Advanced life support


Advances in oxygenator membrane, vascular cannula, and centrifugal pump technologies led to the miniaturization of extracorporeal lung support (ECLS) and simplified its insertion and use. Support of combat injuries complicated by severe respiratory failure requires critical care resources not sustainable in the deployed environment. In response to this need, a unique international military-civilian partnership was forged to create a transportable ECLS capability to rescue combat casualties experiencing severe respiratory failure. METHODS: A multidisciplinary training and consultative relationship developed between the US military at Landstuhl Regional Medical Center (LRMC) and the University Hospital Regensburg (UHR), a German regional ‘lung failure’ center with expertise in ECLS. ECLS circuits used were pumpless arteriovenous extracorporeal lung assist (NovaLung iLA) and pump-driven venovenous extracorporeal membrane oxygenation (PLS Quadrox D Membrane Oxygenator with Rotaflow Centrifugal Pump). US casualties supported by ECLS between June 2005 and August 2011 were identified from the LRMC Trauma Program Registry for review. RESULTS: UHR cared for 10 US casualties supported by ECLS. The initial five patients were cannulated with arteriovenous circuits (pumpless arteriovenous extracorporeal lung assist), and the remaining five were cannulated with pump-driven venovenous circuits (extracorporeal membrane oxygenation). Four patients were cannulated in the war zone, and six patients were cannulated at LRMC after evacuation to Germany. All patients were transferred to UHR for continued management (mean, 9.6 ECLS days). In all cases, both hypoxemia and hypercapnia improved, allowing for decreased airway pressures. Nine patients were weaned from ECLS and extubated. One soldier died from progressive multiple-organ failure. CONCLUSION: ECLS should be considered in the management of trauma complicated by severe respiratory failure. Modern ECLS technology allows these therapies to be transported for initiation outside of specialized centers even in austere settings. Close collaboration with established centers potentially allows both military and civilian hospitals with infrequent ECLS requirements to use it for initial patient stabilization before transfer for continued care.


In the past three decades, there has been a significant clinical shift in the performance of resuscitative thoracotomy (RT), from a nearly obligatory procedure before declaring any trauma patient deceased to a more selective application of RT. We have sought to formulate an evidence-based guideline for the current indications for resuscitative thoracotomy (RT) after injury in the patient. METHODS: The Western Trauma Association Critical Decisions Committee queried the literature for studies defining the appropriate role of RT in the trauma patient. When good data were not available, the Committee relied on expert opinion. RESULTS: There are no published PRCT and it is not likely that there will be; recommendations are based on published prospective observational and retrospective studies, as well as expert opinion of Western Trauma Association members. Patients undergoing cardiopulmonary resuscitation (CPR) on arrival to the hospital should be stratified based on injury and transport time. Indications for RT include the following: blunt trauma patients with less than 10 minutes of prehospital CPR, penetrating torso trauma patients with...
less than 15 minutes of CPR, patients with penetrating trauma to the neck or extremity with less than 5 minutes of prehospital CPR, and patients in profound refractory shock. After RT, the patient's intrinsic cardiac activity is evaluated; patients in asystole without cardiac tamponade are declared dead. Patients with a cardiac wound, tamponade, and associated asystole are aggressively treated. Patients with an intrinsic rhythm following RT should be treated according to underlying primary pathology. Following several minutes of such treatment as well as generalized resuscitation, salvageability is reassessed; we define this as the patient's ability to generate a systolic blood pressure of greater than 70 mm Hg with an aortic cross-clamp if necessary. CONCLUSION: The success of RT approximates 35% for the patient arriving in shock with a penetrating cardiac wound and 15% for all patients with penetrating wounds. Conversely, patient outcome is relatively poor when RT is performed for blunt trauma, 2% survival for patients in shock and less than 1% survival for patients with no vital signs. Patients undergoing CPR on arrival to the hospital should be stratified based on injury and transport time to determine the utility of RT. This algorithm represents a rational approach that could be followed at trauma centers with the appropriate resources; it may not be applicable at all hospitals caring for the injured. There will be patient, personnel, institutional, and situational factors that may warrant deviation from the recommended guideline. The annotated algorithm is intended to serve as a quick bedside reference for clinicians.

Therapeutic hypothermia (TH) has become standard management following out of hospital cardiac arrest (OHCA). Recent evidence suggests therapeutic hypothermia (TH) increases the incidence of pneumonia. We retrospectively assessed infective indicators after OHCA and evaluated the effect of antibiotics on survival. Method: We identified all patients admitted to the ICU of a regional primary angioplasty hospital following OHCA from May 2007 to December 2010. We collected demographic and outcome data, evidence of infection and the use of antimicrobial therapy.
Results: 138 patients were admitted to ICU following OHCA. The mortality rate was 68.1% with mean ICNARC predicted mortality of 77.5%. Of 138 patients, 135 (97.8%) had at least one positive marker of infection within 72 h. 53 of 138 patients (38.4%) received antibiotics during the first 7 days of their ICU stay. The hospital mortality rate for these patients was significantly less than those not receiving antibiotics (56.6% vs. 75.3%; p = 0.025) with NNT of 5. Multivariate analysis demonstrated that antibiotic use was an independent predictor of survival. Conclusion: The post-arrest management of OHCA is commonly complicated by infections, the accurate diagnosis of which is impaired by the associated increase in inflammatory markers, body temperature control, delay in the processing of samples and poor quality chest radiography. We have shown a significant reduction in mortality in patients who received antibiotics compared with patients who did not. This suggests that a formal clinical trial is warranted.

Objectives: Prehospital airway management for adult trauma patients remains controversial. We sought to review the frequency that paramedic non-drug assisted intubation or attempted intubation is performed for trauma patients in Ontario, Canada, and determine its association with mortality. Methods: We conducted a retrospective cohort study using the Ontario Trauma Registry's Comprehensive Data Set for 2002 - 2009. Eligible patients were greater than 16 years of age, had an initial Glasgow Coma Score of less than 9 and were cared for by ground-based non-critical care paramedics. The primary outcome was mortality. Outcomes were compared between patients undergoing prehospital intubation versus basic airway management. Logistic regression analyses were used to quantify the association between prehospital intubation and mortality.

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Results: Of the 2229 patients included in the analysis, 671 (30.1%) underwent prehospital intubation. Annual rates of prehospital intubation declined from 33.7% to 14.0% (p trend<0.0001) over the study period. Unadjusted death rates were 66.0% versus 34.8% in the intubation and basic airway groups, respectively (p<0.0001). Intubation in the prehospital setting was associated with a heightened risk of mortality (adjusted OR 2.8, 95% CI 1.1 to 7.6).

Conclusions: Prehospital non-drug assisted intubation for trauma is being performed less frequently in Ontario, Canada. Within our study population, paramedic non-drug assisted intubation or attempted intubation was associated with a heightened risk of mortality.

Fields JM, Catallo K, Au AK, Rotte M, Leventhal D, Weiner S and Ku BS. Resuscitation of the pregnant patient: What is the effect of patient positioning on inferior vena cava diameter? Resuscitation 2012; Online first (21 November)

Patients in the third trimester of pregnancy presenting to the emergency department (ED) with hypotension are routinely placed in the left lateral tilt (LLT) position to relieve inferior vena cava (IVC) compression from the gravid uterus thereby increasing venous return. However, the relationship between patient position and proximal intrahepatic IVC filling has never assessed directly. This study set out to determine the effect of LLT position on intrahepatic IVC diameter in third trimester patients under real-time visualization with ultrasound. Methods: This prospective observational study on the labor and delivery floor of a large urban academic teaching hospital enrolled patients between 30 and 42 weeks estimated gestational age from August 2011 to March 2012. Patients were placed in three different positions: supine, LLT, and right lateral tilt (RLT). After the patient was in each position for at least 3 min, IVC ultrasound using the intercostal window was performed by one of three study sonologists. Maternal and fetal hemodynamics were also monitored and recorded in each position. Results: A total of 26 patients were enrolled with one excluded from data analysis due to inability to obtain IVC measurements. The median IVC maximum diameter was 1.26 cm (95% confidence interval [CI] 1.13, 1.55) in LLT compared to 1.13 cm (95% CI 0.89, 1.41) in supine, p = 0.01. When comparing each individual patient's LLT to supine measurement, LLT lead to an increase in maximum IVC diameter in 76% (19/25) of patients with the average LLT measurement 29% (95% confidence interval 10, 48%) larger. Six patients had the largest maximum IVC measurement in the supine position. No patients experienced any hemodynamic instability or distress during the study. Conclusion: IVC ultrasound is feasible in late pregnancy and demonstrates an increase in diameter with LLT positioning. However, a quarter of patients had a decrease in IVC diameter with tilting and, instead, had the largest IVC diameter in the supine position suggesting that uterine compression of the IVC may not occur universally. IVC assessment at the bedside may be a useful adjunct in determining optimal positioning for resuscitation of third trimester patients.


Despite the publication and dissemination of the Advanced Cardiac Life Support guidelines, variability in the use of drugs during resuscitation from out-of-hospital cardiac arrest may exist between different Emergency Medical Services throughout North America. The purpose of this study was to characterize the use of such drugs and evaluate their relationship to cardiac arrest outcomes. Methods and results The Resuscitation Outcomes Consortium Registry-Cardiac Arrest collects out-of-hospital cardiac arrest data from 264 Emergency Medical Services agencies in 11 geographical locations in the US and Canada. Multivariable logistic regression was used to assess the association between drug use, characteristics of the cardiac arrest and a pulse at emergency department arrival and survival to discharge. A total of 16,221 out-of-hospital cardiac arrests were attended by 74 Emergency Medical Services agencies. There was a considerable variability in the administration of amiodarone and lidocaine for the treatment of shock resistant ventricular tachycardia/ventricular fibrillation. For non-shockable rhythms, atropine use ranged from 29 to 95% and sodium bicarbonate use ranged from 0.2 to 73% across agencies in the 89% of agencies that used the drug. Epinephrine use ranged from 57 to
98% within agencies. Neither lidocaine nor amiodarone was associated with a survival benefit while there was an inverse relationship between the administration of epinephrine, atropine and sodium bicarbonate and survival to hospital discharge. **Conclusions:** There is considerable variability among Emergency Medical Services agencies in their use of pharmacological therapy for out-of-hospital cardiac arrests which may be resolved by performing large randomized trials examining effects on survival.

Therapeutic hypothermia, also known as targeted temperature management (TTM), improves clinical outcomes in patients resuscitated from cardiac arrest. Hyperthermia after discontinuation of active temperature management (“rebound pyrexia”) has been observed, but its incidence and association with clinical outcomes is poorly described. We hypothesized that rebound pyrexia is common after rewarming in post-arrest patients and is associated with poor neurologic outcomes. **Methods:** Retrospective multicenter US clinical registry study of post-cardiac arrest patients treated with TTM at 11 hospitals between 5/2005 and 10/2011. We assessed the incidence of rebound pyrexia (defined as temperature >38 °C) in post-arrest patients treated with TTM and subsequent clinical outcomes of survival to discharge and "good" neurologic outcome at discharge, defined as cerebral performance category (CPC) 1–2. Results: In this cohort of 236 post-arrest patients treated with TTM, mean age was 58.1 ± 15.7 y and 106/236 (45%) were female. Of patients who survived at least 24 h after TTM discontinuation (n = 167), post-rewarming pyrexia occurred in 69/167 (41%), with a median maximum temperature of 38.7 (IQR 38.3–38.9). There were no significant differences between patients experiencing any pyrexia and those without pyrexia regarding either survival to discharge (37/69 (54%) v 51/98 (52%), p = 0.88) or good neurologic outcomes (26/37 (70%) v 42/51 (82%), p = 0.21). We compared patients with marked pyrexia (greater than the median pyrexia of 38.7 °C) versus those who experienced no pyrexia or milder pyrexia (below the median) and found that survival to discharge was not statistically significant (40% v 56% p = 0.16). However, marked pyrexia was associated with a significantly lower proportion of CPC 1–2 survivors (58% v 80% p = 0.04). **Conclusions:** Rebound pyrexia occurred in 41% of TTM-treated post-arrest patients, and was not associated with lower survival to discharge or worsened neurologic outcomes. However, among patients with pyrexia, higher maximum temperature (>38.7 °C) was associated with worse neurologic outcomes among survivors to hospital discharge.

