Debunking Dogma in the ED- Bridging the Knowledge Translation gap to Bring Cutting Edge Care to the Bedside

Supplemental Selected Evidence and References

**Backboards:**

**The lateral trauma position: what do we know about it and how do we use it?**

**A cross-sectional survey of all Norwegian emergency medical services.**

**BACKGROUND:**

Trauma patients are customarily transported in the supine position to protect the spine. The Airway, Breathing, Circulation, Disability, and Exposure (ABCDE) principles clearly give priority to airways. In Norway, the lateral trauma position (LTP) was introduced in 2005. We investigated the implementation and current use of LTP in Norwegian Emergency Medical Services (EMS).

**CONCLUSIONS:**

LTP is implemented and used in the majority of Norwegian EMS, despite little evidence as to its possible benefits and harms. How the patient is positioned in the LTP differs. More research on LTP is needed to confirm that its use is based on evidence that it is safe and effective.

**Limitations**- data collected through surveys distributed to first responders asking if they are trained in and use the position. Patient outcome data was not collected.

**EMS Spinal Precautions and the Use of the Long Backboard –Resource Document to the Position Statement of the National Association of EMS Physicians and the American College of Surgeons Committee on Trauma**

**Abstract:**

Field spinal immobilization using a backboard and cervical collar has been standard practice for patients with suspected spine injury since the 1960s. The backboard has been a component of field spinal immobilization despite lack of efficacy evidence. While the backboard is a useful spinal protection tool during extrication, use of backboards is not without risk, as they have been shown to cause respiratory compromise, pain, and pressure sores. Backboards also alter a patient’s physical exam, resulting in unnecessary radiographs. Because backboards present known risks, and their value in protecting the spinal cord of an injured patient remains unsubstantiated, they should only be used judiciously.

**Conclusion:**

All trauma patients should receive spinal assessment from EMS providers in the field. At a minimum, patients with potential for spine injury should be transported to the hospital using spinal precautions that include cervical collar and log roll procedures. Patients who are ambulatory or able to self-extricate without causing
undue pain should be encouraged to move themselves to a supine position on the EMS cot, after application of a cervical collar. Backboards remain a valuable adjunct to spinal immobilization during patient extrication. Careful patient handling and transport of the patient with suspected spinal injury using spinal precautions remains prudent.

**Effects of spinal immobilization devices on pulmonary function in healthy volunteer individuals.**

**BACKGROUND:** We aimed to investigate the effects of spinal immobilization devices on pulmonary functions.

**CONCLUSION:** We determined that both KED and long spinal backboard cause a decrease in pulmonary functions.

**Pressure ulcers from spinal immobilization in trauma patients: a systematic review.**

**BACKGROUND:** To protect the (possibly) injured spine, trauma patients are immobilized on backboard or vacuum mattress, with a cervical collar, lateral headblocks, and straps. Several studies identified pressure ulcer (PU) development from these devices. The aim of this literature study was to gain insight into the occurrence and development of PUs, the risk factors, and the possible interventions to prevent PUs related to spinal immobilization with devices in adult trauma patients.

**CONCLUSION:** The results from this systematic review show that immobilization with devices increases the risk for PU development. This risk is demonstrated in nine experimental studies with healthy volunteers and in four clinical studies.

**Changes in physical examination caused by use of spinal immobilization.**

**OBJECTIVE:** To determine whether spinal immobilization causes changes in physical exam findings over time.

**CONCLUSION:** This study shows that over time, standard immobilization causes a false-positive exam for midline vertebral tenderness. In order to reduce this high false-positive rate for midline vertebral tenderness, the authors recommend that, initially on arrival to the emergency department, immediate evaluation occur of all immobilized patients. Furthermore, backboards should be modified to reduce patient discomfort to prevent the iatrogenically induced midline vertebral tenderness, thereby reducing subsequent false-positive examinations.

**Long backboard versus vacuum mattress splint to immobilize whole spine in trauma victims in the field: a randomized clinical trial.**
INTRODUCTION: Patients with possible spinal injury must be immobilized properly during transport to medical facilities. The aim of this research was comparing spinal immobilization using a long backboard (LBB) with using a vacuum mattress splint (VMS) in trauma victims transported by an Emergency Medical Services (EMS) system.

CONCLUSION: The results of this study showed that immobilization using LBB was easier, faster, and more comfortable for the patient, and provided additional decrease in spinal movement when compared with a VMS.

C-Collars

Prehospital Use of Cervical Collars in Trauma Patients: A Critical Review

Abstract: The cervical collar has been routinely used for trauma patients for more than 30 years and is a hallmark of state-of-the-art prehospital trauma care. However, the existing evidence for this practice is limited: Randomized, controlled trials are largely missing, and there are uncertain effects on mortality, neurological injury, and spinal stability. Even more concerning, there is a growing body of evidence and opinion against the use of collars. It has been argued that collars cause more harm than good, and that we should simply stop using them. In this critical review, we discuss the pros and cons of collar use in trauma patients and reflect on how we can move our clinical practice forward. Conclusively, we propose a safe, effective strategy for prehospital spinal immobilization that does not include routine use of collars.

