Clinical trials


To compare the clinical effectiveness of intravenous paracetamol with intravenous morphine in patients with moderate to severe traumatic limb pain. Methods: This randomised, double-blind pilot study was conducted in an urban UK emergency department. Patients between 16 and 65 years old with isolated limb trauma and in moderate to severe pain (pain score of 7 or more) received either 1 g intravenous paracetamol or 10 mg intravenous morphine sulphate over 15 min. The primary outcome measure was pain score measured on a visual analogue scale at 0, 5, 15, 30 and 60 min after commencing drug administration. The requirement for rescue analgesia and the frequency of adverse reactions were also recorded. Results: 55 patients were recruited over 10 months. There was no significant difference in analgesic effect between the paracetamol and morphine groups at any time interval. There was no significant difference in the rescue analgesia administered, but there were significantly more adverse reactions in the morphine group. Conclusion: Intravenous paracetamol appears to provide a level of analgesia comparable to intravenous morphine in isolated limb trauma. Further larger studies are required.


The present study aims to assess the influence of ultra-low doses of opioid antagonists on the analgesic properties of opioids and their side effects. Methods: In the present randomized, double-blind controlled trial, the influence of the combination of ultra-low-dose naltrexone and morphine on the total opioid requirement and the frequency of the subsequent side effects was compared with that of morphine alone (added with placebo) in patients with trauma in the upper or lower extremities. Results: Although the morphine and naltrexone group required 0.04 mg more opioids during the study period, there was no significant difference between the opioid requirements of the 2 groups. Nausea was less frequently reported in patients receiving morphine and naltrexone. Conclusion: The combination of ultra-low-dose naltrexone and morphine in extremity trauma does not affect the opioid requirements; it, however, lowers the risk of nausea.

Observational studies


The prognostic value of emergency echocardiography (EE) in the management of cardiac arrest patients has previously been studied in an in-hospital setting. These studies mainly included patients who underwent cardiopulmonary resuscitation (CPR) by emergency medicine technicians at the scene and who arrived at
the emergency department (ED) still in a state of cardiac arrest. In most European countries, cardiac arrest patients are normally treated by physician-staffed emergency medical services (EMS) teams on scene. Transportation to the ED while undergoing CPR is uncommon. **Objective:** To evaluate the ability of EE to predict outcome in cardiac arrest patients when it is performed by ultrasound-inexperienced emergency physicians on scene. **Methods.** We performed a prospective, observational study of nonconsecutive, nontrauma, adult cardiac arrest patients who were treated by physician-staffed urban EMS teams on scene. Participating emergency physicians (EPs) received a two-hour course in EE during CPR. After initial procedures were accomplished, EE was performed during a rhythm and pulse check. A single subxiphoid, four-chamber view was required for study enrollment. We defined sonographic evidence of cardiac kinetic activity as any detected motion of the myocardium, ranging from visible ventricular fibrillation to coordinated ventricular contractions. The CPR had to be continued for at least 15 minutes after the initial echocardiography. No clinical decisions were made based on the results of EE. Results. Forty-two patients were enrolled in the study. The heart could be visualized successfully in all patients. Five (11.9%) patients survived to hospital admission. Of the 32 patients who had cardiac standstill on initial EE, only one (3.1%) survived to hospital admission, whereas four out of 10 (40%) patients with cardiac movement on initial EE survived to hospital admission (p = 0.008). Neither asystole on initial electrocardiogram nor peak capnography value, age, bystander CPR, or downtime was a significant predictor of survival. Only cardiac movement was associated with survival, and cardiac standstill at any time during CPR resulted in a positive predictive value of 97.1% for death at the scene. **Conclusion.** Our results support the idea of focused echocardiography as an additional criterion in the evaluation of outcome in CPR patients and demonstrate its feasibility in the prehospital setting.


The necessity for rapid administration of intravenous thrombolysis in patients with acute ischemic stroke may lead to treatment of patients with conditions mimicking stroke. We analyze stroke patients treated with intravenous thrombolysis in our center to characterize cases classified as stroke mimics. Methods. We identified and reviewed all cases with a diagnosis other than ischemic stroke in our large-scale single-center stroke thrombolysis registry. We compared these stroke mimics with patients with neuroimaging-negative and neuroimaging-positive ischemic stroke results. Results. Among 985 consecutive intravenous thrombolysis–treated patients, we found 14 stroke mimics (1.4%; 95% confidence interval 0.8% to 2.4%), 694 (70.5%) patients with neuroimaging-positive ischemic stroke results, and 275 (27.9%) patients with neuroimaging-negative ischemic stroke results. Stroke mimics were younger than patients with neuroimaging-negative or -positive ischemic stroke results. Compared with patients with neuroimaging-positive ischemic stroke results, stroke mimics had less severe symptoms at baseline and better 3-month outcome. No differences appeared in medical history or clinical features between stroke mimics and patients with neuroimaging-negative ischemic stroke results. None of the stroke mimics developed symptomatic intra-cerebral hemorrhage compared with 63 (9.1%) among patients with neuroimaging-positive ischemic stroke results and 6 (2.2%) among patients with neuroimaging-negative ischemic stroke results. Conclusion: Stroke mimics were infrequent among intravenous thrombolysis–treated stroke patients in this cohort, and their treatment did not lead to harmful complications.


To determine the epidemiology and survival of pediatric out-of-hospital cardiac arrest (OHCA) secondary to trauma. Methods. The CanAm Pediatric Cardiac Arrest Study Group is a collaboration of researchers in the United States and Canada sharing a common goal to improve survival outcomes for pediatric cardiac arrest. This was a prospective, multicenter, observational study. Twelve months of consecutive data were collected from emergency medical services (EMS), fire, and inpatient records from 2000 to 2003 for all OHCAs secondary to trauma in patients aged ≤18 years in 36 urban and suburban communities supporting advanced life support (ALS) programs. Eligible patients were apneic and pulseless and received chest compressions in the field. The primary outcome was survival to discharge. Secondary measures included return of spontaneous circulation (ROSC), survival to hospital admission, and 24-hour survival. Results. The study included 123 patients. The median patient age was 7.3 years (interquartile range [IQR] 6.0–17.0). The patient population was 78.1% male and 59.0% African American.
American, 20.5% Hispanic, and 15.7% white. Most cardiac arrests occurred in residential (47.1%) or street/highway (37.2%) locations. Initial recorded rhythms were asystole (59.3%), pulseless electrical activity (29.1%), and ventricular fibrillation/tachycardia (3.5%). The majority of cardiac arrests were unwitnessed (49.5%), and less than 20% of patients received chest compressions by bystanders. The median (IQR) call-to-arrival interval was 4.9 (3.1–6.5) minutes and the on-scene interval was 12.3 (8.4–18.3) minutes. Blunt and penetrating traumas were the most common mechanisms (34.2% and 25.2%, respectively) and were associated with poor survival to discharge (2.4% and 6.5%, respectively). For all OHCA patients, 19.5% experienced ROSC in the field, 9.8% survived the first 24 hours, and 5.7% survived to discharge. Survivors had triple the rate of bystander cardiopulmonary resuscitation (CPR) than nonsurvivors (42.9% vs. 15.2%). Unlike patients sustaining blunt trauma or strangulation/hanging, most post–cardiac arrest patients who survived the first 24 hours after penetrating trauma or drowning were discharged alive. Drowning (17.1% of cardiac arrests) had the highest survival-to-discharge rate (19.1%). Conclusions. The overall survival rate for OHCA in children after trauma was low, but some trauma mechanisms are associated with better survival rates than others. Most OHCA in children is preventable, and education and prevention strategies should focus on those overrepresented populations and high-risk strategies to improve mortality.

CPR in patients in residential aged care facilities (RACF) deserves careful consideration. We examined the characteristics, management and outcomes of out-of-hospital cardiac arrest (OHCA) in RACF (residential aged care facilities) patients in Melbourne, Australia. Methods: The Victorian Ambulance Cardiac Arrest Registry (VACAR) was searched for all OHCA occurring in RACFs in Melbourne. The characteristics and outcomes were compared to non-RACF patients in the VACAR. Results: Between 2000 and 2009 there were 30,006 OHCA, 2350 (7.8%) occurring in a RACF. A shockable rhythm was present in 179 (7.6%) patients on arrival of paramedics of whom bystander CPR had been performed in 118 (66%); 173 (97%) received an EMS attempted resuscitation. ROSC was achieved in 71 (41%) patients and 15 (8.7%) patients survived to leave hospital. Non shockable rhythm was present in 2171 patients (92%) of whom 804 (37%) had an attempted resuscitation by paramedics. ROSC was achieved in 176 patients (22%) and 10 patients (1.2%) were discharged alive. Survival from OHCA occurring in a RACF was less than survival in those aged >70 years of age who suffered OHCA in their own homes (1.8% vs. 4.7%, p<0.001). On multivariable analysis, witnessed OHCA (OR 3.0, 95% CI 2.4–3.7) and the presence of bystander CPR (OR 4.6, 95% CI 3.7–5.8) was associated with the paramedic decision to resuscitate. Conclusion: Resuscitation of patients in RACF is not futile. However, informed decisions concerning resuscitation status should be made by patients and their families on entry to a RACF. Where it is appropriate to perform resuscitation, outcomes may be improved by the provision of BLS training and possibly AED equipment to RACF staff.

Optimal care for out-of hospital cardiac arrest (OHCA) patients may depend on the underlying aetiology of OHCA. Specifically chest compression only bystander CPR may provide greater benefit among those with cardiac aetiology and chest compressions plus rescue breathing may provide greater benefit among those with non-cardiac aetiology. The aim of this study was to generate a simple predictor model to identify OHCA patients with non-cardiac aetiology in order to accurately allocate rescue breathing. Methods: We used two independent cohorts of OHCA patients from a randomized pre-hospital trial and a prospective hospital registry (total n = 3086) to assess whether the characteristics of age, gender and arrest location (private versus public) could sufficiently discriminate non-cardiac aetiology. We used logistic regression models to generate a receiver operator curve and likelihood ratios. Results: Overall, 965/3086 (31%) had a final diagnosis of a non-cardiac cause. Using 8 exclusive groups according to age, gender, and location, the frequency of non-cardiac aetiology varied from a low of 16% (55/351) among men >age 50 in a public location up to 58% (199/346) among women <60 in a private location. Although each characteristic was predictive in the logistic regression model, the area under the curve in the receiver operating curve was only 0.66. The associated positive likelihood ratios ranged from 1 to 3 and the negative
likelihood ratios ranged from 1 to 0.4. **Conclusion:** The results highlight the challenge of accurately identifying non-cardiac aetiology by characteristics that could be consistently used to allocate bystander rescue breathing.


