Clinical trials

1. Olasveengen TM, Wik L, Sunde K, Steen PA. *Outcome when adrenaline (epinephrine) was actually given vs. not given - post hoc analysis of a randomized clinical trial*. Resuscitation 2012; 83 (3): 327-32

IV line insertion and drugs did not affect long-term survival in an out-of-hospital cardiac arrest (OHCA) randomized clinical trial (RCT). In a previous large registry study adrenaline was negatively associated with survival from OHCA. The present post hoc analysis on the RCT data compares outcomes for patients actually receiving adrenaline to those not receiving adrenaline. Materials and methods: Patients from an RCT performed May 2003 to April 2008 were included. Three patients from the original intention-to-treat analysis were excluded due to insufficient documentation of adrenaline administration. Quality of cardiopulmonary resuscitation (CPR) and clinical outcomes were compared. Results: Clinical characteristics were similar and CPR quality comparable and within guideline recommendations for 367 patients receiving adrenaline and 481 patients not receiving adrenaline. Odds ratio (OR) for being admitted to hospital, being discharged from hospital and surviving with favourable neurological outcome for the adrenaline vs. no-adrenaline group was 2.5 (CI 1.9, 3.4), 0.5 (CI 0.3, 0.8) and 0.4 (CI 0.2, 0.7), respectively. Ventricular fibrillation, response interval, witnessed arrest, gender, age and endotracheal intubation were confounders in multivariate logistic regression analysis. OR for survival for adrenaline vs. no-adrenaline adjusted for confounders was 0.52 (95% CI: 0.29, 0.92). Conclusion: Receiving adrenaline was associated with improved short-term survival, but decreased survival to hospital discharge and survival with favourable neurological outcome after OHCA. This post hoc survival analysis is in contrast to the previous intention-to-treat analysis of the same data, but agrees with previous non-randomized registry data. This shows limitations of non-randomized or non-intention-to-treat analyses.

*Guideline 11.5: Medications in adult ALS*


Cardiopulmonary resuscitation (CPR) guidelines recommend specific chest compression (CC) target depths for children. We quantitatively describe relative anterior–posterior diameter (APD) depth, actual depth, and force of CCs during real CPR events in children. Methods: CC depth and force were recorded during real CPR events in children ≥8 years using FDA-approved CC sensor. Patient chest APD was measured at conclusion of each CPR event. CC data was stratified and analyzed according to age (pre-puberty, 8–14 years; post-puberty, 15+ years). Relative (% APD) and actual CC depth, corrected for mattress deflection, were assessed and compared with American Heart Association (AHA) 2005 and 2010 pediatric CPR guidelines. Results: 35 events in 32 subjects included 16,158 CCs for data analysis: 16 pre-puberty (CCs = 7484, age 11.9 ± 2 years, APD 164.6 ± 25.1 mm); 19 post-puberty (CCs = 8674, age 18.0 ± 2.7 years, APD 196.5 ± 30.4 mm). After correction for
mattress deflection, 92% of CC delivered to pre-puberty were <1/3 relative APD and 60% of CC were <38 mm actual depth. Mean actual CC depth (36.2 ± 9.6 mm vs. 36.8 ± 9.9 mm, p = 0.64), mean relative APD (22.5% ± 7.0% vs. 19.5 ± 6.7%, p = 0.13), and mean CC force (30.7 ± 7.6 kg vs. 33.6 ± 9.4 kg, p = 0.07) were not significantly less in pre-puberty vs. post-puberty. Conclusions: During in-hospital cardiac arrest of children ≥8 years, cardiac compressions delivered by resuscitation teams were frequently <1/3 relative APD and <38 mm actual depth after mattress deflection correction, below pediatric and adult target guidelines. Mean CC actual depth and force were not significantly different in pre-puberty and post-puberty. Additional investigation to determine depth of CCs to optimize hemodynamics and outcomes is needed to inform future CPR guidelines.

Guideline 6: Compressions

Animal models of hypertonic saline infusion during cardiopulmonary resuscitation (CPR) improve survival, as well as myocardial and cerebral perfusion during CPR. We studied the effect of hypertonic saline infusion during CPR (Guidelines 2000) on survival to hospital admission and hospital discharge, and neurological outcome on hospital discharge. Methods: The study was performed by the EMS of Bonn, Germany, with ethical committee approval. Study inclusion criteria were non-traumatic out-of-hospital cardiac arrest, aged 18–80 years, and given of adrenaline (epinephrine) during CPR. Patients were randomly infused 2 ml kg⁻¹ HHS (7.2% NaCl with 6% hydroxyethyl starch 200,000/0.5 [HES]) or HES over 10 min. Results: 203 patients were randomised between May 2001 and June 2004. After HHS infusion, plasma sodium concentration increased significantly to 162 ± 36 mmol l⁻¹ at 10 min after infusion and decreased to near normal (144 ± 6 mmol l⁻¹) at hospital admission. Survival to hospital admission and hospital discharge was similar in both groups (50/100 HHS vs. 49/103 HES for hospital admission, 23/100 HHS vs. 22/103 HES for hospital discharge). There was a small improvement in neurological outcome in survivors on discharge (cerebral performance category 1 or 2) in the HHS group compared to the HES group (13/100 HHS vs. 5/100 HES, p < 0.05, odds-ratio 2.9, 95% confidence interval 1.004–8.5). Conclusion: Hypertonic saline infusion during CPR using Guidelines 2000 did not improve survival to hospital admission or hospital discharge. There was a small improvement with hypertonic saline in the secondary endpoint of neurological outcome on discharge in survivors. Further adequately powered studies using current guidelines are needed.

Guideline 11.5: Medications in adult ALS

Strategies to restore sinus rhythm in patients with atrial fibrillation (AF) lasting less than 48 h with haemodynamic stability remain controversial. The aim of this study was to test the hypothesis that electrical cardioversion (EC) would be more effective and safer in converting acute AF to sinus rhythm, compared with intravenous propafenone treatment. Methods: In the emergency department (ED) of Valduce Hospital, a single-centre randomised trial was conducted to compare EC with pharmacological cardioversion (PC) to restore the sinus rhythm in selected patients with acute AF. A total of 247 patients were enrolled (121 in the EC group and 126 in the PC group). Results: EC was more successful than PC in restoring sinus rhythm. Successful cardioversion was achieved in 108 out of 121 patients in the EC group (89.3%) and 93 out of 126 patients in the PC group (73.8%) (HR in the EC group, 0.34; 95% CI 0.17 to 0.68; p=0.02). The time patients spent in the ED undergoing treatment was
significantly lower in the EC group compared with the PC group (median (range), 180 (120, 900) vs 420 (120, 1400) min; p<0.001). Conclusions: Electrical cardioversion was more effective in patients with acute AF and resulted in a shorter length of stay in the ED than PC. Adverse events were small in number and transient in both groups of patients.

Guideline 11.9: Managing acute dysrhythmias


We compare the efficacy and safety of sublingual buprenorphine versus intravenous morphine sulfate in emergency department adults with acute bone fracture. Methods: Enrolled patients received buprenorphine 0.4 mg sublingually or morphine 5 mg intravenously in this double-blind, double-dummy, randomized controlled trial. Patients graded their pain with a standard 11-point numeric rating scale before medication administration and 30 and 60 minutes after, and we recorded adverse reactions. Results: We analyzed 44 and 45 patients in the buprenorphine and morphine groups, respectively. Mean pain scores were similar at 30 minutes (5.0 versus 5.0; difference 0; 95% confidence interval 0.6 to 0.8) and at 60 minutes (2.2 versus 2.2; difference 0; 95% confidence interval 0.3 to 0.3). Adverse effects observed within 30 minutes were nausea (14% versus 12%), dizziness (14% versus 22%), and hypotension (4% versus 18%). Conclusion: For adults with acute fractures, buprenorphine 0.4 mg sublingually is as effective and safe as morphine 5 mg intravenously.


METHODOLOGY PAPER ONLY – twelve-month follow up is due to be completed in mid-2012. Experimental studies suggest that metabolic myocardial support by intravenous (IV) glucose, insulin, and potassium (GIK) reduces ischemia-induced arrhythmias, cardiac arrest, mortality, and progression from unstable angina pectoris to acute myocardial infarction (AMI), and myocardial infarction size. However, trials of hospital administration of IV GIK to patients with ST-elevation myocardial infarction (STEMI) have generally not shown favorable effects possibly because of the GIK intervention taking place many hours after ischemic symptom onset. A trial of GIK used in the very first hours of ischemia has been needed, consistent with the timing of benefit seen in experimental studies. Objective: The IMMEDIATE Trial tested whether, if given very early, GIK could have the impact seen in experimental studies. Accordingly, distinct from prior trials, IMMEDIATE tested the impact of GIK (1) in patients with acute coronary syndromes (ACS), rather than only AMI or STEMI, and (2) administered in prehospital emergency medical service settings, rather than later, in hospitals, after emergency department evaluation. Design: The IMMEDIATE Trial was an emergency medical service-based randomized placebo-controlled clinical effectiveness trial conducted in 13 cities across the United States that enrolled 911 participants. Eligible were patients 30 years or older for whom a paramedic performed a 12-lead electrocardiogram to evaluate chest pain or other symptoms suggestive of ACS for whom electrocardiograph-based acute cardiac ischemia time-insensitive predictive instrument indicated a > 75% probability of ACS, and/or the thrombolytic predictive instrument indicated the presence of a STEMI, or if local criteria for STEMI notification of receiving hospitals were met. Prehospital IV GIK or placebo was started immediately. Prespecified were the primary end point of progression of ACS to infarction and, as major secondary end points, the composite of cardiac arrest
or in-hospital mortality, 30-day mortality, and the composite of cardiac arrest, 30-day mortality, or hospitalization for heart failure. Analyses were planned on an intent-to-treat basis, on a modified intent-to-treat group who were confirmed in emergency departments to have ACS, and for participants presenting with STEMI. Conclusion: The IMMEDIATE Trial tested whether GIK, when administered as early as possible in the course of ACS by paramedics using acute cardiac ischemia time-insensitive predictive instrument and thrombolytic predictive instrument decision support, would reduce progression to AMI, mortality, cardiac arrest, and heart failure. It also tested whether it would provide clinical and pathophysiologic information on GIK's biological mechanisms.

Guideline 14: ACS

Observational studies

Pneumonia is the most common infectious complication of drowning. Pneumonia is potentially life threatening and should be treated by effective antibiotic therapy. However the risk factors, microbiological causes, diagnostic approach and appropriate therapy for pneumonia associated with drowning are not well described. The microbiological ecology of the body of water where immersion occurred could be of import. The aim of this study was to report on microorganisms involved in pneumonia associated with drowning and out of hospital cardiac arrest after successful cardiopulmonary resuscitation. Additionally, we retrieved and undertook microbiological analysis on samples of water from our local river.

Methods: This retrospective study included all patients having suffered an out of hospital cardiac arrest due to drowning and admitted to our tertiary care academic hospital between 2002 and 2010. Data concerning bacteriological lung samples (tracheal aspirate or broncho-alveolar lavage) at admission were reported and compared to bacteriological samples obtained from our local river (the river Seine). Results: A total of thirty-seven patients were included in the study. Lung samples were obtained for twenty-one of these patients. Lung samples were positive in nineteen cases, with a high frequency of multi-drug resistant bacteria. Samples from the Seine River found microorganisms similar to those found in drowning associated pneumonia. Conclusions: Drowning associated pneumonia can be due to multi drug resistant bacteria. When treating drowning associated pneumonia, antibiotics should be effective against bacteria similar to those found in the body of water where immersion occurred.

Objectives: Our aim was to describe long-term outcome of OHCA patients in a cohort of STEMI patients treated by primary PCI based on the EUROTRANSFER Registry data. Background: The occurrence of cardiac arrest is associated with impaired survival. There are a limited number of studies reporting outcome of STEMI patients with out-of-hospital cardiac arrest (OHCA) treated by primary percutaneous coronary
intervention (PCI). The recently published resuscitation guidelines of the European Resuscitation Council (ERC) support immediate angiography/PCI or fibrinolysis in these patients in order to improve survival. Methods: Consecutive data on 1650 STEMI patients, transferred for primary PCI in hospital STEMI networks between November 2005 and January 2007 from 7 countries in Europe were gathered. Patients were divided into two groups: OHCA group – 42 patients and no OHCA group – 1608 patients. Results: Baseline demographics, clinical characteristic on admission to catheterisation lab and past medical history were similar in both groups. Cardiogenic shock on admission or acute heart failure defined as Killip 3 + 4 was more frequently observed in OHCA group. The in-hospital mortality was similar, however, 1-year mortality was 19.1% in the OHCA group vs 8.1% in no OHCA group (p = 0.011) and remained significant after exclusion of patients in cardiogenic shock on admission. Conclusions: STEMI patients treated with primary PCI with out-of-hospital cardiac arrest have higher long-term mortality than no OHCA patients. However, resuscitation prior to catheterisation lab admission is not an independent predictor of long-term adverse outcome. No differences in in-hospital mortality were noticed.