Conclusion: The existing evidence for using collars is weak, and our practice is mainly a result of the historical influence of poor evidence. More significant and concerning, there is a well of less-appreciated documentation of harmful effects from collars. A practice change seems warranted based on a critical evaluation of the pros and cons of prehospital collar use in trauma patients. With this perspective, we propose a safe, effective immobilization strategy that will not require any new equipment and should be easy to implement; the main difference from current protocols is the omission of routine collar application. Few patients are in need of spinal immobilization, and clearance protocols should be optimized to identify these high-risk patients. These patients should not be fitted with a collar, but immobilized on spine boards with head blocks and straps. Temporary use of a rigid collar is an option during extrication procedures from, for example, cars. Unconscious, nonintubated trauma patients should be transported in a modified lateral recovery position that maintains near neutral spine alignment and airway patency. Finally, prehospital management should, by no means, delay transportation of critically injured patients to definitive care. Future efforts should also aim to discontinue the use of rigid spine boards in favor of vacuum mattresses or other softer boards that are more comfortable and adaptable to the individual variations in body composition.
Why EMS Should Limit the Use of Rigid Cervical Collars  
Making the case for soft collars & alternative methods of spinal stabilization.  
(Editorial)

**Conclusion:** It's taken over 20 years to develop the necessary body of scientific evidence to change our practices of spinal immobilization. Fears of worsening a spinal injury, fears of missing a spinal injury and fears of litigation have long driven this process instead of scientific evidence.

In the course of this we've made our patients uncomfortable, sometimes hurt them, and made their healthcare more complicated and more expensive. This is one of the best customer satisfaction practices that EMS can adopt.

It's important to point out that we shouldn't abandon our various tools for moving patients. There's a limited role for backboards in extrication. Scoop-type stretchers and basket stretchers are excellent devices for moving patients, especially over uneven or rough terrain.

The vacuum mattress is also an excellent device for moving patients and actually provides probably the best stabilization of the spine of any device out there.

We don't want to throw the baby out with the bathwater; we just want to provide the best possible evidence-based care for our patients. Overall, our patient care will improve and our patients will remain more comfortable.

**International Liason Committee on Resuscitation (ILCOR) Cervical Collar Guidelines (draft)**

**Question:** Among adults and children with suspected traumatic cervical spinal injury (P), does spinal motion restriction (I), compared with no spinal motion restriction (C), change neurological injury, complications, overall mortality, pain, patient comfort, movement of the spine, hospital length of stay (O)?

**Treatment Recommendation:** We suggest against the use of cervical collars by first aid providers (weak recommendation, very-low-quality evidence). Values, Preferences, and Task Force Insights Consistent with the first aid principle of preventing further harm, the potential benefits of applying a cervical collar do not outweigh harms such as increased intracranial pressure and the consequences of unnecessary neck movement. We recognize that first aid providers might not be able to discriminate between high- or low-risk individuals. We also recognize the potential value of manual stabilization in certain circumstances, but this was not evaluated in this review. Task force discussion about this review included the recognition that, although evidence from the few studies that are available comes
primarily from healthy volunteers and cadavers, there is a growing body of evidence demonstrating harmful effects, such as the development of raised intracranial pressure. In addition, there was concern expressed that the process for application of a cervical collar by a first aid provider to an individual with cervical spinal trauma could result in further injury. Application of a cervical collar requires training and regular practice to be performed properly, and such training may not be a component of every first aid course curriculum. Another important discussion topic was whether a first aid provider is able to distinguish between high- and low-risk injury criteria. As a result of these concerns and the consensus on science findings, the task force suggests against the routine application of cervical collars by first aid providers.

Limitations: Evidence is 'low quality' for a variety of reasons and only bunt trauma was studied. However there is little, if any evidence to refute findings.

Extrication collars can result in abnormal separation between vertebrae in the presence of a dissociative injury.

BACKGROUND: Cervical collars are applied to millions of trauma victims with the intent of protecting against secondary spine injuries. Adverse clinical outcomes during the management of trauma patients led to the hypothesis that extrication collars may be harmful in some cases. The literature provides indirect support for this observation. The purpose of this study was to directly evaluate cervical biomechanics after application of a cervical collar in the presence of severe neck injury.

CONCLUSIONS: This study was consistent with previous evidence that extrication collars can result in abnormal distraction within the upper cervical spine in the presence of a severe injury. These observations support the need to prioritize additional research to better understand the risks and benefits of cervical stabilization methods and to determine whether improved stabilization methods can help to avoid potentially harmful displacements between vertebrae.

Effect of cervical hard collar on intracranial pressure after head injury.

BACKGROUND: Patients suffering head trauma are at high risk of having a concomitant cervical spine injury. A rigid cervical collar is usually applied to each patient until spinal stability is confirmed. Hard collars potentially cause venous outflow obstruction and are a nociceptive stimulus, which might elevate intracranial pressure (ICP). This study tested the hypothesis that application of a hard collar is associated with an increase in ICP.

METHODS: A prospective series of 10 head-injured patients with a postresuscitation Glasgow coma scale score of nine or less had ICP measurements before and after cervical hard collar application.
RESULTS: Nine out of 10 patients had a rise in ICP following application of the collar. The difference in pre- and postapplication ICP was statistically significant (P < 0.05).

CONCLUSIONS: Early assessment of the cervical spine in head-injured patients is recommended to minimize the risk of intracranial hypertension related to prolonged cervical spine immobilization with a hard collar.

Limitations: Small sample size, but easy experiment to replicate.

Head injury = C-spine injury?

Epidemiology and predictors of cervical spine injury in adult major trauma patients: a multicenter cohort study.

