Clinical trials


Objective: The quality of medical documentation is integral to audit, clinical governance, education, medico-legal aspects and continuity of patient care. This study aims to investigate the introduction of a dedicated Airway Registry Form (ARF) on the quality of documentation in prehospital rapid sequence intubation. Methods: A retrospective review and comparison of 96 cases predating the introduction of the ARF and 90 cases immediately following its introduction were performed. Results: The introduction of the ARF yielded significant improvement in the recording of selected data points: difficult airway indicators (p<0.0001), Cormack-Lehane grade of laryngoscopy at first attempt (p<0.0001), documentation of confirmation of tracheal intubation with end-tidal carbon dioxide monitoring (p=0.015) and recording of intubator’s details (p<0.0001). Conclusions: This study validates the use of a dedicated ARF for the improvement of documentation and data collection related to prehospital rapid sequence intubation when compared with post-event extraction of data from a generic case-record.

Observational studies


Chest pain/discomfort (CP) is the hallmark symptom of acute myocardial infarction (MI), but some patients with MI present without CP. We hypothesized that MI type (ST-segment elevation MI [STEMI] or non-STEMI [NSTEMI]) may be associated with the presence or absence of chest pain / discomfort (CP). Methods: We investigated the association between CP at presentation and MI type, hospital care, and mortality among 1,143,513 patients with MI in the National Registry of Myocardial Infarction (NRMI) from 1994 to 2006. Results: Overall, 43.6% of patients with NSTEMI and 27.1% of patients with STEMI presented without CP. For both MI type, patients without CP were older, were more frequently female, had more diabetes or history of heart failure, were more likely to delay hospital arrival, and were less likely to receive evidence-based medical therapies and invasive cardiac procedures. Multivariable analysis indicated that NSTEMI (vs STEMI) was the strongest predictor of atypical symptoms (adjusted odds ratio [95% CI], 1.93 [1.91-1.95]). Within the 4 CP/MI type categories, hospital mortality was highest for no CP/STEMI (27.8%), followed by no CP/NSTEMI (15.3%) and CP/STEMI (9.6%), and was lowest for CP/NSTEMI (5.4%).
adjusted odds ratio of mortality was 1.38 (1.35-1.41) for no CP (vs CP) in the STEMI group and 1.31 (1.28-1.34) in the NSTEMI group. Conclusions: Hospitalized patients with NSTEMI were nearly 2-fold more likely to present without chest pain / discomfort than patients with STEMI. Patients with MI without chest pain / discomfort were less quickly diagnosed and treated and had higher adjusted odds of hospital mortality, regardless of whether they had ST-segment elevation.

**Guideline 14: ACS**


Study objective: Although regionalized care for ST-segment elevation myocardial infarction (STEMI) has improved the use of timely reperfusion therapy, its effect on patient outcomes has been difficult to assess. Our objective is to explore temporal trends in STEMI mortality with the implementation of a statewide STEMI regionalization program (Reperfusion of Acute Myocardial Infarction in North Carolina Emergency Departments [RACE]). Methods: We compared trends in inpatient mortality among STEMI patients treated at North Carolina (NC) hospitals participating in the RACE program, relative to those not participating, using state inpatient claims data. Using Medicare claims data, we compared trends in 30-day mortality among Medicare beneficiaries in NC with those nationally. Logistic models with random effects were used to evaluate the association of the program with mortality. Results From 2005 to 2007, inpatient mortality for 6,565 STEMI patients treated at NC hospitals participating in RACE decreased from 11.6% to 10.1% (risk difference 1.5%; 95% confidence interval [CI] 3.0% to 0.04%), whereas inpatient mortality among 5,850 STEMI patients treated at NC nonparticipating hospitals decreased from 10.2% to 8.6% (risk difference 1.6%; 95% CI 3.1% to 0.10%); (adjusted odds ratio 1.28; 95% CI 0.88 to 1.85 for temporal differences between groups). During the same period, 30-day STEMI mortality among Medicare beneficiaries decreased from 22.7% to 21.4% in NC (risk difference 1.28%; 95% CI 3.60% to 1.03%) and from 22.3% to 21.6% nationally (risk difference 0.71%, 95% CI 1.13% to 0.29%; adjusted odds ratio 0.99, 95% CI 0.85 to 1.15 for temporal differences between regions). Conclusion: The initiation of a statewide STEMI collaborative care model was associated with a reduction in mortality rates according to claims data, yet these changes were similar to those seen nationally. Further study is needed to evaluate regionalized systems of STEMI care and to determine the role of claims data to evaluate population-based STEMI outcomes.