Guideline 14: ACS


Objective: It is unclear whether advanced airway management during ambulance transport is associated with improved out-of-hospital cardiac arrest (OHCA) outcomes compared with bag-valve mask ventilation (BVM). This study aimed to determine whether EMT-intermediate ETI or LMA is associated with improved OHCA outcomes in Korea. Methods: We used a Korean national OHCA cohort database composed of hospital and ambulance data. We included all EMS-treated by level 1 EMTs (EMT-intermediate level) and OHCA with presumed cardiac etiology for the period January 2006–December 2008. We excluded cases not receiving continued resuscitation in the emergency department (ED), treated by level 2 EMT, as well as those without available hospital outcome data. The primary exposure was airway management technique during ambulance transport (endotracheal tube (ETI), laryngeal mask airway (LMA) or bag-valve-mask ventilation with an oropharyngeal airway). The primary outcomes were survival to admission and survival to hospital discharge. We compared outcomes between each airway management group using multivariable logistic regression, adjusting for sex, age, witnessed, prehospital defibrillation, bystander cardiopulmonary resuscitation (CPR), call to ambulance arrival time to the scene, call to ambulance arrival time to ED, initial ECG, metropolitan (defined as population > 1 million), and level of ED (higher versus lower level). We repeated the analysis using propensity-score matched subsets. Results: Of 54,496 patients with OHCA, we included 5278 (9.7%). Overall survival to admission and to discharge was 20.2% and 6.9%, respectively. ETI and LMA were performed in 250 (4.7%) and 391 (7.4%), respectively. In the full multivariable models using total patients, adjusted survival to admission and discharge were similar for ETI and BVM: OR 0.91 (0.66–1.27) and 1.00 (0.60–1.66), respectively. Adjusted survival to admission and discharge were significantly lower in LMA than BVM: OR 0.72 (0.54–0.95) and 0.52 (0.32–0.85), respectively. In the full multivariable models using propensity matched samples, adjusted survival to admission and discharge were similar for ETI and BVM; OR 1.32 (0.81–2.16) and 1.44 (0.66–3.15), respectively. Adjusted survival to admission was similar for LMA and BVM: OR 0.72 (0.50–1.02). However, survival to discharge was significantly lower for LMA than BVM: OR 0.45 (0.25–0.82). Conclusions: In Korea, EMT-I placed LMA during ambulance transport was associated with worsened OHCA survival to discharge than BVM. Outcomes were similar between EMT-I endotracheal intubation and bag-valve-mask ventilation.

Guideline 11.6: Equipment and techniques in adult ALS

Therapeutic temperature modulation is recommended after cardiac arrest (CA). However, body temperature (BT) regulation has not been extensively studied in this setting. We investigated body temperature variation (BT) in cardiac arrest (CA) patients treated with therapeutic hypothermia (TH) and analyzed its impact on outcome. Methods: A prospective cohort of comatose CA patients treated with TH (32–34 °C, 24 h) at the medical/surgical intensive care unit of the Lausanne University Hospital was studied. Spontaneous BT was recorded on hospital admission. The following variables were measured during and after TH: time to target temperature (TTT = time from hospital admission to induced BT target <34 °C), cooling rate (spontaneous BT − induced BT target/TTT) and time of passive rewarming to normothermia. Associations of spontaneous and induced BT with in-hospital mortality were examined. Results: A total of 177 patients (median age 61 years; median time to ROSC 25 min) were studied. Non-survivors (N = 90, 51%) had lower spontaneous admission BT than survivors (median 34.5 [interquartile range 33.7–35.9] °C vs. 35.1 [34.4–35.8] °C, p = 0.04). Accordingly, time to target temperature was shorter among non-survivors (200 [25–363] min vs. 270 [158–375] min, p = 0.03); however, when adjusting for admission BT, cooling rates were comparable between the two outcome groups (0.4 [0.2–0.5] °C/h vs. 0.3 [0.2–0.4] °C/h, p = 0.65). Longer duration of passive rewarming (600 [464–744] min vs. 479 [360–600] min, p < 0.001) was associated with mortality. Conclusions: Lower spontaneous admission BT and longer time of passive rewarming were associated with in-hospital mortality after CA and TH. Impaired thermoregulation may be an important physiologic determinant of post-resuscitation disease and CA prognosis. When assessing the benefit of early cooling on outcome, future trials should adjust for patient admission temperature and use the cooling rate rather than the time to target temperature.

Guideline 11.XX: Therapeutic hypothermia


Epinephrine is the drug of choice during advanced cardiac life support. The cumulative dose of epinephrine applied during resuscitation was shown to be independently associated with unfavourable outcome after ventricular fibrillation cardiac arrest in humans. Our objective was to investigate the association between the cumulative dose of epinephrine applied during resuscitation and unfavourable functional outcome and in-hospital mortality, in patients with asystole and pulseless electric activity. Methods: Data on 946 patients admitted to the emergency department after resuscitation of witnessed in-hospital and out-of hospital cardiac arrest with asystole or pulseless electric activity were retrieved from the cardiac arrest registry of the emergency department at the Vienna General Hospital/Medical University of Vienna. Data were documented according to Utstein Style. The risk factor was cumulative epinephrine categorized into quartiles. The endpoints were unfavourable functional outcome and in-hospital mortality. Results: The median cumulative amount of epinephrine administered was 2 mg (IQR 0–5), ranging from 1 to 50 mg. Of all patients 643/946 (68%) had an unfavourable functional outcome, 649/946 (69%) died during hospital stay. The multivariable analysis showed a statistically significant increasing risk for unfavourable functional outcome and in-hospital mortality outcome with increasing cumulative doses of epinephrine (unfavourable functional outcome: OR 1–1.45–2.25–2.95 over quartiles of epinephrine; in hospital mortality: OR 1–1.35–2.15–2.82 over quartiles of epinephrine). Conclusion: Our results show that an increasing cumulative dose of epinephrine during resuscitation of patients with asystole and pulseless electric activity is an independent risk factor for unfavourable functional outcome and
Guideline 11.5: Medications in adult ALS


Background: Foreign body aspiration (FBA) is one of the most important preventable causes of childhood mortality and morbidity. Objective: The aim of this study was to define the clinical and radiological features of FBA and investigate the diagnostic value of various parameters used to diagnose FBA. Methods: The medical records of 147 children who were admitted to the hospital with a diagnosis of suspected FBA were examined. The sensitivity and specificity of the parameters used for the diagnosis of FBA and their predictive values were calculated. Results: Of the patients, 75.5% were younger than 3 years, and 61.2% were male. Peak incidence was found in 18 months. A negative bronchoscopy rate of 19.7% was found, and 92.6% of these patients were younger than 3 years. The parameter with the highest diagnostic value was the presence of aspiration history (the sensitivity and positive and negative predictive values were 97%, 89%, and 80%, respectively). No significant difference was found in the classic triad of FBA (sudden onset of cough, wheezing, and unilaterally decreased breath sounds) between patients with and without FBA. The specificity and positive predictive value of the classic triad were high, and the sensitivity and negative predictive value were low (85% and 78%, and 13% and 19%, respectively). Conclusions: Especially, male children younger than 3 years have an increased risk of FBA. Neither clinical symptoms nor the radiological findings alone are sufficiently specific and sensitive in diagnosing FBA. The most important factor for diagnosis is the presence of aspiration history.


Context: Epinephrine is widely used in cardiopulmonary resuscitation for out-of-hospital cardiac arrest (OHCA). However, the effectiveness of epinephrine use before hospital arrival has not been established. Objective: To evaluate the association between epinephrine use before hospital arrival and short- and long-term mortality in patients with cardiac arrest. Design, Setting, and Participants: Prospective, nonrandomized, observational propensity analysis of data from 417 188 OHCAs occurring in 2005-2008 in Japan in which patients aged 18 years or older had an OHCA before arrival of emergency medical service (EMS) personnel, were treated by EMS personnel, and were transported to the hospital. Main Outcome Measures: Return of spontaneous circulation before hospital arrival, survival at 1 month after cardiac arrest, survival with good or moderate cerebral performance (Cerebral Performance Category [CPC] 1 or 2), and survival with no, mild, or moderate neurological disability (Overall Performance Category [OPC] 1 or 2). Results: Return of spontaneous circulation before hospital arrival was observed in 2786 of 15 030 patients (18.5%) in the epinephrine group and 23 042 of 402 158 patients (5.7%) in the no-epinephrine group (P < .001); it was observed in 2446 (18.3%) and 1400 (10.5%) of 13 401 propensity-matched patients, respectively (P < .001). In the total sample, the numbers of patients with 1-month survival and survival with CPC 1 or 2 and OPC 1 or 2, respectively, were 805 (5.4%), 205 (1.4%), and 211 (1.4%) with epinephrine and 8906 (4.7%), 8903 (2.2%), and 8831 (2.2%) without epinephrine (all P <.001). Corresponding numbers in propensity-matched patients were 687 (5.1%), 173 (1.3%), and 178 (1.3%) with epinephrine and 944 (7.0%), 413 (3.1%), and 410 (3.1%) without epinephrine (all P <.001). In all patients, a positive association was observed between prehospital epinephrine and return of spontaneous circulation before hospital arrival (adjusted odds ratio [OR], 2.36; 95% CI, 2.22-2.50; P < .001). In propensity-matched patients, a positive association was also observed.
(adjusted OR, 2.51; 95% CI, 2.24-2.80; \( P < .001 \)). In contrast, among all patients, negative associations were observed between prehospital epinephrine and long-term outcome measures (adjusted ORs: 1-month survival, 0.46 [95% CI, 0.42-0.51]; CPC 1-2, 0.31 [95% CI, 0.26-0.36]; and OPC 1-2, 0.32 [95% CI, 0.27-0.38]; all \( P < .001 \)). Similar negative associations were observed among propensity-matched patients (adjusted ORs: 1-month survival, 0.54 [95% CI, 0.43-0.68]; CPC 1-2, 0.21 [95% CI, 0.10-0.44]; and OPC 1-2, 0.23 [95% CI, 0.11-0.45]; all \( P < .001 \)). Conclusion: Among patients with OHCA in Japan, use of prehospital epinephrine was significantly associated with increased chance of return of spontaneous circulation before hospital arrival but decreased chance of survival and good functional outcomes 1 month after the event. 

Guideline 11.5: Medications in adult ALS


Little is known about the safety of intravenous fentanyl for adult trauma patients in the prehospital setting. Our objective was to study the hemodynamic effect of prehospital intravenous fentanyl in initially normotensive adult trauma patients. METHODS: A quasi-experimental design was used to compare adult trauma patients who received intravenous fentanyl and those who did not receive fentanyl in a large regional prehospital system and its affiliated Level I trauma center. Emergent adult trauma patients were included with an initial prehospital Glasgow Coma Scale score of ≥13 and systolic blood pressure >90 mm Hg. Patients were stratified into two groups, those who received a single dose of intravenous fentanyl (100 μg) and those who did not. The outcome was initial emergency department (ED) shock index (heart rate divided by systolic blood pressure). Multivariable linear regression was used to estimate the effect of fentanyl on ED shock index while adjusting for prehospital shock index, age, gender, Trauma Injury Severity Score, and the propensity for receiving fentanyl. RESULTS: Seven hundred sixty-three patients were included, of whom 217 (28%) received fentanyl. The groups had comparable demographics (age, gender, and race/ethnicity) but different clinical characteristics (ED vital signs, Injury Severity Score, mechanism, and ED disposition). The adjusted ED shock index of fentanyl patients improved (-0.03; 95% confidence interval: -0.05 to 0.00; \( p = 0.02 \)) compared with no fentanyl. CONCLUSION: Prehospital intravenous fentanyl did not adversely affect the initial ED shock index in adult trauma patients. Additional research should be performed to confirm and extend our findings.


Trauma centers are more frequently evaluating patients who are receiving anticoagulant or prescription antiplatelet (ACAP) therapy at the time of injury. Because there are reports of delayed intracranial hemorrhage (ICH) after blunt trauma in this patient group, we evaluated patients receiving anticoagulant or prescription antiplatelet (ACAP) with a head computed tomography (CT) on admission (CT1) followed by a routine repeat head CT (CT2) in 6 hours. We hypothesized that among patients with no traumatic findings on CT1 and a normal or unchanged interval neurologic examination, the incidence of clinically significant delayed ICH would be zero. Methods: We retrospectively reviewed adult blunt trauma patients admitted to our Level I trauma center from January 2006 to August 2009 who were receiving preinjury ACAP therapy. We reviewed medications, mechanism of injury, head CT results, and outcomes. Demographic data, injury severity scores, international normalized ratio, and neurologic examinations were recorded. We determined the incidence of delayed ICH on CT2 for patients with a negative CT1. Results: Five hundred patients qualified for the protocol. Of these, 424 patients (85%) had a negative CT1. Among these patients, mean age
was 75 years; 210 (50%) were male. Fall from standing was the most common mechanism of injury found in 357 patients (84%). Warfarin alone was taken in 68%, clopidogrel alone in 24%, and other agents in 2%. Six percent of patients were taking two agents. Mean international normalized ratio for patients on warfarin was 2.5. Among patients with a negative CT1, CT2 was obtained in 362 patients (85%) and was negative in 358 patients (99%). Four patients (1%) with a negative CT1 had a positive (n = 3) or equivocal (n = 1) CT2. All the changes on CT2 were minor and had either resolved or stabilized on third head CT. Of the four patients with positive or equivocal CT2, none had a change in neurologic examination; however, two had symptoms that could be attributed to head injury. Three were discharged home and one died of cardiac disease unrelated to head trauma. Conclusions: The incidence of delayed ICH in our study was 1%. However, none of the delayed findings were clinically significant. Among patients on ACAP therapy with a negative CT1 and a normal or unchanged neurologic examination, a routine CT2 is unnecessary. We recommend a period of observation to recognize those patients with symptoms that could be due to delayed ICH.