BACKGROUND: Patients with cervical spine injuries are a high-risk group, with the highest reported early mortality rate in spinal trauma.

METHODS: This cohort study investigated predictors for cervical spine injury in adult (≥ 16 years) major trauma patients using prospectively collected data of the Trauma Audit and Research Network from 1988 to 2009. Univariate and multivariate logistic regression analyses were used to determine predictors for cervical fractures/dislocations or cord injury.

CONCLUSIONS: 3.5% of patients suffered cervical spine injury. Patients with a lowered GCS or systolic blood pressure, severe facial fractures, dangerous injury mechanism, male gender, and/or age ≥ 35 years are at increased risk. Contrary to common belief, head injury was not predictive for cervical spine involvement.

Logrolling

Transferring patients with thoracolumbar spinal instability: are there alternatives to the log roll maneuver?

STUDY DESIGN: Using a cadaveric model, the amount of spinal motion generated during the execution of various prehospital transfer techniques was evaluated using a crossover study design.

OBJECTIVE: To assess the quantity of segmental motion generated across a globally unstable thoracolumbar spine during the execution of the log roll (LR), lift-and-slide, and 6-plus-person (6+) lift.

CONCLUSION: The execution of the LR maneuver tends to generate more motion than either of the lifting methods examined in this investigation. More research is
needed to identify the safest possible method for transferring or moving patients with thoracolumbar instability.

**Controlled Laboratory Comparison Study of Motion With Football Equipment in a Destabilized Cervical Spine: Three Spine-Board Transfer Techniques.**

**BACKGROUND:** Numerous studies have shown that there are better alternatives to log rolling patients with unstable spinal injuries, although this method is still commonly used for placing patients onto a spine board. No previous studies have examined transfer maneuvers involving an injured football player with equipment in place onto a spine board.

**CONCLUSION:** The log roll resulted in the most motion at an unstable cervical injury as compared with the other 2 spine-boarding techniques examined. The 8-person lift and lift-and-slide techniques may both be more effective than the log roll at reducing unwanted cervical spine motion when spine boarding an injured football player. Reduction of such motion is critical in the prevention of iatrogenic injury.

**Levophed**

**Comparison of Dopamine and Norepinephrine in the Treatment of Shock**

**BACKGROUND:** Both dopamine and norepinephrine are recommended as first-line vasopressor agents in the treatment of shock. There is a continuing controversy about whether one agent is superior to the other.

**Conclusions:** Although there was no significant difference in the rate of death between patients with shock who were treated with dopamine as the first-line vasopressor agent and those who were treated with norepinephrine, the use of dopamine was associated with a greater number of adverse events.

**Safety of peripheral intravenous administration of vasoactive medication.**

**BACKGROUND:** Central venous access is commonly performed to administer vasoactive medication. The administration of vasoactive medication via peripheral intravenous access is a potential method of reducing the need for central venous access. The aim of this study was to evaluate the safety of vasoactive medication administered through peripheral intravenous access.

**CONCLUSIONS:** Administration of norepinephrine, dopamine, or phenylephrine by peripheral intravenous access was feasible and safe in this single-center medical intensive care unit. Extravasation from the peripheral intravenous line was uncommon, and phentolamine with nitroglycerin paste were effective in preventing local ischemic injury. Clinicians should not regard the use of vasoactive medication is an automatic indication for central venous access (Time of peripheral vasopressor administration was 1-3 days).
Ketamine-

Towards evidence based emergency medicine: best BETs from the Manchester Royal Infirmary. BET 3: is ketamine a viable induction agent for the trauma patient with potential brain injury.

Abstract: A short cut review was carried out to establish whether ketamine is a viable induction agent in trauma patients with potential brain injuries. 276 papers were found using the reported searches, of which 5 presented the best evidence to answer the clinical question. The author, date and country of publication, patient group studied, study type, relevant outcomes, results and study weaknesses of these best papers are tabulated. It is concluded that there is no evidence to suggest harm with Ketamine use as induction agent for the patient with potential traumatic brain injury. The drug has major advantages in those patients with associated haemodynamic compromise and should potentially be regarded as the agent of choice.

The ketamine effect on ICP in traumatic brain injury.

Abstract
Our goal was to perform a systematic review of the literature on the use of ketamine in traumatic brain injury (TBI) and its effects on intracranial pressure (ICP). All articles from MEDLINE, BIOSIS, EMBASE, Global Health, HealthStar, Scopus, Cochrane Library, the International Clinical Trials Registry Platform (inception to November 2013), reference lists of relevant articles, and gray literature were searched. Two reviewers independently identified all manuscripts pertaining to the administration of ketamine in human TBI patients that recorded effects on ICP. Secondary outcomes of effect on cerebral perfusion pressure, mean arterial pressure, patient outcome, and adverse effects were recorded. Two reviewers independently extracted data including population characteristics and treatment characteristics. The strength of evidence was adjudicated using both the Oxford and GRADE methodology. Our search strategy produced a total 371 citations. Seven articles, six manuscripts and one meeting proceeding, were considered for the review with all utilizing ketamine, while documenting ICP in severe TBI patients. All studies were prospective studies. Five and two studies pertained to adults and pediatrics, respectively. Across all studies, of the 101 adult and 55 pediatric patients described, ICP did not increase in any of the studies during ketamine administration. Three studies reported a significant decrease in ICP with ketamine bolus. Cerebral perfusion pressure and mean blood pressure increased in two studies, leading to a decrease in vasopressors in one. No significant adverse events related to ketamine were recorded in any of the studies. Outcome data were poorly documented. There currently exists Oxford level 2b, GRADE C evidence to support that ketamine does
not increase ICP in severe TBI patients that are sedated and ventilated, and in fact may lower it in selected cases.

