolonged use. The IO infusion allows for blood sampling and administration of virtually all types of fluids and medications including vasopressors, with a bioavailability close to the intravenous route. Unfortunately, IO infusion remains underused in adults even though learning the technique is rapid and easy.

CONCLUSIONS: Indications for IO infusion use in adults requiring urgent parenteral access and having difficult intravenous access are increasing. Physicians working in emergency departments or intensive care units should learn the procedures for catheter insertion and maintenance, the contraindications of the technique, and the possibilities this access offers.

Arq Bras Cir Dig. 2016 Nov-Dec;29(4):282-286.

Use of tranexamic acid in trauma patients: an analysis of cost-effectiveness for use in Brazil.

Pinto M, Silva J, Chedid A, Chedid M

Introduction: Use of tranexamic acid (TXA) in trauma has been the subject of growing interest by researchers and health professionals. However, there are still several open questions regarding its use. In some aspects medical literature is controversial. The points of disagreement among experts include questions such as: Which patients should receive TXA in trauma? Should treatment be performed in the pre-hospital environment? Is there any need for laboratory parameters before starting TXA treatment? What is the drug safety profile? The main issue on which there is still no basis in literature is: What is the indication for treatment within massive transfusion protocols?

Objective: Answer the questions proposed based on critical evaluation of the evidence gathered so far and carry out a study of cost-effectiveness of TXA use in trauma adapted to the Brazilian reality.

Methods: A literature review was performed through searching Pubmed.com, Embase and Cab Abstract by headings "tranexamic AND trauma", in all languages, yielding 426 articles. Manuscripts reporting on TXA utilization for elective procedures were excluded, remaining 79 articles. Fifty-five articles were selected, and critically evaluated in order to answer study questions. The evaluation of cost effectiveness was performed using CRASH-2 trial data and Brazilian official population data.

Results: TXA is effective and efficient, and should be administered to a wide range of patients, including those with indication evaluated in research protocols and current indication criteria for TXA should be expanded. As for the cost-effectiveness, the TXA proved to be cost-effective with an average cost of R$ 61.35 (currently US$16) per year of life saved.

Conclusion: The use of TXA in trauma setting seems to be effective, efficient and cost-effective in the various groups of polytrauma patients. Its use in massive transfusion protocols should be the subject of further investigations.

Headache. 2017 Feb;57(2):276-282.

Ketamine Infusions for Treatment Refractory Headache.

Pomeroy J, Marmura M, Nahas S, Viscusi E

BACKGROUND: Management of chronic migraine (CM) or new daily persistent headache (NDPH) in those who require aggressive outpatient and inpatient treatment is challenging. Ketamine has been suggested as a new treatment for this intractable population.

METHODS: This is a retrospective review of 77 patients who underwent administration of intravenous, subanesthetic ketamine for CM or NDPH. All patients had previously failed aggressive outpatient and inpatient treatments. Records were reviewed for patients treated between January 2006 and December 2014.

RESULTS: The mean headache pain rating using a 0-10 pain scale was an average of 7.1 at admission and 3.8 on discharge ($P < .0001$). The majority (55/77, 71.4%) of patients were classified as acute responders defined as at least 2-point improvement in headache pain at discharge. Some (15/77, 27.3%) acute responders maintained this benefit at their follow-up office visit but sustained response did not achieve statistical significance. The mean length of infusion was 4.8 days. Most patients tolerated ketamine well. A number of adverse events were observed, but very few were serious.

CONCLUSIONS: Subanesthetic ketamine infusions may be beneficial in individuals with CM or NDPH who have failed other aggressive treatments. Controlled trials may confirm this, and further studies may be useful in elucidating more robust benefit in a less refractory patient population.

Am J Emerg Med. 2017 Jan 26. pii: S0735-6757(17)30063-3. doi: 10.1016/j.ajem.2017.01.045. [Epub ahead of print]

The definite risks and questionable benefits of liberal pre-hospital spinal immobilisation.

Purvis T, Carlin B, Driscoll P

INTRODUCTION: The routine practice of pre-hospital spinal immobilisation (phSI) for patients with suspected spinal injury has existed for decades. However, the controversy surrounding it resulted in the 2013 publication of a Consensus document by the Faculty of Pre-Hospital Care. The question remains as to whether the quality of evidence in the literature is sufficient to support the Consensus guidelines. This critical review aims to determine the validity of current recommendations by balancing the potential benefits and side effects of phSI.

METHOD: A review of the literature was carried out by two independent assessors using Medline, PubMed, EMBASE and the Cochrane Library databases. Manual searches of related journals and reference lists were also completed. The selected body of evidence was subsequently appraised using a checklist derived from SIGN and CASP guidelines, as well as Crombie's guide to critical appraisal.

RESULTS: No reliable sources were found proving the benefit for patient immobilisation. In contrast there is strong evidence to show that pre-hospital spinal immobilisation is not benign with recognised complications ranging from discomfort to significant physiological compromise. The published literature supports the Consensus guideline recommendations for safely reducing the impact of these side effects without compromising the patient.

CONCLUSION: The literature supports the Consensus Guidelines but raises the question as to whether they go far enough as there is strong evidence to suggest phSI is an inherently harmful procedure without having any proven benefit. These results demonstrate an urgent need for further studies to determine its treatment effect.

Crit Care Clin. 2017 Jan;33(1):85-99.

Tranexamic Acid Update in Trauma.

Ramirez R, Spinella P, Bochicchio G.

ABSTRACT:
Following results from the CRASH-2 trial, tranexamic acid (TXA) gained considerable interest for the treatment of hemorrhage in trauma patients. Although TXA is effective at reducing mortality in patients presenting within 3 hours of injury, optimal dosing, timing of administration, mechanism, and pharmacokinetics require further elucidation. The concept of fibrinolysis shutdown in hemorrhagic trauma patients has prompted discussion of real-time viscoelastic testing and its potential role for appropriate patient selection. The results of ongoing clinical trials will help establish high-quality evidence for optimal incorporation of TXA in mature trauma networks in the United States and abroad.

Trials. 2017 Jan 31;18(1):48

Tranexamic acid in bleeding trauma patients: an exploration of benefits and harms.

Roberts I, Edwards P, Prieto D, Joshi M, Mahmood A, Ker K, Shakur H

BACKGROUND: The CRASH-2 trial showed that tranexamic acid (TXA) administration reduces mortality in bleeding trauma patients. However, the effect appeared to depend on how soon after injury TXA treatment was started. Treatment within 3 h reduced bleeding deaths whereas treatment after 3 h increased the risk. We examine how patient characteristics vary by time to treatment and explore whether any such variations explain the time-dependent treatment effect.

METHODS: Exploratory analysis were carried out, including per-protocol analyses, of data from the CRASH-2 trial, a randomised placebo-controlled trial of the effect of TXA on mortality in 20,211 trauma patients with, or at risk of, significant bleeding. We examine how patient characteristics (age, type of injury, presence or absence of head injury, Glasgow coma scale (GCS), systolic blood pressure and capillary refill time) vary with time to treatment and use univariable (restriction) and multivariable methods to examine whether any such variations explain the time-dependent effect of TXA. If not explained by differences in patient characteristics, we planned to conduct separate prespecified subgroup analyses for the early benefit and late harm.

RESULTS: There was no substantial variation in age or capillary refill by time to treatment. However, the proportion of patients with blunt trauma, the proportion with head injury and mean systolic blood pressure increased as time to treatment increased. Mean GCS decreased as time to treatment increased. Analyses restricted to patients with blunt trauma, those without head injury and those with a systolic blood pressure <100 mmHg showed that these characteristics did not explain the time-dependent treatment effect. In a multivariable analysis the interaction with time to treatment remained highly significant ($p < 0.0001$). Separate subgroup analyses that examine how the benefits of early TXA treatment and the harms of late TXA treatment vary by systolic blood pressure (≤75, 76-89, >89 mmHg); GCS (severe 3-8, moderate 9-12, mild 13-15); and type of injury (penetrating versus blunt) showed no significant heterogeneity.