Introduction: In patients with isolated severe traumatic brain injury (TBI), the effect of controlled, therapeutic hypothermia on outcomes has been studied extensively. What is not well understood, however, and the purpose of this study, was to examine the impact of non-induced, nontherapeutic hypothermia on outcomes in these patients. Methods: A retrospective review of the institutional trauma registry at the Los Angeles County + University of Southern California Medical Center was performed to identify all trauma patients admitted to the surgical intensive care unit (SICU) with isolated severe TBI from January 2000 to December 2008. Patients were classified as hypothermic (core temperature [Tc] < 35C) or normothermic (Tc >35C) based on their first Tc recorded on SICU admission. The primary outcome measure was in-hospital mortality, and secondary outcomes included SICU and hospital length of stay. Results: During the study period, 1,403 patients sustaining an isolated severe TBI were admitted to the SICU. After excluding 122 patients with missing temperature data, 1,281 patients were analyzed. Hypothermia (Tc ≤ 35C) on SICU admission was identified in 10.9% (n = 140) of the study population, with the remaining 89.1% (n = 1,141) being normothermic (Tc > 35C). After adjusting for differences in baseline characteristics between the two groups, patients who were hypothermic on SICU admission were found to be significantly less likely to survive (odds ratio, 2.9; 95% confidence interval, 1.3, 6.7; p < 0.013). A penetrating mechanism of injury, Injury Severity Score ≥ 25, and undergoing an exploratory laparotomy before admission were found to be independent risk factors for the development of hypothermia on SICU admission. Conclusion: For patients who have sustained isolated severe TBI, the presence of non-induced, nontherapeutic hypothermia on SICU admission is associated with a significant increase in mortality. The impact of preventative measures used to avoid the development of hypothermia and the effectiveness of measures for restoring normothermia warrant further investigation.


To determine the frequency and characteristics of prehospital deaths compared with hospital deaths in different subpopulations with severe injuries. METHODS: Population-based cohort study using person-based linkage of the Swedish nationwide hospital discharge register with death certificate data. In all, 28,715 injury deaths were identified among 419,137 cases of severe injury during 1998 to 2004. Prehospital deaths
were defined as autopsied out-of-hospital deaths with injury as the underlying cause. Their impact on mortality prediction was assessed using the International Classification of Disease Injury Severity Score with the C statistic as a measure of discrimination. RESULT: The majority of all injury deaths occurred either at the scene or before hospitalization. Among persons younger than 65 years, for each hospital death there were nine prehospital deaths. A high proportion of deaths from drowning, suffocation, and firearm injuries were prehospital (85, 82, and 67% of all cases, respectively). More than 90% of hospital deaths resulted from unintentional injuries, while only 43% of prehospital deaths were unintentional. The largest increase in a cause-specific case fatality risk estimate was seen for poisoning, where inclusion of prehospital deaths increased the risk estimate from 1.6% to 22.8%. Injury mortality prediction based on International Classification of Disease Injury Severity Score improved when prehospital deaths were added to hospital data (C statistic increased from 0.86 to 0.93). CONCLUSIONS: Prehospital deaths constitute the majority of trauma deaths and differ in major characteristics from hospital deaths. The high proportion of prehospital deaths among young and middle aged people highlights the potential impact of preventive efforts.


There is ongoing controversy about the relative effectiveness of air medical versus ground transportation for severely injured patients. In some systems, air medical crews may provide a higher level of care but may require longer transport times. We sought to evaluate the impact of mode of transport on outcome based on analysis of data from two randomized trials of prehospital hypertonic resuscitation. METHODS: Injured patients were enrolled based on prehospital evidence of hypovolemic shock (systolic blood pressure ≤70 mm Hg or systolic blood pressure = 71–90 mm Hg with heart rate ≥108 bpm) or severe traumatic brain injury (TBI; Glasgow Coma Scale score ≤8). Patient demographics, injury severity, and physiology were compared based on mode of transport. Multivariate logistic regression was used to determine the impact of mode of transport on 24-hour and 28-day survival for all patients and 6-month extended Glasgow Outcome Scale for patients with TBI, adjusting for differences in injury severity. RESULTS: Included were 2,049 patients, of which 703 (34%) were transported by air. Patients transported by air were more severely injured (mean Injury Severity Score, 30.3 vs. 22.8; p < 0.001), more likely to be in the TBI cohort (70% vs. 55.4%; p < 0.001), and more likely blunt mechanism (94.0% vs. 78.1%; p < 0.001). Patients transported by air had higher rates of prehospital intubation (81% vs. 36%; p < 0.001), received more intravenous fluids (mean 1.3 L vs. 0.8 L; p < 0.001), and had longer prehospital times (mean 76.1 minutes vs. 43.5 minutes; p < 0.001). Adjusted analysis revealed no significant impact of mode of transport on survival or 6-month neurologic outcome (air transport—28-day survival: odds ratio, 1.11; 95% confidence interval, 0.82–1.51; 6-month extended Glasgow Outcome Scale score ≤4: odds ratio, 0.94; 95% confidence interval, 0.68–1.31). CONCLUSION: There was no difference in the adjusted clinical outcome according to mode of transport. However, air medical transported more severely injured patients with more advanced life support procedures and longer prehospital time.


The potential health benefits of mobile phone use have not been widely studied, except for telemedicine-type applications. This study seeks to determine whether initial contact with emergency services via a mobile phone in life-threatening situations is associated with potential health benefits when compared to contact via a landline. Methods: A record-linkage study was carried out in which data from all emergency dispatches
for immediately life-threatening events from a United Kingdom county ambulance service were linked to the Patient Admission System at two major local hospitals. Mortality (at the scene, at the emergency department [ED], and during hospitalization); transfer to the ED; admission (inpatient care, and intensive care unit); and length of stay were analyzed for calls classified as Code Red (immediately life-threatening) by initial exposure (mobile phone vs. landline), while controlling for potential confounding variables. Results Of 354,199 ambulances dispatched to attend emergency incidents, 66% transported patients to the hospital while 2% stood down due to death at the scene. Mobile phone compared to landline reporting of emergencies resulted in significant reductions in the risk of death at the scene (odds ratio [OR] 0.77), but not for death in the ED or during inpatient admission. The risk of being transferred to the ED and subsequent inpatient admission were significantly lower with reporting from mobile phones compared to landline (OR 0.93 and OR 0.82, respectively). Conclusions: In this study, evidence of statistical association was demonstrated between the use of mobile phones to alert ambulance services in life-threatening situations and improved outcomes for patients.


Background: Studies of patients presenting with coma are limited, and little is known about the prognosis of these cases. Objective: The aim of this study was to investigate the acute and long-term prognosis after an episode of non-traumatic coma. Methods: Adults admitted consecutively to an emergency department in Stockholm, Sweden between February 2003 and May 2005 with a Glasgow Coma Scale (GCS) score of 10 or below were enrolled prospectively. All available data were used to explore the cause of the impaired consciousness on admission. Patients surviving hospitalization were followed-up for 2 years regarding survival. Results: The final study population of 865 patients had the following eight different coma etiologies: poisoning (n = 329), stroke (n = 213), epilepsy (n = 113), circulatory failure (n = 60), infection (n = 56), metabolic disorder (n = 44), respiratory insufficiency (n = 33), and intracranial malignancy (n = 17). The hospital mortality rate among the 865 patients was 26.5%, varying from 0.9% for epilepsy to 71.7% for circulatory failure. The accumulated total 2-year mortality rate was 43.0%, varying from 13.7% for poisoning to 88.2% for malignancy. The level of consciousness on admission also influenced the prognosis: a GCS score of 3-6 was associated with a significantly higher hospital mortality rate than a GCS score of 7-10. Conclusion: The prognosis in patients presenting with non-traumatic coma is serious and depends largely on both the level of consciousness on admission and the etiology of the coma. Adding the suspected coma etiology to the routine coma grading of these emergencies may more accurately predict their prognosis.

Unconsciousness


Performance outcome measures are an essential component of health service improvement. Whereas hospital critical care services have established performance measures, prehospital care services have less well-established outcome measures and this has been identified as a key issue for development. Individual studies examining long-term survival and functional outcome measures have previously been used to evaluate prehospital care delivery. There is no set of standardised patient outcome measures for Helicopter Emergency Medical Services (HEMS) in the UK or Air Medical Services (AMS) in Australia. The aim of this study is to document the patient outcome measures currently in use within British HEMS and Australian AMS. Methods: This is an observational study analysing point prevalence of practice as of November 2009. A structured questionnaire was designed to assess the method of routine patient follow-up, and the timing and nature of applied patient
outcome measures. Results: Full responses were received from 17/21 (81%) British services and 6/7 (86%) Australian services. The overall response rate was 82%. Conclusions: HEMS in Britain and Australian aeromedical retrieval services do not have uniform patient outcome measures. Services tend not to follow-up patients beyond 24h post transfer. Patient outcome data are rarely presented to an external organisation and there is no formal data comparison between surveyed services. Services are not satisfied that the data currently being collected reflects the quality of their service.


The goal of this investigation is to discover whether or not patients with psychiatric diagnoses are less likely to be prescribed opioids for pain in emergency departments compared with other patients. Methods: Pain-related visits to US emergency departments were identified using reason-for-visit and physician diagnosis codes for 13 years (1993 -2005) of the National Hospital Ambulatory Medical Care Survey. The outcome measure was the prescription or administration of an opioid analgesic. Results: Roughly 10 million pain-related visits were made by persons with psychiatric diagnoses in the USA between 1993 and 2005. Across all years, only 18% (95% CI 16 to 20) of pain-related visits by patients with psychiatric diagnoses resulted in an opioid prescription, whereas 33% (95% CI 32 to 34) of visits by other patients did. Lower prescription rates for patients with psychiatric diagnoses were seen for every year of the survey and this difference occurred at every level of pain severity. Controlling for confounding factors did not attenuate this difference. In a multivariate model, patients with psychiatric diagnoses were about half as likely as other patients to be prescribed opiates (adjusted OR 0.49; 95% CI 0.44 to 0.56). Major limitations of the study include the uncertain precision of psychiatric and drug/alcohol diagnoses and the lack of detail about each patient visit. Conclusion: Having a psychiatric diagnosis was associated with a lower likelihood of receiving an opioid among persons presenting with pain to the ED.


Objectives: To ascertain current use of therapeutic hypothermia (TH) after paediatric cardiac arrest in UK emergency departments (EDs), and views on participating in a UK randomised controlled trial (RCT) incorporating early induction of TH in ED. Design: Anonymous web-based survey of 77 UK Emergency Medicine (EM) consultants from 28 UK EDs that see children during the period April - June 2010. Results 62% (48/77) of surveyed consultants responded from 21/28 (75%) EDs. All managed children post cardiac arrest. 90% (43/48) were aware of the literature concerning TH after cardiac arrest in adults. However, 63% (30/48) had never used TH in paediatric practice. All departments had at least one method of inducing TH (surface cooling; air/water blankets; intravenous cold fluid or catheters). Reasons stated for not inducing TH included no equipment available (26%; 11/42), TH not advocated by the local PICU (24%; 10/42) and not enough evidence for its use (24%; 10/42). TH was considered based on advice from the local Paediatric Intensive Care Units (68%; 17/25) or likelihood of recovery after arrest (32%; 8/25). There was strong support for a UK RCT of TH versus normothermia (85%; 40/47). The proposed RCT was felt to be ethical (87%; 40/48) with use of deferred consent acceptable (74%; 34/46). Conclusion: UK EM consultants are aware of TH but infrequently initiate the therapy in children for a number of reasons. Their involvement would enable early induction of TH in EDs after paediatric cardiac arrest during a UK RCT. The authors have demonstrated the availability of suitable equipment and EM consultant support for participation in such a RCT. Guideline 11.8: Therapeutic hypothermia after cardiac arrest

Urgent analgesia is essential for all children who present in severe pain, but difficulties in obtaining venous access can delay the use of adequate opiate analgesia. Intranasal diamorphine (IND) is now in use in around 60% of emergency departments and is the preferred choice of analgesia as reported by both parents and healthcare professionals. While IND has similar efficacy to intramuscular morphine in children, no study has compared its use against the current gold standard, intravenous morphine (IVM). Methods: IND was introduced to the Royal Aberdeen Children's Hospital on 24 December 2009. A retrospective case series was constructed to compare its clinical performance with its predecessor IVM. Three unexplored factors were investigated: time to opiate analgesia, the requirement for further analgesia when still in the emergency department and the effect of simple co-analgesia (eg, paracetamol/ibuprofen) on these requirements. Results: 297 patients were eligible for the study (147 IND, 150 IVM) over a 28-month period. There was a non-significant trend to a longer median time to administration of analgesia in patients receiving IND (p=0.170). Patients who received IND were less likely to require further analgesia (p<0.001). Both groups were less likely to require further analgesia when simple co-analgesia was given (p=0.049). Conclusion: The authors found no significant difference in time to administration of analgesia between agents, but a learning curve has been identified. Sustained effort should be placed on the use of simple co-analgesia. The clinical performance of IND compares favourably with IVM in children with severe pain, and it remains an appropriate preferred agent.