Little is known about long-term prognosis following resuscitation from out-of-hospital cardiac arrest, especially as it relates to the presenting rhythm or arrest aetiology. We investigated long-term survival among those discharged alive following resuscitation according to presenting rhythm and arrest aetiology. **Methods:** We conducted a cohort investigation of all non-traumatic adult out-of-hospital cardiac arrest patients resuscitated and discharged alive from hospital between January 1, 2001 and December 31, 2009 in a large metropolitan emergency medical service system. Information about demographics, circumstances, presenting arrest rhythm and aetiology was collected using the dispatch, EMS, and hospital records. Long-term vital status was ascertained using state death records and the Social Security Death Index through 31st Dec 2010. We used Kaplan Meier to evaluate survival. **Results:** During the study period, a total of 1001/5958 (17%) persons were resuscitated and discharged alive, of whom 313/1001 (31%) presented with a non-shockable rhythm and 210/1001 (21%) had a non-cardiac aetiology. Overall median survival was 9.8 years with 64% surviving >5 years. Five-year survival was 43% for non-shockable rhythms compared to 73% for shockable rhythms, and 45% for non-cardiac aetiology compared to 69% for cardiac aetiology (p <0.001 respectively). **Conclusion:** Cardiac arrest due to non-shockable rhythm or non-cardiac aetiology comprises a substantial proportion of those who survive to hospital discharge. Although long-term survival in these groups is less than their shockable or cardiac aetiology counterparts, nearly half are alive 5 years following discharge. The findings support efforts to improve resuscitation care for those with non-shockable rhythms or non-cardiac cause.


Subjects with chest pain and a negative diagnostic workup constitute a problem for emergency physicians. We tested the usefulness of clinical variables in predicting 30-day and 6-month outcome in subjects with chest pain of undifferentiated origin after a negative workup. **Methods:** Chest pain of undifferentiated origin was diagnosed by negative first-line (serial electrocardiograms, troponins assays, and 12- to 24-hour observation) and second-line evaluation (echocardiography, exercise tolerance test, stress scintigraphy, stress echocardiography, coronary angiography). Thirty-day and 6-month outcomes were considered unfavorable in the presence of any of the following: death, acute coronary syndrome, need for urgent coronary revascularization. The variables considered for risk stratification were age, sex, smoking, family history of coronary artery disease, presence of hypertension, high cholesterol levels, diabetes, chronic renal failure, cerebral vascular disease, and history of acute coronary syndrome, percutaneous transluminal angioplasty (PTA), coronary artery by pass graft, and heart failure. **Findings:** Five items (diabetes, chronic renal failure, history of PTA or bypass, history of heart failure) were associated with 30-day unfavorable outcome (31 events/1262 cases; 2.5%). The receiver operating characteristic area of the selected items was 0.726 (95% confidence interval [CI], 0.654-0.798); sensitivity was 90.3% (73.1–95.8) and specificity was 54.8% (52.0-57.6). A similar panel of items (older age, diabetes, chronic renal failure, history of PTA) predicted an unfavorable 6-month outcome (90 subjects [7.1%], with lower accuracy (receiver operating characteristic area, 0.610 [95% CI, 0.594-0.627, P < 0.05]; sensitivity, 98.9% [95% CI, 93.1–99.6]; specificity, 21.6% [95% CI, 19.4–23.9]). **Interpretation:** In subjects with chest pain of undifferentiated origin, the risk of unfavorable outcome cannot be accurately predicted by the selected clinical items.

Amongst trauma patients, early coagulopathy is common on hospital admission. No studies have evaluated the initial coagulation status in the pre-hospital setting. We hypothesise that the coagulopathic process begins at the time of trauma. We studied the on-scene and on hospital arrival coagulation profile of trauma patients. Prospective, observational study investigating the on-scene coagulation profile and its time course. We studied 45 patients at the scene of the accident, before fluid administration, and on hospital admission and classified their coagulopathy using the International Society on Thrombosis and Haemostasis score during a 2-month period. Prothrombin time, activated partial thromboplastin time, fibrinogen concentration, factors II, V and VII activity, fibrin degradation products, antithrombin and protein C activities, platelet counts and base deficit were measured. The median injury severity score was 25 (13–35). On-scene, coagulation status was abnormal in 56% of patients. Protein C activities were decreased in the trauma-associated coagulopathy group (p=.02). Drops in protein C activities were associated with changes in activated partial thromboplastin time, prothrombin time, fibrinogen concentration, factor V and antithrombin activities. Only factor V levels decreased significantly with the severity of the trauma. On hospital admission, coagulation status was abnormal in 60% of patients. The on-scene coagulopathy was spontaneously normalised only in 2 patients whereas others had the same or a poorer coagulopathy status. All parameters of coagulation were significantly abnormal comparing to the on-scene phase. Decreases in protein C activities were related to the coagulation status (p<.0001) and changes in other coagulation parameters. Patients with base deficit ≤−6mmol/L had changes in antithrombin, factor V and protein C activities but no significant coagulopathy. Coagulopathy occurs very early after injury, before fluid administration, at the site of accident. Coagulation and fibrinolytic systems are activated early. The incidence of coagulopathy is high and its severity is related to the injury and not to hypoperfusion.


Patients with acute myocardial infarction are at high risk of dying within the first hours after onset of coronary ischemia. Therefore, pharmacological intervention should be started in the prehospital setting. This study investigates the effect of the prehospital administration of bivalirudin on short-term morbidity and mortality compared to heparin plus abciximab in patients with ST-segment-elevation myocardial infarction (STEMI). Methods: One hundred ninety-eight patients with STEMI treated with bivalirudin in the prehospital setting were prospectively collected. Coronary angiography was performed to identify the infarct-related artery. In case of a percutaneous coronary intervention, bivalirudin was given according to the guidelines. The historic control group consisted of 171 consecutive patients from the same myocardial infarction network treated with unfractioned heparin and abciximab administration before the admission to the emergency department of the percutaneous coronary intervention center. The primary outcome parameter was the incidence of major adverse cardiac events (recurrent myocardial infarction, stroke, death, target vessel revascularization for ischemia) within 30 days after the primary event. Results: The overall rate of major adverse cardiac events was significantly lower in the bivalirudin group compared to the abciximab group (7.6% vs 14.6%; P = .04). The number of major bleedings was significantly higher in the abciximab group compared to the bivalirudin group (11.8% vs 3.8%; P = .03). Conclusions: The use of bivalirudin in the prehospital setting leads to a reduced rate of major cardiovascular events compared to a standard treatment with abciximab plus heparin. Bivalirudin is a reasonable choice of treatment in the prehospital setting for patients with STEMI.


The utility of prehospital intubation is controversial, as uncontrolled studies in trauma patients suggest adverse outcomes with prehospital intubation, perhaps secondary to inappropriate ventilation once intubation is accomplished. Objectives: The objectives were 1) to establish, immediately upon arrival to the emergency department (ED), the prevalence of abnormal end-tidal carbon dioxide (ETCO2) levels in patients with prehospital intubation and 2) to describe the relationship between abnormal ETCO2 levels on ED arrival and mortality. Methods. This was a prospective, observational cohort study of patients with prehospital
intubation. Patients were excluded if they underwent prehospital cardiopulmonary resuscitation (CPR). On ED arrival, the initial ETCO2 measurement from the patient’s endotracheal tube was immediately obtained prior to purposeful intervention in the patient’s ventilation by using an Oridion Surestream Sure VentLine H Set with a Welch Allyn Propaq CS monitor. For each patient, the treating physician documented the ETCO2 measurement, patient demographics, and details of the transport. The primary outcome was an abnormal ETCO2 value (<30 mmHg or >45 mmHg). The secondary outcome was mortality. Results: One hundred eligible patients were enrolled, with a median age of 30 years (interquartile range [IQR] 15, 48 years). Esophageal intubations were identified in four cases, and those cases were excluded from further analysis. Mechanisms included trauma, 74; medical, 12; and burn, 10. The median ETCO2 value was 32 mmHg (IQR 27, 38 mmHg), range 18–80 mmHg. Forty-six of 96 (48%, 95% confidence interval [CI] 38%, 58%) patients had abnormal ETCO2 values, including 37 (39%, 95% CI 29%, 49%) with low ETCO2 levels and nine (9%, 95% CI 4%, 17%) with high ETCO2 levels. Death was higher in those trauma patients with abnormal ETCO2 levels (10/33, 30%, 95% CI 16%, 49%) than in those with normal ETCO2 levels (2/41, 5%, 95% CI 0.6%, 17%), relative risk = 6.2 (95% CI 1.5, 26.4), p = 0.004. Conclusion: Nearly half of all patients transported by prehospital providers had abnormal ETCO2 measurements on initial ED presentation, suggesting an area for potential improvement. Trauma patients with abnormal initial ETCO2 levels were more likely to die.


A principal reason to order a head CT scan for dizziness patients is to exclude stroke. As CT imaging is substantially limited in assessing for any acute lesions other than haemorrhage, the most important stroke syndrome adequately evaluated by CT is intracerebral haemorrhage (ICH). A population based stroke database was used to assess the frequency with which ICH might mimic a benign dizziness presentation. Methods: The Brain Attack Surveillance in Corpus Christi project was used to identify cases of ICH from 1 January 2000 to 26 December 2007. The hospital records of ICH cases with a National Institutes of Health Stroke Scale of <2 were abstracted for more detailed information. Cases were classified as benign dizziness presentations when isolated dizziness and a normal general neurological examination were documented. Results: Of 595 ICH cases, only 2.2% (13 of 595) had dizziness as the primary presenting symptom and a National Institutes of Health Stroke Scale of <2. No case mimicked a benign dizziness presentation. Only one case had isolated dizziness symptoms but this patient had dysmetria documented on the examination. All other cases had either focal or global neurological symptoms or examination abnormalities. Conclusions: This study provides further support for the notion that ICH is highly unlikely to mimic a benign dizziness presentation. Coupled with the limitations of CT to show acute ischaemia in the posterior fossa, these results suggest that screening for ICH may not be necessary in benign appearing dizziness presentations although more research is needed.


Isolated posterior ST-elevation myocardial infarction (STEMI) accounts for up to 7% of STEMIs. The diagnosis is suggested by indirect anterior-lead ECG changes. Confirmation requires presence of ST-elevation in posterior-leads (V7–V9). We investigated the ability of hospital doctors and paramedics to diagnose posterior STEMI (PMI). Methods: Doctors in the emergency department and acute medical unit at two teaching hospitals and West Midlands Ambulance Service Paramedics were asked to interpret a 12-lead ECG illustrating ST-depression and dominant R-wave in V1-V2 in the context of cardiac chest pain, and identify PMI as a potential diagnosis. Their ability to identify PMI was compared with their ability to diagnose anterolateral STEMI on a 12-lead ECG. We assessed whether doctors knew that posterior-leads were required to confirm PMI and whether doctors and nurses could position posterior-leads. Results: 44 of the 117 doctors (38%) identified PMI as a potential diagnosis. PMI was identified by 73% of registrars, 30% of senior house-officers and 18% of house-officers. 50% of doctors who identified potential PMI knew that posterior-leads were required to confirm the diagnosis. 20% of doctors correctly positioned these and 19% knew the diagnostic criteria for PMI (ST-elevation ≥1 mm in V7–V9). 13 of the 60 nurses (22%) in the emergency department and acute medical unit correctly positioned posterior-leads. Five of the 50
(10%) paramedics identified PMI as a potential diagnosis. Doctors and paramedics were significantly better at diagnosing anterolateral STEMI than PMI. **Conclusions:** A significant proportion of doctors and paramedics were unable to diagnose PMI. Hence, the majority of PMIs may be being missed. Routine use of posterior-leads in the standard assessment of patients with chest pain may identify up to an additional 7% of STEMIs, allowing prompt reperfusion therapy, which would reduce morbidity and mortality.