**Guideline 14: ACS**


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


Out-of-hospital cardiac arrest (OHCA) claims millions of lives worldwide each year. OHCA survival from shockable arrhythmias (ventricular fibrillation/ tachycardia) improved in several communities after implementation of American Heart Association resuscitation guidelines that eliminated "stacked" shocks and emphasized chest compressions. “Nonshockable” rhythms are now the predominant presentation of OHCA; the benefit of such treatments on nonshockable rhythms is uncertain. Methods and Results—We studied 3960 patients with nontraumatic OHCA from nonshockable initial rhythms treated by prehospital providers in King County, Washington, over a 10-year period. Outcomes during a 5-year intervention period after adoption of new resuscitation guidelines were compared with the previous 5-year historical control period. The primary outcome was 1-year survival. Patient demographics and resuscitation characteristics were similar between the control (n=1774) and intervention (n=2186) groups, among whom 471 of 1774 patients (27%) versus 742 of 2186 patients (34%), respectively, achieved return of spontaneous circulation; 82 (4.6%) versus 149 (6.8%) were discharged from hospital, 60 (3.4%) versus 112 (5.1%) with favorable neurological outcome; 73 (4.1%) versus 135 (6.2%) survived 1 month; and 48 (2.7%) versus 106 patients (4.9%) survived 1 year (all P ≤ 0.005). After adjustment for potential confounders, the intervention period was associated with an improved odds of 1.50 (95% confidence interval, 1.29–1.74) for return of spontaneous circulation, 1.53 (95% confidence interval, 1.14–2.05) for hospital survival, 1.56 (95% confidence interval, 1.11–2.18) for favorable neurological status, 1.54 (95% confidence interval, 1.14–2.10) for 1-month survival, and 1.85 (95% confidence interval, 1.29–2.66) for 1-year survival. Conclusion—Outcomes from OHCA resulting from nonshockable rhythms, although poor by comparison with shockable rhythm presentations, improved significantly after implementation of resuscitation guideline changes, suggesting their potential to benefit all presentations of OHCA.


OBJECTIVES: Recent guidelines recommend the immediate performance of a coronary angiography when an acute myocardial infarction is suspected as a cause of out-of-hospital cardiac arrest. However, prehospital factors such as postresuscitation electrocardiogram pattern or clinical features are poorly sensitive in this setting. We searched to evaluate if an early measurement of cardiac troponin I can help to detect a recent coronary occlusion in out-of-hospital cardiac arrest. DESIGN: Retrospective analysis of a prospective electronic registry database. SETTING: University cardiac arrest center. PATIENTS: Between January 2003 and December 2008, 422 out-of-hospital cardiac arrest survivors
without obvious extra-cardiac cause have been consecutively studied. An immediate coronary angiography has been systematically performed. The primary outcome was the finding of a recent coronary occlusion. INTERVENTION: First, blood cardiac troponin I levels at admission were analyzed to assess the optimum cutoff for identifying a recent coronary occlusion. Second, a logistic regression was performed to determine early predictive factors of a recent coronary occlusion (including cardiac troponin I) and their respective contribution. MEASUREMENTS AND MAIN RESULTS: An ST-segment elevation was present in 127 of 422 patients (30%). During coronary angiography, a recent occlusion has been detected in 193 of 422 patients (46%). The optimum cardiac troponin I threshold was determined at 4.66 ng.mL (sensitivity 66.7%, specificity 66.4%). In multivariate analyses, in addition of smoking and epinephrine initial dose, cardiac troponin I (odds ratio 3.58 [2.03-6.32], p < .001) and ST-segment elevation (odds ratio 10.19 [5.39-19.26], p < .001) were independent predictive factors of a recent coronary occlusion.