The authors set out to investigate perceived and actual availability of antidotes recommended for stocking in emergency departments (EDs) by the College of Emergency Medicine in EDs in the South West of England. Methods: Data collectors were asked to physically locate each relevant antidote in the ED, and check whether the recommended quantity was available. If the antidote was not available in the department, the data collector located where in the hospital stocks were available. Senior medical and nursing staff were asked to specify where they believed the antidotes were stored or whom they would ask if they did not know. It was then ascertained whether their source of advice would have known the location. Results: 5 out of 6 departments returned data with an overall response rate from senior medical and nursing staff of 80%. Knowledge of common antidote locations was variable, and stocking of antidotes did not universally meet the College of Emergency Medicine recommendations. Conclusion: Stocking of important antidotes should be rationalised and simplified using central locations, preferably close to the ED. Clinically important antidotes may not be available for patients when they need them. Clear guidance should be available for staff detailing the location of antidotes. There is a need for clarification around the treatment of cyanide poisoning to facilitate rational antidote stocking for this potentially lethal condition.

Guideline 9.5.1: Emergency Management of a Victim who has Been Poisoned


To evaluate the accuracy of a 2-h serial multiple biomarker (SMB) protocol for exclusion of myocardial infarction (MI) in the Emergency
Department. Methods: A prospective, multicentre, observational study enrolled patients undergoing evaluation for possible MI. Blood samples at presentation and 2h later were analysed for myoglobin, creatinine kinase-MB, troponin-I and B-natriuretic peptide. Thrombolysis in Myocardial Infarction (TIMI) score and National Heart Foundation of Australia/Cardiac Society of Australia and New Zealand (NHF/CSANZ) guideline for acute coronary syndrome were used to determine clinical risk. Primary outcome was MI diagnosed at index presentation. Secondary outcome was composite of all-cause mortality, MI and previously unplanned coronary revascularisation within 30 days. Results: 1758 patients were recruited. 168 (11%) of 1501 with data sufficient for analysis had MI, and 223 (14%) of 1620 had a secondary outcome. SMB sensitivity and specificity were 0.90 (95% CI 0.84 to 0.94) and 0.41 (95% CI 0.39 to 0.44) for MI. For 30-day outcome, SMB sensitivity and specificity were 0.84 (95% CI 0.78 to 0.88) and 0.41 (95% CI 0.39 to 0.44), compared with standard 8–12 h troponin sensitivity and specificity of 0.79 (95% CI 0.73 to 0.84) and 0.96 (95% CI 0.95 to 0.97). Combined with risk scores, SMB had sensitivity and specificity for MI of 0.99 (95%CI 0.96 to 1.00) and 0.11 (95% CI 0.09 to 0.12) for TIMI score 0, compared with 0.98 (95% CI 0.94 to 0.99) and 0.31 (95% CI 0.29 to 0.34) for NHF/CSANZ low/intermediate risk groups.

Conclusions: This serial multiple biomarker protocol alone is not sufficiently sensitive to exclude MI. Combined with risk scoring, SMB appears to identify patients at lower risk. This requires prospective validation.

Guideline 14: ACS


To describe the profile and success rates of emergency endotracheal intubation conducted by the Queensland Royal Flying Doctor Service aeromedical retrieval team comprising a doctor and flight nurse. Method: Each intubator completed a study questionnaire at the time of each intubation for indications, complications, overall success, drugs utilised and deployment of rescue airway devices/adjuncts. Results: 76 patients were intubated; 72 intubations were successful. None required surgical airway and three were managed with laryngeal mask airways; the remaining failure was managed with simple airway positioning for transport. There were two cardiac arrests during intubation. Thiopentone and suxamethonium were the predominant drugs used to facilitate intubation. Conclusion: Despite a low rate of endotracheal intubation, the high success rate was similar to other aeromedical organisations' published airway data. This study demonstrates the utility of the laryngeal mask airway device in the retrieval and transport setting, in particular for managing a failed intubation.

Guideline 11.6: Equipment and techniques in adult ALS


Hanging is an infrequent but devastating cause of out-of-hospital cardiac arrest (OHCA). We determine the characteristics and outcomes of hanging-associated OHCA in Melbourne Australia. Methods: A 10-year retrospective case review of all adult hangings (aged >16 years) associated with OHCA, was conducted using data from the Victorian Ambulance Cardiac Arrest Registry. Results: Between 2000 and 2009, the emergency medical service (EMS) attended 33,178 adult OHCA of which 1321 (4%) had hanging as the aetiology. The median age (IQR) of hanging-associated OHCA cases was 39 (29, 51) years and 1162 were men (88%). The first recorded rhythm by EMS was asystole seen in 1276 (75.5%) patients, pulseless electrical activity (PEA) in 38 (13.4%) cases and ventricular fibrillation in 7 cases (0.5%). EMS attempted resuscitation in 208 (15.7%) patients of whom 61 (29.3%) achieved return of spontaneous circulation (ROSC) and were transported, and 7
(3.3%) survived to hospital discharge. Hanging-associated OHCAs were younger (median (IQR) 38 (29, 51) years versus 74 (61, 82) years, p<0.001), less likely to have a shockable rhythm (0.5% vs 17.2%, p<0.001), receive bystander cardiopulmonary resuscitation (14.1% vs 25.5%, p<0.001) or an attempted resuscitation by EMS (15.7% vs 36.1%, p<0.001) compared with OHCA cases with aetiology of 'presumed cardiac' arrest. Multivariable logistic regression identified factors associated with EMS decision to attempt resuscitation; the adjusted OR (95% CI) for presence of bystander cardiopulmonary resuscitation was 15.8 (10.70, 23.30) and for witnessed arrest was 5.26 (1.17, 23.30). Conclusion: Attempted resuscitation was not always futile with a survival of 3.3%. A preventive focus is needed.


In the UK, epilepsy is the neurological condition with the highest rate of accident and emergency department re-attendance, with most arriving by ambulance. Ambulance clinicians triage patients and assess their need for attendance. This study examined the decision-making process of ambulance clinicians in these situations. Methods: In-depth interviews with 15 ambulance clinicians working in South London. Results: Interviewees identified that epileptic seizures that self-resolve present a triage challenge. They reported insufficient training and guidance available for these situations and substantial reliance on experience to direct their practice. Fears of litigation in the event of complications, pressures of public expectation and limited on-scene access to relevant patient information or appropriate alternative care pathways were reported to be significant factors influencing decisions for care for epilepsy seizures. Discussion: Ambulance clinicians reported negotiating a balance between patient safety and patient choice, when deciding whether to transport a patient with epilepsy to hospital or not. Clinician fears and the pressures and limitations of practice may result in hospital conveyance being used as a safety precaution in some instances.

Conclusions: Decisions regarding conveyance of patients with epilepsy in this study were substantially guided by ambulance clinician experience rather than by robust training and guidelines. This study supports the need for improved guidance that addresses this common area of practice and the development of alternative care pathways that may be used by ambulance clinicians for patients with epilepsy.


High-echoic objects in the hepatic vessels of patients with cardiopulmonary arrest (CPA) are frequently detected by ultrasonography. Objective: To demonstrate this phenomenon and clarify its clinical characteristics. Methods: In a tertiary care academic medical centre, 203 CPA patients were evaluated by ultrasonography. CT determined the origin and location of high-echoic objects detected in the liver. The frequency and characteristics of this phenomenon were investigated. The background, laboratory data and survival rate were compared between patients with and without high-echoic objects. Results: High-echoic objects were seen in 73 (36.0%) patients and could clearly be detected in the hepatic veins of 41 (56.2%) patients. CT confirmed that these were gas in 27 of 53 patients, and were clearly visible in the hepatic veins in 12 (44.4%) patients. Hepatic portal venous gas was not identified. Compared to patients without high-echoic objects, witnessed arrest (p<0.001), bystander cardiopulmonary resuscitation (p=0.005), ventricular fibrillation or pulseless electrical activity (p=0.012) and return of spontaneous circulation (p=0.018) were significantly less frequent in patients with high-echoic objects. These patients had a lower incidence of survival to discharge (1.4% vs 7.7%, p=0.100). Multivariate analysis showed that absence of high-echoic objects was a marginally significant factor in association with return of spontaneous circulation (p=0.052). Conclusions: High-echoic objects were often observed on ultrasonography in CPA patients;
these objects were considered hepatic venous gas. The presence of high-echoic objects may be a poor prognostic sign in patients with CPA.


Hypothermia at hospital admission has been found to independently predict increased mortality in trauma patients. Objectives: To establish if patients anaesthetised in the prehospital phase of care had a higher rate of hypothermia than non-anaesthetised patients on admission to hospital. Methods: Retrospective review of admission body temperature in 1292 consecutive prehospital trauma patients attended by a physician-led prehospital trauma service admitted to The Royal London Hospital between 1 July 2005 and 31 December 2008. Results: 38% had a temperature recorded on admission. There was a significant difference in body temperature between the anaesthetised group (N=207) and the non-anaesthetised group (N=287): mean (SD) 35.0 (2.1) vs 36.2 (1.0) C, respectively (p < 0.001). No significant seasonal body temperature variation was demonstrated. Conclusion: This study confirmed that patients anaesthetised in the prehospital phase of care had a significantly lower admission body temperature. This has led to a change in the author's prehospital practice. Anaesthetised patients are now actively surface heated and have whole body insulation to prevent further heat loss in an attempt to conserve body temperature and improve outcome. This is an example of best in-hospital anaesthetic practice being carried out in the prehospital phase.


Objective: To assess the relation between troponin concentration, assay precision, and clinical outcomes in patients with suspected acute coronary syndrome. Design: Cohort study. Setting: Tertiary centre in Scotland. Participants: 2092 consecutive patients admitted with suspected acute coronary syndrome were stratified with a sensitive troponin I assay into three groups (<0.012, 0.012-0.049, and ≥0.050 µg/L) based on the 99th centile for troponin concentration (0.012 µg/L; coefficient of variation 20.8%) and the diagnostic threshold (0.050 µg/L; 7.2%). Main outcome measure: One-year survival without events (recurrent myocardial infarction, death) in patients grouped by troponin concentration. Results: Troponin I concentrations were <0.012 µg/L in 988 patients (47%), 0.012-0.049 µg/L in 352 patients (17%), and ≥0.050 µg/L in 752 patients (36%). Adoption of the 99th centile would increase the number of people receiving a diagnosis of myocardial infarction from 752 to 1104: a relative increase of 47%. At one year, patients with troponin concentrations of 0.012-0.049 µg/L were more likely to be dead or readmitted with recurrent myocardial infarction than those with troponin concentrations <0.012 µg/L (13% v 3%, P<0.001; odds ratio 4.7, 95% confidence interval 2.9 to 7.9). Compared with troponin ≥0.050 µg/L, patients with troponin 0.012-0.049 µg/L had a higher risk profile but were less likely to have a diagnosis of, or be investigated and treated for, acute coronary syndrome. Conclusion: Lowering the diagnostic threshold to the 99th centile and accepting greater assay imprecision would identify more patients with acute coronary syndrome at risk of recurrent myocardial infarction and death but would increase the diagnosis of myocardial infarction by 47%. It remains to be established whether reclassification of these patients and treatment for myocardial infarction would improve outcome.

Guideline 14: ACS

Advanced, out-of-hospital procedures such as intravenous access are commonly performed by emergency medical services (EMS) personnel, yet little evidence supports their use among noninjured patients. We evaluate the association between out-of-hospital, intravenous access and mortality among noninjured, non-cardiac arrest patients. Methods: We analyzed a population-based cohort of adult (aged <18 years) noninjured, non-cardiac arrest patients transported by 4 advanced life support agencies to one of 16 hospitals from January 1, 2002, until December 31, 2006. We linked eligible EMS records to hospital administrative data and used multivariable logistic regression to determine the risk-adjusted association between out-of-hospital intravenous access and hospital mortality. We also tested whether this association differed by patient acuity by using a previously published, out-of-hospital triage score. Results: Among 56,332 eligible patients, half (N=28,078; 50%) received out-of-hospital intravenous access from EMS personnel. Overall hospital mortality for patients who did and did not receive intravenous access was 3%. However, in multivariable analyses, the placement of out-of-hospital, intravenous access was associated with an overall reduction in odds of hospital mortality (odds ratio=0.68; 95% confidence interval [CI] 0.56 to 0.81). The beneficial association of intravenous access appeared to depend on patient acuity (P = 0.13 for interaction). For example, the odds ratio of mortality associated with intravenous access was 1.38 (95% CI 0.28 to 7.0) among patients with lowest acuity (score=0). In contrast, the odds ratio of mortality associated with intravenous access was 0.38 (95% CI 0.17 to 0.9) among patients with highest acuity (score ≥ 6). Conclusion: In this population-based cohort, out-of-hospital efforts to establish intravenous access were associated with a reduction in hospital mortality among noninjured, non-cardiac arrest patients with the highest acuity. Reasons why this occurred (cause and effect) could not be determined in this model.