Approximately 2 million people participate in long-distance running races in the United States annually. Reports of race-related cardiac arrests have generated concern about the safety of this activity. **METHODS:** We assessed the incidence and outcomes of cardiac arrest associated with marathon and half-marathon races in the United States from January 1, 2000, to May 31, 2010. We determined the clinical characteristics of the arrests by interviewing survivors and the next of kin of nonsurvivors, reviewing medical records, and analyzing postmortem data. **RESULTS:** Of 10.9 million runners, 59 (mean [+/- SD] age, 42-13 years; 51 men) had cardiac arrest (incidence rate, 0.54 per 100,000 participants; 95% confidence interval [CI], 0.41 to 0.70). Cardiovascular disease accounted for the majority of cardiac arrests. The incidence rate was significantly higher during marathons (1.01 per 100,000; 95% CI, 0.72 to 1.38) than during half-marathons (0.27; 95% CI, 0.17 to 0.43) and among men (0.90 per 100,000; 95% CI, 0.67 to 1.18) than among women (0.16; 95% CI, 0.07 to 0.31). Male marathon runners, the highest-risk group, had an increased incidence of cardiac arrest during the latter half of the study decade (2000-2004, 0.71 per 100,000 [95% CI, 0.31 to 1.40]; 2005-2010, 2.03 per 100,000 [95% CI, 1.33 to 2.98]; P=0.01). Of the 59 cases of cardiac arrest, 42 (71%) were fatal (incidence, 0.39 per 100,000; 95% CI, 0.28 to 0.52). Among the 31 cases with complete clinical data, initiation of bystander-administered cardiopulmonary resuscitation and an underlying diagnosis other than hypertrophic cardiomyopathy were the strongest predictors of survival. **CONCLUSIONS:** Marathons and half-marathons are associated with a low overall risk of cardiac arrest and sudden death. Cardiac arrest, most commonly attributable to hypertrophic cardiomyopathy or atherosclerotic coronary disease, occurs primarily among male marathon participants; the incidence rate in this group increased during the past decade.


In a patient with symptoms of pulmonary embolism (PE), the presence of an elevated pulse, respiratory rate, shock index, or decreased pulse oximetry increases pretest probability of PE. The objective of this study was to evaluate if normalization of an initially abnormal vital sign can be used as evidence to lower the suspicion for PE. **Methods:** This was a prospective, non-interventional, single-center study of diagnostic accuracy conducted on adults presenting to an academic emergency department (ED), with at least one predefined symptom or sign of PE and one risk factor for PE. Clinical data, including the first four sets of vital signs, were recorded while the patient was in the ED. All patients underwent computed tomography pulmonary angiography (CTPA) and had 45-day follow-up as criterion standards. Diagnostic accuracy of each vital sign (pulse rate, respiratory rate, shock index, pulse oximetry) at each time was examined by the area under the receiver operating characteristic curve (AUC). **Results:** A total of 192 were enrolled, including 35 (18%) with PE. All patients had vital signs at triage, and 174 (91%), 135 (70%), and 106 (55%) had second to fourth sets of vital signs obtained, respectively. The initial pulse oximetry reading had the highest AUC (0.63, 95% confidence interval [CI] = 0.50 to 0.76) for predicting PE, and no other vital sign at any point had an AUC over 0.60. Among patients with an abnormal pulse rate, respiratory rate, shock index, or pulse oximetry at triage that subsequently normalized, the prevalences of PE were 18, 14, 19, and 33%, respectively. **Conclusions:** Clinicians should not use the observation of normalized vital signs as a reason to forego objective testing for symptomatic patients with a risk factor for PE.

Clinically stable patients with type 2 diabetes mellitus and coronary artery disease are not often thought to present with the symptom of typical angina. The aims of this study were to enumerate the proportion of patients presenting with typical angina or other cardiac symptoms and to elucidate what important clinical variables are associated with the presence of typical angina in patients with type 2 diabetes mellitus and angiographically documented coronary artery disease. Symptoms of angina, anginal equivalents, or an absence of symptoms were obtained using baseline data from the Bypass Angioplasty Revascularization Investigation 2 Diabetes (BARI 2D) trial (n = 2,319). A bivariate analysis stratified by the presence or absence of previous revascularization and logistic regression modeling with a stepwise covariate selection was used. Eighty-two percent of patients had symptoms, while 18% presented asymptptomatically. This was further divided approximately into typical angina (1/5), anginal equivalents (1/5), combination (2/5), and asymptomatic (1/5). A history of previous revascularization was a determinant of the type of symptom presentation with regard to the variables gender, age, current insulin use, myocardial jeopardy index score, and use of β blockers. In the multivariate logistic regression analysis, of the available candidate variables, only a history of β-blocker use (odds ratio 1.53, 95% confidence interval 1.24 to 1.94, p < 0.0001) and previous percutaneous coronary intervention (odds ratio 1.55, 95% confidence interval 1.24 to 1.94, p < 0.0001) had higher odds of an association with typical angina. In conclusion, a large proportion of patients with type 2 diabetes mellitus and coronary artery disease indeed have symptoms. Future studies of long-term outcomes associated with these symptoms are needed.


The injury mechanism of blunt cervical spine injury (CSI) involves two forces: (1) an acceleration-deceleration force or change in velocity (delta v) that causes significant head and neck movement, resulting in flexion-extension injury pattern and (2) a direct force to the head or face against an immovable object with force transmitted down the cervical spine. Combining those two forces creates what bioengineers call imparted energy (IE). In blunt assault to the head or face, IE is low; hence, the reported incidence of CSI is low. The goal of our study was to identify the incidence, pattern, and outcome of cervical spine injury in blunt assaulted patients. Method: We queried the trauma registry at our Level I trauma center for patients admitted with the diagnosis of blunt assault over a 5-year period (2005–2009). Patients with CSI were identified by International Classification Diagnosis (Ninth Revision) codes of 805, 806, 839, or 952. We only included the patients who received the blow to the head and face. For eligible patients, we extracted data from trauma registry and inpatient chart review, including radiographic reports. A single author (N.K.) reviewed computed tomography (CT) scan of all individuals with CSI. We performed summary and Spearman rank correlation statistical analysis with p value <0.05 considered significant. Results: During the study period, 1,335 patients met our study inclusion criteria. All underwent CT of the head, cervical spine, and/or face. CSI was suspected in 78 patients; however, 65 had normal CT results and were diagnosed instead with a cervical sprain. Of the remaining 13 patients, two had a herniated disc, two had spinal stenosis, and nine had a fracture or dislocation, yielding a CSI incidence of 0.7%. We found no correlation between an increased incidence of CSI and either severe head trauma (low Glasgow Coma Scale [GCS] score) (r = −0.02, p = 0.58) or severe facial trauma (high face Abbreviated Injury Scale score [f-AIS]) (r = 0.02, p = 0.59). Three patients had significant subluxation; only two had associated spinal cord injury (SCI). All three required surgical fusion, and all three reported a fall after assault without significant head or face trauma. Conclusion: The incidence of CSI after blunt assault is very low, and the pattern of injury and severity is related to a fall occurring after the assault. Our results should encourage clinicians to find out if patient falls after the assault.

Current European Resuscitation Council (ERC) guidelines recommend intraosseous (IO) vascular access, if intravenous (IV) access is not readily available. Because central venous catheterisation (CVC) is an established alternative for in-hospital resuscitation, we compared IO access versus landmark-based CVC in adults with difficult peripheral veins. Methods: In this prospective observational study we investigated success rates on first attempt and procedure times of IO access versus central venous catheterisation (CVC) in adults (≥18 years of age) with inaccessible peripheral veins under trauma or medical resuscitation in a level I trauma centre emergency department. Results: Forty consecutive adults under resuscitation were analysed, each receiving IO access and CVC simultaneously. Success rates on first attempt were significantly higher for IO cannulation than CVC (85% versus 60%, p = 0.024) and procedure times were significantly lower for IO access compared to CVC (2.0 versus 8.0min, p < 0.001). As for complications, failure of IO access was observed in 6 patients, while 2 or more attempts of CVC were necessary in 16 patients. No other relevant complications like infection, bleeding or pneumothorax were observed. Conclusions: IO vascular access is a reliable bridging method to gain vascular access for in-hospital adult patients under resuscitation with difficult peripheral veins. Moreover, IO access is more efficacious with a higher success rate on first attempt and a lower procedure time compared to landmark-based CVC.


Patients who have sustained a traumatic spinal cord injury require appropriate management in the immediate post-injury period for both survival and to reduce the chances of costly and disabling permanent neurological deficits. Emerging time-critical neuroprotective therapies require the prompt recognition and transfer of patients to a specialised centre for early intervention. Methods: The Ambulance Research Institute, with the New South Wales State Spinal Cord Injury Service retrospectively linked prehospital data to spinal cord injury unit (SCIU) outcome data for all 324 patients transported by ambulance and subsequently admitted to a SCIU with a persisting traumatic spinal cord injury (SCI) between January 2004 and June 2008, with the aim of identifying factors that impact on the provision of timely and appropriate care. Results: Paramedics appropriately managed 88% of SCI patients. Only 4.9% of patients had initial vital signs potentially indicative of neurological injury. The median time to a SCIU was 12h, with 60% of patients undergoing multiple transfers. The odds of reaching a SCIU in over 24h were 1.71 times greater for patients injured in a major city (95% CI 1.00–2.90) in comparison to other areas of NSW. More SCI patients with multiple trauma experienced delays in reaching a SCIU (59%), compared to patients with isolated SCI (40%; p = 0.039). Patients initially transported to a designated major trauma centre were more likely to be delayed in reaching a SCIU, regardless of whether their injury was an isolated SCI or associated with multiple trauma, compared with other patients. Patients who took greater than 24h to reach a SCIU were 2.5 times more likely to develop a secondary complication (95% CI 1.51–4.17, p = 0.0004). Patients who sustained their SCI as a result of a low fall were older and less likely to have their SCI identified and treated early, with less than half of this group reaching a SCIU within 24h compared with other SCI patients (OR 0.42, 95% CI 0.19–0.93, p = 0.004). Conclusion: Early recognition, appropriate prehospital management, triage, timely and appropriate inter-facility transfers of all SCI patients are critical for access to specialised care and reducing preventable complications. Elderly fallers present particular challenges to early identification.