CONCLUSIONS: The time-dependent effect of TXA in bleeding trauma patients is not explained by the type of injury, the presence or absence of head injury or systolic blood pressure. When given within 3 h of injury, TXA reduces death due to bleeding regardless of type of injury, GCS or blood pressure.

N Engl J Med. 2016 Dec 15;375(24):2313-2315

Regulating Off-Label Promotion - A Critical Test.

Robertson C, Kesselheim A

QUOTES:

"Still, sensing that the time may be ripe for a major policy shift, the drug and biologics industry recently released proposed guidelines for a new approach to off-label promotion. They seek a rollback of FDA regulation, so that they can instead "responsibly" promote new uses to physicians, even beyond the safe harbors the FDA already allows. The FDA, for its part, is undertaking a comprehensive review of its rules about off-label promotion."

"In recent years, the U.S. Supreme Court has expanded the conception of what counts as "speech" in the eyes of the law and has generally increased its legal protections. For example, in a 2011case, the Court held that protected speech included sales data used by pharmaceutical manufacturers to more efficiently target marketing to physicians. Still, the Caronia decision subverted decades of presumptions about how the government could oversee the behavior of the pharmaceutical and medical device industries. For over 50 years, the FDCA has required that drugs (and later, high-risk devices) be labeled for all uses intended by their manufacturers and that their safety and efficacy for those uses be first demonstrated in clinical trials. The FDA created "safe harbors" allowing companies to distribute peerreviewed literature or answer physician questions. However, until the Second Circuit's Caronia decision, if a company promoted intended uses that had not been FDAapproved, that promotion would be clear evidence that the product was misbranded and that its sale for those uses was illegal. The fact that the work of pharmaceutical sales representatives involved speech did not matter before Caronia."

Mil Med. 2017 Jan;182(1):e1649-e1652.

Ultraportable Oxygen Concentrator Use in U.S. Army Special Operations Forward Area Surgery: A Proof of Concept in Multiple Environments.

Rybak M, Huffman L, Nahouraii R, Loden J, Gonzalez M, Wilson R, Danielson P

INTRODUCTION: A limitation to surgical care in an austere environment is the supply of oxygen to support mechanical ventilation and general anesthesia. Portable oxygen concentrators (OCs) offer an alternative to traditional compressed oxygen tanks.

OBJECTIVES: We set out to demonstrate that a low-pressure OC system could supply the mechanical ventilation needs in an austere operating environment.

METHODS: An ultraportable OC (SAROS Model 3000, SeQual Technologies, Ball Ground, Georgia) was paired with an Impact 754 ventilator (Impact Instrumentation, West Caldwell, New Jersey) to evaluate the delivered fraction of inspired oxygen (FiO2) to a test lung across a range of minute ventilations and at altitudes of 1,200 and 6,500 feet above sea level.

RESULTS: The compressor-driven Impact ventilator was able to deliver FiO2 at close to 0.9 for minute ventilations equal to oxygen flow. Pairing two OCs expanded the range of minute ventilations supported. OCs were less effective at concentrating oxygen at higher altitudes.

CONCLUSIONS: These results demonstrate that low-pressure, ultraportable OCs are capable of delivering high FiO2 during mechanical ventilation in austere locations at both low and high altitudes. Ultraportable OCs could therefore be sufficient to support forward area surgical procedures and positively impact logistics.

Anesthesiology. 2017 Jan 3. doi: 10.1097/ALN.0000000000001489. [Epub ahead of print]

Cricoid Pressure Controversies: Narrative Review.

Salem M, Khorasani A, Zeidan A, Crystal G

ABSTRACT:
Since cricoid pressure was introduced into clinical practice, controversial issues have arisen, including necessity, effectiveness in preventing aspiration, quantifying the cricoid force, and its reliability in certain clinical entities and in the presence of gastric tubes. Cricoid pressure-associated complications have also been alleged, such as airway obstruction leading to interference with manual ventilation, laryngeal visualization, tracheal intubation, placement of supraglottic devices, and relaxation of the lower esophageal sphincter. This review synthesizes available information to identify, address, and attempt to resolve the controversies related to cricoid pressure. The effective use of cricoid pressure requires that the applied force is sufficient to occlude the esophageal entrance while avoiding airway-related complications. Most of these complications are caused by excessive or inadequate force or by misapplication of cricoid pressure. Because a simple-to-use and reliable cricoid pressure device is not commercially available, regular training of personnel, using technology-enhanced cricoid pressure simulation, is required. The current status of cricoid pressure and objectives for future cricoid pressure-related research are also discussed.

Pediatr Crit Care Med. 2016 Dec;17(12):1179-1180.

Ketamine Again Outside the Operating Room? Yes It Works.

Schleien C, Brandwein A

QUOTE:

"Ketamine is widely used for procedural sedation in children. This is due to the fact that ketamine generally preserves airway reflexes and spontaneous respiration for the duration of a procedure. Additionally, ketamine stimulates catecholamine release and thus usually maintains stable hemodynamics over the course of a procedure. Furthermore, ketamine is a sedative, amnestic, and analgesic agent, which allows it to be used as a single medication for most procedural sedations. Numerous studies have investigated the use of ketamine as an anesthetic agent for procedural sedation in children. Studies investigating monotherapy with parenteral ketamine for sedation in the pediatric emergency department have demonstrated a strong safety and efficacy profile with minimal side effects. McCarty et al (2000) described the use of ketamine for fracture reduction. They found that respiratory and hemodynamic status remained stable in all patients studied. Furthermore, both parents and blinded clinicians showed a high degree of satisfaction with both the sedation and analgesia provided by ketamine."

Int J Surg. 2016 Dec;36(Pt A):324-329.

Combined intravenous and topical tranexamic acid versus intravenous use alone in primary total knee and hip arthroplasty: A meta-analysis of randomized controlled trials.

Shang J, Wang H, Zheng B, Rui M, Wang Y

OBJECTIVE: The tranexamic acid (TXA) can reduce surgical perioperative blood loss. However, the optimal regimen of tranexamic acid remains controversial. The purpose of this meta-analysis was to compare the efficacy and safety of combined intravenous and topical tranexamic acid versus intravenous use alone in primary total knee and hip arthroplasty.

METHODS: PubMed, EMbase, Cochrane library and OVID were searched. Eligible randomized controlled trials (RCTs) evaluating combined intravenous and topical TXA versus intravenous alone in primary total knee and hip arthroplasty were included. The relative risk (RR) or the mean difference (MD) for dichotomous or continuous data was calculated respectively, and heterogeneity was analyzed by chi-square and I(2) tests.

RESULTS: A total of five RCTs met the inclusion criteria were included. The meta-analysis indicated that there was statistically significant difference favoring the combined group in total blood loss(MD = -160.90, 95% CI[-201.26, -120.54]), P < 0.00001), hemoglobin drop (MD = -0.41, 95% CI[-0.73,0.08], P = 0.01), transfusion requirements(RR = 0.29, 95% CI[0.12,0.70], P = 0.006) and length of hospital stays (MD = -0.21, 95%CI[-0.40, -0.02], P = 0.03). Both groups showed similar outcomes regarding thromboembolic complications (RR = 0.84, 95% I[0.26,2.70], P = 0.76).

CONCLUSIONS: Based on our study, combined use of intravenous and topical TXA is more effective than intravenous TXA alone in primary total knee or hip arthroplasty without increasing the risk of thromboembolic complications. Further high quality studies with more patients are needed in future studies.