What is the nature of the emergence phenomenon when using intravenous or intramuscular ketamine for paediatric procedural sedation?

OBJECTIVE: Ketamine has become the drug most favoured by emergency physicians for sedation of children in the ED. Some emergency physicians do not use ketamine for paediatric procedural sedation (PPS) because of concern about emergence delirium on recovery. The present study set out to determine the true incidence and nature of this phenomenon.

CONCLUSION: The belief that ketamine, in the doses used for ED PPS, causes frequent emergence delirium is flawed. A pleasant emergence phenomenon is common, but is not distressing for the child, and has no long-term (up to 30 days) negative sequelae. Rarely, there is anxiety or distress on awakening from ketamine sedation, which settles spontaneously. This should not deter emergency physicians from using ketamine for PPS.

Clinical Practice Guideline for Emergency Department Ketamine Dissociative Sedation: 2011 Update

Recovery reactions: The ability of ketamine to induce hallucinatory reactions—both pleasant and unpleasant—during recovery is legendary. Although these so-called emergence reactions are rarely disturbing in children (1.4% incidence of reactions judged clinically important in the large meta-analysis), their incidence in adults varies widely (0% to 30%). The ED experience thus far is that such recovery reactions are uncommon and generally mild in adults; however, clinicians should be aware of the rare potential for pronounced reactions, including nightmares, delirium, excitation, and physical combativeness. Titrated benzodiazepines appear to rapidly and consistently diminish such reactions. Transient diplopia as a result of rotary nystagmus is common during recovery, and transient blindness has been reported.

In the large meta-analysis in children, recovery agitation was not related to age, dose, or other factors to any clinically important degree, except a higher incidence in patients receiving subdissociative (<3 mg/kg IM) dosing. In contrast to traditional thinking, adolescents were not at substantially higher risk. Recovery agitation without an apparent hallucinatory component after dissociative sedation is not uncommon. Given that it occurs at a frequency similar to that of midazolam alone, such agitation appears to be a separate entity from the ketamine-induced hallucinatory reactions. It has been associated with the degree of preprocedural agitation but not the degree of external stimulation during recovery. In one study, emergency physicians graded the severity of ketamine recovery agitation with a 100-mm visual analog scale, and the median rating was 5 mm, ie, a magnitude of minimal clinical importance.
CVP in Femoral Central Lines

Central venous pressure in femoral catheter: correlation with superior approach after heart surgery.

OBJECTIVE: It is common to obtain femoral venous approach in patients undergoing combined heart surgery or as an alternative to superior approach (internal jugular vein or subclavian vein). The aim of this study was to compare the measures of central venous pressure (CVP) at two different sites (superior versus femoral).

CONCLUSION: The CVP can be measured with accuracy in the femoral venous approach in the immediate postoperative period of heart surgery with better linear correlation obtained with the measures made with the headboard positioned at zero degree.

Measurement of central venous pressure from a peripheral vein in infants and children.

BACKGROUND: Previous studies in adults have demonstrated a clinically useful correlation between central venous pressure (CVP) measured from a peripheral intravenous catheter and that measured from a central venous catheter. The current study prospectively compares CVP measurements from a central catheter and a peripheral catheter in infants and children.

CONCLUSION: CVP can be measured from a peripheral IV catheter in infants and children provided that there is continuity with the central venous compartment demonstrated by showing an increase in the CVP from the peripheral IV catheter in response to a sustained inspiratory effort and by occlusion of the extremity above the site of the catheter.

Lidocaine with epinephrine in extremities-

Epinephrine-supplemented local anesthetics for ear and nose surgery: clinical use without complications in more than 10,000 surgical procedures.

INTRODUCTION: Local anesthetics supplemented with epinephrine are generally regarded as contraindicated for surgical procedures involving the fingers, toes, penis, outer ear and the tip of the nose [1], but epinephrine is essential if automated tumescence local anesthesia (Auto-TLA) is used.

CONCLUSION: Epinephrine supplementation of local anesthetics does not block blood perfusion in the ear and did not induce organ, tissue or flap necrosis. Local
anesthesia with epinephrine supplementation is therefore safe for acral areas such as the ear or nose. Despite the relatively small influence on blood perfusion, epinephrine supplementation results in a relatively bloodless operating field and longer effectiveness of local anesthesia. The relative absence of blood in the operating field of the ear and nose significantly reduces the duration of surgery and increases the healing rate, as less electrocautery is needed.

**Lidocaine during RSI**

In patients with head injury undergoing rapid sequence intubation, does pretreatment with intravenous lignocaine/lidocaine lead to an improved neurological outcome? A review of the literature.