CONCLUSIONS: In this large cohort of out-of-hospital cardiac arrest patients, isolated early cardiac troponin I measurement is modestly predictive of a recent coronary occlusion. Furthermore, the contribution of this parameter even in association with other factors does not seem helpful to predict recent occlusion. As a result and given the high benefit of percutaneous coronary intervention for such patients, the dosage of cardiac troponin I at admission could not help in the decision of early coronary angiogram.


Background: Accurate determination of burn size and depth forms an integral part of the initial assessment of any burn injury. Errors might lead to inaccurate fluid resuscitation and inappropriate transfer of patients to specialized burns units (BUs). Although recent data suggest some improvement in the estimation of burn injury in adults, this has not been shown in children. Methods: A retrospective review of children with burn injuries referred to the BU of our institution was performed. Data were collected from all patients presenting to the BU during the calendar year 2009. The total body surface area burned (TBSA-B) estimated by the referring centre was compared with the actual TBSA determined measured on arrival at the BU. Results: Of the 71 paediatric patients referred during the study period, 10 did not have any TBSA-B estimation documented by the referring hospital. Inaccurate estimation of burn area was noted in 48 out of 61 patients (79%). Burn size was more likely to be overestimated than underestimated by a ratio of 2.2 to 1, especially in burns >10% TBSA-B (P= 0.002). Conclusions: Inaccurate estimation of burn size remains a problem in children. The persistent miscalculation of burn size might be a result of the various methods employed in assessing burn area, the inclusion of simple erythema and inadequate training or exposure of first responders. Accurate assessment of TBSA-B and burn depth in children remains elusive and would appear to require additional training and education.


Objective: To evaluate the performance of a newly implemented prehospital trauma triage (T1) protocol in New South Wales for patients transported to an inner city major trauma centre. Methods: An observational study was conducted over 1 year. Prehospital data and injury characteristics were collected prospectively for all hospital trauma team activations and injury presentations transported by Ambulance Service of New South Wales. Univariate comparison of T1- and non-T1-transported patients was performed and sensitivity, specificity, overtriage and undertriage rates were calculated. The outcomes studied were Injury Severity Score >15 and major outcome (composite of in-hospital death and/or transferred from the ED to operating theatre or intensive care unit). Factors associated with undertriage were determined with univariate
analysis. Results: A total of 2664 ambulance arrivals for trauma were studied with 767 (29%) transported on the T1 protocol. T1-transported patients were associated with more severe injury (23% vs 6%, P < 0.001) and major outcomes (30% vs 10%, P < 0.001) compared with non-T1-transported patients. The sensitivity of the T1 protocol for severe injury was 63% with a positive predictive value of 23%. The undertriage and overtriage rates for severe injury were 12% and 77%, respectively. Undertriaged patients were elderly with falls as the predominant mechanism of injury. Conclusion: The sensitivity and undertriage rates associated with the T1 protocol indicate the ongoing need for secondary triage at designated trauma centres and refinement of the protocol to include age as a criterion.

This retrospective, electronic patient care record review examined a consecutive sample of patients presenting with pain to the metropolitan region of Ambulance Victoria over a 12 month period in 2008. Seven factors were found to be associated with the likelihood of clinically important pain reduction following multivariate analyses. These included age, time criticality of the patient, pain aetiology, initial pain severity, analgesic agent or combination administered to the patient and prehospital time.

Objective: Aeromedical retrieval services face the difficult problem of appropriate levels of sedation for transport of acutely agitated patients to definitive care. This paper describes a technique using ketamine, which is titratable and avoids problems associated with airway management. Method: A 3-year review of a new technique of ketamine sedation by aeromedical retrieval teams from the Cairns base of the Queensland section of the Royal Flying Doctor Service of Australia. Clinical records were systematically reviewed for ketamine administration and signs of adverse events during transport and in the subsequent 72 h. Results: 18 patients were sedated during retrieval with intravenous ketamine. Effective sedation was achieved in all cases, with no significant adverse events noted during retrieval or 72h afterwards. Conclusion: Ketamine sedation is effective and safe in agitated patients with a psychiatric illness in the aeromedical setting and does not lead to worsening agitation in the subsequent 72-h period.