Lockey D, Lyon RM and Davies GE. *Development of a simple algorithm to guide the effective management of Traumatic Cardiac Arrest*. Resuscitation 2012; Online first (7 December)
Major trauma is the leading worldwide cause of death in young adults. The mortality from traumatic cardiac arrest remains high but survival with good neurological outcome from cardiopulmonary arrest following major trauma has been regularly reported. Rapid, effective intervention is required to address potential reversible causes of traumatic cardiac arrest if the victim is to survive. **Current ILCOR guidelines do not contain a standard algorithm for management of traumatic cardiac arrest. We present a simple algorithm to manage the major trauma patient in actual or imminent cardiac arrest.** **Methods:** We reviewed the published English language literature on traumatic cardiac arrest and major trauma management. A treatment algorithm was developed based on this and the experience of treatment of more than a thousand traumatic cardiac arrests by a physician - paramedic pre-hospital trauma service. Results: The algorithm addresses the need treat potential reversible causes of traumatic cardiac arrest. This includes immediate resuscitative thoracotomy in cases of penetrating chest trauma, airway management, optimising oxygenation, correction of hypovolaemia and chest decompression to exclude tension pneumothorax. Conclusion: The requirement to rapidly address a number of potentially reversible pathologies in a short time period lends the management of traumatic cardiac arrest to a simple
treatment algorithm. A standardised approach may prevent delay in diagnosis and treatment and improve current poor survival rates.


Survival data for out-of-hospital cardiac arrest (OHCA) victims initially in PEA or asystole who convert to a shockable rhythm during attempted resuscitation, relative to an initial shockable rhythm, have never been previously reported. This study was done to assess OHCA outcomes among a large cohort of adults in the CARES dataset stratified by three rhythm categories: initial shockable (IS), converted shockable (CS), and never shockable (NS). Methods: The study was IRB approved. All adult index events at participating sites (2005 - 2010) were study eligible. All patient data elements were provided. Odds ratios of CS and NS status for survival to hospital discharge were calculated via multivariate logistic regression that adjusted for demographics, site, resuscitation initiators, AED use, and other covariates. Results: There were 40,274 OHCA records submitted to the CARES registry during the study period. After exclusions, our final sample size was 30,939 (7404 IS [23.9%], 3225 CS [10.4%], 20,310 NS [65.7%]). Raw survival rates of CS and NS patients were similar (4.7% vs. 4.1%, respectively; \( p = 0.08 \)) but significantly lower than IS patients (26.9%; \( p < 0.001 \)). The adjusted OR of survival to hospital discharge for CS was 0.17 (95%CI: 0.14, 0.20) and for NS it was 0.17 (95%CI: 0.15, 0.18) with IS as the referent. Conclusion: After OHCA, the survival rate for CS victims is significantly lower than for IS patients. These findings suggest that CS and IS are different entities and that alternatives to existing resuscitation algorithm tailored to patients with CS should be investigated.

Maertens VL, De Smedt LEG, Lemoyne S, Huybrechts SAM, Wouters K, Kalmar AF and Monsieurs KG. Patients with cardiac arrest are ventilated two times faster than guidelines recommend: An observational prehospital study using tracheal pressure measurement. Resuscitation 2012; Online first (21 November)

Aim: To measure ventilation rate using tracheal airway pressures in prehospitaly intubated patients with and without cardiac arrest. Methods: Prospective observational study. In 98 patients (57 with and 41 without cardiac arrest) an air-filled catheter was inserted into the endotracheal tube and connected to a custom-made portable device allowing tracheal airway pressure recording and subsequent calculation of ventilation rate. Results: In manually ventilated patients with cardiac arrest 39/43 (90%) had median ventilation rates higher than 10/min (overall median 20, min 4, max 74). During mechanical ventilation, 35/38 (92%) had ventilation rates higher than 10/min. The ventilation rate in patients with cardiac arrest was higher than in patients without cardiac arrest, both for manual and mechanical ventilation. Sub-analysis comparing episodes with and without compression in cardiac arrest patients showed no clinically significant difference in ventilation rate after compressions were terminated. Conclusion: Cardiac arrest patients were ventilated two times faster than recommended by the guidelines. Tracheal airway pressure measurement is feasible during resuscitation and may be developed further to provide real-time feedback on airway pressure and ventilation rate during resuscitation.


Mortality rates in Osaka for cardiac arrest after witnessed ventricular tachycardia (VT) or ventricular fibrillation (VF) have decreased dramatically. We sought to estimate the contribution of changes in out-of-hospital care to this decrease. Methods: We applied a previously validated statistical model, IMPACT, to data obtained from the Utstein Osaka Project, which registers all cardiopulmonary arrests in Osaka. The outcome was death within the first month after the arrest. Sensitivity analysis was conducted by simulating an increase in the use of public access defibrillators (PADs).
Results: From 1999 through 2008, age- and sex-adjusted standardized 1-month mortality fell from 88.6% to 57.1%. There were 105 fewer deaths than expected in 2008 (295 deaths). The IMPACT model explained 62.5% of the decrease (67 deaths) in the 1-month mortality. The main contributors to the decrease in mortality were an increase in the use of biphasic waveform defibrillators, and a shortened time to first shock. These were partly offset by an increase in the administration of epinephrine by emergency medical services personnel. According to the simulation, an increase in PAD use from 1.9% to 34.4% would reduce mortality from the observed 55.7% to 50.1%. Conclusions: Modeling suggests that improvement in out-of-hospital care accounted for approximately 60% of the decline in deaths following witnessed VT or VF arrests in Osaka between 1999 and 2008. Increased usage of PADs could further improve these outcomes.


Purpose: Therapeutic hypothermia has become the standard treatment for unconscious patients in cardiac arrest. Although various body parts, including the oesophagus, rectum, bladder and tympanum, can be used for measurement of the core temperature, the oesophageal temperature is preferred because of its accuracy and stability. We first investigated the success rate and procedure time of oesophageal temperature probe (ETP) insertion according to the insertion method. Methods: The conventional method involved blind insertion through nasal orifices. The alternative method was insertion with Magill’s forceps or long forceps under visualisation using a direct laryngoscope. The new method was performed as follows: (1) insertion of another endotracheal tube (ETT) orally into the oesophagus; (2) insertion of a temperature probe into the hole of the ETT; (3) removal of the ETT. To compare the success rates and procedure times according to the insertion method, we collected data retrospectively from the prospective Samsung Medical Centre hypothermia database and medical records. Results: A total of 91 cases were examined. Insertion was performed using the conventional method in 36 cases, the alternative method in 26, and the new method in 29. Rates of success on the first attempt were 63.9%, 65.4% and 100%, and procedure times were 33.2±13.6, 33.3±17.8 and 27.0±7.9 min, for the conventional, alternative and new methods, respectively. The initial success rates and procedure times were significantly different among the three groups (p<0.01). Conclusions: The new ETP insertion method had a better first attempt success rate than the conventional method and the alternative method.

Santos D, Carron P-N, Yersin B and Pasquier M. *EZ-IO intraosseous device implementation in a pre-hospital emergency service: A prospective study and review of the literature.* Resuscitation 2012; Online first (14 November)

Intraosseous access is increasingly recognised as an effective alternative vascular access to peripheral venous access. We aimed to prospectively study the patients receiving prehospital intraosseous access with the EZ-IO, and to compare our results with those of the available literature. Methods: Every patient who required an intraosseous access with the EZ-IO from January 1st, 2009 to December 31st, 2011 was included. The main data collected were: age, sex, indication for intraosseous access, localisation of insertion, success rate, drugs and fluids administered, and complications. All published studies concerning the EZ-IO device were systematically searched and reviewed for comparison. Results Fifty-eight patients representing 60 EZ-IO procedures were included. Mean age was 47 years (range 0.5, 91), and the success rate was 90%. The main indications were cardiopulmonary arrest (74%), major trauma (12%), and shock (5%). The anterior tibia was the main route. The main drugs administered were adrenaline (epinephrine), atropine and amiodarone. No complications were reported. We identified 30 heterogeneous studies representing 1603 EZ-IO insertions. The patient’s characteristics and success rate were similar to our study. Complications were reported in 13 cases (1.3%). Conclusion: The EZ-IO provides an effective way to achieve vascular access in the pre-hospital setting. Our results were similar to
the cumulative results of all studies involving the use of the EZ-IO, and that can be used for comparison for further studies.

Segal N, Matsuura T, Caldwell E, Sarraf M, et al. **Ischemic postconditioning at the initiation of cardiopulmonary resuscitation facilitates functional cardiac and cerebral recovery after prolonged untreated ventricular fibrillation.** Resuscitation 2012; 83 (11): 1397-403

Ischemic postconditioning (PC) with "stuttering" reintroduction of blood flow after prolonged ischemia has been shown to offer protection from ischemia reperfusion injury to the myocardium and brain. We hypothesized that four 20-s pauses during the first 3 min of standard CPR would improve post resuscitation cardiac and neurological function, in a porcine model of prolonged untreated cardiac arrest. Methods: 18 female farm pigs, intubated and isoflurane anesthetized had 15 min of untreated ventricular fibrillation followed by standard CPR (SCPR). Nine animals were randomized to receive PC with four, controlled, 20-s pauses, during the first 3 min of CPR (SCPR + PC). Resuscitated animals had echocardiographic evaluation of their ejection fraction after 1 and 4 h and a blinded neurological assessment with a cerebral performance category (CPC) score assigned at 24 and 48 h. All animals received 12 h of post resuscitation mild therapeutic hypothermia. Results: SCPR + PC animals had significant improvement in left ventricular ejection fraction at 1 and 4 h compared to SCPR (59 ± 11% vs 35 ± 7% and 55 ± 8% vs 31 ± 13% respectively, p < 0.01). Neurological function at 24 h significantly improved with SCPR + PC compared to SCPR alone (CPC: 2.7 ± 0.4 vs 3.8 ± 0.4 respectively, p = 0.003). Neurological function significantly improved in the SCPR + PC group at 48 h and the mean CPC score of that group decreased from 2.7 ± 0.4 to 1.7 ± 0.4 (p < 0.00001). Conclusions: Ischemic postconditioning with four 20-s pauses during the first 3 min of SCPR improved post resuscitation cardiac function and facilitated neurological recovery after 15 min of untreated cardiac arrest in pigs.

**Basic life support**

Bebarta VS. **Cyanide poisoning and antidotes.** Emerg Med Australas 2012; 24 (6): 680 (letter)

We read with interest the review article by Reade et al. titled, ‘Review article: Management of cyanide poisoning’. The article was a succinct review of current treatment guidelines for cyanide treatment. We concur with several of the authors’ recommendations that had not been clearly stated in other reviews or reports. In particular, we agree that in cyanide-induced cardiac arrest, patients should receive hydroxocobalamin preferentially and repeat dosing as needed. We also agree that based on adverse effects alone, hydroxocobalamin might be a better choice for cyanide toxicity; in addition, we note a comparative study has been reported comparing sodium nitrite with hydroxocobalamin. Finally, we also concur that the guidelines by the UK, which do not recommend antidotal treatment, are not based on current published evidence and that antidotes are effective for cyanide toxicity. However, we disagree on three areas. First, the authors report that studies comparing supportive care with use of antidote have not been conducted; however, we reported a comparative trial between supportive care and antidotal therapy and found that supportive care in a cardiac arrest model is 100% lethal. Second, the authors report that most studies used thiosulphate in combination with antidotes and that there is evidence that sodium thiosulphate is effective alone. However, we reported a clinically relevant, critically ill model of cyanide-induced hypotension demonstrating that sodium thiosulphate is not effective alone and had 100% mortality. Finally, we disagree with the authors that sodium thiosulphate should be used following failure to respond to hydroxocobalamin. We demonstrated that sodium thiosulphate does not improve efficacy when combined with hydroxocobalamin. In addition, based on previous animal and human studies, if the patient does not respond to the
Discussion of cyanide antidotes excites interest out of proportion to the number of patients they could potentially benefit. If they are to be of most use they must be immediately accessible, but their high cost warrants a cost–benefit analysis that takes into account the paucity of comparative evidence. We were therefore circumspect in our recommendation that hydroxocobalamin sodium thiosulphate should be the preferred alternative. Our original paper discussed the 2010 study to which the letter refers, which in 24 pigs poisoned with cyanide noted no difference in mortality or biochemical parameters but faster normalisation of blood pressure with hydroxocobalamin. We drew attention to the absence of a UK cyanide antidote recommendation, but careful reading reveals this is not an active recommendation not to use any antidote. Of note, only solutions A and B, dicobalt edetate and amyl nitrite were considered when formulating this policy, none of which was our recommended alternative. The authors of the letter identify their two animal studies published in March and June 2012 in which the comparative efficacy of certain approaches to cyanide poisoning is found to be superior to others. We would have included these studies had they been published when we performed our systematic review, or even in February 2012 when we approved the proofs of our paper. However, as they are not human studies, they would not have met the criteria for the systematic review itself. In September 2012, our statement that ‘no comparative or placebo-controlled human trials evaluating treatment strategies for severe cyanide poisoning’ have been performed remains correct. The animal studies cited by the authors are informative, but do not provide definitive guidance. In the first, 45 pigs were randomised to hydroxocobalamin, epinephrine or saline after i.v. potassium cyanide-induced cardiac arrest. Epinephrine in cardiac arrest would meet our paper’s definition of ‘supportive care’. Although the saline group did indeed have 100% mortality, survival was equal (11/15) in the epinephrine and hydroxocobalamin groups. The authors could not demonstrate benefit of thiosulphate alone in another pig-cyanide model: all 12 animals treated with thiosulphate died, compared with 2/12 given hydroxocobalamin + thiosulphate and 1/12 given hydroxocobalamin alone. Although the authors conclude that additional benefit of thiosulphate was not seen, the study lacked the power to exclude this possibility. Others have found thiosulphate alone to be beneficial in animal models. Failure to reproduce this benefit in the authors’ animal model does not invalidate earlier results. On the basis of their underpowered animal study (which in fact showed a trend to lower mortality with thiosulphate and hydroxocobalamin in combination), the authors recommend against use of thiosulphate in patients who have not responded to hydroxocobalamin. We accept there is evidence that this might not work. However, ‘failure to respond’ in this context will often equate to death, and it seems there is little to lose at this point from adding a drug that if nothing else appears safe, especially given its demonstrated utility in humans (as opposed to animals) with slower-onset cyanide toxicity. Human research on cyanide antidotes is difficult, which is why the animal models described by the authors are important, instructive, and offer the best opportunity for advances in this area. However, for the reasons articulated above, we stand by the conclusions of our original paper.