Acute traumatic coagulopathy is observed in 10–25% of patients post major trauma and its management forms an integral part of haemostatic resuscitation. The identification and treatment of this coagulopathy is difficult and there is uncertainty regarding optimal therapeutic guidelines during the early phases of trauma resuscitation. This study aimed to examine the association between acute coagulopathy and early deaths post major trauma. A retrospective review of data over a 5 year period was performed to determine the associations between variables considered to contribute to mortality for adult major trauma patients (Injury
Severity Score (ISS)>15 receiving blood transfusions as part of their initial resuscitation. Early death, defined as death in ED, or death in the operating theatre (OT), Intensive Care Unit (ICU) or wards within 24h of admission was the primary end-point. Patients with non-survivable head injury on initial imaging were excluded. Univariate associations were calculated and multivariable logistic regression analysis was used to determine independent associations with mortality. There were 772 patients included in this study with a median ISS of 29 (19–41), with 91.7% blunt trauma. All-cause in-hospital mortality was 17.5%, while 77 (9.7%) patients died early. Increasing age (OR 1.04), a GCS of 3–8 (OR 5.05), and the presence of acute coagulopathy (OR 8.77) were significant independent variables associated with early death. Acute traumatic coagulopathy, independent of injury severity, transfusion practice or other physiological markers for haemorrhage, was associated with early death in major trauma patients requiring a blood transfusion. Early recognition and management of coagulopathy, independent of massive transfusion guidelines, may improve outcome from trauma resuscitation. Further studies are required for the early recognition of acute traumatic coagulopathy to enable the development of an evidence base for management.

22. Murray, SL, R Crouch, et al. (2012). "Quality of the handover of patient care: A comparison of Pre-Hospital and Emergency Department notes." Int Emerg Nur 20(1): 24-27. The aim of this audit was to evaluate the accuracy of patient information transfer from pre-hospital reports to Emergency Department (ED) documentation. Methods The records of 100 patients seen in the ED resuscitation room of a UK hospital were compared using a pro-forma designed by the research team. Sections of the ambulance service patient report form and the ED documentation were compared for differences. The history of the event leading to the 999 call, the patient’s previous medical history, prescribed medications, allergies and any treatment carried out by the ambulance crew were analysed. Results: Of the 100 records, 26 had at least one instance where information recorded by the ambulance crew was either omitted or altered during transfer. These fell into various categories including the previous medical history of the patient, the timings of the event bringing them to hospital, frequency of the event occurring, allergies and medications. Conclusion: This audit quantifies the number of patient encounters where written information changes or is lost when care is passed from pre-hospital to hospital staff in the resuscitation room. We have not investigated other parts of the ED or the verbal transfer of information. Further work investigating the causes of these changes in information, any impact on patient care and whether this occurs in other parts of an ED is suggested.

23. Ornato, JP, MA Peberdy, et al. (2012). "Impact of resuscitation system errors on survival from in-hospital cardiac arrest." Resuscitation 83(1): 63-69. An estimated 350,000–750,000 adult, in-hospital cardiac arrest (IHCA) events occur annually in the United States. The impact of resuscitation system errors on survival during IHCA resuscitation has not been evaluated. The purpose of this paper was to evaluate the impact of resuscitation system errors on survival to hospital discharge after IHCA. Methods and results We evaluated subjective and objective errors in 118,387 consecutive, adult, index IHCA cases entered into the Get with the Guidelines National Registry of Cardiopulmonary Resuscitation database from January 1, 2000 through August 26, 2008. Cox regression analysis was used to determine the relationship between reported resuscitation system errors and other important clinical variables and the hazard ratio for death prior to hospital discharge. Of the 108,636 patients whose initial IHCA rhythm was recorded, resuscitation system errors were committed in 9,894/24,467 (40.4%) of those with an initial rhythm of ventricular fibrillation or pulseless ventricular tachycardia (VF/pVT) and in 22,599/84,169 (26.8%) of those with non-VF/pVT. The most frequent system errors related to delay in medication administration (>5min time from event recognition to first dose of a vasoconstrictor), defibrillation, airway management, and chest compression performance errors. The presence of documented resuscitation system errors on an IHCA event was associated with decreased rates of return of spontaneous circulation, survival to 24h, and survival to hospital discharge. The relative risk of death prior to hospital discharge based on hazard ratio analysis was 9.9% (95% CI 7.8, 12.0) more likely for patients whose initial documented rhythm was non-VF/pVT when resuscitation system errors were reported compared to when no errors were reported. It was 34.2% (95% CI 29.5, 39.1) more likely for those with VF/pVT. Conclusions: The presence of resuscitation system errors that are evident from review of the resuscitation record is associated with decreased survival from IHCA in adults. Hospitals should

This study compared the clinical performance of the Canadian CT Head Rule (CCHR) and the New Orleans Criteria (NOC) for detecting any traumatic intracranial lesion on computed tomography (CT) in patients with a Glasgow Coma Scale (GCS) score of 15. Also assessed were ability to detect patients with “clinically important” brain injury and patients requiring neurosurgical intervention. Additionally, the performance of the CCHR was assessed in a larger cohort of those presenting with GCS of 13 to 15. Methods: This prospective cohort study was conducted in a U.S. Level I trauma center and enrolled a consecutive sample of mildly head-injured adults who presented to the emergency department (ED) with witnessed loss of consciousness, disorientation or amnesia, and GCS 13 to 15. The rules were compared in the group of patients with GCS 15. The primary outcome was prediction of “any traumatic intracranial injury” on CT. Secondary outcomes included “clinically important brain injury” on CT and need for neurosurgical intervention. Results: Among the 431 enrolled patients, 314 patients (73%) had a GCS of 15, and 22 of the 314 (7%) had evidence of a traumatic intracranial lesion on CT. There were 11 of 314 (3.5%) who had “clinically important” brain injury, and 3 of 314 (1.0%) required neurosurgical intervention. The NOC and CCHR both had 100% sensitivity (95% confidence interval [CI] = 82% to 100%), but the CCHR was more specific for detecting any traumatic intracranial lesion on CT, with a specificity of 36.3% (95% CI = 31% to 42%) versus 10.2% (95% CI = 7% to 14%) for NOC. For “clinically important” brain lesions, the CCHR and the NOC had similar sensitivity (both 100%; 95% CI = 68% to 100%), but the specificity was 35% (95% CI = 30% to 41%) for CCHR and 9.9% (95% CI = 7% to 14%) for NOC. When the rules were compared for predicting need for neurosurgical intervention, the sensitivity was equivalent at 100% (95% CI = 31% to 100%) but the CCHR had a higher specificity at 80.7% (95% CI = 76% to 85%) versus 9.6% (95% CI = 7% to 14%) for NOC. Among all 431 patients with a GCS score 13 to 15, the CCHR had sensitivities of 100% (95% CI = 84% to 100%) for 27 patients with clinically important brain injury and 100% (95% CI = 46% to 100%) for five patients requiring neurosurgical intervention. Conclusions: In a U.S. sample of mildly head-injured patients, the CCHR and the NOC had equivalently high sensitivities for detecting any traumatic intracranial lesion on CT, clinically important brain injury, and neurosurgical intervention, but the CCHR was more specific. A larger cohort will be needed to validate these findings.


We aimed to describe and compare the epidemiologic features and outcomes among patients with poisoning-induced out-of-hospital cardiac arrests (POHCAs) according to causative agent groups. Methods: We identified emergency medical service (EMS)-treated POHCA patients from a nationwide OHCA registry between 2006 and 2008, which was derived from EMS run sheets and followed by hospital record review. Utstein elements were collected and hospital outcomes (survival to admission and to discharge) were measured. We compared risk factors and outcomes according to the main poisons. Adjusted odds ratios (ORs) and 95% confidence intervals (CIs) were calculated from a multivariate logistic regression model for hospital outcomes. Results: The total number of non-cardiac aetiology OHCA was 20,536. Of these, the number of EMS-assessed and EMS-treated POHCAs was 900 (4.4%). For EMS-treated POHCAs, insecticides (n = 111, 15.5%) including organophosphate and carbamates; herbicides (n = 94, 13.2%); unknown pesticides (n = 142, 19.9%); non-pesticide drugs (n = 120, 16.8%); and unknown poisons (n = 247, 6%) were identified. The survival to admission rate was 22.5% for insecticides, 3.2% for herbicides, 16.2% for unknown pesticides, 16.7% for non-pesticides and 11.3% for the unknown group. The survival to discharge rates were 9.9% for insecticides, 0.0% for herbicides, 2.1% for unknown pesticides, 3.3% for non-pesticides and 3.2% for the unknown group. The adjusted OR for each group for survival to admission was significantly lower when compared with insecticides: herbicides (OR = 0.11, 95% CI = 0.03–0.44), non-pesticide drugs (OR = 0.28, 95% CI = 0.13–0.61) and unknown group (OR = 0.40, 95% CI = 0.21–0.76). The adjusted OR for each group for survival to discharge was significantly lower when compared with insecticides: herbicides (OR < 0.01, 95% CI < 0.01 or >99.9), non-pesticide drugs (OR < 0.01, 95% CI < 0.01 or >99.9), and unknown group (OR < 0.01, 95% CI < 0.01 or >99.9).
unknown pesticides (OR = 0.23, 95% CI = 0.06–0.87), non-pesticide drugs (OR = 0.14, 95% CI = 0.04–0.54) and unknown group (OR = 0.30, 95% CI = 0.11–0.83). Conclusion: Using a nationwide OHCA registry, we found that poisonings were responsible for 4.4% of OHCAs of a non-cardiac aetiology. Ingestion of insecticides including organophosphate and carbamate was associated with more favourable outcomes.

26. Qureshi, SA, T Ahern, et al. (2012). "A Standardized Code Blue Team Eliminates Variable Survival from In-hospital Cardiac Arrest." J Emerg Med 42(1): 74-78. Recent studies suggest that time of day affects survival from in-hospital cardiac arrest. Lower survival rates are observed during nights and on weekends, except in areas with consistent physician care, such as the Emergency Department. Since 1997, our hospital has utilized a standard, hospital-wide “Code Blue Team” (CBT) to respond to cardiac arrests at any time. This team is always led by an emergency physician, and includes specially trained nurses. Objective: To assess if time of day or week affects survival from in-hospital cardiac arrest when a trained, consistent, emergency physician-led CBT is implemented. Methods: This is an analysis of prospectively collected data on initial survival rates (return of spontaneous circulation &gt;20 min) of all cardiac arrests that were managed by the CBT from 2000 to 2008. Cardiac arrests were also subcategorized based on initial cardiac rhythm. Survival rates were compared according to time of day or week. Results A total of 1692 cardiac arrests were included. There was no significant difference in the overall rate of initial survival between day/evening vs. night hours (odds ratio [OR] 1.04, 95% confidence interval [CI] 0.83–1.29), or between weekday vs. weekend hours (OR 1.10, 95% CI 0.85–1.38). This held true for all cardiac rhythms. Conclusion: At our institution, there is no significant difference in survival from cardiac arrest when a standardized “Code Blue Team” is utilized, regardless of the time of day or week.