The emergency care practitioner (ECP) role in the UK health service involves paramedic and nurse practitioners with advanced training to assess and treat minor illness and injury. Available evidence suggests that the introduction of this role has been advantageous in terms of managing an increased demand for emergency care, but there is little evidence regarding the quality and safety implications of ECP schemes. Objectives: The objectives were to compare the quality and safety of care provided by ECPs with non-ECP (e.g. paramedic, nurse practitioner) care across three different types of emergency care settings: static services (emergency department, walk-in-centre, minor injury unit); ambulance/care home services (mobile); primary care out of hours services. Methods: A retrospective patient case note review was conducted to compare the quality and safety of care provided by ECPs and non-ECPs across matched sites in three types of emergency care settings. Experienced clinicians conducted retrospective assessment of care provided. The study was part of a larger trial evaluating ECP schemes
Results: Care provided by ECPs was rated significantly higher than that of non-ECPs across some aspects of care. The differences detected, although statistically significant, are small and may not reflect clinical significance. On other aspects of care, ECPs were rated as equal to their non-ECP counterparts. Conclusions: As a minimum, care provided should meet the standards of existing service models and the findings from the study suggest that this is true of ECPs regardless of the service they are operational in.


The cardiopulmonary resuscitation (CPR) registry has been documented for medical records and investigational purposes. Although the accuracy of the CPR registry is generally adequate, it is difficult to precisely describe CPR in emergency situations. Objectives: To evaluate the accuracy of the CPR registry in an emergency department (ED) and to determine whether closed-circuit television (CCTV) is useful for recording CPR events. Methods: To assess the accuracy of the CPR registry, CCTV clips of the room in which CPR was performed in the ED and the corresponding CPR registry were consecutively collected and reviewed. The contents of the registry, specifically the time interval between patient arrival and CPR procedures, were compared with those determined by the CCTV clips. Accuracy was defined as the frequency of accurately registered time intervals differing by < 30s. Results: In a university-based ED between May and November 2009, 46 CPRs were performed and 150 CPR time intervals were documented in the CPR registry. The level of CPR registry accuracy was 54% (81/150). Conclusions: The accuracy of the CPR registry was improved by the use of CCTV. These results indicate that more detailed CPR investigations could be performed with the addition of CCTV-based information to the CPR registry.


Background: Technological progress has led to the introduction of hand-carried ultrasound (HCU) imagers in clinical workflow. The aim of this study is to analyse whether examination with a HCU device is a rapid and reliable alternative to contrast-enhanced multidetector CT (MDCT) scans in diagnosis of free intra-abdominal fluid and organ lacerations in major trauma patients. Methods: 31 major trauma patients with an injury severity score >15 and the necessity of a MDCT scan (standard of reference) were enrolled prospectively to this study, and additionally examined with a HCU, according to 'focused assessment with sonography for trauma' principles for the assessment of organ lacerations and free intra-abdominal fluid. The HCU device employed was of the latest generation. Statistical analysis was performed using PASW V.18. Results: Four patients were diagnosed with free intra-abdominal fluid (prevalence 12.9%). HCU showed a sensitivity and specificity of 75% and 100%, respectively. Positive predictive value and negative predictive value were 100% and 96%, respectively. Five patients had organ lacerations (prevalence 16.1%). In these cases, the HCU was able to detect organ lacerations with a sensitivity and specificity of 80% and 100%, respectively. Therefore, a positive predictive value and negative predictive value of 100% and 96%, respectively, were calculated. Conclusion: In major trauma patients, examination with HCU according to the 'focused assessment with sonography for trauma' principles for the diagnosis of organ lacerations and free intra-abdominal fluid is a reliable and rapid alternative to MDCT scans and can help save precious time in emergency situations, and should, additionally, be evaluated in the pre-clinical workflow.