J Trauma Acute Care Surg. 2017 Feb;82(2):287-292.

Model of trauma-induced coagulopathy including hemodilution, fibrinolysis, acidosis, and hypothermia: Impact on blood coagulation and platelet function.

Shenkman B, Budnik I, Einav Y, Hauschner H, Andrejchin M, Martinowitz U.

BACKGROUND: Trauma-induced coagulopathy (TIC) is commonly seen among patients with severe injury. The dynamic process of TIC is characterized by variability of the features of the disease.

METHODS: A model of TIC was created. Hemodilution was produced by mixing the blood with 40% Tris/saline solution, fibrinolysis by treating the blood with 160 ng/mL tPA, acidosis by adding 1.2 mg/mL lactic acid achieving pH 7.0 to 7.1, and hypothermia by running the assay at 31°C. Intact blood tested at 37°C served as control. Clot formation was evaluated using rotation thromboelastometry. Platelet adhesion and aggregation were assayed at a shear rate of 1800 s using Impact-R device.

RESULTS: Clotting time was not affected by any of the TIC constituents used. Clotting initiation was reduced by hemodilution and further reduced by additive hypothermia. The propagation phase of blood clotting was reduced by hemodilution, further reduced by additive hypothermia, and maximally reduced if additionally combined with fibrinolysis. No effect of fibrinolysis on clot propagation was observed at 37°C. Maximum clot firmness was reduced by hemodilution, further reduced by additive fibrinolysis, and maximally reduced if additionally combined with hypothermia. No effect of hypothermia on clot strength was observed in the absence of fibrinolysis. Platelet adhesion (percentage of surface coverage) and aggregation (aggregate size) under flow condition were reduced by hemodilution and further reduced by additive acidosis. Introduction of tPA to diluted blood had no effect on platelet function.

CONCLUSION: The study revealed a differential effect of TIC constituents-hemodilution, hypothermia, fibrinolysis, and acidosis-on clot formation and platelet function. The effect of one factor may influence that of another factor. These data may be helpful to better understand the pathogenesis of TIC and to elaborate an individually tailored treatment strategy.

LEVEL OF EVIDENCE: A new model of TIC is created. Contribution of various constituents to pathogenesis of TIC and their interactions are evaluated.

Br J Anaesth. 2016 Dec;117(suppl 3):iii31-iii43.

Acute traumatic coagulopathy: pathophysiology and resuscitation.

Simmons J, Powell M

ABSTRACT:
Acute Traumatic Coagulopathy occurs immediately after massive trauma when shock, hypoperfusion, and vascular damage are present. Mechanisms for this acute coagulopathy include activation of protein C, endothelial glycocalyx disruption, depletion of fibrinogen, and platelet dysfunction. Hypothermia and acidaemia amplify the endogenous coagulopathy and often accompany trauma. These multifactorial processes lead to decreased clot strength, autoheparinization, and hyperfibrinolysis. Furthermore, the effects of aggressive crystalloid administration, haemodilution from inappropriate blood product transfusion, and prolonged surgical times may worsen clinical outcomes. We review normal coagulation using the cell-based model of haemostasis and the pathophysiology of acute traumatic coagulopathy. Developed trauma systems reduce mortality, highlighting critical goals for the trauma patient in different phases of care. Once patients reach a trauma hospital, certain triggers reliably indicate when they require massive transfusion and specialized trauma care. These triggers include base deficit, international normalized radio (INR), systolic arterial pressure, haemoglobin concentration, and temperature. Early identification for massive transfusion is critically important, as exsanguination in the first few hours of trauma is a leading cause of death. To combat derangements caused by massive haemorrhage, damage control resuscitation is a technique that addresses each antagonist to normal haemostasis. Components of damage control resuscitation include damage control surgery, permissive hypotension, limited crystalloid administration, haemostatic resuscitation, and correction of hyperfibrinolysis.

J Trauma Acute Care Surg. 2017 Jan;82(1):102-108.

There's an app for that: A handheld smartphone-based infrared imaging device to assess adequacy and level of aortic occlusion during REBOA.

Sokol K, Black G, Willey S, Kniery K, Marko S, Eckert M, Martin M

BACKGROUND: Advances in thermal imaging devices have made them an appealing noninvasive point-of-care imaging adjunct in the trauma setting. We sought to assess whether a smartphone-based infrared imaging device (SBIR) could determine presence and location of aortic occlusion in a swine model. We hypothesized that various levels of aortic occlusion would transmit significantly different heat signatures at various anatomical points.

METHODS: Six swine (35-50 kg) underwent sequential zone 1 (Z1) aortic cross clamping as well as zone 3 (Z3) aortic balloon occlusion (resuscitative endovascular balloon occlusion of the aorta [REBOA]). SBIR images and readings (FLIR One) were taken at five anatomic points (axilla [A], subcostal [S], umbilical [U], inguinal [I], medial malleolar [M]) and were used to determine significant thermal trends 5 minutes to 10 minutes after Z1 and Z3 occlusion. Significant ($p \leq 0.05$) thermal ratio patterns were identified and compared among groups, and images were reviewed for obvious qualitative differences at the various levels of occlusion.

RESULTS: Body temperatures were similar during control (CON), Z1 occlusion, and Z3 occlusion, ranging from 94.0 °F to 100.9 °F ($p = 0.126$). No significant temperature differences were found among A, S, U, I, M points prior to and after aortic occlusions. Among the anatomical 2-point ratios evaluated, A/M and S/M ratios were the best predictors of aortic occlusion, whether at Z1 (8.2 °F, $p < 0.01$; 10.9 °F, $p < 0.01$) or Z3 (7.3 °F, $p < 0.01$; 8.4 °F, $p < 0.01$), respectively. The best predictor of Z1 versus Z3 level of occlusion was the S/I ratio (5.2 °F, $p < 0.05$ vs. 3.4 °F, $p = 0.27$). SBIR generated qualitatively different thermal signatures among groups.

CONCLUSION: SBIR was capable of detecting thermal trends during Z1 and Z3 aortic occlusion by using an anatomical 2-point thermal ratio. There were also easily recognized qualitative differences between control and occlusion images that would allow immediate determination of adequate occlusion of the aorta. SBIR represents a potential inexpensive and accurate tool for assessing perfusion, adequate REBOA placement, and even the aortic level of occlusion.

JAMA Surg. 2016 Dec 7. doi: 10.1001/jamasurg.2016.4686. [Epub ahead of print]

Mortality and Prehospital Blood Pressure in Patients With Major Traumatic Brain Injury: Implications for the Hypotension Threshold.

Spaite D, Hu C, Bobrow B, Chikani V, Sherrill D, Barnhart B, Gaither J, Denninghoff K, Viscusi C, Mullins T, Adelson P

Importance: Current prehospital traumatic brain injury guidelines use a systolic blood pressure threshold of less than 90 mm Hg for treating hypotension for individuals 10 years and older based on studies showing higher mortality when blood pressure drops below this level. However, the guidelines also acknowledge the weakness of the supporting evidence.

Objective: To evaluate whether any statistically supportable threshold between systolic pressure and mortality emerges from the data a priori, without assuming that a cut point exists.

Design, Setting, and Participants: Observational evaluation of a large prehospital database established as a part of the Excellence in Prehospital Injury Care Traumatic Brain Injury Study. Patients from the preimplementation cohort (January 2007 to March 2014) 10 years and older with moderate or severe traumatic brain injury (Barell Matrix Type 1 classification, International Classification of Diseases, Ninth Revision head region severity score of 3 or greater, and/or Abbreviated Injury Scale head-region severity score of 3 or greater) and a prehospital systolic pressure between 40 and 119 mm Hg were included. The generalized additive model and logistic regression were used to determine the association between systolic pressure and probability of death, adjusting for significant/important confounders.