Field triage is a process used by emergency medical services providers to make decisions about the most appropriate destination hospital for injured patients. In 2011, CDC convened an expert panel to review the existing guidelines, which had last been modified in 2006. This report explains the revisions and modifications that were made to the 2006 guidelines and provides the rationale for these changes. This report is intended to help prehospital-care providers in their daily duties recognize individual injured patients who are most likely to benefit from specialized trauma center resources and is not intended as a mass casualty triage tool. This guideline is available for free at: http://www.cdc.gov/Mmwr/pdf/rr/rr6101.pdf

28. Smith, SB, JB Geske, et al. (2012). "Risk Factors Associated with Delayed Diagnosis of Acute Pulmonary Embolism." J Emerg Med 42(1): 1-6. Prompt diagnosis and treatment of acute pulmonary embolism (PE) is essential to reduce mortality. Risk factors for PE are well known, but factors associated with delayed diagnosis are less clear. Objective: Our objective was to identify clinical factors associated with delayed diagnosis of patients with acute PE presenting to a tertiary-care emergency department (ED). Methods: We studied 400 consecutive adults who presented to our ED with acute, symptomatic PE. All patients were diagnosed by computed tomography (CT) angiography. Early diagnosis was defined as CT diagnosis &lt;12h from ED arrival, and delayed diagnosis as CT diagnosis &gt;12h. Univariate and multiple logistic regression models were used to identify factors associated with delayed diagnosis. Odds ratios with 95% confidence intervals are reported. Results The median time from arrival to diagnosis was 2.4h (interquartile range 1.4–7.6), and 73 (18.3%) patients had delayed diagnosis. Patients aged &gt;65 years and those with coronary artery disease or congestive heart failure had longer times from ED arrival to CT diagnosis, whereas patients with recent immobility had shorter times. Patients diagnosed &gt;12h were older and had higher rates of morbid obesity and coronary artery disease, whereas patients diagnosed &lt;12h had higher rates of tachycardia. In multiple regression modeling, tachycardia and recent immobility remained associated with early diagnosis, whereas morbid obesity remained associated with delayed diagnosis. Conclusions: Older patients with cardiovascular comorbidities had longer times from ED arrival to CT diagnosis. Our data suggest that these patients represent more of a diagnostic challenge than those presenting with traditional risk factors for PE.
such as tachycardia and recent immobilization. Physicians should consider these factors to diagnosis acute PE promptly in the ED.

The identification and treatment of critical illness is often initiated by emergency medical services (EMS) providers. We hypothesized that emergency department (ED) patients with severe sepsis who received EMS care had more rapid recognition and treatment compared to non-EMS patients. Methods: This was a prospective observational study of ED patients with severe sepsis treated with early goal-directed therapy (EGDT). We included adults with suspected infection, evidence of systemic inflammation, and either hypotension after a fluid bolus or elevated lactate. Prehospital and ED clinical variables and outcomes data were collected. The primary outcome was time to initiation of antibiotics in the ED. Results: There were 311 patients, with 160 (51.4%) transported by EMS. Emergency medical services–transported patients had more organ failure (Sequential Organ Failure Assessment score, 7.0 vs 6.1; P = .02), shorter time to first antibiotics (111 vs 146 minutes, P = .001), and shorter time from triage to EGDT initiation (119 vs 160 minutes, P = .005) compared to non–EMS-transported patients. Among EMS patients, if the EMS provider indicated a written impression of sepsis, there was a shorter time to antibiotics (70 vs 122 minutes, P = .003) and a shorter time to EGDT initiation (69 vs 131 minutes, P = .001) compared to those without an impression of sepsis. Conclusions: In this prospective cohort, EMS provided initial care for half of the patients with severe sepsis requiring EGDT. Patients presented by EMS had more organ failure and a shorter time to both antibiotic and EGDT initiation in the ED.

Objectives: To describe the experience of a U.S. emergency medical services (EMS) agency utilizing a dispatch algorithm to identify low-acuity patients and determine whether secondary telephone triage by a nurse was associated with subsequent hospital admission among those patients. Methods: This was a retrospective study of all patients meeting the low-acuity Omega classification by the Medical Priority Dispatch System (MPDS) in a large urban EMS system, conducted in two phases. Patients were excluded from the study if a refusal for transport was obtained, the call was received from a third-party caller, the MPDS system was not used, the patient was being referred from a skilled nursing facility, school, or university nursing office or physician's office, or if the call was referred to the Carolina Poison Center. Patients were enrolled over two phases using two different versions of the MPDS protocol, and in phase 2 patients were offered the option of speaking with an advice-line nurse. The outcome of interest was emergency department disposition, classified as hospital admission or discharge home. Admission to an intensive care unit (ICU) bed was also collected as a subcategory of hospital admission. Results. Of the 1,862 patients in phase 1, 69.3% were discharged home from the emergency department, whereas in phase 2, 73.0% of the 1,078 patients were discharged home. Individuals were most frequently admitted to the hospital across both phases if they had a dispatch determinant of pregnancy, psychiatric/behavioral, fall, sick person. Hospital admission was also associated with receiving an EMS or emergency department procedure. There were 530 patients in phase 2 who underwent secondary triage by an advice-line nurse. Among this cohort of patients, 134 (25.3%) required subsequent hospital admission, with a further three (2.2%) requiring an ICU admission. Conclusion: This study identified a method for classifying patients during the dispatch period as low-acuity while attempting to ensure that those individuals received the medical care that they needed. Key words: emergency medical services; emergency medical dispatch; triage.

The objective of the study was to explore the association between physical fitness and the likelihood of acute coronary syndrome (ACS) in patients presenting to
the emergency department (ED) with chest pain (CP). We hypothesized that the likelihood of ACS would be lower in physically fit patients and higher in patients with exercise-induced CP. Methods The study involved a prospective, descriptive cohort in an academic suburban ED. Subjects were ED patients with CP admitted for suspected ACS. Demographic and clinical data were collected by trained research assistants using standardized forms. Patients were surveyed on level of fitness and whether they had ever experienced anginal type symptoms during exercise. Acute coronary syndrome was considered present if the patient had electrocardiographic evidence of infarction or ischemia; elevated troponin I levels; greater than 70% stenosis of culprit coronary artery; or a positive nuclear, echocardiographic, or treadmill stress test result. Patients readmitted within 30 days for reinfarction, cardiogenic shock, or arrhythmias were also considered to have ACS. The association between physical fitness and ACS was determined using χ² tests and odds ratios (ORs). Results: One hundred patients were enrolled. Mean age was 55.8 (±15.3) years; 36% were female; 85% were white. Thirteen (13%) patients had positive troponins, 22 of 36 catheterized patients had greater than 70% coronary artery stenosis, and 6 (6%) had abnormal stress test results. There were no deaths or reinfarctions within 30 days. The rate of ACS was similar in patients who were physically fit and those who were not (24% vs 37%; OR, 0.5 [95% confidence interval, 0.2-1.3]) and in patients who had experienced exercise-induced CP and those who had not (32% vs 29%; OR, 1.2 [95% confidence interval, 0.4-3.2]). Neither the frequency nor the intensity of exercise was associated with ACS. Conclusions: Physically fit patients with CP were as likely to have ACS as those not physically fit. A history of exercise-induced CP was not associated with an increased likelihood of ACS.


Although congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), and asthma patients typically present with abnormal auscultatory findings on lung examination, respiratory sounds are not normally subjected to rigorous analysis. The aim of this study was to evaluate in detail the distribution of respiratory sound intensity in CHF, COPD, and asthma patients during acute exacerbation. Methods: Respiratory sounds throughout the respiratory cycle were captured and displayed using an acoustic-based imaging technique. Breath sound distribution was mapped to create a gray-scale sequence of two-dimensional images based on intensity of sound (vibration). Consecutive CHF (n = 22), COPD (n = 19), and asthma (n = 18) patients were imaged at the time of presentation to the emergency department (ED). Twenty healthy subjects were also enrolled as a comparison group. Geographical area of the images and respiratory sound patterns were quantitatively analyzed. Results: In healthy volunteers and COPD patients, the median (interquartile range [IQR]) geographical areas of the vibration energy images were similar, at 75.6 (IQR = 6.0) and 75.8 (IQR = 10.8) kilopixels, respectively (p > 0.05). Compared to healthy volunteers and COPD patients, areas for CHF and asthma patients were smaller, at 66.9 (IQR = 9.9) and 53.9 (IQR = 15.6) kilopixels, respectively (p < 0.05). The geographic area ratios between the left and right lungs for healthy volunteers and CHF and COPD patients were 1.0 (IQR = 0.2), 1.0 (IQR = 0.2), and 1.0 (IQR = 0.1), respectively. Compared to healthy volunteers, the geographic area ratio between the left and right lungs for asthma patients was 0.5 (IQR = 0.4; p < 0.05). In healthy volunteers and CHF patients, the ratios of vibration energy values at peak inspiration and expiration (peak I/E ratio) were 4.4 (IQR = 4.4) and 4.7 (IQR = 3.5). In marked contrast, the peak I/E ratios of COPD and asthma patients were 3.4 (= 2.1) and 0.1 (IQR = 0.3; p < 0.05), respectively. Conclusions: The pilot data generated in this study support the concept that relative differences in respiratory sound intensity may be useful in distinguishing acute dyspnea caused by CHF, COPD, or asthma.


To examine weather effects on the daily demand for ambulance services in Hong Kong. Methods: Over 6 million cases of emergency attendance from May 2006 through April 2009 (3 years) were obtained from the Hospital Authority in Hong Kong. These cases were further stratified by age, triage levels, hospital admission status, comprehensive social security assistance (CSSA) recipients and gender. The stratification was used to correlate against weather factors to assess the dependency of these variables and their effects on the daily number of ambulance calls. Adjusted-R² values obtained from the regression analysis were used as a
measure for evaluating predictability. Results: The adjusted-R2 of emergency cases by age groups showed proportional correlation with weather factors, which was more significant in older patients (0.76, p<0.01) than young patients (0.10, p<0.05). Furthermore, patients with more severe conditions were shown to have a higher adjusted-R2 (0.63, p<0.05 for critical as opposed to 0 for non-urgent patients). Weather effects were also found more significant in women (0.50, p<0.01) and CSSA recipients (0.54, p<0.01) when compared against their corresponding reference groups (respectively men at 0.46, p<0.01 and non-CSSA recipients at 0.45, p<0.01). Moreover, average temperature appeared to be a major weather effect. Conclusions: The presence of strong weather effects among different target groups indicates possibility for the development of a short-term forecast system of daily ambulance demand using weather variables. The availability of such a forecast system would render more effective deployment of the ambulance services to meet the unexpected increase in service demands.