14. Wichmann S, Nielsen SrL, Siersma VD and Rasmussen LS. Risk factors for 48-hours mortality after prehospital treatment of opioid
overdose. Emerg Med J 2012; Online first (April 13)

Introduction: Opioid overdose is commonly treated by prehospital emergency services and the majority of the patients are discharged immediately after treatment and a short observation period. There is a minor risk for rebound opioid toxicity and other life-threatening conditions might occur after such episodes. The authors describe the short-term outcome and identify risk factors for death within 48h after prehospital treatment of opioid overdose in Copenhagen, the capital of Denmark. Methods: Data on all cases of opioid overdose treated by the medical emergency care unit between 1994 and 2003 were recorded prospectively. Risk factors for death within 48 h after initial medical emergency care unit contact were analysed in a multivariable logistic regression analysis. Results: The authors recorded 4762 episodes of opioid overdose, covering 1967 unique identified patients. A total of 78 patients (8.4%, 95% CI 7.0 to 10.4) died within 48 h in the period 1999 - 2003, and 85% (66/78) of these had cardiac arrest and died. The authors found age > 50 years and overdose during the weekend significantly associated with 48-h mortality. Gender, former episodes of opioid overdose, time of the day, month or year were not significantly associated with increased mortality. Conclusions: The author found a 48-hours mortality of 8.4%. Advanced age and opioid overdose in the weekends were significant risk factors. Release on scene after treatment was associated with a very small risk.


To compare the cervical status after neck sprains in frontal and rear-end car impacts with respect to earlier proposed neck-sprain injury mechanisms, rotated head at impact, and the seat-belt geometry. A prospective, multidisciplinary, in-depth study was made based on 23 car occupants injured in frontal impacts and 108 injured in rear-end impacts. The active neck mobility was measured in protraction–retraction, flexion–extension, side bending right–left, and rotation right–left. This was done in the acute phase and then three and twelve months later. The maximum range, increase in pain, and level of pain were recorded for each movement. A subgroup with increased pain during movements towards the impact direction, but not in the opposite one, so-called isolated contra-directional pain (ICP), was further analysed. The side bending and rotation mobility were studied in another subgroup, in which the head was rotated inwards or outwards relative the car, i.e. away from or towards the diagonal part of the seat belt. Rear-end impacts more often than frontal impacts caused greater restrictions of the cervical mobility and more frequently increased pain at the three different times that measurements were recorded, but, with few exceptions, the differences for each movement were not statistically significant. Increased pain during extension was more often noted after rear-end impacts. ICP during pro-/retraction was also more often noted after rear-end impacts. Head-inward rotation in rear-end impacts caused a more restricted mobility in the same direction at the primary examination than head-outward rotation. The cervical status after neck sprains in frontal and rear-end car impacts is very similar, and the cervical range of movement in different directions and increased pain during cervical motions do not reveal any specific isolated injury mechanisms. Combined injury mechanisms should be considered, and further studies are recommended to investigate asymmetric loading during impact.

Management of a patient with a suspected spinal injury


The early recognition of cervical spine injury remains a top priority of acute trauma care. Missed diagnoses can lead to exacerbation of an existing injury and potentially devastating consequences. We sought to identify predictors of cervical spine injury. Trauma registry records for blunt trauma patients cared for at a Level I Trauma Centre from 1997 to 2002 were examined. Cervical spine injury included all cervical
dislocations, fractures, fractures with spinal cord injury, and isolated spinal cord injuries. Univariate and adjusted odds ratios (ORs) were calculated to identify potential risk factors. Variables and two-way interaction terms were subjected to multivariate analysis using backward conditional stepwise logistic regression. Data from 18,644 patients, with 55,609 injuries, were examined. A total of 1255 individuals (6.7%) had cervical spine injuries. Motor Vehicle Collision (MVC) (odds ratio (OR) of 1.61 (1.26, 2.06)), fall (OR of 2.14 (1.63, 2.79)), age <40 (OR of 1.75 (1.38–2.17)), pelvic fracture (OR of 9.18 (6.96, 12.11)), Injury Severity Score (ISS) >15 (OR of 7.55 (6.16–9.25)), were all significant individual predictors of cervical spine injury. Neither facial fracture nor head injury alone were associated with an increased risk of cervical spine injury. Significant interactions between pelvic fracture and fall and pelvic fracture and head injury were associated with a markedly increased risk of cervical spine (OR 19.6 (13.1, 28.8)) and (OR 27.2 (10.0–51.3)). MVC and falls were independently associated with cervical spine injury. Pelvic fracture and fall and pelvic fracture and head injury, had a greater than multiplicative interaction and high risk for cervical spine injury, warranting increased vigilance in the evaluation of patients with this combination of injuries.