Bogle B, Mehrotra S, Chiampas G and Aldeen AZ. Assessment of knowledge and attitudes regarding automated external defibrillators and cardiopulmonary resuscitation among American University students. Emerg Med J 2012; Online first (12 November)

We sought to quantify knowledge and attitudes regarding automated external defibrillators (AEDs) and cardiopulmonary resuscitation (CPR) among university students. We also aimed to determine awareness of the location of an actual AED on campus. Methods: We performed an online survey of undergraduate and graduate students at a mid-sized, private university that has 37 AEDs located throughout its two campuses. Results: 267
students responded to the survey. Almost all respondents could identify CPR (98.5%) and an AED (88.4%) from images, but only 46.1% and 18.4%, respectively, could indicate the basic mechanism of CPR and AEDs. About a quarter (28.1%) of respondents were comfortable using an AED without assistance, compared with 65.5% when offered assistance. Of those who did not feel comfortable, 87.7% indicated that they were 'afraid of doing something wrong'. One out of 6 (17.6%) respondents knew that a student centre had an AED, and only 2% could recall its precise location within the building. Most (66.3%) respondents indicated they would look for an AED near fire extinguishers, followed by the entrance of a building (19.6%).

Conclusions: This study found that most students at an American university can identify CPR and AEDs, but do not understand their basic mechanisms of action or are willing to perform CPR or use AEDs unassisted. Recent CPR/AED training and 9-1-1 assistance increases comfort. The most common fear reported was incorrect CPR or AED use. Almost all students could not recall where an AED was located in a student centre.


Public access automated external defibrillator (PAD) programs have been shown to be successful in several municipalities. This study sought to determine the usage of and survival rate from a large, urban PAD program in the first 10 years since its implementation. Methods: This was a prospective, longitudinal, observational study from January 2002 - 2012 conducted in Los Angeles, California, a city with a population of 3.8 million. An incremental rollout resulted in a current total of 1300 automated external defibrillators (AEDs) in place in city-owned buildings and other public places, including all 3 area airports, golf-courses, and public pools. All instances where an AED was applied were included in the study. Results: There were 59 incidents of cardiac arrest with a public access AED applied, of which 42 (71%) occurred at an airport. 51 (86%) of the patients were male, with a median age of 64 years (interquartile range, 56.5 to 70 years). A shockable rhythm was detected and shocks were applied in 39 (66%) patients, with 30 (77%) of these patients achieving a return of spontaneous circulation (ROSC). Of those patients who received shock(s) by public access AED, 27 (69%) survived to hospital discharge. The youngest survivors were a 25 year old male and a 34 year old female. Conclusion: While the majority of PAD cases occurred at an airport, there were also survivors from other public locations. AEDs deployed as part of a large PAD program resulted in a very high survival rate for patients with cardiac arrest.


The goal of this experimental study was to investigate rescuer exertion when using "Animax," a manually operated hand-powered mechanical resuscitation device (MRD) for cardiopulmonary resuscitation (CPR), compared to standard basic life support (BLS). Methods: This was a prospective, open, randomized, crossover simulation study. After being trained, 80 medical students with substantial knowledge in BLS performed one-rescuer CPR using either the MRD or the standard BLS for 12-minute intervals in random order. The main outcome parameter was the heart rate pressure product (RPP) as an index of cardiac work. Secondary outcome parameters were physical exhaustion quantified by the Borg scale (measurement of perceived exertion), Nine Hole Peg Test (NHPT; measurement of fine motor skills), and capillary lactate concentration during testing. Results While no significant difference could be found for the RPP, a significantly increased mean heart rate during the final minute of standard BLS compared to the MRD was found (139 ± 22 beats/min vs. 135 ± 26 beats/min, p = 0.027). By contrast, subjective exertion using the MRD was rated significantly higher on the Borg scale (15.1 ± 2.4 vs. 14.6 ± 2.6, p = 0.027). Mean serum lactate concentration was significantly higher when the MRD was used compared to standard BLS (3.4 ± 1.5 mmol/L vs. 2.1 ± 1.3 mmol/L, p = 0.001). Conclusions: Use of the MRD leads to a RPP of the rescuers comparable to standard BLS. These findings suggest that there is no clinically relevant reduction of exertion if this MRD is
used by a single rescuer. If this kind of MRD is used for CPR, frequent changeovers with a second rescuer should be considered as the guidelines suggest for standard CPR.


Despite advances in resuscitation care in recent years, it is not clear whether survival and neurologic function after in-hospital cardiac arrest have improved over time. Methods: We identified all adults who had an in-hospital cardiac arrest at 374 hospitals in the Get with the Guidelines–Resuscitation registry between 2000 and 2009. Using multivariable regression, we examined temporal trends in risk-adjusted rates of survival to discharge. Additional analyses explored whether trends were due to improved survival during acute resuscitation or postresuscitation care and whether they occurred at the expense of greater neurologic disability in survivors. Results: Among 84,625 hospitalized patients with cardiac arrest, 79.3% had an initial rhythm of asystole or pulseless electrical activity, and 20.7% had ventricular fibrillation or pulseless ventricular tachycardia. The proportion of cardiac arrests due to asystole or pulseless electrical activity increased over time (P<0.001 for trend). Risk-adjusted rates of survival to discharge increased from 13.7% in 2000 to 22.3% in 2009 (adjusted rate ratio per year, 1.04; 95% confidence interval [CI], 1.03 to 1.06; P<0.001 for trend). Survival improvement was similar in the two rhythm groups and was due to improvement in both acute resuscitation survival and postresuscitation survival. Rates of clinically significant neurologic disability among survivors decreased over time, with a risk-adjusted rate of 32.9% in 2000 and 28.1% in 2009 (adjusted rate ratio per year, 0.98; 95% CI, 0.97 to 1.00; P=0.02 for trend). Conclusion: Both survival and neurologic outcomes after in-hospital cardiac arrest have improved during the past decade at hospitals participating in a large national quality-improvement registry. (Funded by the American Heart Association.)


Anterior chest thrusts (with the subject sitting or standing and thrusts applied to the lower sternum) are recommended by the Australian Resuscitation Council as part of the sequence for clearing upper airway obstruction by a foreign body. Lateral chest thrusts (with the victim lying on their side) are no longer recommended due to a lack of evidence. We compared anterior, lateral chest and abdominal thrusts in the generation of airway pressures using a suitable animal model. Methods: This was a repeated-measures, cross-over, clinical trial of eight anaesthetised, intubated, adult pigs. For each animal, ten trials of each technique were undertaken with the upper airway obstructed. A chest/abdominal pressure transducer, a pneumotachograph and an intra-oesophageal balloon catheter recorded chest/abdominal thrust, expiratory airflows, airway and intrapleural pressures, respectively. Results: The mean (SD) thrust pressures generated for the anterior, lateral and abdominal techniques were 120.9 (11.0), 135.2 (20.0), and 142.4 (27.3) cmH2O, respectively (p < 0.0001). The mean (SD) peak expiratory airway pressures were 6.5 (3.0), 18.0 (5.5) and 13.8 (6.7) cmH2O, respectively (p < 0.0001). The mean (SD) peak expiratory intrapleural pressures were 5.4 (2.7), 13.5 (6.2) and 10.3 (8.5) cmH2O, respectively (p < 0.0001). At autopsy, no rib, intra-abdominal or intra-thoracic injury was observed. Conclusion: Lateral chest and abdominal thrust techniques generated significantly greater airway and pleural pressures than the anterior thrust technique. We recommend further research to provide additional evidence that may inform management guidelines for clearing foreign body upper airway obstruction.

Monsieurs KG, De Regge M, Vansteelandt K, De Smet J, et al. Excessive chest compression rate is associated with insufficient

ANZCOR Research updates November 2012
**Compression depth in prehospital cardiac arrest. Resuscitation 2012; 83 (11): 1319-23**

**Aim:** The relationship between chest compression rate and compression depth is unknown. In order to characterise this relationship, we performed an observational study in prehospital cardiac arrest patients. We hypothesised that faster compressions are associated with decreased depth.

**Materials and methods:** In patients undergoing prehospital cardiopulmonary resuscitation by health care professionals, chest compression rate and depth were recorded using an accelerometer (E-series monitor-defibrillator, Zoll, USA). Compression depth was compared for rates <80/min, 80–120/min and >120/min. A difference in compression depth ≥0.5 cm was considered clinically significant. Mixed models with repeated measurements of chest compression depth and rate (level 1) nested within patients (level 2) were used with compression rate as a continuous and as a categorical predictor of depth. Results are reported as means and standard error (SE). Results and discussion: One hundred and thirty-three consecutive patients were analysed (213,409 compressions). Of all compressions 2% were <80/min, 62% between 80 and 120/min and 36% >120/min, 36% were <4 cm deep, 45% between 4 and 5 cm, 19% >5 cm. In 77 out of 133 (58%) patients a statistically significant lower depth was observed for rates >120/min compared to rates 80–120/min, in 40 out of 133 (30%) this difference was also clinically significant. The mixed models predicted that the deepest compression (4.5 cm) occurred at a rate of 86/min, with progressively lower compression depths at higher rates. Rates >145/min would result in a depth <4 cm. Predicted compression depth for rates 80–120/min was on average 4.5 cm (SE 0.06) compared to 4.1 cm (SE 0.06) for compressions >120/min (mean difference 0.4 cm, P < 0.001). Age and sex of the patient had no additional effect on depth. Conclusions: This study showed an association between higher compression rates and lower compression depths. Avoiding excessive compression rates may lead to more compressions of sufficient depth.

Nielsen AM1, Folke F, Lippert FK and Rasmussen LS. **Use and benefits of public access defibrillation in a nation-wide network.** Resuscitation 2012; Online first (15 November)

Automated External Defibrillators (AEDs) are known to increase survival after out-of-hospital cardiac arrest (OHCA). The aim of this study was to examine the use and benefit of public-access defibrillation (PAD) in a nation-wide network. We primarily sought to assess survival at 1 month but information about the circumstances of each OHCA is provided as well. Methods: In this 28-month study, we assessed the use of 807 AEDs in Denmark. When an AED was deployed information about the circumstances of OHCA, the bystander, the AED and the victim's condition was obtained. Results: An AED was connected to an OHCA victim prior to the arrival of Emergency Medical Services (EMS) in 48 instances. Ten percent of bystanders were off-duty healthcare professionals. Shockable arrests (N = 31, 70%) were significantly more likely to be witnessed (94% vs. 54%) to occur at sports facilities (74% vs. 31%), in relation to exercise (42% vs. 0%), and with improved 30-day survival (69% vs. 15%, p = 0.001). Among those presenting with a shockable rhythm, 20 (65%) had Return of Spontaneous Circulation upon arrival of EMS and 8 (26%) were conscious, which emphasizes the diagnostic value of ECG downloads from AEDs. Survival could be determined in 42 of 44 patients with OHCA of cardiac origin, and was 52% (n = 22, 95% CI [38, 67]) and the Cerebral Performance Category was 1 (Good Cerebral Performance) in all survivors. Conclusion: With a 30-day neurologically intact survival of 69% for patients with shockable rhythms, this study provides further evidence of the lifesaving potential of PAD.