**Abstract**

It is well known that laryngeal instrumentation and endotracheal intubation is associated with a marked, transient rise in intracranial pressure (ICP). Patients with head injury requiring endotracheal intubation are considered particularly at risk from this transient rise in ICP as it reduces cerebral perfusion and thus may increase secondary brain injury. The favoured method for securing a definitive airway in this patient group is by rapid sequence intubation (RSI). In the United States the Emergency Airway Course teaches emergency physicians to routinely administer intravenous lidocaine as a pretreatment for RSI in this patient group in an attempt to attenuate this rise in ICP. A literature search was carried out to identify studies in which intravenous lidocaine was used as a pretreatment for RSI in major head injury. Any link to an improved neurological outcome was also sought. Papers identified were appraised in the manner recommended by the evidence based medicine group to ensure validity. There were no studies identified that answered our question directly and, furthermore, it is our belief that no such study, at present, exists in the literature. Six valid papers were found, which individually contained elements of the question posed and these are presented in a narrative and graphic form. There is currently no evidence to support the use of intravenous lidocaine as a pretreatment for RSI in patients with head injury and its use should only occur in clinical trials.

**Atropine during RSI:**

**Bradycardia during critical care intubation: mechanisms, significance and atropine.**

**Abstract:** Bradycardia occurs during the intubation of some critically ill children as a result of vagal stimulation due to hypoxia and/or laryngeal stimulation; such 'stable' bradycardia is accompanied by selective vasoconstriction. Some induction drugs also induce bradycardia which may be accompanied by vasodilatation which is also a feature of certain pathologies, which influence the progression to 'unstable' bradycardia, which does not respond to re-oxygenation and a pause in laryngoscopy. Preintubation atropine diminishes the overall incidence of stable
bradycardia during routine anaesthesia. However, clinical studies of critical care intubation show that atropine does not prevent all episodes of bradycardia and specifically cannot affect vasodilatation. As such, there is insufficient evidence to support a recommendation for the indiscriminate use of atropine for intubation during critical care illness, including simple neonatal respiratory distress. Atropine is appropriate during septic or late stage hypovolaemic shock where abnormal vasomotor tone and bradycardia may potentially set up a negative feedback loop of cardiac hypo-oxygenation and hypoperfusion and during premedication when using suxamethonium.

**Pediatric rapid sequence intubation: incidence of reflex bradycardia and effects of pretreatment with atropine.**

**OBJECTIVE:** To describe the incidence of reflex bradycardia and its relationship to the administration of atropine during L/TI in a Pediatric Emergency Department.

**CONCLUSION:** Atropine is not routinely administered prior to L/TI in this pediatric ED. Pretreatment with atropine did not prevent bradycardia in all cases. These data suggest that use of atropine prior to L/TI may not be required for all pediatric patients. Some patients will experience bradycardia regardless of atropine pretreatment.

**Cricoid pressure:**

**Controlled rapid sequence induction and intubation - an analysis of 1001 children.**

**BACKGROUND:** Classic rapid sequence induction puts pediatric patients at risk of cardiorespiratory deterioration and traumatic intubation due to their reduced apnea tolerance and related shortened intubation time. A 'controlled' rapid sequence induction and intubation technique (cRSII) with gentle facemask ventilation prior to intubation may be a safer and more appropriate approach in pediatric patients. The aim of this study was to analyze the benefits and complications of cRSII in a large cohort.

**CONCLUSION:** Controlled RSII with gentle facemask ventilation prior to intubation supports stable cardiorespiratory conditions for securing the airway in children with an expected or suspected full stomach. Pulmonary aspiration does not seem to be significantly increased.

**A Pilot Randomized Clinical Trial Assessing the Effect of Cricoid Pressure on Risk of Aspiration.**

**INTRODUCTION:** Patients at risk for microaspiration during elective intubation often receive cricoid pressure in the hopes of mitigating such risk. However, there is scarce evidence to either support or reject this practice. The objective of this
investigation was to assess the effect of cricoid pressure on microaspiration and to inform the potential feasibility of conducting a larger, more definitive clinical trial.

**CONCLUSIONS:** Utilizing pepsin A as a biomarker of aspiration, this pilot clinical trial did not find evidence for a reduced rate of aspiration or adverse clinical events with the administration of cricoid pressure during elective endotracheal intubation of patients with risk factors for microaspiration. This article is protected by copyright. All rights reserved.

**Cricoid pressure impedes tracheal intubation with the Pentax-AWS Airwayscope®: a prospective randomized trial.**

**BACKGROUND:** It is unclear how cricoid pressure affects tracheal intubation with the Pentax-AWS Airwayscope® (AWS). We conducted a prospective randomized clinical trial in anaesthetized patients.

**CONCLUSIONS:** Cricoid pressure impedes tracheal intubation using the AWS, and is associated with longer intubation time, which can be attributed to increased difficulty in the passage of a tube through the glottis.

**Videographic analysis of glottic view with increasing cricoid pressure force.**

**STUDY OBJECTIVE:** Cricoid pressure may negatively affect laryngeal view and compromise airway patency, according to previous studies of direct laryngoscopy, endoscopy, and radiologic imaging. In this study, we assess the effect of cricoid pressure on laryngeal view with a video laryngoscope, the Pentax-AWS.

**CONCLUSION:** Cricoid pressure application with increasing force resulted in a worse glottic view, as examined with the Pentax-AWS Video laryngoscope. There is much individual difference in the degree of change, even with the same force. Clinicians should be aware that cricoid pressure affects laryngeal view with the Pentax-AWS and likely other video laryngoscopes.