Management of a patient with a suspected spinal injury


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. 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. 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). Early recognition, appropriate prehospital management, triage, timely and appropriate interfacility transfers of all SCI patients are critical for access to specialised care and reducing preventable complications. Elderly fallers present particular challenges to early identification.

Management of a patient with a suspected spinal injury

Patients with cervical spine injuries are a high-risk group, with the highest reported early mortality rate in spinal trauma. METHODS: This cohort study investigated predictors for cervical spine injury in adult (≥ 16 years) major trauma patients using prospectively collected data of the Trauma Audit and Research Network from 1988 to 2009. Univariate and multivariate logistic regression analyses were used to determine predictors for cervical fractures/dislocations or cord injury. RESULTS: A total of 250,584 patients were analyzed. Median age was 47.2 years (interquartile range, 29.8–66.0) and Injury Severity Score 9 (interquartile range, 4–11); 60.2% were male. Six thousand eight hundred two patients (2.3%) sustained cervical fractures/dislocations alone. Two thousand sixty-nine (0.8%) sustained cervical cord injury with/without fractures/dislocations; 39.9% of fracture/dislocation and 25.8% of cord injury patients suffered injuries to other body regions. Age ≥65 years (odds ratio [OR], 1.45–1.92), males (females OR, 0.91; 95% CI, 0.86–0.96), Glasgow Coma Scale (GCS) score <15 (OR, 1.26–1.30), LeFort facial fractures (OR, 1.29; 95% confidence interval [CI], 1.05–1.59), sports injuries (OR, 3.51; 95% CI, 2.87–4.31), road traffic collisions (OR, 3.24; 95% CI, 3.01–3.49), and falls >2 m (OR, 2.76; 95% CI, 2.53–2.97) were predictive for fractures/dislocations. Age <35 years (OR, 1.25–1.72), males (females OR, 0.59; 95% CI, 0.53–0.65), GCS score <15 (OR, 1.35–1.85), systolic blood pressure <110 mm Hg (OR, 1.16; 95% CI, 1.02–1.31), sports injuries (OR, 4.42; 95% CI, 3.28–5.95), road traffic collisions (OR, 2.58; 95% CI, 2.26–2.94), and falls >2 m (OR, 2.24; 95% CI, 1.94–2.58) were predictors for cord injury. CONCLUSIONS: 3.5% of patients suffered cervical spine injury. Patients with a lowered GCS or systolic blood pressure, severe facial fractures, dangerous injury mechanism, male gender, and/or age ≥35 years are at increased risk. Contrary to common belief, head injury was not predictive for cervical spine involvement.

**Management of a suspected spinal injury**


BACKGROUND: The association between admission heart rate (AHR) and mortality after trauma can assist initial emergency department triage and resuscitation. In addition, increased AHR is often associated with sympathetic hyperactivity which may require targeted treatment. We determined whether admission heart rate (AHR) was a predictor for mortality in trauma patients. METHODS: The Los Angeles County Trauma System Database was queried for all injured patients admitted between 1998 and 2005 (n = 147,788). Traumatic brain injury (TBI) patients (head Abbreviated Injury Scale score ≥3) were excluded. Demographics were compared at various AHR subgroups (<50, 50–59, 60–69, 70–79, 80–89, 90–99, 100–109, and ≥110). Mortality was compared at various AHR ranges, and logistic regression was performed to determine significance. RESULTS: After exclusions, 103,799 trauma patients requiring admission were identified; overall mortality was 1.4%. AHR 80 to 89 demonstrated a statistically significant lower mortality (0.5%) compared with all other AHR ranges, except AHR 70 to 79 (0.6%). In trauma patients who required admission, AHR 70 to 79 and 80 to 89 were predictors of lower mortality. Mortality for 22,323 moderate to severely injured patients was 5.5% and AHR 80 to 89 demonstrated a statistically lower mortality (2.0%) than all other AHR ranges, except AHR 70 to 79 (1.9%). After moderate to severe trauma, AHR <60 and ≥100 were associated with significantly higher mortality. CONCLUSION: Mortality after trauma increases outside the AHR range of 70 to 89 beats per minute. AHR ranges previously considered “normal” were associated with significantly increased mortality. Prospective research is required to evaluate if resuscitation goals should target heart rate at the 70 to 89 range.