Roosa JR, Vadeboncoeur TF, Dommer PB, Panchal AR, Venuti M, Smith G, Bobrow BJ. **CPR variability during ground ambulance transport of patients in cardiac arrest.** Resuscitation 2012; Online first (21 November)

High quality CPR is associated with improved outcome from out-of-hospital (OHCA). The purpose of this investigation was to compare the quality of CPR provided at the prehospital scene, during ambulance transport, and during the early minutes in the emergency department (ED). Methods: A
prospective observational review of consecutive adult patients with non-traumatic OHCA between September 2008 and February 2010. Patients with initiation of prehospital CPR were included as part of a statewide quality improvement program. A monitor-defibrillator with accelerometer-based CPR measurement capability (E-series, ZOLL Medical) was utilized. CPR quality measures included variability in chest compression CC depth and rate, mean depth and rate, and the (CC) fraction. Variability of CC was defined as the mean of minute-to-minute standard deviation in CC depth or rate per minute. CC fraction was defined as the percent time that CPR was being performed. Results: Fifty-seven adult patients with OHCA had electronic CPR data recorded at the scene, in the ambulance, and upon arrival in the ED. Across time periods, there was increased variability in CC depth (scene: 0.20 in.; transport: 0.26 in.; ED: 0.31 in., P < 0.01) and rate (scene: 18.2 CC per min; transport: 26.1 CC per min; ED: 26.3 CC per min, P < 0.01). The mean CC depth, rate, and the CC fraction did not differ significantly between groups. Conclusions: There was increased CC variability from the pre-hospital scene to the ED though there was no difference in CC depth, rate, or in CC fraction. The clinical significance of CC variability remains to be determined.


Conflicting studies exist about the effectiveness of cardiopulmonary resuscitation (CPR) on a dental chair. In some situations, dental surgeons are obliged to perform CPR with the patient on the chair. Feedback devices are supposed to guide the compression depth in order to improve the quality of CPR, but some devices are based on an accelerometer that can theoretically report erroneous results because of the lack of rigidity of a dental chair. Objective: The aim of this study was to evaluate the accuracy of these devices to guide chest compressions on a dental chair. Methods: A prospective, randomised, crossover, equivalence/non-inferiority study was conducted to compare the values of compression depths provided by the feedback device (Real CPR Help, delivered by Zoll© Medical Corporation, Chelmsford, MA, USA) with the real measurements provided by the manikin (Resusci Anne Advanced SkillTrainer, Laerdal Medical AS©, Norway). Chest-compression-only CPR was performed by 15 Basic Life Support instructors who carried out two rounds of continuous CPR for 2 min each. Data were analysed with a correlation test, a Bland-Altmann method and a Wilcoxon test. Statistical significance was defined as p<0.05. Results: A significant difference was found between the mean depths of compression measured by the feedback device and the manikin on a dental chair and on the floor (p<0.0001). The feedback device overestimated the depth of chest compressions, and Bland - Altman analysis demonstrated poor agreement. Conclusion: This study indicates that feedback devices with accelerometer technology are not sufficiently reliable to ensure adequate chest compression on dental chairs.

Siddiq AA, Brooks SC and Chan TCY. Modeling the impact of public access defibrillator range on public location cardiac arrest coverage. Resuscitation 2012; Online first (29 November)

Public access defibrillation with automated external defibrillators (AEDs) can improve survival from out-of-hospital cardiac arrests (OHCA) occurring in public. Increasing the effective range of AEDs may improve coverage for public location OHCAs. Objective: To quantify the relationship between AED effective range and public location cardiac arrest coverage. Methods: This was a retrospective cohort study using the Resuscitation Outcomes Consortium Epistry database. We included all public-location, atraumatic, EMS-attended OHCAs in Toronto, Canada between December 16, 2005 and July 15, 2010. We ran a mathematical model for AED placement that maximizes coverage of historical public OHCAs given pre-specified values of AED effective range and the number of locations to place AEDs. Locations of all non-residential buildings were obtained from the City of Toronto and used as candidate sites for AED placement. Coverage was evaluated for range values from 10 to 300 m and number of AED locations from 10 to 200, both in increments of 10, for a total of 600 unique scenarios. Coverage from placing AEDs in all public buildings was also measured.
Results There were 1310 public location OHCAs during the study period, with 25,851 non-residential buildings identified as candidate sites for AED placement. Cardiac arrest coverage increased with AED effective range, with improvements in coverage diminishing at higher ranges. For example, for a deployment of 200 AED locations, increasing effective range from 100 m to 200 m covered an additional 15% of cardiac arrests, whereas increasing range further from 200 m to 300 m covered an additional 10%. Placing an AED in each of the 25,851 public buildings resulted in coverage of 50% and 95% under assumed effective ranges of 50 m and 300 m, respectively. **Conclusion:** Increasing AED effective range can improve cardiac arrest coverage. Mathematical models can help evaluate the potential impact of initiatives which increase AED range.

**Education, implementation and teams**


**Objective:** To assess the practices and opinions of prehospital emergency medical services (EMS) with regard to family witnessed resuscitation (FWR) and to analyse the differences between physicians and nurses responses. **Design:** An anonymous questionnaire (30 yes/no questions on demographics and FWR) was sent to all prehospital emergency staff (physicians, nurses and support staff) working for the 377 Mobile Intensive Care Units in France. **Results** Of the 2689 responses received 2664 were analysed. Mean respondent age was 38 ± 8 years, the male to female ratio was 1:2. 87% of respondents had already performed FWR and 38% had offered relatives the option to be present during resuscitation. Most respondents (90%) felt that FWR might cause psychological trauma to the family; 70% thought that FWR might impact on the duration of resuscitation and 68% on EMS team concentration. In the 28% of cases when relatives had asked to be present, 59% of respondents had acquiesced but only 27% were willing to invite relatives to be routinely present. **Conclusions:** Prehospital EMS teams in France seem to support FWR but are not yet ready to offer it systematically to relatives. Following our survey, written guidelines are currently in development in our department. These guidelines could be the first step of a national strategy for developing FWR in France. We await results from other studies of family members’ opinions to compare prehospital practitioners’ and family members’ views to further develop our practice.

The aim of this study was to evaluate the risk of prolonged transportation against the benefit of treatment in high-volume centres for out-of-hospital cardiac arrest (OHCA) patients without prehospital return of spontaneous circulation (ROSC). **Methods:** This study used a nationwide EMS-assessed OHCA database (2006 - 2008). Patients with cardiac aetiology were selected from the registry. A high-volume centre was defined as a hospital that received an average of more than 33 cases per year. OHCA patients without prehospital ROSC were divided into subgroups according to their destination (high-volume centre vs. low-volume centre) and transport interval. The rates of survival to discharge were compared among these groups using multivariate logistic regression analysis. **Results:** During the study period, 54,499 OHCA patients were assessed by EMS in Korea. Of these patients, prehospital resuscitation was attempted for 29,345 patients with presumed cardiac origin. After excluding cases with inappropriate time data, 27,662 cases were selected for further analysis. 15,885 (57.4%) patients were transported to low-volume centres while the rest were transported to high-volume centres. The rate of survival to discharge was 1.43% and 4.78%, respectively. A multivariate analysis indicated that even with a longer transport interval (TI) (TI 5 - 9 min vs. TI 0 - 4 min), the high-volume centres presented a better overall outcome. **Conclusion:** A higher rate of survival to discharge was demonstrated when OHCA patients without prehospital ROSC were transported to high-
volume rather than low-volume centres. The rate was still significantly higher when the transportation time was longer compared with that of low-volume centres.

Limehouse WE, Ramana Feeser V, Bookman KJ and Derse A. A Model for Emergency Department End-of-life Communications After Acute Devastating Events—Part II: Moving From Resuscitative to End-of-life or Palliative Treatment. Acad Emerg Med 2012;19(11): 1300-8

The model for emergency department (ED) end-of-life communications after acute devastating events addresses decision-making capacity, surrogates, and advance directives, including legal definitions and application of these steps. Part II concerns communications moving from resuscitative to palliative and end-of-life treatments. After completing the steps involved in determining decision-making, emergency physicians (EPs) should consider starting palliative measures versus continuing resuscitative treatment. As communications related to these end-of-life decisions increasingly fall within the scope of emergency medicine (EM) practice, we need to become educated about and comfortable with them.

Martin PS, Kemp AM, Theobald PS, Maguire SA and Jones MD. Does a more 'physiological' infant manikin design effect chest compression quality and create a potential for thoracic over-compression during simulated infant CPR? Resuscitation 2012; Online first (31 October)

Poor survivability following infant cardiac arrest has been attributed to poor quality chest compressions. Current infant CPR manikins, used to teach and revise chest compression technique, appear to limit maximum compression depths (CDmax) to 40 mm. This study evaluates the effect of a more 'physiological' CDmax on chest compression quality and assesses whether proposed injury risk thresholds are exceeded by thoracic over-compression. A commercially available infant CPR manikin was instrumented to record chest compressions and modified to enable compression depths of 40 mm (original; CDmax40) and 56 mm (the internal thoracic depth of a three-month-old male infant; CDmax56). Forty certified European Paediatric Life Support instructors performed two-thumb (TT) and two-finger (TF) chest compressions at both CDmax settings in a randomised crossover sequence. Chest compression performance was compared to recommended targets and compression depths were compared to a proposed thoracic over-compression threshold. Compressions achieved greater depths across both techniques using the CDmax56, with 44% of TT and 34% of TF chest compressions achieving the recommended targets. Compressions achieved depths that exceeded the proposed intra-thoracic injury threshold. The modified manikin (CDmax56) improved duty cycle compliance; however, the chest compression rate was consistently too high. Overall, the quality of chest compressions remained poor in comparison with internationally recommended guidelines. This data indicates that the use of a modified manikin (CDmax56) as a training aid may encourage resuscitators to habitually perform deeper chest compressions, whilst avoiding thoracic over-compression and thereby improving current CPR quality. Future work will evaluate resuscitator performance within a more realistic, simulated CPR environment.


While prior studies highlight regional variations in out-of-hospital cardiac arrest (OHCA) survival, the underlying reasons remain unknown. We sought to characterize regional variations early and later survival to hospital discharge after OHCA. Methods: We studied adult, non-traumatic OHCA treated by 10 regional sites of the Resuscitation Outcomes Consortium (ROC) during 12/01/2005 - 6/30/2007. We compared (1) early survival (up to one calendar day after arrest) and (2) later conditional survival to hospital discharge (early survivors progressing to eventual hospital discharge) between ROC regional sites. Results: Among 3763 VF/VT with complete covariates, site unadjusted early survival varied from 11.3 to
54.3%, and site unadjusted later survival varied from 33.3 to 70.5%. Compared with the largest site, adjusted VF/VT survival varied across sites: early survival OR 0.33 (95% CI: 0.17, 0.65) to 2.87 (2.20, 3.73), overall site variation p < 0.001; later survival OR 0.29 (0.14, 0.59) to 1.21 (0.73, 2.00), p < 0.001. Among 10,879 non-VF/VT with complete covariates, site unadjusted early survival varied from 6.6 to 14.3%, and site unadjusted later survival varied from 4.5 to 39.6%. Compared with the largest site, adjusted non-VF/VT survival varied across sites: early survival OR 1.02 (0.63, 1.64) to 2.43 (1.91, 3.12), p < 0.001; later survival OR 0.11 (0.01, 0.82) to 1.56 (0.90, 2.70), p = 0.02. Conclusions: In this prospective multicenter North American series, there were regional disparities in early and later survival after OHCA, suggesting that there are underlying regional differences in out-of-hospital and post-arrest care beyond traditional Utstein predictors. Community efforts to improve OHCA survival must address both out-of-hospital and in-hospital care.

Paediatric advanced life support


Intravenous lipid emulsion (ILE) rescue therapy has recently become a focus of much investigation in the poisoned patient. Initially used to reverse local anesthetic toxicity, there have been numerous human case reports and controlled animal studies describing the use of resuscitative ILE in other poisoning scenarios with cardiovascular collapse. The mechanism of action has not been elucidated but may involve altering fatty acid metabolism, increasing myocyte calcium stores, and creating an artificial compartment or 'lipid sink' in the plasma to sequester toxin. However, clear clinical benefits over current available treatments have not yet been established, and much is still unknown. There are safety concerns with the use of ILE, which require further investigation. Lastly, data in pediatric patients are scant, especially in the non-local anesthetic toxicity scenario. The purpose of this article is to review the proposed mechanisms of lipid therapy, summarize the animal and human evidence for its efficacy, review evidence for resuscitative ILE in the pediatric population, and discuss safety issues and potential adverse effects.