The variable effectiveness of clinical asthma pathways to reduce hospital admissions may be explained in part by the timing of systemic corticosteroid administration. We examine the effect of early (within 60 minutes [SD 15 minutes] of triage) versus delayed (> 75 minutes) administration of systemic corticosteroids on health outcomes. Methods: We conducted a prospective observational cohort of children aged 2 to 17 years presenting to the emergency department with moderate or severe asthma, defined as a Pediatric Respiratory Assessment Measure (PRAM) score of 5 to 12. The outcomes were hospital admission, relapse, and length of active treatment; they were analyzed with multivariate logistic and linear regressions adjusted for covariates and potential confounders. Results: Among the 406 eligible children, 88% had moderate asthma; 22%, severe asthma. The median age was 4 years (interquartile range 3 to 8 years); 64% were male patients. Fifty percent of patients received systemic corticosteroids early; in 33%, it was delayed; 17% of children failed to receive any. Overall, 36% of patients were admitted to the hospital. Compared with delayed administration, early administration reduced the odds of admission by 0.4 (95% confidence interval 0.2 to 0.7) and the length of active treatment by 0.7 hours (95% confidence interval 1.3 to 0.8 hours), with no significant effect on relapse. Delayed administration was positively associated with triage priority and negatively with PRAM score. Conclusion: In this study of children with moderate or severe asthma, administration of systemic corticosteroids within 75 minutes of triage decreased hospital admission rate and length of active treatment, suggesting that early administration of systemic corticosteroids may allow for optimal effectiveness.

Current guidelines recommend an immediate (eg ≤ 10 minutes) 12-lead electrocardiogram (ECG) to identify ST-elevation myocardial infarction (STEMI) among patients presenting to the emergency department (ED) with chest pain. Yet, one third of all patients with myocardial infarction do not have chest pain. Our objective was to develop a practical approach to identify patients, especially those without chest pain, who require an immediate ECG in the ED to identify STEMI. Methods: An ECG prioritization rule was derived and validated using classification and regression tree analysis among > 3 million ED visits to 107 EDs from 2007 to 2008. Results: The final study population included 3,575,178 ED patient visits; of these, 6,464 (0.18%) were diagnosed with STEMI. Overall, 1,413 (21.9%) of patients with STEMI did not present to the ED with chest pain. Major predictors of those requiring an immediate ECG in the ED included age >30 years with chest pain; age >50 years with shortness of breath, altered mental status, upper extremity pain, syncope, or generalized weakness; and those with age >80 years with abdominal pain or nausea/vomiting. When the ECG prioritization rule was applied to a validation sample, it had a sensitivity of 91.9% (95% CI 90.9%-92.8%) for STEMI and a negative predictive value 99.98% (95% CI 99.98%-99.98%). Conclusion: A simple ECG prioritization rule based on age and presenting symptoms in the ED can identify patients during triage who are at high risk for STEMI and therefore should receive an immediate 12-lead ECG, often before a physician sees them.

Guideline 14: ACS


The aim of this study was to investigate the clinical characteristics of anaphylactic shock and the factors associated with anaphylactic shock in anaphylaxis. Data were retrospectively collected from patients with anaphylaxis for 10 years. Study subjects were searched with broad disease codes including anaphylaxis, adverse, angioedema, allergy, insect bite, bee, and hypersensitivity to prevent omission. All the 294 study subjects were divided into shock and non-shock groups. The mean age of the subjects was 43 years old, and males comprised 162 patients (55%). There were 119 patients (41%) in the shock group and 175 patients in the non-shock group. Age was older in the shock group than in the non-shock group; however, there was no difference in sex between 2 groups. Frequent causes of anaphylaxis were drugs in the shock group and food in the non-shock group. Non-steroidal anti-inflammatory drugs and radio-contrast media were the most common cause of drug-induced anaphylaxis in the non-shock group and shock group, respectively. Cardiovascular symptoms were the most frequent symptoms in the shock group. Factors associated with the shock in cases with anaphylaxis were old age, emergency department (ED) arrival by emergency medical services use, radio-contrast material, and symptoms with cyanosis, syncope, and dizziness. Elderly anaphylactic patients with symptoms of cyanosis, syncope, and dizziness were at increased risk for the development of shock. Physicians in the ED have to be alert to the possibility of progression to shock in patients with anaphylaxis, and early recognition of anaphylactic shock is critical for adequate treatment.

Guideline 9.2.7: Anaphylaxis – First Aid Management

37. Hoon Oh S, Min Kim Y, Joon Kim H, Song Youn C, et al. Implication of cardiac marker elevation in patients who resuscitated from
It is often difficult to diagnose acute myocardial infarction (AMI) in patients who were resuscitated after out-of-hospital cardiac arrest (OHCA) and had a delayed elevation in cardiac marker. This study explored whether elevations in cardiac marker were due to coronary artery occlusion or resulted from other causes. Methods: The study included 19 non-ST-segment elevation patients who resuscitated after OHCA and underwent delayed coronary angiography. We checked patients' serial creatine kinase–myocardial band (CK-MB) and troponin I (cTnI) levels on arrival and 6, 12, 24, 48, 72, and 96 hours postarrest. Based on the association of elevated cTnI and the results of their delayed angiographies, the patients were retrospectively divided into 2 groups: an AMI group (n = 5) and a non-AMI group (n = 14). We then analyzed the serial cardiac marker measurements in each group. Results: Peak marker levels were significantly higher in the AMI group than in the non-AMI group (CK-MB, 177.0 ± 112.7 vs 66.4 ± 85.2 ng/mL; P = .033 and cTnI, 40.4 ± 14.5 vs 10.6 ± 13.5 ng/mL; P = .005). After adjusting for covariates, the peak and 6-, 12-, and 24-hour cTnI and 6-hour CK-MB were significantly different between the 2 groups (P = .005, P = .004, P = .005, P = .020, and P = .007). In the non-AMI group, 3 patients had cTnI values that were within the reference range at all of the evaluated times. Most patients had only low cTnI elevations that rapidly fell back to normal. Conclusion: The resuscitation of patients who experience sudden OHCA but do not have an AMI may lead to elevations of cardiac markers. However, these elevations are low and normalize early.

Guideline 14: ACS


The aim of this study was to evaluate the incidence of adverse cardiac events in patients with chest pain with or without known existing coronary disease presenting normal electrocardiogram (ECG) and initial troponin. Prospective, nonrandomized study enrolled low-risk patients with normal ECG and troponin on admission who underwent observation and/or stress testing by unstandardized clinical judgment. Patients who experienced recurrent angina or positive ECGs or positive troponins during observation or patients with positive stress testing were admitted; otherwise, they were discharged. The end points are cardiac events at short- and long-term follow-up including cardiovascular death, myocardial infarction, unstable angina, and revascularization. Of 5656 patients considered, 1732 with ischemic ECG were initially admitted and, therefore, excluded from the analysis; 2860 with pleuritic chest pain and normal ECG were discharged; 1064 with visceral chest pain and normal ECG were enrolled. Patients with known coronary disease (45%) were older and likely presented known vascular disease. Patients with known vascular disease, older age, female sex, diabetes mellitus, and lower chest pain score were likely managed with observation. In patients with known coronary disease as compared with patients without, overall cardiac events account for 35% vs 14%, respectively (P < .001), as follows: in-hospital, 23% vs 10%, (P < .001); 1 month, 4% vs 2% (P = .133); and 9.9 ± 4.9 months, 8% vs 2%, respectively (P < .001). One-third of patients with chest pain with known coronary disease, negative ECG, and biomarkers were subsequently found to have adverse cardiac events. The value of this research for an emergency medicine audience could be extended to all clinicians and general practitioners beyond cardiologists.

Guideline 14: ACS

Reviews

Differences in systolic blood pressure (SBP) of 10 mm Hg or more or 15 mm Hg or more between arms have been associated with peripheral vascular disease and attributed to subclavian stenosis. We investigated whether an association exists between this difference and central or peripheral vascular disease, and mortality. Methods: We searched Medline, Embase, Cumulative Index to Nursing and Allied Health Literature, Cochrane, and Medline In Process databases for studies published before July, 2011, showing differences in SBP between arms, with data for subclavian stenosis, peripheral vascular disease, cerebrovascular disease, cardiovascular disease, or survival. We used random effects meta-analysis to combine estimates of the association between differences in SBP between arms and each outcome. Findings: We identified 28 eligible studies for review, 20 of which were included in our meta-analyses. In five invasive studies using angiography, mean difference in SBP between arms was 36·9 mm Hg (95% CI 35·4–38·4) for proven subclavian stenosis (>50% occlusion), and a difference of 10 mm Hg or more was strongly associated with subclavian stenosis (risk ratio [RR] 8·8, 95% CI 3·6–21·2). In non-invasive studies, pooled findings showed that a difference of 15 mm Hg or more was associated with peripheral vascular disease (nine cohorts; RR 2·5, 95% CI 1·6–3·8; sensitivity 15%, 9–23; specificity 96%, 94–98); pre-existing cerebrovascular disease (five cohorts; RR 1·6, 1·1–2·4; sensitivity 8%, 2–26; specificity 93%, 86–97); and increased cardiovascular mortality (four cohorts; hazard ratio [HR] 1·7, 95% CI 1·1–2·5) and all-cause mortality (HR 1·6, 1·1–2·3). A difference of 10 mm Hg or higher was associated with peripheral vascular disease (five studies; RR 2·4, 1·5–3·9; sensitivity 32%, 23–41; specificity 91%, 86–94). Interpretation: A difference in SBP of 10 mm Hg or more, or of 15 mm Hg or more, between arms might help to identify patients who need further vascular assessment. A difference of 15 mm Hg or more could be a useful indicator of risk of vascular disease and death.


Acute myocardial infarction (AMI) with subsequent left ventricular dysfunction and heart failure continues to be a major cause of morbidity and mortality in the Western world. Rapid advances in the treatment of AMI, mainly through timely reperfusion, have substantially improved outcomes in patients presenting with acute coronary syndrome and particularly ST-segment elevation myocardial infarction. A vast amount of research, both translational and clinical, has been published on various pharmacological and interventional techniques to prevent myocardial cell death during the time of ischemia and subsequent reperfusion. Several methods of cardioprotection have shown the ability to limit myocardial infarction size in clinical trials. Examples of interventional techniques that have proven beneficial are ischemic post-conditioning and remote ischemic per-conditioning, both of which can reduce infarction size. Lowering core body temperature with cold saline infusion and cooling catheters have also been shown to be effective in certain circumstances. The most promising pharmaceutical cardioprotective agents at this time appear to be adenosine, atrial natriuretic peptide, and cyclosporine, with other potentially effective medications in the pipeline.

*Guideline 14: ACS*


Background: The human dive reflex (HDR), a physiological phenomenon similar to the bradycardia reflex used by marine mammals during
prolonged submersion, can be employed in managing paroxysmal supraventricular tachycardia (PSVT). This review aims to identify a standardised HDR technique for haemodynamically stable PSVT, to determine the effectiveness of the HDR and to define its usefulness in the prehospital setting. Methods: A review of the Medline, EMBASE and CINAHL databases was conducted. Articles were included if they described the use of the HDR to revert PSVT in the prehospital or emergency medical setting, the nature of the effectiveness of the HDR for PSVT or historically significant developments of HDR techniques for PSVT reversion. Articles not available in English or describing the use of HDR in animal studies only were excluded. Results: 211 articles were identified, of which 21 were found to be relevant. These included 10 studies of HDR effectiveness in PSVT and three physiological studies of HDR effect. No standardised model of performance exists for the HDR. Elements of performance include: a cold stimulus applied to the entire face, a specific temperature of the cold stimulus, application duration, breath holding during HDR and posture assumed to perform the procedure. There are also safety and logistics issues with using the HDR in prehospital care. Conclusions: The HDR represents an effective method of terminating PSVT in the hospital emergency department. Its usefulness in prehospital care requires further evaluation of the elements of the manoeuvre to determine appropriateness to this setting.