Main Outcomes and Measures: The main outcome measure was in-hospital mortality.

Results: Among the 3844 included patients, 2565 (66.7%) were male, and the median (range) age was 35 (10-99) years. The model revealed a monotonically decreasing association between systolic pressure and adjusted probability of death across the entire range (ie, from 40 to 119 mm Hg). Each 10-point increase of systolic pressure was associated with a decrease in the adjusted odds of death of 18.8% (adjusted odds ratio, 0.812; 95% CI, 0.748-0.883). Thus, the adjusted odds of mortality increased as much for a drop from 110 to 100 mm Hg as for a drop from 90 to 80 mm Hg, and so on throughout the range.

Conclusions and Relevance: We found a linear association between lowest prehospital systolic blood pressure and severity-adjusted probability of mortality across an exceptionally wide range. There is no identifiable threshold or inflection point between 40 and 119 mm Hg. Thus, in patients with traumatic brain injury, the concept that 90 mm Hg represents a unique or important physiological cut point may be wrong. Furthermore, clinically meaningful hypotension may not be as low as current guidelines suggest. Randomized trials evaluating treatment levels significantly above 90 mm Hg are needed.

Ann Emerg Med. 2017 Jan;69(1):62-72

The Effect of Combined Out-of-Hospital Hypotension and Hypoxia on Mortality in Major Traumatic Brain Injury.

Spaite D, Hu C, Bobrow B, Chikani V, Barnhart B, Gaither J, Denninghoff K, Adelson P, Keim S, Viscusi C, Mullins T, Sherrill D

STUDY OBJECTIVE: Survival is significantly reduced by either hypotension or hypoxia during the out-of-hospital management of major traumatic brain injury. However, only a handful of small studies have investigated the influence of the combination of both hypotension and hypoxia occurring together. In patients with major traumatic brain injury, we evaluate the associations between mortality and out-of-hospital hypotension and hypoxia separately and in combination.

METHODS: All moderate or severe traumatic brain injury cases in the preimplementation cohort of the Excellence in Prehospital Injury Care study (a statewide, before/after, controlled study of the effect of implementing the out-of-hospital traumatic brain injury treatment guidelines) from January 1, 2007, to March 31, 2014, were evaluated (exclusions: <10 years, out-of-hospital oxygen saturation ≤10%, and out-of-hospital systolic blood pressure <40 or >200 mm Hg). The relationship between mortality and hypotension (systolic blood pressure <90 mm Hg) or hypoxia (saturation <90%) was assessed with multivariable logistic regression, controlling for Injury Severity Score, head region severity, injury type (blunt versus penetrating), age, sex, race, ethnicity, payer, interhospital transfer, and trauma center.

RESULTS: Among the 13,151 patients who met inclusion criteria (median age 45 years; 68.6% men), 11,545 (87.8%) had neither hypotension nor hypoxia, 604 (4.6%) had hypotension only, 790 (6.0%) had hypoxia only, and 212 (1.6%) had both hypotension and hypoxia. Mortality for the 4 study cohorts was 5.6%, 20.7%, 28.1%, and 43.9%, respectively. The crude and adjusted odds ratios for death within the cohorts, using the patients with neither hypotension nor hypoxia as the reference, were 4.4 and 2.5, 6.6 and 3.0, and 13.2 and 6.1, respectively. Evaluation for an interaction between hypotension and hypoxia revealed that the effects were additive on the log odds of death.

CONCLUSION: In this statewide analysis of major traumatic brain injury, combined out-of-hospital hypotension and hypoxia were associated with significantly increased mortality. This effect on survival persisted even after controlling for multiple potential confounders. In fact, the adjusted odds of death for patients with both hypotension and hypoxia were more than 2 times greater than for those with either hypotension or hypoxia alone. These findings seem supportive of the emphasis on aggressive prevention and treatment of hypotension and hypoxia reflected in the current emergency medical services traumatic brain injury treatment guidelines but clearly reveal the need for further study to determine their influence on outcome.

Ann Burns Fire Disasters. 2016 Jun 30;29(2):103-107.

Factors at scene and in transfer related to the development of hypothermia in major burns.

Steele J, Atkins J, Vizcaychipi M

ABSTRACT:
There is a paucity of evidence regarding incidence and causes of hypothermia in patients with major burns and its impact on outcomes. This paper identifies contributing factors to hypothermia and its relationship with the severity of physiological scoring systems on admission to a tertiary centre. Patients with burns >20% TBSA admitted between March 2010 and July 2013 comprised this retrospective survey. Data relating to causative factors at time of burn, during transfer, physiological outcome scores (BOBI, SOFA, RTS and APACHE II), length of hospital stay and mortality were collected. SPSS statistical software was used for analysis. The study included 31 patients (medians: age 32 years, burn size 30% TBSA). 13% (n=4) of patients died during hospital admission. 42% (n=13) of patients had a temperature <36.0C on arrival. Temperature on arrival at the burns centre was related to the severity of all physiological scores (p=<0.001). There was no difference between groups in terms of mortality in hospital (p=0.151) or length of hospital stay (p=0.547). Our results show that hypothermia is related to burn severity and patient physiological status. They do not show a relationship between hypothermia and external factors at the time of the burn. This paper prompts further investigation into the prevention of hypothermia in patients with major burns.

Curr Opin Crit Care. 2016 Dec;22(6):591-597.

Haemostatic resuscitation in trauma: the next generation.

Stensballe J, Ostrowski S, Johansson P

PURPOSE OF REVIEW: To discuss the recent developments in and evolvement of next generation haemostatic resuscitation in bleeding trauma.

RECENT FINDINGS: Mortality from major trauma is a worldwide problem, and massive haemorrhage remains a major cause of potentially preventable deaths. Development of coagulopathy further increases trauma mortality emphasizing that coagulopathy is a key target in the phase of bleeding. The pathophysiology of coagulopathy in trauma reflects at least three distinct mechanisms that may be present isolated or coexist: acute traumatic coagulopathy, coagulopathy associated with the lethal triad, and consumptive coagulopathy. The concepts of 'damage control surgery' and 'damage control resuscitation' have been developed to ensure early control of bleeding and coagulopathy to improve outcome in bleeding trauma. Haemostatic resuscitation aims at controlling coagulopathy and consists of a ratio driven strategy aiming at 1:1:1, using tranexamic acid according to CRASH-2, and applying haemostatic monitoring enabling a switch to a goal-directed approach when bleeding slows. Haemostatic resuscitation is the mainstay of trauma resuscitation and is associated with improved survival.

SUMMARY: The next generation of haemostatic resuscitation aims at applying a ratio 1:1:1 driven strategy while using antifibrinolytics, haemostatic monitoring and avoiding critical fibrinogen deficiency by substitution.

Crit Care Med. 2016 Dec;44(12):2282-2283.

"Normal" Saline and Co: What Is Normal?

Stocker R

QUOTES:

"The long lasting debate concerning use of crystalloids versus colloids suggests that all crystalloids used for fluid resuscitation are interchangeable. The study Lactated Ringer is associated with reduced mortality by Zampieri et al (1) published in this issue of *Critical Care Medicine* comes to the conclusion that this assumption most probably is not true. In order to understand the rationale, it is worthwhile to provide some background information. Sodium chloride 0.9% (NaCl 0.9%) almost for an eternity has been used in various patients for dissolution of IV given drugs, for fluid replacement, and even in larger quantities for fluid resuscitation in hypovolemic or dehydrated patients. The latter in the early 19th century gave reason for its development in order to treat patients suffering from cholera (2). In 1883, the Dutch chemist Hamburger (3) defined NaCl 0.9% as "normal saline" based on the observation that after in vitro exposure of RBCs to solutions with different sodium chloride concentrations, NaCl 0.9% caused less hemolysis than the other solutions. However, the solution has neither something to do with normal nor with physiology as its composition differs considerably from human plasma (Table 1). Beside the higher concentration in sodium and chloride and the lack of other electrolytes, it does not contain any buffer. Administration of higher amounts of NaCl (0.9%) displace and dilute bicarbonate leading to a dilution acidosis. Furthermore, the chloride anion, the most prevalent anion in the extracellular space, acts as an acid. An increased Cl^- concentration therefore causes a decrease in strong ion difference (SID) and thus a metabolic acidosis."