Reviews


The risk factors for mortality following blunt chest wall trauma have neither been well established or summarised. To summarise the risk factors for mortality in blunt chest wall trauma patients based on available evidence in the literature. A systematic review of English and non-English articles using MEDLINE, EMBASE and the Cochrane Library from their introduction until May 2010. Additional studies were identified by hand-searching bibliographies and contacting relevant clinical experts. Grey literature was sought by searching abstracts from all Emergency Medicine conferences. Broad search terms and inclusion criteria were used to reduce the number of missed studies. A two step study selection process was used. All published and unpublished observational studies were included if they investigated estimates of association between a risk factor and mortality for blunt chest wall trauma patients. A two step data extraction process using pre-defined data fields, including study quality indicators. Each study was appraised using a previously designed quality assessment tool and the STROBE checklist. Where sufficient data were available, odds ratios with 95% confidence intervals were calculated using Mantel–Haenszel method for the risk factors investigated. The I2 statistic was calculated for combined studies in order to assess heterogeneity. Age, number of rib fractures, presence of pre-existing disease and pneumonia were found to be related to mortality in 29 identified studies. Combined odds ratio of 1.98 (1.86–2.11, 95% CI), 2.02 (1.89–2.15, 95% CI), 2.43 (1.03–5.72, 95% CI) and 5.24 (3.51–7.82) for mortality were calculated for blunt chest wall trauma patients aged 65 years or more, with three or more rib fractures, pre-existing conditions and pneumonia respectively. The risk factors for mortality in patients sustaining blunt chest wall trauma were a patient age of 65 years or more, three or more rib fractures and the presence of pre-existing disease especially cardiopulmonary disease. The development of pneumonia post injury was also a significant risk factor for mortality. As a result of the variable quality in the studies, the results of the selected studies should be interpreted with caution.


The out-of-hospital setting is unique to health care and presents many challenges to providing safe, high-quality medical care in emergency situations. The challenges of the prehospital environment require thoughtful design of systems and processes of care. The unique challenges of ambulance safety may be met by analyzing systems and incorporating process improvements. The purposes of this paper are to 1) outline the nature of this problem, 2) introduce a framework for this discussion, 3) provide expert opinion from a two-day ambulance safety conference, and 4) propose a plan of action to address the safety issues identified in the literature and expert opinion at the conference. Utilizing the Haddon Matrix as a framework, we present the safety issues and proposed solutions for factors
contributing to an injury event in the emergency medical services (EMS) transport environment: host, agent, physical environment, and social environment. Host refers to the person or persons at risk, in this case, the EMS personnel or the patient. The agent of injury refers to the energy exerted during the course of an injury, and may be modified to include unrestrained equipment that contributes to the injury. The physical environment refers to the characteristics of the setting in which the injury takes place, such as the roadway or the physical design of the ambulance. Finally, the social environment refers to the social, legal, and cultural norms and practices in the society, such as peer pressure and a culture that discourages the use of safety equipment.

Due to its protective effect on the brain and the myocardium, hypothermia therapy (HT) has been extensively studied in cardiac arrest patients with coma as well as in patients presenting with acute myocardial infarction (MI). In the setting of cardiac arrest, randomized studies have shown that HT decreases mortality and improves neurological outcomes. Subsequent guidelines have therefore recommended cooling (32°C to 34°C) for 12 to 24 h in unconscious adult patients with spontaneous circulation after out-of-hospital cardiac arrest due to ventricular fibrillation. Observational studies have also confirmed the feasibility of this therapy in clinical practice and support its early application in patients with non-ventricular fibrillation cardiac arrest and in post-resuscitation circulatory shock. In patients with acute MI, available clinical evidence does not yet support HT as the standard of care, because no study to date has shown a clear net benefit in such a cohort. After a brief review of the mechanisms of action for HT, we provide a review of the clinical evidence, cooling techniques, and potential adverse effects associated with HT in the setting of post-cardiac arrest patient and acute MI.

Pulseless electrical activity (PEA), a cardiac arrest rhythm scenario with an associated poor prognosis, is defined as cardiac electrical activity without a palpable pulse. Considering both outpatient and inpatient cardiac arrest presentations, PEA as a rhythm group has been increasing over the past 10 to 20 years with a corresponding decrease in the “shockable” rhythms, such as pulseless ventricular tachycardia and ventricular fibrillation. This review focuses on electrocardiographic findings encountered in PEA cardiac arrest presentations with an emphasis on recognition of patients with a potential opportunity for successful resuscitation.

Prior meta-analyses-reported results of randomised controlled trials (RCTs) published between 1997 and 2004 failed to show any vasopressin-related benefit in cardiac arrest. Based on new RCT-data and a hypothesis of a potentially increased vasoconstricting efficacy of vasopressin, we sought to determine whether the cumulative, current evidence supports or refutes an overall and/or selective benefit for vasopressin regarding sustained restoration of spontaneous circulation (ROSC), long-term survival, and neurological outcome. Methods: Two reviewers independently searched PubMed, EMBASE, and Cochrane Database for RCTs assigning adults with cardiac arrest to treatment with a vasopressin-containing regimen (vasopressin-group) vs adrenaline (epinephrine) alone (control-group) and reporting on long-term outcomes. Data from 4475 patients in 6 high-methodological quality RCTs were analyzed. Subgroup analyses were conducted according to initial cardiac rhythm and time from collapse to drug administration (TDRUG) < 20 min. Results: Vasopressin vs. control did not improve overall rates of sustained ROSC, long-term survival, or favourable neurological outcome. However, in asystole, vasopressin vs. control was associated with higher long-term survival [odds ratio (OR) = 1.80, 95% confidence interval (CI) = 1.04–3.12, P = 0.04]. In asystolic patients of RCTs with average TDRUG < 20 min, vasopressin vs. control increased the rates of sustained ROSC (data available from 2 RCTs; OR = 1.70, 95% CI = 1.17–2.47, P = 0.005) and long-term survival (data available from 3 RCTs; OR = 2.84,
95% CI = 1.19–6.79, \( P = 0.02 \)). Conclusions: Vasopressin use in the resuscitation of cardiac arrest patients is not associated with any overall benefit or harm. However, vasopressin may improve the long-term survival of asystolic patients, especially when average TDRUG is <20 min.


Objectives: To describe the advancement of intraosseous (IO) infusion in the spectrum of resuscitative protocols and to provide a systematic review on currently used semi-automatic IO infusion devices. The specific question addressed was: “In patients undergoing resuscitation, does the use of semi-automatic IO infusion devices compared to manual needles influence IO placement success rate, time for IO placement, and ease-of-use and user preference?” Methods The electronic databases PubMed and Embase were searched for articles published from 1997 to 2010 using the search terms (“intraosseous”) AND (“needle” or “device” or “technique”) AND (“infusion” or “injection” or “access”). The Internet search engine Google Scholar was searched using the search term “intraosseous infusion device” to identify articles published in electronic journals, books, and scientific websites. Articles were included only if they compared at least two types of semi-automatic devices, or compared one or more semi-automatic device with one or more manual needles. Reviews, editorials, surveys, and case reports were excluded. Results The search strategy yielded 179 papers. Ten studies met full criteria for further review. Of these, two were LOE 1 (randomized controlled trials), one was LOE 2 (non-randomized, concurrent controls), one was LOE 3 (retrospective controls), and six were LOE 5 (simulation-based study). One of the six LOE 5 studies was a non-peer reviewed article. Conclusions: Only a few studies compared the performance of different types of IO infusion devices, most of them have a low level of evidence. These studies suggested a superiority of the battery-powered IO driver over manual needles, and other semi-automatic IO infusion devices.


The 2011 Update to the Unstable Angina/Non–ST–Elevation Myocardial Infarction (UA/NSTEMI) Guideline is based in evolving data or expert opinion and incorporates information from late-breaking clinical trials presented at the 2008–2009 Scientific Sessions of the American College of Cardiology, the American Heart Association, and the European Society of Cardiology, among others, as well as selected data through April 2010. The 5 key issues highlighted in this summary are: (1) the timing of acute interventional therapy in non–ST–elevation myocardial infarction; (2) emphasis on the timing, duration, and application of dual and triple antiplatelet therapy; (3) specific recommendations for patients with diabetes mellitus; (4) the role and potential benefit of invasive therapy in patients with advanced renal dysfunction; and (5) issues of quality improvement for acute coronary syndromes.


The American Heart Association and other scientific guidelines recommend emergency medical services acquire prehospital (PH) electrocardiography (ECG) in all patients with symptoms of acute coronary syndrome. The purpose of this article is to critically review the scientific literature about PH ECG. Methods: Using multiple search terms, we searched the PubMed and Web of Science databases for relevant information. Search limiters were used: human, research (clinical trials, experimental), core journals, and adult. All articles about the clinical effects of PH ECG published between 2001 and 2011 were retained, in addition to a landmark study from 1997. Results Our search yielded a total of 105 articles when all years of publication were considered. When the same search was limited to articles published between 2001 and 2011 for new and current data, 45 articles were returned. A total of 7 articles about the clinical effects of PH ECG were retained for this review. Articles were conceptualized and organized by clinical effects of PH ECG (timing, reperfusion rate, death, ejection fraction, reinfarction, and stroke). PH ECG has been associated with reduced PH delay time, increased use of reperfusion interventions, earlier diagnosis, and faster time to treatment.

Metronome guidance is a simple and economical feedback system for guiding cardiopulmonary resuscitation (CPR). However, a recent study showed that metronome guidance reduced the depth of chest compression. The results of previous studies suggest that a higher chest compression rate is associated with a better CPR outcome as compared with a lower chest compression rate, irrespective of metronome use. Based on this finding, we hypothesized that a lower chest compression rate promotes a reduction in chest compression depth in the recent study rather than metronome use itself. METHODS: One minute of chest compression-only CPR was performed following the metronome sound played at 1 of 4 different rates: 80, 100, 120, and 140 ticks/min. Average compression depths (ACDs) and duty cycles were compared using repeated measures analysis of variance, and the values in the absence and presence of metronome guidance were compared. RESULTS: Both the ACD and duty cycle increased when the metronome rate increased (P = .017, <.001). Average compression depths for the CPR procedures following the metronome rates of 80 and 100 ticks/min were significantly lower than those for the procedures without metronome guidance. CONCLUSIONS: The ACD and duty cycle for chest compression increase as the metronome rate increases during metronome-guided CPR. A higher rate of chest compression is necessary for metronome-guided CPR to prevent suboptimal quality of chest compression.