De Caen AR and Kleinman ME. Pediatric CPR quality targets - Not just for 'grown-ups'. Resuscitation 2012; (Online first): 23 November

Mortality from pediatric cardiac arrest remains high despite progress in resuscitation techniques and post-resuscitation care. Although outcomes have improved over the past 20 years, nearly two-thirds of children who suffer in-hospital cardiac arrest will not survive to hospital discharge. Among the many factors that contribute to the outcome of cardiopulmonary resuscitation (CPR) is the quality of chest compressions (CC), a parameter that is rarely measured during actual pediatric resuscitation events. The most common location for pediatric in-hospital cardiac arrest is the intensive care unit, where many patients have indwelling arterial catheters for monitoring and blood sampling. This provides a unique setting in which to study the relationship between resuscitation techniques and hemodynamic measurements that may be important to resuscitation success or failure. The adult cardiac arrest literature suggests a strong association between measures of CPR quality (e.g. chest compression rate and depth) and patient survival. Adult and animal data support targeting hemodynamic parameters such as diastolic blood pressure to achieve an adequate coronary perfusion pressure, as well as the use of indirect measures of cardiac output (e.g. end-tidal CO2) during CPR to optimize chest compression technique and signify return of spontaneous circulation. Currently, no pediatric-specific data exist to guide clinicians on physiologic targets during the resuscitation of infants and children. As is often the case, practitioners are left to extrapolate adult, animal and mannequin data for use in the pediatric cardiac arrest setting.

Case study
A case of a previously healthy 10-week-old female who presented with a generalized tonic-clonic seizure is reviewed and discussed. Presenting signs and symptoms included fever, tachycardia, hypertension, dilated pupils, diaphoretic skin, and an altered mental status, consistent with a sympathomimetic ingestion. Urine drug screening and confirmatory blood testing revealed the designer methamphetamine, MDMA (Ecstasy), and methamphetamine as the causative agents. The differential diagnosis of seizures and causes of sympathomimetic toxicity are discussed.


Among other developed and developing nations, the United States is experiencing an unprecedented epidemic of prescription opioid misuse. The prescription opioid epidemic clearly continues to have significant and widespread adverse effects on pediatric and adult populations alike. Prescription opioids have had the single greatest impact on pediatric emergency department visits, with visits increasing by 101% from 2001 to 2008, and an 86% increase in rates of admission, with rates of injury increasing by 92%. This article provides readers with an overview of the epidemiology, history, basic science, and advocacy interventions associated with this public health calamity. It discusses the increased susceptibility of young children to the adverse effects of these drugs and the neonatal abstinence syndrome, an opioid withdrawal syndrome. A multifaceted approach will be needed to contain the problem including comprehensive prescriber and patient education, expanded prescription drug monitoring programs, increased protection against accidental ingestion, increased law enforcement efforts, and stringent regulation and oversight of pharmaceutical companies.


We sought to verify, using computed tomography (CT) examinations of infants, which the left ventricle (LV) is compressed and abdominal compression avoided by using the chest compression landmarks recommended by the 2010 American Heart Association (AHA) Guidelines for infant cardiopulmonary resuscitation (CPR). Methods: Using CT examinations of 63 infants performed between March 2002 and July 2011, we retrospectively measured the distance between the INL and the xiphoid process, and the distance of the lower third (LT) of the sternum. The distances between LV maximal diameter (LVMD) and xiphoid processes were also measured to determine whether LVs would be compressed by chest compressions. These distances were compared with the finger placements by 20 adults, when placed on infant mannequins for simulated two-finger or two-thumb infant CPR. Results: The mean distances of the INL and the LT of the sternum were 32 ± 8 mm and 12 ± 2 mm from the xiphoid, respectively. The LVMD was placed 15 ± 6 mm from the xiphoid process. When we overlaid the width of adult finger placement (a mean of 28 mm for two-finger technique, and 23 mm for two-thumb technique), the LV was compressed in 57 patients (90.5%) and 59 patients (93.7%), respectively. The upper abdomen was compressed in 22 patients (34.9%) by the two-finger technique and in 16 patients (25.3%) by the two-thumb technique with the range of 0.3, 10.8 mm. Conclusion: When applying the 2010 AHA Guidelines for infant CPR, recommended finger placement allows for adequate compression of the LV in more than 90% of patients. In 23 - 35% of infants, the upper abdomen is compressed from 0.3 mm to 10.7 mm.
Children undergo many diagnostic and therapeutic procedures in the ED. Although emergency staff can often intervene to reduce physical pain through topical anaesthesia, analgesia and sedation, much procedural distress can be addressed by better preparing patients and families for the procedures. A key to guiding children through procedures is the use of age-appropriate and non-threatening language by all clinicians involved. We present a practical language guide for procedures and equipment for use by clinicians in the ED before, during and after procedures. The language tables might be most usefully placed in the procedure rooms for easy reference or incorporated into clinical practice guidelines.

**Resuscitation of the newborn**


Objective: To describe the implementation and outcomes of delayed cord clamping (DCC) in preterm babies. Study Design: Following staff orientation, a policy of DCC for 45 seconds was instituted for all eligible babies born between 28 and 32 weeks' gestational age, and later to all those younger than 33 weeks. Results: Of 480 babies, 349 (73%) were eligible for DCC. Of these, 236 (68%) received DCC. Monthly compliance rates to DCC protocol in eligible babies ranged from 18% to 93%. There was no significant difference in demographic measures or rates of delivery room ventilation between eligible babies who did or did not receive DCC. Delayed cord clamping was associated with less hypothermia, higher initial hemoglobin levels, and less necrotizing enterocolitis, with a trend toward lower 1-minute Apgar scores and less blood pressure support. Conclusions: The DCC protocol is feasible in preterm babies with reinforcement and education. It appears practical, safe, and applicable, and has minimal impact on immediate neonatal transition, with possible early neonatal benefits.

Schmolzer GM, Agarwal M, Kamlin COF and Davis PG. *Supraglottic airway devices during neonatal resuscitation: An historical perspective, systematic review and meta-analysis of available clinical trials*. Resuscitation 2012; Online first (9 November)

Various supraglottic airway devices are routinely used to maintain airway patency in children and adults. However, oropharyngeal airways or laryngeal masks (LM) are not routinely used during neonatal resuscitation. Methods: The aim of this article was to review the available literature about the use of supraglottic airway devices during neonatal resuscitation. We reviewed books, resuscitation manuals and articles from 1830 to the present using the search terms “Infant”, “Newborn”, “Delivery Room”, “Resuscitation”, “Airway management”, “Positive Pressure Respiration”, “Oropharyngeal Airway” and “Laryngeal Mask”. Results: No study was identified using oropharyngeal airways during neonatal resuscitation. Four trials including 509 infants compared positive pressure ventilation with a LM, bag and mask or an endotracheal tube. Infants in the LM group were intubated less frequently compared to infants in the bag and mask ventilation group 4/275 vs. 28/234 (OR 0.13, 95% CI 0.05–0.34). Infants resuscitated with the LM had significantly less unsuccessful resuscitations 4/275 vs. 31/234 (OR 0.10, 95% CI 0.03–0.28). Two trials including 34 preterm infants compared surfactant administration via LM vs. endotracheal tube. LM surfactant administration was safe and no adverse events were reported. Conclusion: The efficacy and safety of oropharyngeal airways during neonatal resuscitation remain unclear and randomized trials are required. The current evidence suggests that resuscitation with a LM is a feasible and safe alternative to mask ventilation in infants >34 weeks gestation and birth weight >2000 g. However, further randomized control trials are needed to evaluate short- and long-term outcomes following use of laryngeal masks. In addition, surfactant administration via LM should be used only within clinical trials.
Acute coronary syndromes


Objectives: To compare cardiac risk stratification using a 0 and 2 h point-of-care (POC) cardiac troponin (cTn), 0 and 2 h POC multi-biomarkers against the 0 and 6 h laboratory cTn reference standard. Methods: A prospective observational study of ED patients presenting with chest pain was performed. Patients were risk stratified and treated as per the Heart Foundation of Australia/Cardiac Society of Australia and New Zealand (HF-A/CS-ANZ) guidelines using the 0 and 6 h laboratory cTn (T6). Patients were further stratified using a 0 and 2 h POC cTn (T2) plus 0 and 2 h POC multi-biomarkers (cTn, creatine kinase-MB, myoglobin) (M2). The T6, T2 and M2 strategies were compared using the 30-day major adverse cardiac events as the primary outcome. Results: Seven hundred and four patients (median age 54 years, male 62.1%) were enrolled. Using the T6 reference standard, 2%, 61% and 37% were stratified as low, intermediate and high risk, respectively. The 30-day event rates were 0%, 3.5% and 28.6%, respectively. The T2 strategy stratified 1.5%, 57% and 41% as low, intermediate and high risk, respectively, with 30-day event rates of 0%, 4.2% and 24.8%, respectively. The M2 strategy resulted in significantly different risk distribution with 1%, 40% and 59% stratified as low, intermediate and high risk, respectively, with 30-day event rates of 0%, 3.9% and 18.8%, respectively. Conclusion: Using a 2 h POC cTn-only biomarker strategy with the HF-A/CS-ANZ guidelines accurately identified a population at intermediate risk of 30-day events in whom further objective testing might be accelerated, allowing subsequent early discharge of the majority of this cohort. Within 2 h of presentation a high risk population could be identified in whom early management, including admission, was required.


The treatment of acute ST elevation myocardial infarction (STEMI) has greatly improved in the last three decades, especially after the introduction of primary percutaneous coronary intervention (PCI). However, primary PCI is available in selected centres only, thus necessitating transportation of the STEMI patient. Improvement in the logistics of care for these patients is associated with significant improvement of patient outcome. Both the American Heart Association (AHA) and the European Society of Cardiology (ESC) STEMI guidelines recommend pre-hospital infarct diagnosis as a class I recommendation. Despite this, the large majority of STEMI patients are only diagnosed after arrival in the hospital. Therefore, great care should be taken in the initial diagnosis, risk assessment and triage, subsequent transfer and the distance of transportation as well as pre- and in-hospital time delays in these patients. STEMI patients can be diagnosed in the pre-hospital phase in two ways. The first option is diagnosis in the ambulance via an emergency medical services (EMS) call (118 or 911) by the patient or by a general practitioner. The second option is diagnosis at a referral non-PCI centre after self-referral of the patient or when no pre-hospital ECG is performed by EMS in the ambulance. Pre-hospital diagnosis in the ambulance gives the best outcomes for STEMI patients, since pre-hospital treatment can be started directly in the ambulance after diagnosis and triage. Subsequently, these patients are directly transferred in an ambulance from the pick-up place to the nearest PCI centre with 24/7 service, bypassing the emergency departments of the nearby referral non-PCI centres. The second option, diagnosis at a non-PCI centre, also occurs often, especially in rural areas. These patients are transported to a PCI centre, following diagnosis and triage of STEMI, preferably …

Acute coronary thrombotic occlusion is the most common trigger of cardiac arrest. The aim of the present study was to assess the impact of an invasive strategy characterized by emergency coronary angiography and subsequent percutaneous coronary intervention (PCI), if indicated, on in-hospital survival of resuscitated patients with out-of-hospital cardiac arrest (OHCA) and no obvious extra-cardiac cause who do not regain consciousness soon after recovery of spontaneous circulation. Ninety-three consecutive patients (67 ± 12 years old, 76% men) were included in the study. Clinical characteristics and coronary angiographic and in-hospital outcome data were retrospectively collected. Multivariate Cox proportional-hazards analysis was performed to identify independent determinants of in-hospital survival. Coronary angiography was performed in 66 patients (71%). Forty-eight patients underwent emergency coronary angiography; in the remaining 18 patients, mean time from OHCA to coronary angiography was 13 ± 10 days. In patients referred to emergency coronary angiography, successful emergency PCI of a culprit coronary lesion was performed in 25 patients (52%). In-hospital survival rate was 54%. At multivariate analysis, emergency coronary angiography (hazard ratio 2.32, 95% confidence interval 1.23 to 4.38, p = 0.009) and successful emergency PCI (hazard ratio 2.54, 95% confidence interval 1.35 to 4.8, p = 0.004) were independently related to in-hospital survival in the overall study population; delay in performing coronary angiography (hazard ratio 0.95, 95% confidence interval 0.92 to 0.99, p = 0.013) was independently related to in-hospital mortality in patients referred to coronary angiography. In conclusion, an invasive strategy characterized by emergency coronary angiography and subsequent PCI, if indicated, seems to improve in-hospital outcome of resuscitated but unconscious patients with OHCA without obvious extra-cardiac cause.

General papers


Objectives: To determine if complications from blunt thoracic trauma are reduced with patient-controlled analgesia (PCA) compared with interval analgesic dosing given as needed. Secondary aims were to investigate the influence of PCA on hospital length of stay (LOS) and cost. Methods: In this retrospective cohort study, patients were identified using the hospital trauma registry and clinical information department. Data on analgesic method, outcomes and confounders were obtained from the medical record. Costing data were obtained from the case-mix department. The analysis used logistic regression for the primary outcome and a generalised linear model for the secondary outcomes to adjust for potential confounders. Results: 227 patients were included. In the PCA group, 17/52 (33%) patients had a complication compared with 26/175 (15%) in the interval dosing group. The adjusted odds for a complication in patients receiving PCA was not significantly different from the adjusted odds in those receiving interval dosing (OR=1.2, 95% CI 0.3 to 4.6, p=0.83). The median LOS was 8.9 days in the PCA group and 4.6 days in the interval dosing group. The adjusted LOS for patients receiving PCA was 10% shorter than those receiving interval dosing (relative difference 0.9, 95% CI 0.6 to 1.3, p=0.52). The median hospital cost was $A11 107 in the PCA group (IQR $A7520–$A15 744) and $A4511 (IQR $A2687–$A8248) in the interval dosing group. The adjusted total hospital costs for patients receiving PCA was 10% higher than for those receiving interval dosing (relative difference 1.1, 95% CI 0.8 to 1.5, p=0.44). Conclusions: PCA did not reduce complications, hospital LOS or costs compared with interval analgesic dosing.