"Although the findings in this article do not result from a classical prospective randomized large scale trial, which most probably never will be done due to its complexity and costs, the large number of patients analyzed allows for a quite robust conclusion: For fluid replacement and resuscitation use of solutions with a low SID as NaCl 0.9% and D5W should be abandoned. One century after the development of a balanced solution with a SID close to plasma, it is really time to change."

J Orthop Trauma. 2016 Jun;30(6):325-30

Effect of Pelvic Binder Placement on OTA Classification of Pelvic Ring Injuries Using Computed Tomography. Does It Mask the Injury?

Swartz J, Vaidya R, Hudson I, Oliphant B, Tonnos F

OBJECTIVES: To assess the diagnostic sensitivity of computed tomography (CT) in patients with an unstable pelvic ring injury after application of a pelvic binder.

DESIGN: An institutional review board approved retrospective study from 2003 to 2010.

SETTING: Level 1 trauma center.

PATIENTS: Inclusion criteria were patients in our trauma database with AO/OTA B or C type pelvic ring injury, which first had an anterior-posterior pelvic x-ray followed by application of a pelvic circumferential compression device (PCCD), then a CT, and a fluoroscopic stress examination under anesthesia (FEUA) (used as gold standard). Of 867 patients, 43 met the inclusion criteria.

INTERVENTION: A senior Orthopaedic Resident and Trauma Attendings assessed x-rays, CTs, and FEUAs. Binomial test was used to compare imaging against final diagnosis.

RESULTS: In Anterior Posterior Compression/Vertical Shear (OTA 61-B1, 61-B3.1, 61-C) injury patterns, prebinder x-rays were diagnostic in 69.4% (CI, 51.9%-83.7%) of cases, compared with 50% (CI, 32.9%-67.1%) with CT + PCCD. The x-ray was superior to CT + PCCD for identification of the anterior pelvic injury (McNemar exact P = 0.0352). If x-ray and CT + PCCD were viewed in tandem, 83.3% (CI, 67.2%-93.6%) of classifications were in agreement with the FEUA. For lateral compression mechanisms, the binder did not effect of the sensitivity of the CT except in the open book component of an lateral compression 3 (61-B3.2) mechanism.

CONCLUSIONS: The placement of a pelvic binder has the potential to mask the severity of unstable pelvic ring injuries when relying only on CT for diagnosis. Fluoroscopic manual pelvic stress examination under anesthesia is an essential adjunct when a binder is placed before imaging.

LEVEL OF EVIDENCE: Diagnostic level III. See Instructions for Authors for a complete description of levels of evidence.

Anaerobe. 2017 Feb;43:69-74.

Clinical characteristics and antimicrobial susceptibilities of anaerobic bacteremia in an acute care hospital.

Tan T, Ng L, Kwang L, Rao S, Eng L

ABSTRACT:
This study investigated the clinical features of anaerobic bacteraemia in an acute-care hospital, and evaluated the antimicrobial susceptibility of these isolates to commonly available antibiotics. Microbiological and epidemiological data from 2009 to 2011were extracted from the laboratory information system and electronic medical records. One hundred and eleven unique patient episodes consisting of 116 anaerobic isolates were selected for clinical review and antibiotic susceptibility testing. Susceptibilities to amoxicillin-clavulanate, clindamycin, imipenem, metronidazole, moxifloxacin, penicillin and piperacillin-tazobactam were performed using Etest strips with categorical interpretations according to current CLSI breakpoints. Metronidazole-resistant and carbapenem-resistant anaerobic Gram-negative bacilli were screened for the nim and cfiA genes. Clinical data was obtained retrospectively from electronic medical records. During the 3 year period, Bacteroides fragilis group (41%), Clostridium species (14%), Propionibacterium species (9%) and Fusobacterium species (6%) were the most commonly isolated anaerobes. Patients with anaerobic bacteraemia that were included in the study were predominantly above 60 years of age, with community-acquired infections. The most commonly used empiric antibiotic therapies were beta-lactam/beta-lactamase inhibitor combinations (44%) and metronidazole (10%). The crude mortality was 25%, and appropriate initial antibiotic therapy was not significantly associated with improved survival. Intra-abdominal infections (39%) and soft-tissue infections (33%) accounted for nearly three-quarters of all bacteraemia. Antibiotics with the best anaerobic activity were imipenem, piperacillin-tazobactam, amoxicillin-clavulanate and metronidazole, with in-vitro susceptibility rates of 95%, 95%, 94% and 92% respectively. Susceptibilities to penicillin (31%), clindamycin (60%) and moxifloxacin (84%) were more variable. Two multidrug-resistant isolates of Bacteroides species were positive for nim and cfiA genes respectively, while another two imipenem-resistant Fusobacterium species were negative for cfiA genes. This study demonstrated that anaerobic bacteraemia in our patient population was predominantly associated with intra-abdominal and soft-tissue infections. Overall antibiotic resistance was high for penicillin and clindamycin, and the presence of emerging resistance to carbapenems and metronidazole warrants further monitoring.

Anaesth Crit Care Pain Med. 2017 Feb;36(1):7-8.

Combat Casualty Care improvement: A quality process.

Tourtier J

QUOTE:

"Comparing combat casualty data within a conflict, as well as between conflicts provides the basis for an overall understanding of combat trauma in the hope of pointing out where medical care and evacuation can be improved. Comprehensive studies conducted on combat casualties during recent conflicts in Afghanistan and Iraq showed that progresses have been made. However, the most substantial survival gain is still to be reached through efforts in the prehospital phase. Indeed historically, efforts had been focused on the died of wound (DOW) category which refers to those who died at the hospital. Lesser attention had been paid to the much larger Killed in Action (KIA) group, which refers to those who died in the pre-hospital setting. Comprehensive studies conducted on deaths during recent conflicts in Afghanistan and Iraq show that progress has been made; however, the most substantial improvement in survival can still be realized through prehospital efforts. Unfortunately, the historical lack of prehospital combat data makes performance improvement during this phase difficult. Comprehensive studies on preventable death that categorize fatalities as survivable or not are of great value to determine where improvements can be made. In particular, if they specify the mechanisms of injury, wounds' anatomical locations, cause of death, and care provided or not. All American dead combat casualties are recovered when feasible and transported to the Armed Forces Medical Examiner System (AFMES) at Dover Air Force Base, Delaware, for a comprehensive forensic examination and entry into the Mortality Trauma Registry. It allows to conduct trend analysis which may uncover opportunities for improvement in combat casualty care.

"To conclude, the JTTS has been the single greatest advancement in military medicine instituted during the recent conflicts in Afghanistan and Iraq [4]. It recommends optimal placement of surgical assets, develops triage criteria for casualty evacuation to the appropriate level of care, ensures coordination of efforts and communication between treatment facilities, standardizes approaches to treating traumatic injuries, collects data and maintains the registry for near real-time performance development, education and training, and improvement of care. The current mission of the JTTS is to improve trauma care delivery and patient outcomes across the continuum of care utilizing continuous performance improvement and evidence-based medicine driven by the concurrent collection and analysis of data maintained in the JTTR."

J Trauma Acute Care Surg. 2016 Dec;81(6):1171-1174

Western Trauma Association Critical Decisions in Trauma: Management of pelvic fracture with hemodynamic instability-2016 updates.