**Needle Thoracostomy:**

**Radiologic evaluation of alternative sites for needle decompression of tension pneumothorax.**

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

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

**Cadaveric comparison of the optimal site for needle decompression of tension pneumothorax by prehospital care providers.**

**BACKGROUND:** Computed tomographic and cadaveric studies have demonstrated needle decompression of tension pneumothorax at the fifth intercostal space (ICS), anterior axillary line (AAL) has advantages over the second ICS midclavicular line (MCL). The purpose of this study was to compare the ability of prehospital care providers to accurately decompress the chest at these two locations.

**CONCLUSION:** For prehospital care providers, the fifth ICS AAL can be localized and decompressed with a higher degree of accuracy than the traditional second ICS MCL. It is rated as easier to perform and can be done just as quickly. Based on these data, the fifth ICS AAL should be considered as an equivalent first-line position for needle decompression in patients with clinical evidence of a tension pneumothorax.

**Bronchodilators in RSV:**

**Pulmonary mechanics following albuterol therapy in mechanically ventilated infants with bronchiolitis.**

**BACKGROUND AND AIMS:** Bronchiolitis is a common cause of critical illness in infants. Inhaled β(2)-agonist bronchodilators are frequently used as part of treatment, despite unproven effectiveness. The purpose of this study was to describe the physiologic response to these medications in infants intubated and mechanically ventilated for bronchiolitis.

**CONCLUSIONS:** In this population of mechanically ventilated infants with bronchiolitis, relatively few had a reduction in pulmonary resistance in response to inhaled albuterol therapy. This response was not associated with improvements in outcomes.

**GCS 8 = Intubate?**

**What is the relationship between the Glasgow coma scale and airway protective reflexes in the Chinese population?**

**AIM:** To describe the relationship of gag and cough reflexes to Glasgow coma score (GCS) in Chinese adults requiring critical care.

**CONCLUSIONS:** Our study has shown that in a Chinese population with a wide range of critical illness (but little trauma or intoxication), reduced GCS is significantly related to gag and cough reflexes. However, a considerable proportion of patients
with a GCS≤8 have intact airway reflexes and may be capable of maintaining their own airway, whilst many patients with a GCS>8 have impaired airway reflexes and may be at risk of aspiration. This has important implications for airway management decisions.

**Decreased Glasgow Coma Scale score does not mandate endotracheal intubation in the emergency department.**

**BACKGROUND:** Decreased consciousness is a common reason for presentation to the emergency department (ED) and admission to acute hospital beds. In trauma, a Glasgow Coma Scale score (GCS) of 8 or less indicates a need for endotracheal intubation. Some advocate a similar approach for other causes of decreased consciousness, however, the loss of airway reflexes and risk of aspiration cannot be reliably predicted using the GCS alone.

**RESULTS:** The study included 73 patients with decreased consciousness as a result of drug or alcohol intoxication. The GCS ranged from 3 to 14, and 12 patients had a GCS of 8 or less. No patient with a GCS of 8 or less aspirated or required intubation. There was one patient who required intubation; this patient had a GCS of 12 on admission to the ward.

**CONCLUSIONS:** This study suggests that it can be safe to observe poisoned patients with decreased consciousness, even if they have a GCS of 8 or less, in the ED.

**Oxygen in COPD**

**Oxygen-induced hypercapnia in COPD: myths and facts**

**Abstract:** Despite subsequent studies and reviews [3] describing the effect of oxygen on the ventilator drive in patients with COPD, disproving the 'hypoxic drive' theorem, many clinicians are still being taught during their medical training that administration of oxygen in patients with COPD can be dangerous given that it induces hypercapnia through the 'hypoxic drive' mechanism; that is, increasing arterial O2 tension will reduce the respiratory drive, leading to a (dangerous) hypercapnia. This misconception has resulted in the reluctance of clinicians and nurses to administer oxygen to hypoxemic patients with COPD. In most cases, this is an unwise decision, putting at risk the safety of patients with acute exacerbation of COPD. In this concise paper, we will discuss the impact and pathophysiology of oxygen-induced hypercapnia in patients with acute exacerbation of COPD.

**Conclusions:** In patients with COPD, hypoxic pulmonary vasoconstriction is the most efficient way to alter the Va/Q ratios to improve gas exchange. This physiological mechanism is counteracted by oxygen therapy and accounts for the largest increase of oxygen-induced hypercapnia. A titrated oxygen therapy to achieve saturations of 88% to 92% is recommended in patients with an acute
exacerbation of COPD to avoid hypoxemia and reduce the risk of oxygen-induced hypercapnia.

Rectal exam in trauma:

Reasons to omit digital rectal exam in trauma patients: no fingers, no rectum, no useful additional information.

BACKGROUND: Performance of digital rectal examination (DRE) on all trauma patients during the secondary survey has been advocated by the Advanced Trauma Life Support course. However, there is no clear evidence of its efficacy as a diagnostic test for traumatic injury. The purpose of this study is to analyze the value of a policy mandating DRE on all trauma patients as part of the initial evaluation process and to discern whether it can routinely be omitted.

CONCLUSION: DRE is equivalent to OCI for confirming or excluding the presence of index injuries. When index injuries are demonstrated, OCI is more likely to be associated with their presence. DRE rarely provides additional accurate or useful information that changes management. Omission of DRE in virtually all trauma patients appears permissible, safe, and advantageous. Elimination of routine DRE from the secondary survey will presumably conserve time and resources, minimize unpleasant encounters, and protect patients and staff from the potential for further harm without any significant negative impact on care and outcome.