Guideline 11.9: Managing acute dysrhythmias

To determine the accuracy of using nitroglycerine as a 'test of treatment' in the diagnosis of cardiac chest pain we undertook a systematic review of studies of diagnostic accuracy. Databases searched included PubMed, Cochrane Database, Google Scholar, Science Citation Index, EMBASE and manual searching of bibliographies of known primary and review articles. Studies were included if sublingual nitroglycerine was the index test, its effect on the patient's pain score was recorded and the reference test was performed on at least 80% of patients. The data from the five papers were used to form 2 x 2 contingency tables. Five eligible studies were found, all in the acute setting (although one paper collected its data in the follow-up setting, all patients had acute presentations). The sensitivity ranged from 35% to 92% and the specificity from 12% to 63%. However, in all but one paper the Youden indices were close to zero suggesting that the response to nitroglycerine is not useful as a diagnostic test. The combined sensitivity was 0.52 (95% CI 0.48 to 0.56) and combined specificity was 0.49 (95% CI 0.46 to 0.52). The diagnostic OR from the combined studies was 1.2 (95% CI 0.97 to 1.5), which is not significantly different from 1. In the acute setting, nitroglycerine is not a reliable test of treatment for use in the diagnosis of coronary artery disease. However, further studies are needed to determine the diagnostic accuracy of nitroglycerine for recurrent exertional chest pain.

Guideline 14: ACS

Patients requiring emergency airway management are at great risk of hypoxaemic hypoxia because of primary lung pathology, high metabolic demands, anaemia, insufficient respiratory drive, and inability to protect their airway against aspiration. Tracheal intubation is often required before the complete information needed to assess the risk of peri-procedural hypoxia is acquired, such as an arterial blood gas level, hemoglobin value, or even a chest radiograph. This article reviews pre-oxygenation and peri-intubation oxygenation techniques to minimize the
risk of critical hypoxia and introduces a risk-stratification approach to emergency tracheal intubation. Techniques reviewed include positioning, pre-oxygenation and de-nitrogenation, positive end expiratory pressure devices, and passive apneic oxygenation.

Guideline 11.6: Equipment and techniques in adult ALS


A myriad of hospital-wide initiatives have been implemented with the goal of decreasing door-to-balloon time. Much of the evidence behind the common strategies used is unknown; multiple strategies have been suggested in the reduction to the use of this important time-sensitive intervention. Among 8 primary strategies, 2 have substantial evidence to support their implementation in the attempt to reduce door-to-balloon time in ST-segment elevation myocardial infarction (STEMI), including emergency physician activation of the cardiac catheterization laboratory and prehospital activation of the STEMI alert process. Two strategies have moderate evidence to support their use, including real-time data feedback to team members and team-based approach to STEMI management. The remaining 4 strategies have no quantitative evidence to support their use, including single call to a central paging system, expecting the cardiac catheterization laboratory personnel to arrive within 20 minutes of activation, attending cardiologist on site (within the hospital), and senior management commitment to the project. Although all the STEMI systems of care reviewed are associated with a decreased in time to treatment, only a few have sufficient quantitative evidence to support their implementation. To be effective, the movement to decrease time to treatment of STEMI at any hospital must be composed of an institutional response that includes multiple disciplines. Success also requires active participation from nurses, members of the catheterization team, and hospital leadership.

Guideline 14: ACS

Animal, manikin & cadaver models


Recent resuscitation guidelines for infant cardiopulmonary resuscitation (CPR) emphasise that rescuers should minimise the interruption of chest compressions. To that end, supraglottic devices such as laryngeal mask airways (LMAs) are suggested as a backup for airway
management during infant CPR. We therefore compared the utility of the air-Q® LMA (air-Q) with that of the Soft Seal® LMA (Soft Seal) for infant CPR in an infant manikin. Methods: Twenty-four novice doctors in the anaesthesia department performed insertion and ventilation with air-Q and Soft Seal on an infant manikin with or without chest compression. Results: Two doctors failed to insert the Soft Seal without chest compression, while nine failed during chest compression (P < 0.05). However, only one doctor failed to insert the air-Q without chest compression, and two doctors failed during chest compression. Insertion time was not significantly increased with chest compression using either device. Insertion time during chest compression was significantly shorter for the air-Q than for the Soft Seal (P < 0.05). The visual analogue scale (VAS) was used to evaluate difficulty of use (0 mm (extremely easy) to 100 mm (extremely difficult)). VAS scores did not change significantly by the addition of chest compression with either device; however, VAS scores during chest compression were significantly higher with Soft Seal than with the air-Q device. Conclusion: We conclude that novice doctors find the air-Q easier to use than Soft Seal for emergency airway management during chest compression in infants, in an infant manikin.

Guidelines 12 & 13: Paediatric and neonatal ALS


To compare the time-dependent changes in the quality of chest compressions in 30:2 cardiopulmonary resuscitation (CPR) and hands-only cardiopulmonary resuscitation (HO-CPR) and to evaluate how individual rescuer factors affect the quality of chest compressions over time for both CPR techniques. Methods: Total 1028 adult hospital and university workers participated in CPR training programs including sessions of 30:2 CPR and HO-CPR. Tests of both CPR methods were performed in a random order using a manikin with Skill-Reporter™. Data were collected from 863 subjects. The time-dependent changes in chest compressions quality and the effects of individual rescuer factors (age, gender, body mass index (BMI), prior CPR training and experience) were analysed using the general linear model for a repeated-measures procedure. Results: In HO-CPR, the mean proportion of correct compressions depth (MPCD) decreased significantly throughout the time sectors following 20–40 s (74.4–50.4% in 100–120 s) compared to 30:2 CPR (83.4–76.3% in 100–120 s) (p < 0.0001). A significant decline of MPCD (MPCD < 70%) was initially observed at 40–60 s in HO-CPR, however, this pattern was not observed in 30:2 CPR. Individual rescuer factors minimally affected the time-dependent change in MPCD during 30:2 CPR. For HO-CPR, all rescuer factors except for male or obese/overweight (BMI ≥ 25) were associated with a significant declines of MPCD, and these decline were usually observed from 40 to 60 s. Conclusion: Switching rescuers at an interval of 2-min is reasonable for 30:2 CPR. However, for HO-CPR switching rescuers every 1-min may be preferable except when rescuers are male or obese/overweight (BMI > 25).

Guideline 8: Cardiopulmonary resuscitation


Chest compressions are often performed at a variable rate during cardiopulmonary resuscitation (CPR). The effect of compression rate on other chest compression quality variables (compression depth, duty-cycle, leaning, performance decay over time) is unknown. This randomised controlled cross-over manikin study examined the effect of different compression rates on the other chest compression quality variables.
Methods: Twenty healthcare professionals performed 2 min of continuous compressions on an instrumented manikin at rates of 80, 100, 120, 140 and 160 min⁻¹ in a random order. An electronic metronome was used to guide compression rate. Compression data were analysed by repeated measures ANOVA and are presented as mean (SD). Non-parametric data was analysed by Friedman test. Results: At faster compression rates there were significant improvements in the number of compressions delivered (160(2) at 80 min⁻¹ vs. 312(13) compressions at 160 min⁻¹, P < 0.001); and compression duty-cycle (43(6)% at 80 min⁻¹ vs. 50(7)% at 160 min⁻¹, P < 0.001). This was at the cost of a significant reduction in compression depth (39.5(10) mm at 80 min⁻¹ vs. 34.5(11) mm at 160 min⁻¹, P < 0.001); and earlier decay in compression quality (median decay point 120 s at 80 min⁻¹ vs. 40 s at 160 min⁻¹, P < 0.001). Additionally not all participants achieved the target rate (100% at 80 min⁻¹ vs. 70% at 160 min⁻¹). Rates above 120 min⁻¹ had the greatest impact on reducing chest compression quality. Conclusions: For Guidelines 2005 trained rescuers, a chest compression rate of 100–120 min⁻¹ for 2 min is feasible whilst maintaining adequate chest compression quality in terms of depth, duty-cycle, leaning, and decay in compression performance. Further studies are needed to assess the impact of the Guidelines 2010 recommendation for deeper and faster chest compressions.

Guideline 6: Compressions


The aim of this manikin study was to compare the efficiency between overlapping (OP) and adjacent thumb positions (AP) for cardiac compressions using the encircling method in infants. Methods: The study conducted from December 2010 to August 2011 involved 48 volunteers who were students in the emergency medical technician course. The authors let volunteers practice OP and AP as a crossover design. The authors monitored the simulated mean arterial pressure (MAP) generated during a 5-min chest compression. The fatigue level of the volunteers after the chest compression was evaluated with the Likert scale. Results: There were no significant differences in MAP between the dominant hand and the non-dominant hand as the lower thumb of OP. Significant differences were observed in simulated systolic blood pressure, MAP and simulated pulse pressure between OP and AP at 1, 2, 3, 4 and 5 min. There were no significant differences among the changes in heart rate, respiratory rate and end-tidal CO2 during a 5-min chest compression by OP and AP. The Likert scale scores (1 no fatigue to 5= extreme fatigue) during the 5-min chest compressions were higher in AP than in OP at 2, 3 and 5 min. Conclusion: Higher intrathoracic pressures were achieved by OP in this study. However, further studies are needed to validate these effects of overlapping thumbs technique in infant cardiopulmonary resuscitation, not manikin.

Guidelines 12 & 13: Paediatric and neonatal ALS


To determine whether hydroxocobalamin will improve survival compared with epinephrine and saline solution controls in a model of cyanide-induced cardiac arrest. Methods: Forty-five swine (38 to 42 kg) were tracheally intubated, anesthetized, and central venous and arterial continuous cardiovascular monitoring catheters were inserted. Potassium cyanide was infused until cardiac arrest developed, defined as mean arterial pressure less than 30 mm Hg. Animals were treated with standardized mechanical chest compressions and were randomly assigned to receive one of 3 intravenous bolus therapies: hydroxocobalamin, epinephrine, or saline solution (control). All animals were monitored for 60
minutes after cardiac arrest. Additional epinephrine infusions were used in all arms of the study after return of spontaneous circulation for systolic blood pressure less than 90 mm Hg. A sample size of 15 animals per group was determined according to a power of 80%, a survival difference of 0.5, and an $\alpha$ of 0.05. Repeated-measure ANOVA was used to determine statistically significant changes between groups over time. Results: Baseline weight, time to arrest, and cyanide dose at cardiac arrest were similar in the 3 groups. Coronary perfusion pressures with chest compressions were greater than 15 mm Hg in both treatment groups indicating sufficient compression depth. Zero of 15 (95% confidence interval [CI] 0% to 25%) animals in the control group, 11 of 15 (73%; 95% CI 48% to 90%) in the hydroxocobalamin group, and 11 of 15 (73%; 95% CI 48% to 90%) in the epinephrine group survived to the conclusion of the study ($P<.001$). The proportion of animals with return of spontaneous circulation at 5 minutes was 4 of 15 (27%; 95% CI 10% to 52%), and that of return of spontaneous circulation at 10 minutes was 11 of 15 (73%; 95% CI 48% to 90%) in the 2 treatment groups. Additional epinephrine infusion after return of spontaneous circulation was administered for hypotension in 2 of 11 (18%; 95% CI 4% to 48%) hydroxocobalamin animals and in 11 of 11 (100%; 95% CI 70% to 100%) of the epinephrine animals ($P<0.001$). At 60 minutes, serum lactate was significantly lower in the hydroxocobalamin group compared with the epinephrine group (4.9 [SD 2.2] versus 12.3 [SD 2.2] mmol/L), and the pH was significantly higher (7.34 [SD 0.03] versus 7.15 [SD 0.07]). Serial blood cyanide levels in the hydroxocobalamin group were also lower than that of the epinephrine group from cardiac arrest through the conclusion of the study. Conclusion: Intravenous hydroxocobalamin and epinephrine both independently improved survival compared with saline solution control in our swine model of cyanide-induced cardiac arrest. Hydroxocobalamin improved mean arterial pressure and pH, decreased blood lactate and cyanide levels, and decreased the use of rescue epinephrine therapy compared with that in the epinephrine group.

Guideline 9.5.1 Emergency Management of a Victim who has Been Poisoned


External laryngeal manipulation (ELM) is a technique used in cases of poor glottic view in direct laryngoscopy. Studies investigating ELM in the pediatric population are lacking. The objective of this study was to examine if use of ELM by inexperienced intubators improves the success rate of pediatric intubation. We conducted a randomized, controlled, manikin study comparing intubation using ELM (study subjects) with standard intubation (controls). Study participants were paramedic students. Each participant performed 1 intubation attempt on 3 different pediatric airway manikins, independently. If an optimal Cormack-Lehane glottic view (CLGV) of more than 2 has been obtained, study subjects were previously instructed to perform the intubation using ELM; controls were instructed to continue with standard intubation. Outcome measures were single-attempt intubation success rate, preintubation CLGV, and duration of intubation. The study group included 13 subjects who performed 39 intubations. In 19 intubations, CLGV of more than 2 had been obtained; and ELM was used. The control group included 14 subjects who performed 42 intubations. In 20 intubations, CLGV of more than 2 was obtained. Median CLGV score improved from 3.5 before ELM to 2 when ELM was used. However, no difference was found between the groups in intubation success rate (10/19 vs 14/20, $P = .43$); and the duration of intubation was significantly shorter in controls (25.8 vs 37.8 seconds, $P < .007$). In this pediatric manikin study, ELM performed by novice intubators improved laryngeal view, but lengthened the duration of intubation and did not improve intubation success rate.