Tran T, Brasel K, Karmy-Jones R, Rowell S, Schreiber M, Shatz D, Albrecht R, Cohen M, DeMoya M, Biffl W, Moore E, Namias N

QUOTE:

"In summary, emerging state-of-the-art management of the hemodynamically unstable patient with a pelvic fracture in 2016 includes hemostatic resuscitation guided by viscoelastic testing, external pelvic stabilization with wrapping devices, and definitive hemorrhage control with angiographic embolization and/or preperitoneal packing. During resuscitation, TIC can be recognized early by the use of viscoelastic assay such as TEG and ROTEM to guide blood-product transfusion. Noninvasive external pelvic stabilization with pelvic sheeting or commercially available devices can be applied in the prehospital setting to provide temporary stabilization and reduce hemorrhage from bony surfaces and venous disruption. Early angiography and embolization along with preperitoneal packing are complementary techniques in definitive hemorrhage management. Although promising, the role of REBOA as an adjunct in the management of hemorrhagic shock secondary to pelvic fractures remains uncertain. Temporization with REBOA is a promising new frontier whose exact role is yet to be determined."

Ann Vasc Surg. 2017 Feb 2. pii: S0890-5096(17)30099-7. doi: 10.1016/j.avsg.2016.09.011. [Epub ahead of print]

Management of Vascular Trauma during the Paris Terrorist Attack of November 13,2015.

Tresson P, Touma J, Gaudric J, Pellenc Q, Le Roux M, Pierret C, Kobeiter H, Julia P, Goeau-Brissonniere O, Desgranges P, Koskas F, Castier Y

BACKGROUND: On November 13, 2015, Paris and Saint-Denis were the targets of terrorist attacks. The Public Hospitals of Paris Organization and the Percy Armed Forces Instruction Hospitals were mobilized to face the mass casualty situation. The objective of this study is to analyze the management of the victims presenting with a nonthoracic vascular trauma (NTVT).

METHODS: All the data relating to the victims of NTVT who required a specific vascular open or endovascular treatment were analyzed retrospectively. A 6-month follow-up was obtained for all the patients.

RESULTS: Among the 351 wounded, 20 (5.7%) patients had an NTVT and were dispatched in 8 hospitals (11 men of average age 32). NTVTs were gunshots in 17 cases (85%) or due to a handmade bomb in 3 cases (15%). Twelve patients (60%) received cardiopulmonary resuscitation during prehospital care. NTVT affected the limbs (14 cases, 70%) and the abdomen or the small pelvis (6 cases, 30%). All the patients were operated in emergency. Arterial lesions were treated with greater saphenous vein bypasses, by ligation, and/or embolization. Eleven venous lesions were treated by direct repair or ligation. Associated lesions requiring a specific treatment were present in 19 patients (95%) and were primarily osseous, nervous, and abdomino-pelvic. Severe postoperative complications were observed in 9 patients (45%). Fourteen patients (70%) required blood transfusion (6.4 U of packed red blood cells on average, range 0-48). There were no deaths or amputation and all vascular reconstructions were patent at 6 months.

CONCLUSIONS: The effectiveness of the prehospital emergency services and a multisite and multidisciplinary management made it possible to obtain satisfactory results for NTVT casualties. All the departments of vascular surgery must be prepared to receive many wounded victims in the event of terrorist attacks.

J Cataract Refract Surg. 2016 Dec;42(12):1836-1837

Anaphylactic reaction secondary to topical preoperative moxifloxacin.

Ullman M, Midgley K, Kim J, Ullman S

ABSTRACT:
We report a case of anaphylactic shock following topical administration of moxifloxacin for endophthalmitis prophylaxis prior to cataract surgery. Immunoglobulin E (IgE) serology and IgE skin testing confirmed the anaphylactic etiology. Phacoemulsification with posterior chamber intraocular lens implantation was later performed with identical preoperative preparation except for the exclusion of moxifloxacin; no anaphylactic response occurred. To our knowledge, this is the first report of an anaphylactic response to topical moxifloxacin. FINANCIAL DISCLOSURE: None of the authors has a financial or proprietary interest in any material or method mentioned.

Ann Emerg Med. 2017 Jan;69(1):24-33.e2.

Comparison of Etomidate and Ketamine for Induction During Rapid Sequence Intubation of Adult Trauma Patients.

Upchurch C, Grijalva C, Russ S, Collins S, Semler M, Rice T, Liu D, Ehrenfeld J, High K, Barrett T, McNaughton C, Self W.

STUDY OBJECTIVE: Induction doses of etomidate during rapid sequence intubation cause transient adrenal dysfunction, but its clinical significance on trauma patients is uncertain. Ketamine has emerged as an alternative for rapid sequence intubation induction. Among adult trauma patients intubated in the emergency department, we compare clinical outcomes among those induced with etomidate and ketamine.

METHODS: The study entailed a retrospective evaluation of a 4-year (January 2011 to December 2014) period spanning an institutional protocol switch from etomidate to ketamine as the standard induction agent for adult trauma patients undergoing rapid sequence intubation in the emergency department of an academic Level I trauma center. The primary outcome was hospital mortality evaluated with multivariable logistic regression, adjusted for age, vital signs, and injury severity and mechanism. Secondary outcomes included ICU-free days and ventilator-free days evaluated with multivariable ordered logistic regression using the same covariates.

RESULTS: The analysis included 968 patients, including 526 with etomidate and 442 with ketamine. Hospital mortality was 20.4% among patients induced with ketamine compared with 17.3% among those induced with etomidate (adjusted odds ratio [OR] 1.41; 95% confidence interval [CI] 0.92 to 2.16). Patients induced with ketamine had ICU-free days (adjusted OR 0.80; 95% CI 0.63 to 1.00) and ventilator-free days (adjusted OR 0.96; 95% CI 0.76 to 1.20) similar to those of patients induced with etomidate.

CONCLUSION: In this analysis spanning an institutional protocol switch from etomidate to ketamine as the standard rapid sequence intubation induction agent for adult trauma patients, patient-centered outcomes were similar for patients who received etomidate and ketamine.

West J Emerg Med. 2016 Nov;17(6):766-774.

Application of Circumferential Compression Device (Binder) in Pelvic Injuries: Room for Improvement.

Vaidya R, Roth M, Zarling B, Zhang S, Walsh C, Macsuga J, Swartz J

INTRODUCTION: The use of a noninvasive pelvic circumferential compression device (PCCD) to achieve pelvic stabilization by both decreasing pelvic volume and limiting inter-fragmentary motion has become commonplace, and is a well-established component of Advanced Trauma Life Support (ATLS) protocol in the treatment of pelvic ring injuries. The purpose of this study was to evaluate the following: 1) how consistently a PCCD was placed on patients who arrived at our hospital with unstable pelvic ring injuries; 2) if they were placed in a timely manner; and 3) if hemodynamic instability influenced their use.

METHODS: We performed an institutional review board-approved retrospective study on 112 consecutive unstable pelvic ring injuries, managed over a two-year period at our Level I trauma center. Our hospital electronic medical records were used to review EMT, physician, nurses', operative notes and radiographic images, to obtain information on the injury and PCCD application. The injuries were classified by an orthopaedic trauma surgeon and a senior orthopaedic resident. Proper application of a pelvic binder using a sheet is demonstrated.

RESULTS: Only 47% of unstable pelvic fractures received PCCD placement, despite being the standard of care according to ATLS. Lateral compression mechanism pelvic injuries received PCCDs in 33% of cases, while anterior posterior compression (APC) and vertical shear (VS) injuries had applications in 63% of cases. Most of these PCCD devices were applied after imaging (72%). Hemodynamic instability did not influence PCCD application.