Ballow SL, Kaups KL, Anderson S and Chang M. *A standardized rapid sequence intubation protocol facilitates airway management in ANZCOR Research updates November 2012*

BACKGROUND: In the emergency department (ED) of a teaching hospital, rapid sequence intubation (RSI) is performed by physicians with a wide range of experience. A variety of medications have been used for RSI, with potential for inadequate or excessive dosing as well as complications including hypotension and the need for redosing. We hypothesized that the use of a standardized RSI medication protocol has facilitated endotracheal intubation requiring less medication redosing and less medication-related hypotension. METHODS: An RSI medication protocol (ketamine 2 mg/kg intravenously administered and rocuronium 1 mg/kg intravenously administered, or succinylcholine 1.5 mg/kg intravenously administered) was implemented for all trauma patients undergoing ED intubation at a Level I trauma center. We retrospectively reviewed patients for the 1-year period before (PRE) and after (KET) the protocol was instituted. Data collected included age, sex, Injury Severity Score (ISS), Abbreviated Injury Scale (AIS) score of the head/face, AIS score of the chest, RSI drugs, need for redosing, time to intubation, indication for RSI, and number of RSI attempts. RESULTS: During the study period, 439 patients met inclusion criteria; 266 without protocol (PRE) and 173 with protocol (KET). Patients were severely injured with a mean ISS of 24 and median AIS score of the head/face of 3. Dosing in the KET group was appropriate with a mean dose of 1.9-mg/kg ketamine administered. Compliance after KET introduction approached 90%. Fifteen patients in the PRE group required redosing of medication versus three in the KET group (p < 0.05). For patients younger than 14 years, (26 in PRE and 10 in KET), 2 patients in the PRE group required redosing and none in the KET group (not significant). In all patients, mean time from drug administration to intubation decreased from 4 minutes to 3 minutes. CONCLUSION: A standardized medication protocol simplifies RSI and allows efficient airway management of critically injured trauma patients in the ED of a teaching hospital. Incorporation of ketamine avoids potential complications of other commonly used RSI medications.


Get With the Guidelines (GWTG-R) is a data registry and quality improvement program for in-hospital cardiac arrest (IHCA). It is unknown if duration of hospital participation in GWTG-R is associated with IHCA outcomes. Methods: We analyzed adults with IHCA from 362 hospitals participating in GWTG-R between 2000 and 2009. Using logistic regression with generalized estimating equations to account for clustering on hospital, we determined the association between duration of hospital participation in GWTG-R and patient outcomes after IHCA, adjusted for patient and arrest characteristics and secular trend. Using these methods, we also evaluated the association between duration of participation and factors previously correlated with survival after IHCA, including ECG monitored status, after-hours arrest, and time to defibrillation. Results: Of 104,732 patients with IHCA, 17,646 patients (16.9%) survived to discharge. Duration of hospital participation in GWTG-R was associated with IHCA event survival (per year of participation, odds ratio [OR] 1.02; 95% CI 1.00–1.04; p = 0.046) but not survival to discharge (OR 1.02; 95% CI 0.99–1.04; p = 0.18). Among factors previously correlated with IHCA survival, duration of participation was associated with time to defibrillation ≤2 min (per year of participation, OR 1.06; 95% CI 1.03–1.10; p < 0.001), but not ECG monitored status (OR 1.00; 95% CI 0.93–1.06; p = 0.90) or survival of after-hours arrest (OR 1.01; 95% CI 0.99–1.03; p = 0.41). Among ventricular tachycardia or ventricular fibrillation (VT/VF) arrests, time to defibrillation attenuated the association between duration of hospital participation and outcomes. Conclusion: Duration of hospital participation in GWTG-R was significantly associated with survival of the IHCA event, but not with survival to discharge. In VT/VF arrests, this association may have been mediated by improvements in time to defibrillation.

Brujins SR, Guly HR, Bouamra O, Lecky F and Wallis LA. Heart rate and systolic blood pressure in patients with minor to moderate, non-
Raised blood pressure (and heart rate (HR)) due to anxiety in a clinical situation is well described and is called the white coat effect (WCE). It is not known whether the pain and anxiety that results from trauma causes a measurable WCE. Methods: A sample of patients with a non-haemorrhagic injury from the Trauma Audit and Research Network (TARN) was compared with a healthy, non-injury sample from the Health Survey for England (HSE) databases. Two-way analysis of variance with rank transformation of data was used to compare systolic blood pressure (SBP) and HR between the groups at different ages. In the injured group, the SBP and HR were also compared between spinally immobilised and non-immobilised patients. Results: There was a statistically significant difference between the groups for both HR and SBP (p<0.001). Median HR remained approximately 10 bpm higher in the TARN set when compared to the HSE set, irrespective of age. The difference for SBP was not considered clinically relevant (the highest was 5 mm Hg). There was no significant difference between immobilised and non-immobilised patients, for either HR or SBP (p=0.07 and 0.3, respectively). Discussion: Median HR remained approximately 10 bpm higher in the TARN (injury) set compared to the HSE (non-injury, control) set, irrespective of age. Understanding that HR reacts in this way for mild to moderately injured patients is important as it will affect clinical interpretation during the initial assessment.

Study objective: In the context of calls to develop better systems for out-of-hospital clinical research, we seek to understand paramedics' perceptions of involvement in research and the barriers and facilitators to that involvement. Methods: This was a qualitative study using semi-structured focus groups with 58 United Kingdom paramedics and interviews with 30 US firefighter-paramedics. The study focused on out-of-hospital research (trials of out-of-hospital treatment for stroke), whereby paramedics identified potential study subjects or obtained consent and administered study treatment in the field. Data were analyzed with a thematic and discourse approach. Results: Three key themes emerged as significant facilitators and barriers to paramedic involvement in research: patient benefit, professional identity and responsibility, and time. Paramedics showed willingness and capacity to engage in research but also some reticence because of the perceived sacrifice of autonomy and challenge to their identity. Paramedics work in a time-sensitive environment and were concerned that research would increase time taken in the field. Conclusion: Awareness of these perspectives will help with development of out-of-hospital research protocols and potentially facilitate greater participation.
Temporal patterns in case types were influenced by age and gender. Conclusions: Temporal patterns are present in ambulance demand and importantly these populations are distinct from those found in hospital datasets suggesting that variation in ambulance demand should not be inferred from hospital data alone. Case types seem to have similar temporal patterns across jurisdictions; thus, research where demand is broken down into case types would be generalisable to many ambulance services. This type of research can lead to improvements in ambulance service deliverables.


Methods: Data Sources: This study was the fourth update of a systematic review on wound cleansing. In this update, the authors searched the Cochrane Wounds Group Specialized Register (searched November 2011), the Cochrane Central Register of Controlled Trials (CENTRAL) (Cochrane Library 2011, Issue 4), Ovid MEDLINE (2010 to October, week 4, 2011; In-Process and Other Non-Indexed Citations, November 2011), Ovid EMBASE (2010 to 2011 week 44), and Elton B. Stephens Company (EBSCO) CINAHL (2010 to November 2011). The authors reviewed the reference lists of relevant reviews and trials to identify additional studies. Study Selection: Randomized and quasi-randomized studies comparing wound cleansing with water to other solutions (sterile normal saline solution, cooled boiled water) or no cleansing were reviewed. Trials that objectively measured wound healing or reported signs of wound infection were included. Trials were excluded if they involved the perioperative or intraoperative environment, dental wounds, burns, or ulcer dressings or used solution as a prophylactic intervention (eg, povidone-iodine). The primary outcome for this systematic review was wound infection; secondary outcomes included wound healing, pain, cost, and patient and staff satisfaction. Data Extraction and Synthesis: Two authors independently reviewed trials and jointly decided on their inclusion for this review. Data extracted from each study included wound and patient characteristics, description of the intervention (eg, tap water quality), setting, duration of follow-up, number of withdrawals, and outcomes. Study quality was assessed with the Cochrane Collaboration Quality Scale Assessment tool. The Cochrane statistical package, RevMan version 4.2A, was used to calculate a weighted treatment effect, and statistical heterogeneity was reported according to the I2 statistic. Results: 11/29 identified trials met inclusion criteria and were analyzed. Patients' age ranged from 2 to 95 years, with wounds consisting of lacerations (5 studies), open fractures (1 study), chronic wounds (1 study), and surgical wounds (4 studies). Ten trials were in hospital emergency departments (EDs) or wards; 1 trial occurred in community health centers. Cleansing solutions included tap water, cooled boiled water, distilled water, and normal saline solution. A variety of cleansing methods were used: pressured syringe with or without angiocatheter or irrigation shield, showering, perineal toilet, and running tap water. Most studies did not report the volume or pressure of cleansing; patients cleaned their own wounds in 4 trials. Five of the 11 trials lacked essential information according to the Quality Scale Assessment tool. All studies used randomized allocation, 8 trials described inclusion and exclusion criteria, blinding was described in 3 trials, baseline characteristics of patients were given in 6 trials, and a wide range of outcomes were assessed. Discussion: In acute wound management, wound cleansing may be the most important step in preventing infection and promoting healing. Although there are many options for wound cleansing, there has not been a clear consensus on which solution is “best.” The use of antiseptics, such as iodine and alcohol, remains controversial because of toxic effects on tissue and lack of significant clinical benefit. This systematic review found tap water to be as effective as other solutions in wound cleansing. In fact, tap water demonstrated a significant reduction in infection rates for acute adult wounds. Other water preparations, distilled or cooled boiled water, were also as effective as saline solution. In addition, there was no statistically significant difference in other clinically important outcomes when tap water was used. This is not the first study to question wound care dogma in the ED. A small randomized controlled trial from 1989 found no significant difference in healing or infection rates when a surgically clean technique (hand washing, no mask, no drapes, no sterile gloves) was used compared with full sterile technique (antiseptic hand washing, mask,
sterile drapes, sterile gloves) in simple laceration repair. Another randomized controlled trial in 2004 showed no difference in infection rates when clean gloves were used compared with sterile gloves. Because of its availability, low cost, efficiency, and effectiveness, tap water should be strongly considered for wound cleansing in the ED. Take-Home Message: The practice of cleansing wounds with water is as effective as using isotonic saline solution.

Intimate partner violence (IPV) is a common occurrence in Australian society, with far-reaching health, social and economic implications. The victims of intimate partner violence (IPV) requiring medical care are often encountered by paramedics in the prehospital environment. However, paramedics receive little training and education in the management of such patients. Over the past two decades the international literature has repeatedly highlighted this issue and yet Australian research has stagnated in both the prehospital recognition and management of IPV. Practical attempts to improve outcomes for victims (the vast majority of whom are female) by Australian paramedic organisations have also been minimal. We recently examined the results of a questionnaire given to 50 Australian Capital Territory paramedics that measured their frequency of attending IPV cases, paramedic knowledge of IPV and their perceived preparedness for IPV cases. We found that 90% of participants had responded to at least one IPV case in the preceding year (with a range of 0–20 cases), with an average of 3.66 cases. Notably, none of the paramedics sampled used any IPV screening tools, and therefore was likely to have suspected IPV only where it was overt. Victims of IPV will not always volunteer the true cause of their trauma and might even attempt to hide the fact. Thus, there is significant underreporting in the above data. Furthermore, two-thirds of participating paramedics were unaware of the lack of mandatory reporting legislation in their state, and almost four in every five reported feeling less than confident in managing IPV cases....