Guideline 11.6: Equipment and techniques in adult ALS
51. Tisherman SA. Spontaneous cooling and rewarming after cardiac arrest may not be therapeutic. Resuscitation 2012; 83 (3): 283-4
Therapeutic temperature management has become standard care for comatose survivors of cardiac arrest. Intuitively, it is logical that the sooner the patients reach target temperature, the greater the effect of the hypothermia. Indeed, some studies have correlated time to target temperature with better outcomes. Some studies have had opposite findings, however. What has been missing from these studies has been consideration of the effect of the insult itself on temperature regulation.
Editorial: Guideline 11.8: Therapeutic hypothermia after cardiac arrest

Resuscitation of cardiac arrest is exceptionally challenging, but can be achieved by successfully integrating the links in the chain of survival. Importantly, successful treatment requires cardiovascular resuscitation and brain recovery. Advanced cardiac life support is a core link and incorporates acute medication management with epinephrine (or vasopressin) as the primary drug treatment for shockable and non-shockable arrest. Given the dynamic nature of cardiac arrest and the formidable challenge of resuscitation, treatment decisions ideally would be supported by exhaustive evidence that establishes the optimal sequence, timing, and dose of epinephrine; and perhaps considers the individual patient's physiological status and their response to other therapies. Currently however we generally apply a uniform dose and timing of vasopressor therapy in pulseless patients based on modest supporting evidence, an approach that enables operational efficiency and directs clinical care but may or may not advance resuscitation. To improve care for cardiac arrest, we need better evidence about “whether”, “when”, “how much”, and “for whom” with regards to epinephrine, a circumstance that might reasonably be extended to describe each of the links in the chain. As a consequence, we should consider creative and insightful approaches to accumulate evidence and inform resuscitation strategies. Randomized, placebo-controlled clinical trials among human arrest patients are the gold-standard, but even the best trials have limitations. There is only one such placebo-controlled human trial evaluating epinephrine. The results demonstrated evidence of increased short-term cardiovascular resuscitation with epinephrine treatment but did not demonstrate a long-term survival benefit. The study is instructive and the investigators deserve praise for their rigorous approach. Nonetheless the study’s generally poor outcomes and modest sample size still provide for questions about the role of epinephrine. Other human randomized comparisons involving advanced care provide similar evidence, greater cardiovascular resuscitation with epinephrine as evidenced by a greater proportion of patients with return of spontaneous circulation, but with no long-term survival benefit.
Editorial…Guideline 11.5: Medications in adult ALS

Out-of-hospital cardiac arrest carries a poor prognosis. Survival to hospital discharge is less than 10% and has been unchanged over decades. A number of factors influence the prognosis after out-of-hospital cardiac arrest, amongst which the provision of basic life support (BLS) by bystanders is of major significance. BLS can double to triple survival following out-of-hospital cardiac arrest, however, the proportion of
bystanders who provide CPR remains low. To address this issue there has been a continuous effort to simplify the BLS algorithm for laymen. Recently, this has culminated in The American Heart Association's (AHA) general emphasis on hands only CPR (HO-CPR) and furthermore specific recommendation of HO-CPR for untrained lay rescuers. The superiority, equivalence or non-inferiority of HO-CPR versus conventional 30:2 CPR is, however, still intensely debated...

Editorial: Guideline 8: Cardiopulmonary resuscitation


Airway management has been a core aspect of out-of-hospital cardiac arrest (OHCA) resuscitation since the advent of emergency medical services (EMS) systems. Recent data, however, suggest that advanced airway intervention, and perhaps even any airway intervention and ventilation at all, may be less helpful than previously thought, and potentially detrimental, particularly in the setting of brain injury. Most of these data come from animal studies and non-randomised human trials; true randomised controlled outcomes trials of EMS airway management are the exception rather than the rule. This has made it difficult to be definitive about the true benefits or harms of the A and B aspects of the three-part airway, breathing, and circulation resuscitation approach, regardless of the order in which the components are presented (the classic A–B–C versus the recent shift to C–A–B). Shin and colleagues (Abstract 9 in this report) present data from a national database in Korea examining the outcomes of non-traumatic OHCA patients managed with bag-mask ventilation, tracheal intubation, or laryngeal mask airway (LMA). This observational study is essentially a natural experiment resulting from a small cadre of EMS personnel with additional airway management training being authorised to use either tracheal intubation or LMA at their discretion, while the remainder of the nation’s EMS personnel are restricted to bag-mask ventilation. Thus, while the overall cardiac arrest sample is quite large (well over five thousand patients from across the nation), only a minority received either intubation or LMA; the majority was managed with bag-mask ventilation. Survival rates were very similar regardless of the method of airway management; survival to discharge was actually somewhat lower in those patients who received an LMA compared with those managed with bag-mask ventilation, while all other comparisons were non-significant...

Editorial: Guideline 11.6: Equipment and techniques in ALS


A 48-year-old Asian woman collapsed at home without prodrome in May 2010. Her husband started basic life support, and paramedics successfully cardioverted her from ventricular fibrillation. History included pulmonary sarcoidosis diagnosed 9 years previously after a presentation with breathlessness, erythema nodosum, and mildly raised serum angiotensin converting enzyme (ACE) concentration (82 u/L, normal <70 u/L). She was treated with a short course of oral corticosteroids, but had declined biopsy or further treatment and had been symptom-free for 2 years. She exercised for 30–40 min daily, had never had chest pain, and did not have any cardiac risk factors. On admission, she was intubated, ventilated, and cooled in the intensive care unit and extubated on the 7th day without neurological deficit. Blood tests were unremarkable and troponin assays were negative.

Case study


Acute ST-elevation myocardial infarction (STEMI) is a major cause of cardiac death. In the late 1970s, Rentrop and colleagues used
intracoronary delivery of a thrombolytic agent to dissolve the occlusive thrombus and re-establish coronary flow, after which intravenous thrombolysis became the standard of care. Use of primary percutaneous coronary intervention has grown rapidly because of evidence that it is more effective than thrombolysis alone. Potent antithrombotic agents such as platelet glycoprotein IIb–IIIa inhibitors, including abciximab, have increased the options available to interventional cardiologists. Why might intracoronary abciximab be better?

Guideline 14: ACS Editorial

57. Callaway CW. Questioning the Use of Epinephrine to Treat Cardiac Arrest. JAMA 2012; 307 (11): 1198-200

The most exciting scientific progress occurs when new research challenges conventional wisdom. Even when a medical practice is founded on less-than-perfect scientific data, testing of an established therapy is nearly impossible to justify unless compelling new data lead to questioning of standard care. One example is the use of epinephrine, which has been a cornerstone of cardiac resuscitation and advanced cardiac life support since the 1960s. In this issue of JAMA, the report by Hagihara et al (abstract 13 in this report), based on one of the largest observational databases of cardiopulmonary resuscitation (CPR) ever assembled, challenges the role of epinephrine drug therapy during cardiac arrest. These new data suggest that epinephrine use may be associated with lower survival and worse neurological outcomes after cardiac arrest...

Guideline 11.5: Medications in adults ALS Editorial


Topical hemostatic agents have generated intense research interest in recent years, prompted in part by the demands of wartime medicine. Numerous animal studies demonstrate variable degrees of efficacy of a variety of agents; however, little clinical data are available in severely traumatized patients. This report describes 30 consecutive uses of the modified rapid deployment hemostat (MRDH) during combat operations in Operation Iraqi Freedom. Methods: In a prospective observational fashion, traumatized patients presenting to a combat support hospital or a forward surgical team with difficult to control hemorrhage (due to anatomy, limited resources, or tactical environment) had the MRDH applied to severely bleeding wounds. Basic demographics, wounding mechanism, wound characteristics, circumstances, and efficacy were recorded. Presence of a clinical coagulopathy was also noted. Results: Thirty hemostatic bandages were applied to 19 patients with a wide variety of wounds. All but one application occurred in the operating room. The demographics were mean age 27 years (range, 9-55 years), 95% male, 68% penetrating or fragmentation, and four casualties had a clinical coagulopathy. Hemostasis was achieved following application of the hemostatic agent in 16 of 19 wounds. Re-bleeding occurred upon removal in three cases. In all cases, the patient failed conventional interventions at hemostasis before the hemostat was applied. Conclusions: This is the single largest description of the clinical efficacy of the MRDH and the first description during combat operations. The MRDH bandage was an effective hemostat for temporarily controlling hemorrhage in difficult circumstances. Caution should be exercised when removing the dressing as re-bleeding may occur.

Case series

Myocarditis is a recognized but rare complication of smallpox immunization. It typically presents within 30 days of immunization and on initial presentation shares many characteristics with acute coronary syndrome. Electrocardiogram findings, elevated cardiac enzymes, and undifferentiated chest pain require immediate implementation of therapy directed towards an acute coronary syndrome. In an austere environment, access to advanced care may be limited. Objectives: Smallpox vaccine-mediated myocarditis may present, typically within 30 days of immunization, in such a fashion that it is impossible to distinguish from acute myocardial infarction. The purpose of this article is to alert the clinician to this problem and to provide information to assist in making a suitable diagnosis and disposition in the absence of an absolute diagnosis. Case Report: We present a case of smallpox vaccine-associated myocarditis in an American serviceman deployed in Iraq, and review the literature to determine management of these cases in an emergency setting. Conclusions: This case serves to increase awareness of the association of vaccine-mediated myocarditis in the month after immunization, and the fact that it may present similar to infarction. If the clinical probability of myocarditis is greater than infarction, this will lead the clinician to different treatment modalities.

Guideline 14: ACS Case study


Coagulopathy after snakebite is well known; however, cardiac tamponade as a manifestation of coagulopathy is rare. Objective: To report a case of pericardial hemorrhage with cardiac tamponade after Russell viper bite. Case Report: A 26-year-old man developed breathlessness after being bitten by a Russell viper. The clinical and laboratory follow-up of this case confirmed the clinical diagnosis of toxin-induced disseminated intravascular coagulation. Interestingly, pericardial hemorrhage with large pericardial effusion was evident clinically as well as on electrocardiogram and echocardiogram, as an initial presentation without any other bleeding manifestations. The patient developed cardiac arrest and was revived with cardiopulmonary resuscitation. Emergency pericardiocentesis was carried out. He was given fresh frozen plasma in addition to snake antivenin along with symptomatic management. On the third day of hospitalization, the patient's clinical and laboratory profile returned to normal and he was discharged on the fifth day. Conclusion: Pericardial hemorrhage may be due to toxin-induced myocardial damage or pericardial vessel injury coupled with coagulopathy, possibly in conjunction with vasculitis or endothelial damage. Practitioners and physicians should suspect and search for pericardial effusion in snakebite victims who develop breathlessness, and treat it vigorously in addition to antivenin therapy.

Guideline 9.4.1 Australian Snake Bite: Case study


Dog bites are the most common animal bite injuries occurring in the United States. Estimated infection rates range between 15% and 20%. Polymicrobial infections are most common. Capnocytophaga canimorsus (C. canimorsus) is a Gram-negative rod strongly associated with dog bites, and is known to cause life-threatening infection in humans. Objectives: 1) Outline epidemiology of dog bites in the United States; 2) Identify host factors associated with infection, and common pathogens; 3) Discuss microbiology of C. canimorsus; 4) Discuss common clinical manifestations of C. canimorsus infection; 5) Outline treatment options. Case Report: A 42-year-old woman with a remote history of Hodgkin's
lymphoma (treated with irradiation) and thyroid carcinoma, both of which were in remission, presented to the Emergency Department with fever, abdominal pain, and diarrhea. She was found to be in septic shock. She was aggressively resuscitated and administered broad-spectrum antibiotics. Blood cultures grew *C. canimorsus* in 2/4 bottles. The patient recalled being bitten by the family dog 48 h before her initial presentation. She made an uneventful recovery. She was felt to be 'functionally hyposplenic' due to her prior irradiation. **Conclusions:** *C. canimorsus* is a rare pathogen strongly associated with dog bites. By eliciting a history of animal bite, clinicians may be able to alert the laboratory of suspected *C. canimorsus* infection. Prolonged laboratory incubation times may be necessary as the organism is fastidious. Predisposing conditions include, among others, prior splenectomy and alcoholism. The mortality rate from *C. canimorsus* sepsis is high, so treatment should be promptly initiated.

**Case study**


Constipation in pediatric patients is a common diagnosis in the emergency department (ED) and may occasionally arise from a significant underlying illness. **Objective:** To discuss a rare cause of constipation that led to a strangulated small bowel and cardiac arrest. **Case Report:** A 7-year-old boy presented in pulseless electrical activity. The patient had been seen in the ED 2 days prior with the complaint of abdominal pain, which was diagnosed as constipation. The boy had emigrated from Mexico 18 months earlier. The patient was resuscitated in the ED and taken emergently to the operating room. During surgery he was discovered to have a congenital abdominal adhesive band that led to a strangulated small bowel. He suffered subsequent multi-organ failure, including hypoxic ischemic encephalopathy, and was hospitalized for 5 months. One month after discharge he was improving and being followed by multiple providers. **Conclusion:** Congenital adhesive bands, although rare, may be life-threatening anomalies. We present this case to increase awareness of this condition among emergency physicians.