Lack of evidence to support routine digital rectal examination in pediatric trauma patients.

BACKGROUND: Current advanced trauma life support guidelines recommend that a digital rectal examination (DRE) should be performed as part of the initial evaluation of all trauma patients. Our primary goal was to estimate the test characteristics of the DRE in pediatric patients for the following injuries: (1) spinal cord injuries, (2) bowel injuries, (3) rectal injuries, (4) pelvic fractures, and (5) urethral disruptions.

CONCLUSIONS: The DRE has poor sensitivity for the diagnosis of spinal cord, bowel, rectal, bony pelvis, and urethral injuries. Our findings suggest that the DRE should not be routinely used in pediatric trauma patients.

MONA- do we need the ‘O’?

Effect of supplemental oxygen exposure on myocardial injury in ST-elevation myocardial infarction.

OBJECTIVE: Supplemental oxygen therapy may increase myocardial injury following ST elevation myocardial infarction (STEMI). In this study, we aimed to
evaluate the effect of the dose and duration of oxygen exposure on myocardial injury after STEMI.

**CONCLUSIONS:** Supplemental oxygen exposure in the first 12 h after STEMI was associated with a clinically significant increase in cTnI (troponin) and CK release.

**Air Versus Oxygen in ST-Segment-Elevation Myocardial Infarction.**

**BACKGROUND:** Oxygen is commonly administered to patients with ST-elevation-myocardial infarction despite previous studies suggesting a possible increase in myocardial injury as a result of coronary vasoconstriction and heightened oxidative stress.

**CONCLUSION:** Supplemental oxygen therapy in patients with ST-elevation-myocardial infarction but without hypoxia may increase early myocardial injury and was associated with larger myocardial infarct size assessed at 6 months.

**Epinephrine in cardiac arrest**

**Patient-centric blood pressure-targeted cardiopulmonary resuscitation improves survival from cardiac arrest.**

**RATIONALE:** Although current resuscitation guidelines are rescuer focused, the opportunity exists to develop patient-centered resuscitation strategies that optimize the hemodynamic response of the individual in the hopes to improve survival.

**OBJECTIVES:** To determine if titrating cardiopulmonary resuscitation (CPR) to blood pressure would improve 24-hour survival compared with traditional CPR in a porcine model of asphyxia-associated ventricular fibrillation (VF).

**CONCLUSIONS:** Blood pressure-targeted CPR improves 24-hour survival compared with optimal American Heart Association care in a porcine model of asphyxia-associated VF cardiac arrest.

**Hemodynamic-directed cardiopulmonary resuscitation during in-hospital cardiac arrest.**

**Abstract:** Cardiopulmonary resuscitation (CPR) guidelines assume that cardiac arrest victims can be treated with a uniform chest compression (CC) depth and a standardized interval administration of vasopressor drugs. This non-personalized approach does not incorporate a patient’s individualized response into ongoing resuscitative efforts. In previously reported porcine models of hypoxic and normoxic ventricular fibrillation (VF), a hemodynamic-directed resuscitation improved short-term survival compared to current practice guidelines. Skilled in-hospital rescuers should be trained to tailor resuscitation efforts to the individual
patient’s physiology. Such a strategy would be a major paradigm shift in the treatment of in-hospital cardiac arrest victims.

**Hemodynamic directed CPR improves cerebral perfusion pressure and brain tissue oxygenation.**

**AIM:** Advances in cardiopulmonary resuscitation (CPR) have focused on the generation and maintenance of adequate myocardial blood flow to optimize the return of spontaneous circulation and survival. Much of the morbidity associated with cardiac arrest survivors can be attributed to global brain hypoxic ischemic injury. The objective of this study was to compare cerebral physiological variables using a hemodynamic directed resuscitation strategy versus an absolute depth-guided approach in a porcine model of ventricular fibrillation (VF) cardiac arrest.

**CONCLUSIONS:** Hemodynamic directed resuscitation strategy targeting coronary perfusion pressure >20 mmHg following VF arrest was associated with higher cerebral perfusion pressures and brain tissue oxygen tensions during CPR.

**STEMI vs. NSTEMI**

**SHORT AND LONG-TERM MORTALITY AFTER STEMI VERSUS NON-STEMI: A SYSTEMATIC REVIEW AND META-ANALYSIS**

**Background:** Acute coronary syndromes may manifest as ST-Elevation Myocardial Infarction (STEMI) or Non-ST Elevation Myocardial Infarction (NSTEMI). Although patients who present with STEMI or NSTEMI share the same cardiac risks factors, is it not clear in the literature if STEMI patients have a better or worse prognosis than NSTEMI patients, both on a short and long term perspective.

**Conclusions:** In this meta-analysis, the first to compare short and long term mortality in STEMI and NSTEMI patients, both types of ACS share a similar long-term prognosis, despite a worse short-term prognosis after STEMI. Younger age in STEMI is a factor related to better long-term prognosis.

**Differences in the profile, treatment, and prognosis of patients with cardiogenic shock by myocardial infarction classification: A report from NCDR.**

**BACKGROUND:** Cardiogenic shock is a deadly complication of an acute myocardial infarction (MI). We sought to characterize differences in patient features, treatments, and outcomes of cardiogenic shock by MI classification: ST-segment-elevation MI (STEMI) versus non-ST-segment elevation MI (NSTEMI).