Methods: Data Sources: The investigators searched the Cochrane Airways Group Specialized Register of Trials. Authors, personal contacts, and advisors to pharmaceutical companies were contacted, and reference lists of studies used were reviewed to identify any further studies. Study Selection: Only randomized clinical trials comparing continuous versus intermittent inhaled β-agonists in patients presenting to an emergency department (ED) or its equivalent were considered for inclusion. Data Extraction and Synthesis: Study quality was measured by 2 independent reviewers using the Jadad score and the Cochrane assessment of allocation concealment. Heterogeneity was measured with the Breslow-Day test. Continuous outcomes were calculated as weighted mean differences and dichotomous variables, as relative risks. Results used 95% confidence intervals, using a fixed-effects model. Results; 20 studies were ultimately identified for potential inclusion. Four studies were excluded because they were not randomized controlled trials, another 6 were excluded because they did not compare continuous with intermittent β-agonist therapy, and 2 were excluded because they were inpatient studies. Eight of the remaining studies contained the desired data on continuous versus intermittent β-agonist nebulization. All studies were controlled, and 2 were single blinded; there was no double blinding. Four studies scored 3 of 5 on the Jadad quality score; the other 4 scored lower, at 2 of 5, because of an inpatient component and initial baseline differences in peak flow tests. For the subset of patients with severe asthma, there was a significant reduction in pulmonary function tests and hospital admissions with the use of continuous β-agonist therapy. There was no significant difference in vital signs or adverse effects between the 2 groups.
Commentary: Acute asthma exacerbations are common, accounting for nearly 1.7 million ED visits in 2006 to 2007. Inhaled β-agonist administration forms the cornerstone of treatment. Continuous albuterol has been found safe and effective for asthma exacerbations. This review focuses on whether there is a benefit compared with intermittent nebulized β-agonist administration for adult patients. Only 2 studies included children, and though these conclusions could apply to children, this systematic review could not reach that conclusion.

Continuous β-agonist treatments resulted in significantly improved peak flow rates, and changes in peak flow have been found to be a significant contributing factor in hospital admissions. Therefore, hospitalization rates were also decreased in severe asthma exacerbations. Mild to moderate exacerbations showed no noticeable change in admission rates. However, it was difficult to separate these data into categories of disease severity because not all studies categorized severity similarly. Despite continuous nebulization's being found safe overall, there has been concern that it increases the incidence of hypokalemia. Potassium concentrations were reported in only 3 trials, but no significant difference was observed between treatment groups. There was also no significant increase in tachycardia or tremors in the continuous β-agonist groups. It is still important to consider possible adverse effects, as well as slightly increased cost, when considering continuous nebulization. As always, clinical judgment is necessary, but in severe exacerbations, continuous nebulization appears to be more beneficial. Take-Home Message: Continuous nebulized β-agonist therapy reduces hospital admissions compared with intermittent β-agonist treatments in moderate to severe asthma exacerbations.


We recently demonstrated that near-syncope patients are as likely as syncope patients to experience adverse outcomes. The Boston Syncope Criteria (BSC) identify patients with syncope unlikely to have adverse outcomes and reduce hospitalizations. It is unclear whether these guidelines could reduce hospitalization in near syncope as well. Objective: To determine if Boston Syncope Criteria (BSC) accurately predict which near-syncope patients require hospitalization. Methods: A prospective observational study enrolled from August 2007 to October 2008 consecutive emergency department (ED) patients (aged > 18 years) with near syncope. BSC were first employed assuming that any patient with risk factors for adverse outcomes should be admitted, and then utilizing using a modified rule: if the etiology of near syncope is dehydration or vasovagal, and ED work-up is normal, patients may be discharged even with risk factors. Outcomes were identified by chart review and 30-day follow-up calls. Results Of 244 patients with near syncope, 111 were admitted, with 49 adverse outcomes. No adverse outcomes occurred among discharged patients. If BSC had been followed strictly, another 41 patients with risk factors would have been admitted and 34 discharged, a 3% increase in admission rate. However, using the modified criteria, only 68 patients would have required admission, a 38% reduction in admission, with no missed adverse outcomes on follow-up. Conclusion: Although near-syncope patients may have risk factors for adverse outcomes similar to those with syncope, if the etiology of near syncope is dehydration or vasovagal, and ED work-up is normal, these patients may be discharged even with risk factors.

Hampson NB, Piantadosi CA, Thom SR and Weaver LK. Practice recommendations in the diagnosis, management, and prevention of carbon monoxide poisoning. Am J Respir Crit Care Med 2012; 186 (11): 1095-101

Carbon monoxide (CO) poisoning is common in modern society, resulting in significant morbidity and mortality in the United States annually. Over the past two decades, sufficient information has been published about carbon monoxide poisoning in the medical literature to draw firm conclusions about many aspects of the pathophysiology, diagnosis, and clinical management of the syndrome, along with evidence-based recommendations for optimal clinical practice. This article provides clinical practice guidance to the pulmonary and critical care community regarding the diagnosis, management, and prevention of acute CO poisoning. The article represents the consensus opinion of four recognized content experts in the field.
Supporting data were drawn from the published, peer-reviewed literature on CO poisoning, placing emphasis on selecting studies that most closely mirror clinical practice.


Objectives: The first extended care paramedic (ECP) model of care in New Zealand was introduced in the Kapiti region, north of Wellington in 2009. The ECP model aimed to increase the proportion of patients presenting to the ambulance service who could be treated in the community. This study evaluated the first 1000 patients seen by ECPs. Methods: The first 1000 presentations attended by ECPs were examined to determine the proportions of patients transported to the ED and treated in the community. For patients treated in the community we determined the number presenting to the ED within 7 days of ECP attendance. Results A total of 797 patients (mean age 62 years) had 1000 clinical presentations. In 59% the patient was treated either at home or in the local community, with 40% transported to the ED. Within the same region and time period 74% of patients attended by standard paramedics were transported to the ED. The rate of ECP transport to the ED differed significantly by clinical condition, with 71% of cardiac presentations versus 19% of patients with spinal problems taken to the ED. In 31 cases (5%) where the patient had been managed in the community there was an acute ED presentation within 7 days. Conclusion: We observed that ECPs have significant potential to reduce hospital ED attendances by treating more patients in the community, and this is associated with a low rate of subsequent ED presentations. Prioritisation of dispatch of ECPs to particular types of patients might be useful in maximising this reduction.


Natural disasters such as earthquakes, hurricanes, tornadoes, floods, and volcanic eruptions may increase human exposures to toxins. Disaster management encompasses a continuous cycle involving preparedness, response, recovery, and mitigation. Toxic exposures occur in predictable segments of the disaster cycle. Although carbon monoxide poisoning is the most widely reported poisoning after natural disasters, other toxins including certain hydrocarbons, volcanic ash, and gases, as well as snake and animal bites, are also recognized hazards. Emergency response personnel and health care providers should be aware of these hazards to respond and manage these exposures effectively. This article will present an overview of toxic exposures related to natural disasters, specifically, carbon monoxide, hydrocarbons/petroleum distillates, volcanic ash, animal exposures, and snakebites. Their relation to the disaster management cycle will be presented to serve as a primer for medical personnel and health care providers assisting with disaster response or emergency planning.


Tension pneumothorax (tPTX) is a common and potentially fatal event after thoracic trauma. Needle decompression is the currently accepted first-line intervention but has not been well validated. The purpose of this study was to evaluate the effectiveness of a properly placed and patent needle thoracostomy (NT) compared with standard tube thoracostomy (TT) in a swine model of tPTX. METHODS: Six adult swine underwent instrumentation and creation of tPTX using thoracic CO2 insufflation via a balloon trocar. A continued 1 L/min insufflation was maintained to simulate an ongoing air leak. The efficacy and failure rate of NT (14 gauge) compared with TT (34F) was assessed in two separate arms: (1) tPTX with hemodynamic compromise and (2) tPTX until pulseless electrical activity (PEA) obtained. Hemodynamics was assessed at 1 and 5 minutes.
after each intervention. RESULTS: A reliable and highly reproducible tPTX was created in all animals with a mean insufflation volume of 2441 mL. tPTX resulted in the systolic blood pressure declining 54% from baseline (128,Â±58 mm Hg), cardiac output declining by 77% (7,Â±1.6 L/min), and equalization of central venous pressure and wedge pressures. In the first arm, there were 19 tPTX events treated with NT placement. All NTs were patent on initial placement, but 5 (26%) demonstrated mechanical failure (due to kinking, obstruction, or dislodgment) within 5 minutes of placement, all associated with hemodynamic decline. Among the 14 NTs that remained patent at 5 minutes, 6 (43%) failed to relieve tension physiology for an overall failure rate of 58%. Decompression with TT was successful in relieving tPTX in 100%. In the second arm, there were 21 tPTX with PEA events treated initially with either NT (n = 14) or TT (n = 7). The NT failed to restore perfusion in nine events (64%), whereas TT was successful in 100% of events as a primary intervention and restored perfusion as a rescue intervention in eight of the nine NT failures (88%).

CONCLUSION: Thoracic insufflation produced a reliable and easily controlled model of tPTX. NT was associated with high failure rates for relief of tension physiology and for treatment of tPTX-induced PEA and was due to both mechanical failure and inadequate tPTX evacuation. This performance data should be considered in future NT guideline development and equipment design.


The use of extracorporeal life support (ECLS) as a treatment for severe cardiovascular impairment due to poisoning is unclear. Therefore, we conducted a retrospective cohort analysis to compare survival among critically ill poisoned patients treated with or without ECLS. Methods: All consecutive patients admitted into 2 university hospitals in northwestern France over the past decade for persistent cardiac arrest or severe shock following poisoning due to drug intoxication were included. ECLS was preferentially performed in 1 of the 2 centers. Results: Sixty-two patients (39 women, 23 men; mean age 48 Â± 17 years) fulfilled inclusion criteria: 10 with persistent cardiac arrest and 42 with severe shock. Fourteen patients were treated with ECLS and 48 patients with conventional therapies. All subjects received vasopressor and fluid loading. Patients treated with or without ECLS at ICU admission had comparable drug ingestion histories, Simplified Acute Physiology Score (SAPS II score) (66 Â± 18), Sequential Organ Failure Assessment (SOFA) score (median: 11 [IQR, 9–13]), Glasgow Coma Scale score (median: 3 [IQR, 3–11]), need for ventilator support (n = 56) and extra renal support (n = 23). Thirty-five (56%) patients survived: 12/14 (86%) ECLS patients and 23/48 (48%) non-ECLS patients (p = 0.02, by Fisher exact test). None of the patients with persistent cardiac arrest survived without ECLS support. Based on admission data, beta-blocker intoxication (p = 0.02) was also associated with lower mortality. In multivariate analysis, adjusting for SAPS II and beta-blocker intoxication, ECLS support remained associated with lower mortality [Adjusted Odds Ratio, 0.18; 95% CI, 0.03–0.96; p = 0.04]. Conclusion: In the absence of response to conventional therapies, we consider that ECLS may improve survival in critically ill poisoned patients experiencing cardiac arrest and severe shock.


Tracheal intubation is recommended in unconscious trauma patients to protect the airway from pulmonary aspiration of gastric contents and also to ensure ventilation and oxygenation. Unconsciousness is often defined as a Glasgow Coma Scale (GCS) score below 9. In non-trauma patients, however, there are no such firm recommendations regarding airway management and the GCS score may be less useful. The aim of this study was to describe the authors' experience with airway management in unconscious non-trauma patients in the prehospital setting with a physician-manned Mobile Emergency Care Unit (MECU). The main focus of the study was on the need for subsequent tracheal intubation during hospitalisation after initial treatment. Methods: The study was based on an analysis of data prospectively collected from the MECU database in Copenhagen, Denmark.
All unconscious (GCS scores below 9) non-trauma patients registered in the database during 2006 were included. The ambulance patient charts and medical records were scrutinised to assess outcome and the need for tracheal intubation during the first 24h after admittance into hospital. Results: A total of 557 unconscious non-trauma patients were examined and 129 patients (23%) were tracheally intubated by the MECU physician before or during transport to the hospital. Intubation was done in most patients with cardiac arrest, severe stroke or respiratory failure. Of the remaining 428 patients, 364 (85%) regained consciousness before being transported to the hospital, whereas 64 patients remained unconscious during transport and 12 (19%) of these were intubated in the emergency department. Conclusions: The majority of unconscious non-trauma patients were not intubated in the prehospital setting. Unconscious non-trauma patients may not all need tracheal intubation before being transferred to hospital.


Early damage-control resuscitation (DCR) indicators have not been clearly discerned in patients with penetrating abdominal trauma. Our objective was to identify these clinical indicators that could standardize a DCR initiation policy in this subset of patients. METHODS: Prospective data collection from January 2003 to October 2010 at a Level I trauma center in Cali, Colombia. All adult (>15 years) patients with abdominal gunshot wounds (GSWs) were included. They were divided into two groups: those who underwent DCR and those who did not. Both groups were compared by demographics, clinical variables, severity scores, and overall mortality. Other scores were compared with our newly devised model using the area under the receiver operating characteristic curve (AUROC). RESULTS: There was a total of 331 abdominal GSWs. Of these, a total of 162 (49%) underwent DCR. The overall mortality was 11.2%. Multivariate analysis identified (A) acidosis (base deficit ≥ 8); (B) blood loss (hemoperitoneum > 1,500 mL); (C) cold (temperature < 35°C); (D) damage (New Injury Severity Score > 35) as significant clinical indicators that aided in the decision process of early implementation of DCR. The Trauma-Associated Severe Hemorrhage (AUROC, 0.8333), McLaughlin (AUROC, 0.8148), ABC (AUROC, 0.7372) scores and our ABCD mnemonic (AUROC, 0.8745) were all good predictors of DCR, and the difference between them was statistically significant (p < 0.001). CONCLUSION: We have identified (A) acidosis (base deficit ≥ 8); (B) blood loss (hemoperitoneum > 1,500 mL); (C) cold (temperature < 35°C); (D) damage (New Injury Severity Score > 35) as significant clinical indicators that aided in the decision process of early implementation of DCR for patients with abdominal GSWs.