CONCLUSION: PCCD placement was missed in many (37%) of APC and VS mechanism injuries, where their application could have been critical to providing stability. Furthermore, to provide rapid stability, pelvic circumferential compression devices should be applied after secondary examination, rather than after receiving imaging results. Better education on timing and technique of PCCD placement at our institution is required to improve treatment of pelvic ring injuries.

J Crit Care. 2017 Apr;38:209-214.

Increased incidence of clinical hypotension with etomidate compared to ketamine for intubation in septic patients: A propensity matched analysis.

Van Berkel M, Exline M, Cape K, Ryder L, Phillips G, Ali N, Doepker B

PURPOSE: This study compared the incidence of clinical hypotension between ketamine and etomidate within a 24 hour period following endotracheal intubation.

MATERIALS AND METHODS: This single-center, retrospective propensity-matched cohort study included septic patients admitted to our medical intensive care unit who received either etomidate or ketamine for intubation. Clinical hypotension was defined as any one of the following: mean arterial pressure (MAP) decrease >40% compared to baseline and MAP <70 mmHg, MAP <60 mmHg, initiation of a vasopressor, or increase to >30% of the initial vasopressor dose.

RESULTS: Patients were matched based on propensity scores determined by demographics and baseline characteristics. A total of 384 (200 etomidate and 184 ketamine) patients were included for analysis with 230 patients (115 in each group) matched. Clinical hypotension was less prevalent in patients who received ketamine as compared to etomidate [51.3% vs. 73% (odds ratio=0.39, 95% confidence interval=0.22-0.67, P=.001]. The etomidate group experienced significantly lower MAPs at time periods 6.1-12 hours (65.1 mmHg vs. 69.3 mmHg, P=.01) and 12.1-24 hours (63.9 mmHg vs. 68.4 mmHg, P=.003).

CONCLUSIONS: Ketamine was associated with a lower incidence of clinical hypotension within the 24 hour period following endotracheal intubation in septic patients.

J Shoulder Elbow Surg. 2017 Feb 3. pii: S1058-2746(17)30016-2. doi: 10.1016/j.jse.2017.01.005. [Epub ahead of print]

Intravenous tranexamic acid reduces total blood loss in reverse total shoulder arthroplasty: a prospective, double-blinded, randomized, controlled trial.

Vara A, Koueiter D, Pinkas D, Gowda A, Wiater B, Wiater J

BACKGROUND: Patients undergoing reverse total shoulder arthroplasty (RTSA) are at risk of significant perioperative blood loss. To date, few studies have examined the effectiveness of tranexamic acid (TXA) to reduce blood loss in the setting of RTSA.

METHODS: In a prospective, double-blinded, single-surgeon trial, we analyzed 102 patients undergoing primary RTSA who were randomized to receive intravenous TXA (n = 53) or placebo (n = 49). Calculated total blood loss, drain output, and hemoglobin (Hb) drop were measured. Postoperative transfusions were recorded. Complications were assessed out to 6 weeks postoperatively.

RESULTS: Total blood loss was less for the TXA group (1122.4 ± 411.6 mL) than the placebo group (1472.6 ± 475.4 mL, P < .001). Total drain output was less for the TXA group (221.4 ± 126.2 mL) than the placebo group (371.9 ± 166.3 mL , P < .001). Total Hb loss was less in the TXA group (154.57 ± 60.29 g) compared with the placebo group (200.1 ± 65.5 g, P = .001). Transfusion rates differed significantly at postoperative day 1; however, overall transfusion rates did not vary significantly. Seven patients (14.3%) and 12 units were transfused in the placebo group compared with 3 patients (5.7%) and 3 units in the TXA group.

DISCUSSION: In this cohort of patients undergoing primary RTSA, TXA was effective in reducing total drain output, total Hb loss, and total blood loss compared with a placebo control.

Thorac Surg Clin. 2017 Feb;27(1):1-5.

Chest Tubes: Generalities.

Venuta F, Diso D, Anile M, Rendina E, Onorati I

ABSTRACT:
Insertion, management, and withdrawal of chest tubes is part of the routine activity of thoracic surgeons. The selection of the chest tube and the strategy for each of these steps is usually built on knowledge, practice, experience, and judgment. The indication to insert a chest tube into the pleural cavity is the presence of air or fluid within it. Various types and sizes of chest tubes are now commercially available.

J Trauma Acute Care Surg. 2017 Feb 4. doi: 10.1097/TA.0000000000001372. [Epub ahead of print]

Automated variable aortic control vs. complete aortic occlusion in a swine model of hemorrhage.

Williams T, Neff L, Johnson M, Russo R, Ferencz S, Davidson A, Clement N, Grayson J, Rasmussen T

BACKGROUND: Future endovascular hemorrhage control devices will require features that mitigate the adverse effects of vessel occlusion. Permissive regional hypoperfusion (PRH) with variable aortic control (VAC) is a novel strategy to minimize hemorrhage and reduce the ischemic burden of complete aortic occlusion (AO). The objective of this study was to compare PRH with VAC to AO in a lethal model of hemorrhage.

METHODS: Twenty-five swine underwent cannulation of the supraceliac aorta, with diversion of aortic flow through an automated extracorporeal circuit. After creation of uncontrolled liver hemorrhage, animals were randomized to 90 minutes of treatment: Control (full, unregulated flow; n=5) AO (no flow; n=10), and PRH with VAC (dynamic distal flow initiated after 20 minutes of AO; n=10). In the PRH group, distal flow rates were regulated between 100-300mL/min based on a desired, preset range of proximal mean arterial pressure (MAP). At 90 minutes, damage control surgery, resuscitation, and restoration of full flow ensued. Critical care continued for 4.5 hours or until death. Hemodynamic parameters and markers of ischemia were recorded.

RESULTS: Study survival was 0%, 50%, and 90% for control, AO, and VAC respectively ($p<0.01$) (Figure). During intervention, VAC resulted in more physiologic proximal MAP (84mmHg±18 vs. 105±9mmHg, $p<0.01$) and higher renal blood flow than AO animals ($p=0.02$). During critical care, VAC resulted in higher proximal MAP (73 mmHg±8 vs. 50 mmHg±6, $p<0.01$), carotid and renal blood flow ($p<0.01$), lactate clearance ($p<0.01$), and urine output ($p<0.01$) than AO despite requiring half the volume of crystalloids to maintain proximal MAP ≥50 mmHg ($p<0.01$).

CONCLUSION: Permissive regional hypoperfusion with variable aortic control minimizes the adverse effects of distal ischemia, optimizes proximal pressure to the brain and heart, and prevents exsanguination in this model of lethal hemorrhage. These findings provide foundational knowledge for the continued development of this novel paradigm and inform next generation endovascular designs.

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Fibrinogen in traumatic haemorrhage: A narrative review.

Winearls J, Campbell D, Hurn C, Furyk J, Ryan G, Trout M, Walsham J, Holley A, Shuttleworth M, Dyer W, Keijzers G, Presneill J, Fraser JF, Wullschleger M

ABSTRACT:
Haemorrhage in the setting of severe trauma is associated with significant morbidity and mortality. There is increasing awareness of the important role fibrinogen plays in traumatic haemorrhage. Fibrinogen levels fall precipitously in severe trauma and the resultant hypofibrinogenaemia is associated with poor outcomes. Hence, it has been postulated that early fibrinogen replacement in severe traumatic haemorrhage may improve outcomes, although, to date there is a paucity of high quality evidence to support this hypothesis. In addition there is controversy regarding the optimal method for fibrinogen supplementation. We review the current evidence regarding the role of fibrinogen in trauma, the rationale behind fibrinogen supplementation and discuss current research.

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The surgical management of facial trauma in British soldiers during combat operations in Afghanistan.

Wordsworth M, Thomas R, Breeze J, Evriviades D, Baden J, Hettiaratchy S.