**CONCLUSIONS:** Cardiogenic shock is associated with high mortality in patients with STEMI and NSTEMI. However, urgent revascularization is more commonly pursued in patients with STEMI presenting with shock than in patients with NSTEMI. More
research is needed to improve the outcomes for patients with MI presenting with shock, particularly those presenting with NSTEMI.

**Blown pupils:**

Prognosis of patients with bilateral fixed dilated pupils secondary to traumatic extradural or subdural haematoma who undergo surgery: a systematic review and meta-analysis

**Primary objective:** To review the prognosis of patients with bilateral fixed and dilated pupils secondary to traumatic extradural (epidural) or subdural haematoma who undergo surgery.

**Conclusions and implications of key findings:** Despite the poor overall prognosis of patients with closed head injury and bilateral fixed and dilated pupils, our findings suggest that a good recovery is possible if an aggressive surgical approach is taken in selected cases, particularly those with extradural haematoma.

**Lactate**

Lactate clearance for death prediction in severe sepsis or septic shock patients during the first 24 hours in Intensive Care Unit: an observational study

**Background:** This study was design to investigate the prognostic value for death at day-28 of lactate course and lactate clearance during the first 24 hours in Intensive Care Unit (ICU), after initial resuscitation.

**Conclusions:** During the first 24 hr in the ICU, lactate clearance was the best parameter associated with 28-day mortality rate in septic patients. Protocol of lactate clearance-directed therapy should be considered in septic patients, even after the golden hours.

**THE ROLE OF LACTATE CLEARANCE AS A PREDICTOR OF ORGAN DYSFUNCTION AND MORTALITY IN PATIENTS WITH SEVERE SEPSIS**

**Background:** Little is known about biomarkers which are used to classification of patients in order to diagnosis severity of sepsis among clients of emergency units. It seems that Lactate’s clearance can be used in this regard. This study aimed to determine the relationship between Lactate’s clearance, mortality and organ’s dysfunction with severe sepsis.

**Conclusion:** It was concluded that patients with severe sepsis is a marker which is related to tissue hypoxia, also lactate’s clearance increasing is related to drastic reduction in biomarkers, mortality, and incidence of organ’s dysfunction. Overall,
patients with lower lactate’s clearance are counted a high risk group for mortality and organs’ dysfunction.

**Sepsis-associated hyperlactatemia**

**Abstract:** There is overwhelming evidence that sepsis and septic shock are associated with hyperlactatemia (sepsis-associated hyperlactatemia (SAHL)). SAHL is a strong independent predictor of mortality and its presence and progression are widely appreciated by clinicians to define a very high-risk population. Until recently, the dominant paradigm has been that SAHL is a marker of tissue hypoxia. Accordingly, SAHL has been interpreted to indicate the presence of an ‘oxygen debt’ or ‘hypoperfusion’, which leads to increased lactate generation via anaerobic glycolysis. In light of such interpretation of the meaning of SAHL, maneuvers to increase oxygen delivery have been proposed as its treatment. Moreover, lactate levels have been proposed as a method to evaluate the adequacy of resuscitation and the nature of the response to the initial treatment for sepsis. However, a large body of evidence has accumulated that strongly challenges such notions. Much evidence now supports the view that SAHL is not due only to tissue hypoxia or anaerobic glycolysis. Experimental and human studies all consistently support the view that SAHL is more logically explained by increased aerobic glycolysis secondary to activation of the stress response (adrenergic stimulation). More importantly, new evidence suggests that SAHL may actually serve to facilitate bioenergetic efficiency through an increase in lactate oxidation. In this sense, the characteristics of lactate production best fit the notion of an adaptive survival response that grows in intensity as disease severity increases. Clinicians need to be aware of these developments in our understanding of SAHL in order to approach patient management according to biological principles and to interpret lactate concentrations during sepsis resuscitation according to current best knowledge.

**Conclusion:** Hyperlactatemia is common in patients with sepsis, a marker of illness severity and a strong predictor of mortality. However, in this review, we critique the theory that SAHL indicates an oxygen debt or hypoperfusion or tissue hypoxia or ‘anaerobic glycolysis’. We provide evidence that metabolic changes can account for SAHL and that such evidence is recurrent, logical and consistent and not yet contradicted by any empirical observation. SAHL may thus reflect severity of illness and the degree of activation of the stress response (and release of epinephrine). If the metabolic theory of SAHL is correct, then in a metaphorical sense SAHL may be the cellular equivalent of fever and may represent the impact of major changes in numerous metabolic processes. Under stress, lactate is a source of energy in the same cell where it is produced and also in other cells where it can be used as an important fuel for oxidation and glucose generation. Fluid resuscitation- or hemodynamic-based protocols may not directly affect lactate if the mechanisms of its production are not directly targeted by such activities. Similarly, lactate may not necessarily indicate the need to deliberately increase calculated systemic oxygen delivery because it may not represent an oxygen deficiency. In contrast, if the tissue hypoxia theory of SAHL is correct, then the therapeutic implications are very
different. It is possible, maybe likely, that both (tissue hypoxia and metabolic adaptation) explain SAHL in different patients at different times or occur simultaneously to a degree that changes from patient to patient and according to illness severity, genetics and interventions, in a way that we do not yet understand. The extraordinary complexity of lactate makes it impossible, at this stage, to achieve such deeper understanding. Until then, clinicians should be aware of such complexity and make therapeutic choices on the basis of such knowledge.

References


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