Tracheal intubation is often difficult in the prehospital setting, especially in trapped casualties, when long extrication time is anticipated and conventional laryngoscopy cannot be achieved. The aim of the present study was the comparison of applicability and efficacy of two alternative techniques: intubation using a laryngeal mask airway (ILMA) or an Airtraq laryngoscope in different patient positions, using an airway management manikin. Methods: 20 anaesthetists attempted manikin intubations standing behind the manikin (Sup), standing in front and facing the manikin’s head (Fac), facing the manikin in the sitting position (Sit) and facing the manikin lying in the lateral decubitus position (Lat), using either Airtraq or ILMA techniques. The intubations were evaluated regarding the success rate, number of attempts and time needed for successful intubation, teeth damage and overall difficulty. Results: All intubation attempts were successful for both techniques. Intubations through ILMA were completed with a significantly greater number of attempts and longer time in the Lat position, compared to Fac, Sit and Sup (p<0.05), whereas intubations using Airtraq in the Sup and Fac positions were completed with a significantly greater number of attempts and longer time, compared to Sit and Lat positions (p<0.05). Both ILMA and Airtraq can be used for securing the airway when direct laryngoscopy is impossible due to patient position. ILMA seems to cause greater difficulty in the Lat position, whereas Airtraq intubation is more easily performed in the Sit and Lat positions. Conclusions: These preliminary data in manikins could indicate the applicability of the methods to the prehospital setting.


We compared the pharmacokinetics of intraosseous (IO) drug delivery via tibia or sternum, with central venous (CV) drug delivery during cardiopulmonary resuscitation (CPR). Methods: CPR of anesthetized KCl arrest swine was initiated 8 min post arrest. Evans blue and indocyanine green, each were simultaneously injected as a bolus with adrenaline through IO sternal and tibial needles, respectively, n = 7. In second group (n = 6) simultaneous IO sternal and IV central venous
Paramedics may use the King Laryngeal Tube airway (KLT) in difficult adult airways, but only limited data describe their application in pediatric patients. The objective of this study was to identify causes of errors during a simulated, prehospital pediatric emergency. Methods: Two-person emergency medical services (EMS) crews from five geographically diverse agencies participated in a validated simulation of an infant with altered mental status, seizures, and respiratory arrest using their own equipment and drugs. A scoring protocol was used to identify errors. A debriefing conducted by a trained facilitator immediately after the simulated event elicited root causes of active and latent errors, which were analyzed by thematic qualitative assessment methods. Results: Forty-five crews completed the study. Clinically important themes that emerged from the data included oxygen delivery, equipment organization and use, glucose measurement, drug administration, and inappropriate cardiopulmonary resuscitation. Delay in delivery of supplemental oxygen resulted from two different automaticity errors and a 54% failure rate in using an oropharyngeal airway (OPA). Most crews struggled to locate essential pediatric equipment. Three found broken or inoperable bag-valve-masks (BVMs), resulting in delayed ventilation. Some mistrusted their intraosseous (IO) injection gun device; others used it incorrectly. Only 51% of crews measured blood glucose; some discovered that glucometers were not stored in their sealed pediatric bags. The error rate for diazepam dosing was 47%; for midazolam, it was 60%. Underlying causes of dosing errors were found in four domains (cognitive, procedural, affective, and teamwork), and they included incorrect estimates of weight, incorrect use of the Broselow pediatric emergency tape, faulty recollection of doses, difficulty with calculations under stress, mg/kg to mg to mL conversion errors, inaccurate measurement of volumes, use of the wrong end of prefilled syringes, and failure to crosscheck doses with partners. Conclusions: Simulation, followed immediately by facilitated debriefing, uncovered underlying causes of active cognitive, procedural, affective, and teamwork errors, latent errors, and error-producing conditions in EMS pediatric care.


Introduction: Pediatric endotracheal intubation (ETI) is difficult and can have serious adverse events when performed by paramedics in the prehospital setting. Paramedics may use the King Laryngeal Tube airway (KLT) in difficult adult airways, but only limited data describe their application in pediatric patients. Objective: To compare paramedic airway insertion speed and complications between KLT and ETI in a simulated model of pediatric respiratory arrest. Methods: This prospective, randomized trial included paramedics and senior paramedic students with limited prior KLT experience. We provided brief training on pediatric KLT insertion. Using a random allocation protocol, participants performed both ETI and KLT on a pediatric mannequin (6-month old size) in simulated respiratory arrest. The primary outcomes were 1) elapsed time to successful airway placement (seconds), and 2) proper airway positioning. We compared airway insertion performance between KLT and ETI using the Wilcoxon signed-ranks test. Subjects also indicated their preferred airway device. Results: The 25 subjects included 19 paramedics and 6 senior paramedic students. Two subjects had prior adult KLT experience. Airway insertion time was not statistically different between the KLT (median 27 secs) and ETI (median 31 secs) (p = 0.08). Esophageal intubation occurred in 2 of 25 (8%) ETI. Airway leak occurred in 3 of 25 (12%) KLT, but ventilation remained satisfactory. Eighty-four percent of the subjects preferred the KLT over ETI. Conclusions: Paramedics and paramedic students demonstrated similar
airway insertion performance between KLT and ETI in simulated, pediatric respiratory arrest. Most subjects preferred KLT. KLT may provide a viable alternative to ETI in prehospital pediatric airway management.

The use of a suction laryngoscope that enables simultaneous suction and laryngoscopy was evaluated. 34 emergency medical technicians intubated the trachea of a manikin with simulated upper airway haemorrhage using the suction laryngoscope and the Macintosh laryngoscope, in random order. When using the suction laryngoscope, the number of oesophageal intubations was lower (3/34 vs 11/34; p=0.021) and the time taken to intubation was shorter (mean (SD) 50 (15) vs 58 (27) s; p=0.041). In cases of airway haemorrhage, the use of the suction laryngoscope might be beneficial.

Objective: The aim of the study is to compare the accuracy of manually delivered target tidal volumes (TVs) with the conventional paediatric self-inflating bags (CPBs) versus the novel paediatric self-inflating bags (NPBs) during simulated advanced paediatric resuscitation. Methods: Before the trial begun, four target TV ranges were established using the Broselow™ Tape as a reference: 36–70 ml for 6–10 kg, 60–105 ml for 10–15 kg, 90–168 ml for 15–24 kg and 144–210 ml for 24–30 kg. An NPB with four surface marks matching the target TV ranges was prepared. Senior medical students (N = 73) were enrolled. After 1 week of training in TV delivery with both CPB and NPB, subjects participated in a test simulation. Using the CPB and NPB in a random cross-over design, participants delivered 10 ventilations to test lungs connected to gas flow analysers for the randomly assigned target TV ranges. Results: Each of the 730 values for TV and peak inspiratory pressures (PIPs) delivered by CPB and NPB were analysed. The proportion of accurate TV delivery was higher with NPB than with CPB: 84.2% versus 45.9% for 36–70 ml, 93.2% versus 42.7% for 60–105 ml, 96.0% versus 70.3% for 90–168 ml and 91.2% versus 62.6% for 144–210 ml, respectively (all p < 0.0001). Compared with NPB, CPB delivery was more varied and was more frequently out of range. There were no significant differences in PIP between the CPB and NPB. Conclusions: NPB is useful as a ventilation device for the accurate delivery of TV to small children of varying weights.

The study aims to compare the performances (ease of insertion, time to establish effective ventilation and maximal inflation pressure) of classic™ (cLMA), ProSeal™ (PLMA) and Supreme™ (SLMA) Laryngeal Mask Airway when used in a neonatal airway management manikin by inexperienced delivery room trainees. The quality of the three devices, as perceived by participants, was also evaluated. Methods: Health-care professional trainees were given a brief supervised training with the three devices. Every trainee was then observed positioning each of the three different LMAs in a single occasion. Success rate, time (IT) and maximal inflation pressure (PImax) were recorded by a single unblinded observer. A 4-point scale was used to rate participants’ perceived quality. Results: A total of 40 health-care professional trainees participated in the study. There were five, three and one failed insertions at the first attempt with the cLMA, PLMA and SLMA, respectively. No failures to establish an effective airway within three attempts were recorded. The success rate at first attempt was comparable among the three devices. The mean IT was significantly lower with the SLMA as compared with PLMA (p < 0.01), but not to cLMA. The mean PImax was higher with SLMA than with cLMA and PLMA (p < 0.01). The ease of insertion as well as the effectiveness of ventilation were perceived by the participants as superior with SLMA as compared with cLMA and PLMA (p < 0.01). Conclusions: Neonatal SLMA is superior to PLMA in terms of time to establish effective ventilation; furthermore, maximal inflation pressure and quality perceived by the operator are higher with neonatal SLMA than with cLMA and PLMA. These manikin data could provide a
useful guide for planning potential future clinical research involving the newly developed supraglottic device in neonates.

Objective: To determine which of the disaster triage tag systems in use in Australia and New Zealand is better in terms of the time taken to complete the triage and the ease of use. Methods: A disaster scenario was created. Mock patients were provided with clinical information to allow them to be triaged in a disaster sieve. Six different triage tag systems available in Australia and New Zealand were trialled. Participants triaged 10 patients with each triage tag system. The 10 patients used were different for each of the tag systems and were standardized for acuity and triage category. The time to complete the triage of the 10 patients with each different tag system was measured. The participants then completed a questionnaire with regards to the ease of use of the different tags and were asked to nominate their most preferred tag. Results: The Victorian cruciate fold up tag was the quickest to complete, with an average of 6.6 min to triage 10 patients, compared with an average time for all systems of 7.8 min. New Zealand tags were found to be the easiest to use, easiest to fill in and were considered the most preferred tag. Conclusion: The Victorian style of tag was found to be the most efficient in terms of the time to complete a triage. The New Zealand tags were the easiest to use, easiest to fill in and the most preferred tag by the participants. We recommend that one of these tags be adapted for use as a nationwide system.

Case studies, letters & editorials

Treatment of myocardial infarction is today governed by specific protocols. Angioplasty involves a therapeutical anticoagulation to prevent the risk of acute thrombosis. Acute myocardial infarction after a blunt trauma has been described, but there is no specific treatment recommendations extant, particularly weighing the risk of hemorrhage. In this report, we describe an adolescent boy who suffered from an acute myocardial infarction by dissection of the left anterior descending coronary after a car crash. He also presented with a subdural hemorrhage and a lung contusion, injuries, which both present a substantial risk of hemorrhage. After diagnosing the therapeutical problem, we describe our decisions regarding how we approached this case. We provide an algorithm of treatment coming from our experience of these cases with the hope it can help physicians in their future decisions. Case study

Hiccups, which are usually benign and self-limited, occasionally serve as markers of a serious underlying pathology. We present this case report to inform emergency physicians about the potential for hiccups to serve as the only presenting symptom of a myocardial infarction. The patient, a 68-year-old man with a history of diabetes mellitus, hypertension, and current tobacco use, was first seen in the emergency department after 4 days of intractable hiccups with no other complaints or symptoms. After ineffective hiccup treatment on the first visit with 2 mg Ativan and 25 intramuscular (i.m.) thorazine and a normal chest x-ray, he was discharged. Two days later, the patient returned to the emergency department with the same complaint of hiccups without any additional complaints or symptoms. An electrocardiogram displayed several abnormalities including Q waves in II, III, and aVF and T-wave inversions in aVL and V6. Troponin I was highly elevated at 4.302 ng/mL. In the catheterization laboratory, the patient exhibited severe stenosis of the left circumflex artery and obtuse marginal. Stents were placed in these sites, and the patient recovered uneventfully. This is the first case in which hiccups were the single presenting symptom of a myocardial infarction in the last 50 years. Although extremely common and usually benign, hiccups can occasionally be a sole symptom of serious underlying pathology, which in this
case, was a non-ST-segment elevation myocardial infarction.