INTRODUCTION: The recent Afghanistan conflict caused a higher proportion of casualties with facial injuries due to both the increasing effectiveness of combat body armour and the insurgent use of the improvised explosive device (IED). The aim of this study was to describe all injuries to the face sustained by UK service personnel from blast or gunshot wounds during the highest intensity period of combat operations in Afghanistan.

METHODS: Hospital records and Joint Theatre Trauma Registry data were collected for all UK service personnel killed or wounded by blast and gunshot wounds in Afghanistan between 01 April 2006 and 01 March 2013.

RESULTS: 566 casualties were identified, 504 from blast and 52 from gunshot injuries. 75% of blast injury casualties survived and the IED was the most common mechanism of injury with the mid-face the most commonly affected facial region. In blast injuries a facial fracture was a significant marker for increased total injury severity score. A facial gunshot wound was fatal in 53% of cases. The majority of survivors required a single surgical procedure for the facial injury but further reconstruction was required in 156 of the 375 of survivors aero medically evacuated to the UK.

CONCLUSIONS: The presence and pattern of facial fractures was significantly different in survivors and fatalities, which may reflect the power of the blast that these cohorts were exposed to. The Anatomical Injury Scoring of the Injury Severity Scale was inadequate for determining the extent of soft tissue facial injuries and did not predict morbidity of the injury.

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Lactated Ringer Is Associated With Reduced Mortality and Less Acute Kidney Injury in Critically Ill Patients: A Retrospective Cohort Analysis.

Zampieri F, Ranzani O, Azevedo L, Martins I, Kellum J, Libório A

OBJECTIVES: To assess the impact of the percentage of fluid infused as Lactated Ringer (%LR) during the first 2 days of ICU admission in hospital mortality and occurrence of acute kidney injury.

DESIGN: Retrospective cohort.

SETTING: Analysis of a large public database (Multiparameter Intelligent Monitoring in Intensive Care-II).

PATIENTS: Adult patients with at least 2 days of ICU stay, admission creatinine lower than 5 mg/dL, and that received at least 500 mL of fluid in the first 48 hours.

INTERVENTIONS: None.

MEASUREMENT AND MAIN RESULTS: 10,249 patients were included in mortality analysis and 8,085 were included in the acute kidney injury analysis. For acute kidney injury analysis, we excluded patients achieving acute kidney injury criteria in the first 2 days of ICU stay. Acute kidney injury was defined as stage 2/3 Kidney Disease: Improving Global Outcomes creatinine criteria and was assessed from days 3-7. The effects of %LR in both outcomes were assessed through logistic regression controlling for confounders. Principal component analysis was applied to assess the effect of volume of each fluid type on mortality. Higher %LR was associated with lower mortality and less acute kidney injury. %LR effect increased with total volume of fluid infused. For patients in the fourth quartile of fluid volume (> 7 L), the odds ratio for mortality for %LR equal to 75% versus %LR equal to 25% was 0.50 (95% CI, 0.32-0.79; $p < 0.001$). Principal component analysis suggested that volume of Lactated Ringer and 0.9% saline infused had opposite effects in outcome, favoring Lactated Ringer.

CONCLUSIONS: Higher %LR was associated with reduced hospital mortality and with less acute kidney injury from days 3-7 after ICU admission. The association between %LR and mortality was influenced by the total volume of fluids infused.

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Intravenous versus topical tranexamic acid in primary total hip replacement: A meta-analysis.

Zhang P, Liang Y, Chen P, Fang Y, He J, Wang J

BACKGROUND: As the prevalence of total hip arthroplasty (THA) is increasing, it is usually associated with considerable blood loss. Tranexamic acid (TXA) has been reported to reduce perioperative blood loss in hip joint arthroplasty. But the best route of TXA administration continues to be controversial. So, we conducted a meta-analysis that integrated all data from the 7 included trials to compare the effectiveness and safety of topical and intravenous TXA administration in primary THA. The endpoints assessed in this meta-analysis include the comparisons of total blood loss, postoperative hemoglobin decline, transfusion rates, the incidence rate of deep vein thrombosis (DVT), pulmonary embolisms (PE), and wound infection.

METHODS: Literature searches of PubMed, EMBASE, the Cochrane Library, the Chinese Biomedical Literature database, the CNKI database, and Wan Fang Data were performed up to August 30, 2016. Randomized controlled trials (RCTs) were included in our meta-analysis if they compared the efficiency and safety of intravenous versus topical administration of TXA in patients who underwent primary THA. The endpoints included the comparisons of total blood loss, postoperative hemoglobin decline, transfusion rates, the incidence rate of DVT, PE, and wound infection. A meta-analysis was performed following the guidelines of the Cochrane Reviewer's Handbook and the PRISMA statement. The pooling of data was carried out by using RevMan 5.3, Denmark.

RESULTS: Seven RCTs involving 964 patients met the inclusion criteria. Ourmeta-analysis indicated that there were no significant differences in the 2 groups in terms of total blood loss ([mean difference (MD)=-14.74, 95% confidence interval (CI): -89.21 to 59.74, P=0.7], transfusion rates [RD=-0.02, 95% CI: -0.05 to 0.02, P=0.39]; no significant differences were found regarding the incidence of adverse effects such as deep venous thrombosis [DVT] [RD=0.00, 95% CI: -0.01 to 0.01, P=1.00], PE [RD=0.00, 95% CI: -0.01 to 0.01, P=0.71], or wound infection [RD=-0.01, 95% CI: -0.06 to 0.04, P=0.66]). The pooled results showed that the intravenous groups had a lower postoperative hemoglobin decline (MD=-0.47, 95% CI: -0.74 to -0.20, P=0.0006). It was probably due to insufficient data and the varied reporting of outcomes. There was some inherent heterogeneity due to the small sample size of each primary study.

CONCLUSION: The topical and intravenous administrations of TXA have a similar effect on the decrease of blood loss without an increased risk of complications (DVT, PE, and wound infection). Intravenous TXA administration may have a maximum efficacy. Topical TXA administration may be preferred in patients who with high risk of thromboembolic events. However, larger, high-quality RCTs are required to explore the optimal regimen, dosage, timing still in the future in order to recommend TXA widespread use in total joint arthroplasty.

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Combined use of intravenous and topical versus intravenous tranexamic acid in primary total joint arthroplasty: A meta-analysis of randomized controlled trials.

Zhang X, Ni J, Ge W

OBJECTIVE: To compare the safety and efficacy of combined use of intravenous and topical tranexamic acid with that of intravenous tranexamic acid in primary total joint arthroplasty.

METHODS: Literature was searched in PubMed, Cochrane Library, Embase, Medline, and China National Knowledge Infrastructure databases. Only randomized controlled trials were included in our study. Data were using fixed-effects or random-effects models with standard mean differences and risk ratios for continuous and dichotomous variables, respectively.

RESULTS: Seven randomized controlled trials encompassing 683 patients were retrieved for this meta-analysis. Outcomes showed that when compared with intravenous tranexamic acid, combined use of intravenous and topical tranexamic acid could significantly reduce total blood loss by a mean of 138.70 mL [95% confidence interval (CI): -196.14 to -81.26, $p < 0.001$], transfusion rates (risk ratio 0.42, 95% CI: 0.2 to 0.85, $p < 0.001$). No significant difference in the occurrence of deep vein thrombosis, pulmonary embolism was found between the two groups.

CONCLUSIONS: This meta-analysis indicated that comparing with only intravenous tranexamic acid, combined use of intravenous and topical tranexamic acid can significantly reduce blood loss and transfusion rate in primary total joint arthroplasty without increasing the risk of thrombotic complications. Therefore, we suggest that tranexamic acid should be intravenously combined with topically administered in primary total joint arthroplasty.