**Case study**


Liberal use of intravenous access in the out-of-hospital setting has been an unquestioned standard. This is particularly true of intravenous access for many types of medical non-injury cases. Studies have shown that out-of-hospital intravenous access is often precautionary and that only 17% to 39% of the total out-of-hospital lines placed for non-injury patients are used for delivery of medications or fluids. The decision to place an intravenous line in the field is often based on a protocol requiring intravenous access rather than an immediate intent to administer intravenous treatment. These intravenous lines are placed as a precaution in case of need to deliver intravenous medication or fluid. This protocol-driven use of precautionary intravenous access often fails to take into account other field priorities such as the urgency to load and transport a patient for more definitive treatment. It seems irrational to continue the practice of precautionary intravenous access when data show that up to 83% of the lines will not be used. The unquestioned practice of precautionary intravenous access has led to the convoluted concept that establishing out-of-hospital intravenous access is an actual medical treatment when in fact it is intravenous medications or fluids that are the true intervention.
Editorial – see abstract 33 in this report – Seymour et al

64. Robles LA. High-velocity gunshot to the head presenting as initial minor head injury: things are not what they seem. Am J Emer Med 2012; (Online first): March 2
Tangential gunshots to the head are a special type of injury in which the bullet or bullet fragments do not penetrate the inner table of the skull. Most patients experiencing this kind of injury usually have a benign clinical presentation. We describe the case of a 22-year-old soldier who had a tangential gunshot to the head caused by a high-velocity projectile. Initially, the patient was neurologically intact, progressing to profound coma in the next 2 hours. The characteristics of the wound and initial neurologic condition led to first contact physicians to treat this injury as a case of mild head trauma. This case shows us that gunshots to the head caused by high-velocity missiles must be treated aggressively like a severe head injury, even when the initial neurologic examination is normal.

Case study

Achieving rapid patency of the infarct-related artery with fibrinolysis or primary percutaneous intervention in patients with ST-elevation myocardial infarction (STEMI) can restore normal epicardial coronary flow, abort ongoing ischemia, decrease infarct size, and save lives. Implementation of an effective reperfusion strategy is critically dependent on the timely performance and recognition of ST elevation on a 12-lead surface electrocardiogram (ECG). Failure to perform an ECG in an expeditious manner delays establishment of the clinical diagnosis and subsequent activation of the STEMI system. To facilitate timely diagnosis and reperfusion, the current American College of Cardiology/American Heart Association guidelines recommend that a 12-lead ECG should be performed and interpreted within 10 minutes of “emergency department (ED) arrival on all patients with chest discomfort (or anginal equivalent) or other symptoms suggestive of STEMI” (class I indication, level of evidence: C). Implementation of this strategy in a real world busy ED can, however, be challenging. Chest discomfort is a nonspecific symptom for diagnosis of STEMI and can be encountered in a myriad of clinical conditions ranging from innocuous musculoskeletal ailments to potentially time-sensitive and life-threatening conditions such as aortic dissection and pulmonary embolism. Chest discomfort as a presenting symptom is also insensitive for the diagnosis of STEMI and over a third of subjects with STEMI, particularly the elderly fail to report this on clinical presentation. Atypical presentations of STEMI may also include nonspecific symptoms such as nausea, vomiting, weakness, dyspnea, and upper extremity pain. To cope with this challenge, two extreme strategies may be considered. The first includes performing an ECG on every patient presenting to the ED, regardless of clinical presentation. The alternate option involves performing ECGs on patients only with high index of suspicion for STEMI....

Guideline 14: ACS See abstract 35 – Glickman et al.

Education & ethics in resuscitation
The aim of this study was to examine the experiences of parents encountering the critical deterioration and resuscitative care of other children in the pediatric intensive care unit where their own child was admitted. Design: Grounded theory qualitative methodology. Setting: Pediatric intensive care unit of a pediatric tertiary care center in Montreal, Canada. Subjects: Ten parents of critically ill children who witnessed resuscitative measures on another child. Interventions: None. Measurements and Main Results: Semi-structured interviews were conducted. While witnessing resuscitation, parents struggled with ‘Should I stay or should I go?’ Their decision depended on specific contributing factors that were intrinsic to parents (curiosity or apprehension, the child's sake, trust or distrust) or extrinsic (limited space). These parents were not ‘spectators’. Despite using coping strategies, the experiences were distressing in the majority of cases, although sometimes comforting. The impact on witnessing critical events had divergent effects on parental trust with healthcare professionals. Conclusions: Pediatric intensive care unit teams have to be attentive to the benefits and burdens for parents to be present when resuscitative measures are required for another child to arrange for the provision of psychosocial support by pediatric intensive care unit physicians, nurses, and/or psychosocial consultants.

In US hospitals, cardiopulmonary resuscitation (CPR) is the de facto default option—patients must “opt out” by requesting or consenting to a do-not-attempt-resuscitation order. Despite its worthy intent, requiring all patients or their surrogates to consent to a do-not-attempt-resuscitation order to avoid CPR has resulted in an ethically unjustifiable practice that exposes many patients to substantial harms. Whenever there is a plausible risk of cardiac arrest, the standard approach is to ask patients or their surrogates about their preferences regarding CPR. However, the very act of asking can suggest to the patient and family that CPR may be beneficial, even when the clinician believes otherwise. Additionally, research in cognitive psychology has revealed that default options are often interpreted as recommendations or guidelines, or as the path of least resistance, and that such default options significantly affect decision-making. For these reasons, patients or their surrogates may be biased toward choosing full resuscitation status, even when CPR likely would bring little or no benefit and would risk considerable harm. Therefore, the standard approach of neutrally seeking consent to withhold CPR may inadvertently diminish patients' and families' comprehension of the clinical situation and lead to decisions that are grounded neither in patients' values nor in their best interest. Instead of assuming that CPR must always be offered, we suggest 3 distinct approaches based on the likelihood and degree of potential benefits and harms of resuscitation. In all 3 approaches, physicians must take the time to fully explain the patient's prognosis and likely disease trajectory, clarify any misconceptions, and elicit the patient's values and goals, which should form the basis for all CPR discussions. However, the options offered by the physician should change as the likely proportion of burdens to benefits increases.

Mental and physical symptoms are common in paramedics, which may relate to high work stress, including critical incidents. As previous trauma is a risk factor for psychological symptoms after exposure to critical incidents, the prevalence of childhood experiences with abuse and neglect and paramedics' adaptation to critical incidents may be important. Methods: 635 paramedics were surveyed regarding childhood experiences of
physical, sexual or emotional abuse as well an index critical incident from the past, acute stress responses to that event and current mental and physical symptoms. A comparison group of 159 female hospital-based healthcare workers completed the same survey of childhood abuse and neglect in a separate study. Results: 232 paramedics (36.5%) responded. Among these, physical, sexual or emotional childhood abuse was reported by 38.4%. Female paramedics reported significantly more emotional and physical abuse and neglect than female hospital workers. Paramedics who reported childhood abuse or neglect more frequently experienced signs of acute stress immediately following the index critical incident and for the following 2 weeks. Childhood abuse and neglect were associated with significantly higher scores for depressive symptoms, physical symptoms and burnout, and a higher prevalence of cases scoring above thresholds of clinical significance. Conclusion: Childhood abuse may be more common in paramedics than in other healthcare workers, at least in women. Childhood abuse and neglect is associated with acute stress responses to critical incidents and to current physical and mental symptoms. These results are based on a low response rate and may not be generalisable.

Ethics

A busy day for clinicians... standing up, eating chocolate, tweeting and rubbing crocodile oil on rats.

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69. van der Ploeg HP, Chey T, Korda RJ, Banks E and Bauman A. Sitting Time and All-Cause Mortality Risk in 222 497 Australian Adults. Arch Intern Med 2012; 172 (6): 494-500
Prolonged sitting is considered detrimental to health, but evidence regarding the independent relationship of total sitting time with all-cause mortality is limited. This study aimed to determine the independent relationship of sitting time with all-cause mortality. Methods We linked prospective questionnaire data from 222 497 individuals 45 years or older from the 45 and Up Study to mortality data from the New South Wales Registry of Births, Deaths, and Marriages (Australia) from February 1, 2006, through December 31, 2010. Cox proportional hazards models examined all-cause mortality in relation to sitting time, adjusting for potential confounders that included sex, age, education, urban/rural residence, physical activity, body mass index, smoking status, self-rated health, and disability. Results During 621 695 person-years of follow-up (mean follow-up, 2.8 years), 5405 deaths were registered. All-cause mortality hazard ratios were 1.02 (95% CI, 0.95-1.09), 1.15 (1.06-1.25), and 1.40 (1.27-1.55) for 4 to less than 8, 8 to less than 11, and 11 or more h/d of sitting, respectively, compared with less than 4 h/d, adjusting for physical activity and other confounders. The population-attributable fraction for sitting was 6.9%. The association between sitting and all-cause mortality appeared consistent across the sexes, age groups, body mass index categories, and physical activity levels and across healthy participants compared with participants with preexisting cardiovascular disease or diabetes mellitus. Conclusions Prolonged sitting is a risk factor for all-cause mortality, independent of physical activity. Public health programs should focus on reducing sitting time in addition to increasing physical activity levels.

70. Golomb BA, Koperski S and White HL. Association Between More Frequent Chocolate Consumption and Lower Body Mass Index.
Chocolate has shown favorable metabolic associations with blood pressure (BP), insulin sensitivity, and cholesterol level. Chocolate is rich in antioxidant phytonutrients like catechins that could contribute to favorable relationships of chocolate consumption to insulin sensitivity and BP. However, because chocolate is often consumed as a sweet and bears calories, there are concerns related to its intake. Body mass index (BMI) is part of the metabolic syndrome (MetS) picture, and other MetS elements relate favorably to moderate chocolate consumption. Therefore, we hypothesized that the benefits of modest frequent chocolate intake might extend to reduced fat deposition, potentially offsetting the added calories. To evaluate this, we examined the cross-sectional relationship of chocolate consumption frequency to BMI. In conclusion, our findings—that more frequent chocolate intake is linked to lower BMI—are intriguing. They accord with other findings suggesting that diet composition, as well as calorie number, may influence BMI. They comport with reported benefits of chocolate to other elements of MetS. Compatible experimental findings in rats given epicatechin from cocoa suggest the association could be causal. A randomized trial of chocolate for metabolic benefits in humans may be merited.


Physicians who still communicate primarily through e-mail may be surprised to learn they are already a generation behind. The emerging Internet has been dubbed Web 2.0, which essentially is defined as collaborative. Instead of just reading information, Web users both read and write in the new paradigm...

On the Web, there’s more information than in a Barnes and Noble library, but those who feel overwhelmed by it simply haven’t harnessed filters, which sort useful information from junk, in an effective way. Filters exist for emergency physicians browsing for pertinent medical information. An online blog - Life in the Fast Lane, which Dr. Nickson coedits with Mike Cadogan, MD, serves as such a filter by surveying the greater landscape of emergency medicine and summarizing the best of Web 2.0 in concise blog posts. This can take the form of news in emergency medicine or identifying and highlighting new journal articles that might otherwise be missed. “It’s very difficult to obviously hunt through PubMed or journals to keep up with the flow of information,” Dr. Nickson said. “Podcasts and blogs are very useful for finding the most useful stuff, and oftentimes you’ll get some expert commentary along with it.” Among the medical specialties, emergency physician bloggers are the most active..


Objectives: This study was performed to evaluate the burn wound–healing efficacy of crocodile oil from Crocodylus siamensis by employing deep second-degree burns in a Wistar rat model. Methods: Twenty-four rats were assigned equally into four groups using a random-number table, and two burns were created on the dorsum of each animal except for the sham group. The three treatment groups received with saline solution (12 burns, served as negative control), silver sulfadiazine (12 burns, served as positive control), or crocodile oil (12 burns). Silver sulfadiazine cream was used as standard care, and the treatments were repeated twice daily for 28 days. After day 28 the animals were euthanized and the wounds were removed for quantitative real-time polymerase chain reaction, histologic, and immunohistochemical study. Results: Crocodile oil accelerated the wound-healing process as indicated by a significant decrease in wound closure time in comparison to the...
burn control and silver sulfadiazine treatment groups. Histologic results showed well-organized and distributed skin structure and collagen deposition in the animals treated with crocodile oil. Transforming growth factor-β1 (TGF-β1), a key cytokine promoting scarring, was also observed to play a role in the burn wound healing. Immunohistochemical staining results showed the negative expression of TGF-β1 and Smad3 in the 28-days-postburn skin of crocodile oil group versus positive in the epidermis of burn controls. Compared to the burn control group, expressions of TGF-β1 and Smad3 mRNA decreased significantly (p < 0.01) in the 28-days-postburn skin of the crocodile oil group. Conclusions: Our results showed that crocodile oil could enhance cutaneous burn wound healing and reduce scar formation in rats, which might be related to TGF-β1/Smad3 signaling.