Methods: Data Sources: The authors electronically searched the Cochrane Central Register of Controlled Trials (February 2011), MEDLINE, EMBASE, and Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS) and hand searched abstracts of neurosurgical conference proceedings and reference lists. Experts in the field were contacted to request additional sources. No language or publication restrictions were applied. Study Selection: Studies were included if they were randomized controlled trials comparing antibiotics versus placebo or no intervention after basilar skull fracture. Primary outcome was the development of meningitis. Similar observational trials were also identified for inclusion in a separate meta-analysis. Three authors independently identified potentially suitable articles from the search strategy, and disagreements were resolved by discussion with the fourth author. Data Extraction and Synthesis: Two authors independently extracted data with standardized data collection forms and globally assessed risk of bias with a standardized tool. Meta-analysis of randomized trials was performed with standardized software and the Peto fixed-effect method. Dichotomous outcomes were reported as odds ratios with 95% confidence intervals. Results:
Five randomized controlled trials were included in the systematic review. Only 2 studies reported the number of and explanations for withdrawals leading to an overall high risk of bias in this evidence base. One study was excluded from the meta-analysis because the number of patients in each randomized group was unavailable, although none of the 160 patients enrolled developed meningitis. There were no reported adverse effects of antibiotics in any of the 5 trials. Take-Home Message: In patients with basilar skull fracture, there is inadequate evidence to recommend for or against antibiotic prophylaxis in the prevention of meningitis, irrespective of cerebrospinal fluid leakage.

Anaphylaxis is a severe, potentially fatal, hypersensitivity reaction of rapid onset. It may trigger life-threatening cardiopulmonary compromise, often with skin and mucosal changes such as urticaria and angioedema. The prevalence of anaphylaxis is increasing and the number of cases of fatal anaphylaxis appears to be rising. Food, insect stings, and drugs are the most common triggers. Novel triggers are increasingly seen and include delayed anaphylaxis to red meat, food-dependent exercise-induced reactions and anaphylaxis to monoclonal antibodies. Anaphylaxis is usually IgE mediated, but other mechanisms also play a role for example direct mast cells activation. Differential diagnosis is discussed including asthma, syncope and shock; excessive endogenous histamine, food related syndromes, and some rare diagnoses. Intramuscular epinephrine is first line treatment. The role of other drugs is reviewed. Timed and serial serum tryptase measurements help to confirm the diagnosis. Long-term management is necessary to minimise the risk of recurrence and includes identification of the trigger(s), management of risk factors, education on avoidance and a formalised treatment plan with an epinephrine auto-injector if appropriate. Every patient who has experienced anaphylaxis should be referred to an allergy clinic for appropriate management. This is endorsed by many national guidelines (eg, UK NICE). Anaphylaxis is often misdiagnosed or miscoded as, for example, asthma or food allergy. Most doctors will encounter a patient with anaphylaxis in their career and should to be familiar with the clinical features, management and mechanisms of this potentially fatal condition.

Objective: To determine the analgesic efficacy and safety of intravenous single-dose paracetamol versus morphine in patients presenting to the emergency department with renal colic. Methods: A randomised double-blind study was performed to compare the efficacy of intravenous paracetamol (1g) and 0.1mg/kg morphine in patients with renal colic. The efficacy of the study drugs was measured by a visual analogue scale and a verbal rating scale at baseline and after 15 and 30 min. The adverse effects and need for rescue medication (1g/kg intravenous fentanyl) were also recorded at the end of the study. Results: 133 patients were eligible for enrolment in the study, with 73 patients included in the final analysis (38 in the paracetamol group and 35 in the morphine group). The mean ± SD age of the subjects was 30.2±8.6 years and 51 (70%) were men. The mean reduction in scores at 30 min after study drug administration was 63.7 mm (95% CI 57 to 71) for paracetamol and 56.6 mm (95% CI 48 to 65) for morphine. The difference between pain reduction scores for the two groups at 30 min was 7.1 mm (95% CI 18 to 4), demonstrating no statistical or clinical significance. Two adverse events (5.3%) were recorded in the paracetamol group and five (14.3%) in the morphine group (difference 9%, 95% CI 7% to 26%). Conclusion: Intravenous paracetamol is effective in treating patients presenting with renal colic to the emergency department.

Sheehan A and Batchelor JS. A retrospective cohort study to re-evaluate clinical correlates for intracranial injury in minor head injury.

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The aim of this study was to determine the Relative Risk (RR) ratios for common clinical correlates in adult patients with minor head injury in a cohort of patients in which loss of consciousness (LOC) and post-traumatic amnesia (PTA) were not the only entry criteria for CT scanning.

Methods: The computerised CT request notes were reviewed on all patients who underwent a CT head scan with a minor head injury over a 1-year period (January 2009 - December 2009). The clinical signs and symptoms at presentation were extracted from the request notes and the RR ratios were calculated for five clinical correlates: LOC, PTA, vomiting, nausea and headache. Results: 456 Glasgow coma scale (GCS) 15 patients underwent CT scanning during the period January 2009 - December 2009. 55 of the 456 patients had positive CT findings (12%). 270 patients (59%) of the GCS 15 cohort had neither LOC nor PTA and of this subgroup 27 had positive scans. LOC was the only clinical correlate in which the RR reached statistical significance; RR 2.0930 (95% CI 1.25 to 3.50). However, vomiting accounted for four cases, headache for four cases and nausea for no cases.

Conclusions: Using LOC or PTA as the principal entry criterion for CT scanning may result in a significant number of patients with traumatic intracranial injury being missed. Using a less stringent approach still achieved an acceptable CT abnormality rate.


Massive haemorrhage still accounts for up to 40% of mortality after traumatic injury. The importance of limiting blood loss after injury in order to prevent its associated complications has led to rapid advances in the development of dressings for haemostatic control. Driven by recent military conflicts, there is increasing evidence to support their role in the civilian prehospital care environment. This review aims to summarise the key characteristics of the haemostatic dressings currently available on the market and provide an educational review of the published literature that supports their use. Medline and Embase were searched from start to January 2012. Other sources included both manufacturer and military publications. Agents not designed for use in prehospital care or that have been removed from the market due to significant safety concerns were excluded. The dressings reviewed have differing mechanisms of action. Mineral based dressings are potent activators of the intrinsic clotting cascade resulting in clot formation. Chitosan based dressings achieve haemostasis by adhering to damaged tissues and creating a physical barrier to further bleeding. Acetylated glucosamine dressings work via a combination of platelet and clotting cascade activation, agglutination of red blood cells and local vasoconstriction. Anecdotal reports strongly support the use of haemostatic dressings when bleeding cannot be controlled using pressure dressings alone; however, current research focuses on studies conducted using animal models. There is a paucity of published clinical literature that provides an evidence base for the use of one type of haemostatic dressing over another in humans.


Study objective: As a recommended strategy for optimally managing critical illness, regionalization of care involves matching the needs of the target population with available hospital resources. The national supply and characteristics of hospitals providing specialized critical care services is currently unknown. We seek to characterize the current distribution of specialized care centers in the United States. Methods: Using public data linked with the American Hospital Association directory and US Census, we identified US general acute hospitals providing specialized critical care services for ST-segment elevation myocardial infarction (STEMI) (Â•40 annual primary percutaneous coronary interventions reported in Medicare Hospital Compare), stroke (The Joint Commission certified stroke centers), trauma (American College of Surgeons or state-designated, adult or pediatric, level I or II), and pediatric critical care (presence of a pediatric ICU) services. We determined the characteristics and state-level distribution and density of specialized care centers (centers per state and centers per state population). Results Among 4,931 acute care hospitals in the United States, 1,325 (26.9%) provided one of the 4 defined specialized care services, including 574 STEMI, 763 stroke, 508 trauma, and 457 pediatric
critical care centers. Approximately half of the 1,325 hospitals provided 2 or more specialized services, and one fifth provided 3 or 4 specialized services. There was variation in the number of each type of specialized care center in each state: STEMI median 7 interquartile range (IQR 2 to 14), stroke 8 (IQR 3 to 17), trauma 6 (IQR 3 to 11), pediatric specialized care 6 (IQR 3 to 11). Similarly, there was variation in the number of each type of specialized care center per population: STEMI median 1 center per 585,135 persons (IQR 418,729 to 696,143), stroke 1 center per 412,188 persons (IQR 321,604 to 572,387), trauma 1 center per 610,589 persons (IQR 406,192 to 917,588), and pediatric critical care 1 center per 665,282 persons (IQR 441,525 to 942,254). The national distribution patterns differed for each type of specialized care center. Conclusion: The distribution of specialized care centers varies across the United States. These observations highlight unanswered questions about the regional organization of specialized care in the United States.


Agitated patients are the primary source of injury to patients and providers during ambulance transport. Objective: Our primary hypothesis was that the addition of a chemical restraint agent (midazolam) to a restraint protocol would reduce agitation to a greater extent than a restraint protocol with physical restraint alone. Methods: The local emergency medical services restraint protocol (RP) was implemented on October 1, 2006. It included a form for data collection about each restrained patient. On April 1, 2007, chemical restraint (CR) using midazolam in addition to physical restraints was made available through the RP, and paramedics were educated in its use. Transported patients were divided into pre-CR and post-CR. The post-CR group was split into those who received and those who did not receive midazolam. Agitation was measured on a validated agitation behavior scale with a parametric (Rasch) adjustment. Results: There were 96 patients in the pre-CR group and 522 patients in the post-CR group. Forty-three percent of the pre-CR group and 49% of the post-CR group had a decrease in agitation during transport (NS). Of the 522 in the post-CR group, 110 were physically restrained and given midazolam (21%) and 412 were physically restrained without midazolam (79%). There was a significantly greater decrease in agitation scores (17 ± 21 vs. 7 ± 17) in the subjects receiving midazolam compared to those who did not.

Conclusion: If available, CR is used in about 20% of restrained patients. When CR is used, there is a decrease in the subject's agitation.


Aim: Identify the occurrence rate of post-arrest psychological distress; evaluate methodological approaches; suggest future research priorities; address clinical implications. Methods: The electronic databases PubMed/MEDLINE and PsychInfo/APA PsycNET were utilized to search for terms including ‘Cardiac Arrest’, ‘Therapeutic Hypothermia’ and ‘Depression’, ‘Anxiety’, ‘Quality of Life’, ‘Posttraumatic Stress Disorder (PTSD)’, ‘Psychological Outcomes’, ‘Hospital Anxiety and Depression Scale (HADS)’, and ‘Beck Depression Inventory (BDI)’. Results: High rates of psychological distress have been reported after OHCA. Specifically, incidence rates of depression have ranged from 14% to 45%; anxiety rates have ranged from 13% to 61%; PTSD rates reportedly range from 19% to 27%. Variability between studies is likely attributable to methodological variations relating to measures used, time since arrest, and research setting. Discussion: Given the occurrence rate of psychological distress after OHCA, psychological screening and early intervention seems indicated in the cardiac arrest population. Further studies are needed to better establish occurrence rates in both inpatient and outpatient settings, determine appropriate measures and normative cut off scores, and decide on the most appropriate method of intervention.
It’s all about the size of your ornament.

Models of sexual selection predict that females use ornament size to evaluate male condition. It has also been suggested that ornament asymmetry provides females with accurate information about condition. To test these ideas we experimentally manipulated condition in the stalk-eyed fly, Cyrtodiopsis dalmanni, by varying the amount of food available to developing larvae. Males of this species have greatly exaggerated eyestalk length and females prefer to mate with males with wider eye spans. Our experiments show that male ornaments (eyestalks) display a disproportionate sensitivity to condition compared with the homologous character in females, and to non-sexual traits (wing dimensions). In contrast, in neither sex did asymmetry reflect condition either in sexual ornaments or in non-sexual traits. We conclude that ornament size is likely to play a far greater role in sexual selection as an indicator of individual condition than does asymmetry.

A 60-year-old man with acute pancreatitis developed persistent hiccups after insertion of a nasogastric tube. Removal of the latter did not terminate the hiccups which had also been treated with different drugs, and several manoeuvres were attempted, but with no success. Digital rectal massage was then performed resulting in abrupt cessation of the hiccups. Recurrence of the hiccups occurred several hours later, and again, they were terminated immediately with digital rectal massage. No other recurrences were observed. This is the second reported case associating cessation of intractable hiccups with digital rectal massage. We suggest that this manoeuvre should be considered in cases of intractable hiccups before proceeding with pharmacological agents.