Supraventricular tachycardia (SVT) is a common tachyarrhythmia in the pediatric population that can necessitate immediate treatment. Adenosine has been well studied as a mainstay treatment, but the methods of adenosine administration have not been very well delineated. The intraosseous technique has presented itself as a possible method of administration. We describe 2 cases in which adenosine was administered through bone marrow infusion to convert SVT without success. The cases we describe show that intraosseous is not a reliable method of administering adenosine to stop SVT. Both patients presented with SVT refractory to vagal maneuvers and difficult intravenous placement. Intraosseous access was achieved, but administration of adenosine at increasing doses was unable to successfully convert the arrhythmia.


ST-elevation myocardial infarction (STEMI) is an emergency situation in which immediate measures for myocardial reperfusion are needed. The diagnosis is based on the recognition of ST-segment elevation in the electrocardiogram (ECG). In case of coronary artery occlusion, ST-segment elevation is caused by an injury current from the ischemic myocardium. Rarely, other mechanisms may lead to ECG changes mimicking STEMI. In our case, a 65-year-old man was presented to our institution with ECG abnormalities suggestive of STEMI. However, coronary angiography showed open arteries. Laboratory tests revealed severe hypocalcemia caused by a deficiency of vitamin D. After calcium replacement therapy, the ECG normalized, and the patient was discharged in good condition. Only a few case reports on hypocalcemia-induced ST-segment elevation exist, and the mechanism remains unknown.


The quality of cardiopulmonary resuscitation (CPR) is associated with the rate of return of spontaneous circulation (ROSC) during human cardiac arrest. Current advances in defibrillator technology enable measurement of CPR quality during resuscitation, but it is not known whether this is directly reflected in cerebral oxygenation. In this descriptive study we aimed to evaluate whether the quality of feedback-monitored CPR during in-hospital cardiac arrest is reflected in near infrared frontal cerebral spectroscopy (NIRS). Methods: Nine patients suffering an in-hospital cardiac arrest in a university hospital were included. All patients underwent quality-controlled CPR performed by a dedicated medical emergency team using a Philips HeartStart MRx defibrillator (Philips, Eindhoven, Netherlands) with a CPR quality (Q-CPR, Laerdal Medical, Stavanger, Norway) analysis feature. Simultaneously, bilateral frontal cerebral oximetry was measured using INVOS 5100c (Somanetics, Troy, MI, USA) NIRS. Results: During quality controlled resuscitation, regional cerebral oxygenation (rSO2) as measured with NIRS was low but it improved during CPR (p = 0.043) and 8 min after ROSC (p = 0.022). After the onset of NIRS recording, there were four episodes exceeding 30 s, during which the quality of CPR was substandard. When CPR technique was corrected and maintained for 2 min, a minor non-significant increase in rSO2 was observed in two cases. Conclusions: High quality CPR was not significantly reflected in cerebral oxygenation as quantified using NIRS. Even after ROSC and subsequent significant increase in cerebral oxygenation, rSO2 readings were below previously suggested threshold of cerebral ischaemia. Improving CPR technique after an episode of low quality CPR did not significantly increase rSO2. Case series.


Heatstroke can result in significant diffuse tissue derangement, which can result in multiple organ system dysfunction. The heart can equally be affected and
ischemia and infarction may occur. Objective: This study aimed to present the potential complications from heatstroke to the myocardium. Case: A case of a 15-year-old adolescent boy who collapsed after playing football in a hot summer day was found to be hyperthermic and poorly perfused. He had ischemic electrocardiographic changes and elevated cardiac enzymes but with normal coronary arteries. Conclusions: Heatstroke can lead to morbidity and mortality. Tissue damage during heatstroke is believed to result from uncoupling during oxidative phosphorylation. It is important to realize that heart damage can occur from heatstroke and that appropriate diagnostic and therapeutic measures are required for a good outcome. Case study

Following the publication in 2010 of the International Liaison Committee on Resuscitation (ILCOR) Consensus on Cardiopulmonary Resuscitation (CPR) Science with Treatment Recommendations (CoSTR) and the European Resuscitation Council (ERC) Guidelines, the Resuscitation editorial team was expecting a relatively quiet 2011. Instead, we are delighted to report a substantial increase in the number and, more importantly, the quality of submissions to the journal. Here we summarise briefly the key papers published in Resuscitation in 2010. Editorial

Education & ethics in resuscitation

The patient’s voice has not been present to the same degree as the professional perspective in caring research in a pre-hospital context. In order to further develop and improve pre-hospital care, it is therefore important to explore patients’ situations not only in life threatening but also in non-traumatic situations. This is especially important as these patients might be defined as inappropriate attendees of ambulance services. The aim of this study was to interpret and explain experiences of caring in pre-hospital care situations that are not defined as traumatic or life threatening. Twenty informants aged between 34 and 82 years were interviewed. The design of the study was exploratory, and it used an interpretative approach in order to understand the meaning of pre-hospital caring. The findings show that pre-hospital caring can be understood and explained as a matter of interplay between carer(s) and patient with potentials for positive as well as negative outcomes. Our conclusion is that the initial meeting is of vital importance in how patients experience pre-hospital care. It is suggested that general public information on the development of Swedish pre-hospital care received in turn may facilitate the first encounter between patient and carer(s).

Prior to graduation, paramedic students must be assessed for terminal competency and preparedness for national credentialing examinations. Although the procedures for determining competency vary, many academic programs use a practical and/or oral examination, often scored using skill sheets, for evaluating psychomotor skills. However, even with validated testing instruments, the interevaluator reliability of this process is unknown. Objective: We sought to estimate the interevaluator reliability of a subset of paramedic skills as commonly applied in terminal competency testing. Methods: A mock examinee was videotaped performing staged examinations mimicking adult ventilatory management, oral board, and static and dynamic cardiac stations during which the examinee committed a series of prespecified errors. The videotaped performances were then evaluated by a group of qualified evaluators using standardized skill sheets. Interevaluator variability was measured by standard deviation and range, and reliability was evaluated using Krippendorff's alpha. Correlation between scores and evaluator demographics was assessed by Pearson correlation. Results: Total scores and critical errors varied considerably across all evaluators and stations. The mean (± standard deviation) scores were 24.77 (±2.37) out of a possible 27 points for the adult ventilatory management station, 11.69 (±2.71) out of a possible 15
points for the oral board station, 7.79 (±3.05) out of a possible 12 points for the static cardiology station, and 22.08 (±1.46) out of a possible 24 points for the dynamic cardiology station. Scores ranged from 18 to 27 for adult ventilatory management, 7 to 15 for the oral board, 2 to 12 for static cardiology, and 19 to 24 for dynamic cardiology. Krippendorff's alpha coefficients were 0.30 for adult ventilatory management, 0.01 for the oral board, 0.10 for static cardiology, and 0.48 for dynamic cardiology. Critical criteria errors were assigned by 10 (38.5%) evaluators for adult ventilatory management, five (19.2%) for the oral board, and nine (34.6%) for dynamic cardiology. Total scores were not correlated with evaluator demographics. Conclusions: There was high variability and low reliability among qualified evaluators using skill sheets as a scoring tool in the evaluation of a mock terminal competency assessment. Further research is needed to determine the true overall interevaluator reliability of this commonly used approach, as well as the ideal number, training, and characteristics of prospective evaluators.

To develop an educational program designed to train health care providers in resource limited settings to carry out neonatal resuscitation. We analyzed facilitator and learner perceptions about the course, examined skill performance, and assessed the quality of instruments used for learner evaluation as part of the formative evaluation of the educational program Helping Babies Breathe. Methods: Multiple stakeholders and a Delphi panel contributed to program development. Training of facilitators and learners occurred in global field test sites. Course evaluations and focus groups provided data on facilitator and learner perceptions. Knowledge and skill assessments included pre/post scores from multiple choice questions (MCQ) and post-training assessment of bag and mask skills, as well as 2 objective structured clinical evaluations (OSCE). Results: Two sites (Kenya and Pakistan) trained 31 facilitators and 102 learners. Participants expressed high satisfaction with the program and high self-efficacy with respect to neonatal resuscitation. Assessment of participant knowledge and skills pre/post-program demonstrated significant gains; however, the majority of participants could not demonstrate mastery of bag and mask ventilation on the post-training assessment without additional practice. Conclusions: Participants in a program for neonatal resuscitation in resource-limited settings demonstrated high satisfaction, high self-efficacy and gains in knowledge and skills. Mastery of ventilation skills and integration of skills into case management may not be achievable in the classroom setting without additional practice, continued learning, and active mentoring in the workplace. These findings were used to revise program structure, materials and assessment tools.

To determine the capability of nurses to identify ventricular fibrillation (VF) and ventricular tachycardia (VT) rhythms on an ECG and carry out subsequent defibrillation on their own as soon as they identify and confirm cardiac arrest. Methods: This was a prospective cohort study to determine the capability of emergency department (ED) nurses to recognise VF or pulseless VT correctly and their willingness to perform defibrillation immediately in an ED of a teaching hospital in Hong Kong. A questionnaire was completed before and after a teaching session focusing on the identification of rhythms in cardiac arrest and defibrillation skills. Correct answers for both ECG interpretation and defibrillation decisions scored one point for each question. The differences in mean scores between the pre-teaching and post-teaching questionnaires of all nurses were calculated. Results: 51 pre-teaching and 43 post-teaching questionnaires were collected. There were no statistically significant changes in ECG scores after teaching. For defibrillation scores, there was an overall improvement in the defibrillation decision (absolute mean difference 0.42, p=0.014). Performance was also improved by the teaching (absolute mean difference 0.465, p=0.046), reflected by the combination of both scores. Two-thirds (67%) of nurses became more confident in managing patients with shockable rhythms. Conclusion: Nurses improve in defibrillation decision-making skills and confidence after appropriate brief, focused in-house training.
Answers to last month’s quiz, and some clips to check out.....

Answers to the BMJ Christmas Picture Quiz:

1. Anaemia

2. Cerebral palsy
3. Anaphylactic shock

4. Prostacyclin

5. Kawasaki
Interesting and educational clips...

http://www.youtube.com/watch?v=igZo58KzCM [Perfusion]

http://www.youtube.com/watch?v=Wpsf-EbyBhl&feature=related [911]

http://www.youtube.com/watch?v=LRdebJrwn2s&feature=related [defib]

http://www.youtube.com/watch?v=va8uzkBDcLA&feature=youtu.be [code blue]

http://www.youtube.com/watch?v=x5oq4ErAmW0&feature=related [the heartbeat dance]