BACKGROUND: A fentanyl-only (FO) regimen for prehospital post-intubation sedation in trauma patients was compared with the standard
protocol (SP) of fentanyl + benzodiazepine. METHODS: Intubated patients transported to a Level I trauma center from December 1, 2005, to April 30, 2009, were retrospectively reviewed. Before 2007, only SP was used; afterward both regimens were used. Groups were compared for hemodynamic and neurologic parameters in the prehospital setting and trauma bay, fluid volumes, time until general or neurosurgical intervention (NSI), and other outcomes. RESULTS: Groups were comparable with respect to age, sex, mechanism, alcohol level, intensive care unit length of stay, and hospital length of stay. Comorbidities were similar except hypertension (p = 0.019), and stroke (p = 0.029) were more frequent in FO patients. Prehospital heart rate and Glasgow Coma Scale (GCS) were similar. Trauma bay hemodynamic parameters and fluid resuscitation volumes were comparable, but pupil non-reactivity was more frequent in the FO group both overall (p = 0.032) and when comparing only patients with traumatic brain injury (TBI; p = 0.014). The incidence of TBI was comparable. Although the frequency of craniotomy (13% FO vs. 7% SP) and mortality (17% FO vs. 11% SP) were not statistically different overall, in patients with TBI, there was a higher incidence of NSI (28% vs. 14%, p = 0.015), craniotomy (14% vs. 3%, p = 0.02), and time to initial NSI (446 minutes vs. 193 minutes, p = 0.042) in the FO patients. CONCLUSIONS: In this study, an FO regimen was associated with similar hemodynamic but worse neurologic variables compared with the SP regimen. Prospective evaluation is warranted before adoption of this regimen, especially in TBI patients.

21. Woodford MR, Mackenzie CF, DuBose J, Hu P, et al. Continuously recorded oxygen saturation and heart rate during prehospital transport outperform initial measurement in prediction of mortality after trauma. J Trauma 2012; 72 (4): 1006-12 Available trauma scoring systems that predict need for higher echelons of care require data not available in the field. We hypothesized that analysis of continuous vital sign data in comparison to trauma registry data predicts mortality early in trauma patient management. METHODS: A real-time vital signs wave form and data capture system collected trauma patient data during prehospital management from Propaq 206E physiologic monitors. Analysis using statistical and mathematical software calculated receiver operator characteristic curves to evaluate the sensitivity and specificity of continuous vital sign waveforms in predicting mortality. The area under the curve (AUC) was calculated to determine nonsurvival by a particular vital sign (oxygen saturation [SpO2], heart rate, and systolic blood pressure) from these data, compared with a single value in the trauma registry, and to standard trauma scoring systems. RESULTS: The average transport time from field to hospital for all patients was 25 minutes. Eight of 120 patients (7%) died; 5 of 8 patients (62%) died within the first 24 hours. Receiver operator characteristic analysis of mean SpO2 <90% versus mortality yielded an AUC of 0.76 (p = 0.005) with a sensitivity of 62% and specificity of 86% The initial SpO2 <90% measurement from the trauma registry yielded an AUC of 0.59. Preadmission Glasgow Coma Scale score yielded an AUC of 0.74 (p = 0.009). Injury Severity Score and Trauma-Injury Severity Score produced AUCs of 0.91 and 0.96, respectively. Revised Trauma Score gave an AUC of 0.73, no different from automated predictions of mortality from SpO2. CONCLUSION: Injury Severity Score and Trauma-Injury Severity Score are predictive of mortality but rely on the inclusion of intra-abdominal and intrathoracic diagnostic data that are not readily available during field assessment. Automated vital signs data collection and analysis from a single noninvasive device with decision support has the potential to alleviate the dual burdens of patient triage and documentation required of the prehospital provider.

Methods: CDC analyzed 2000-2009 mortality data from the National Vital Statistics System by age group, sex, race/ethnicity, injury mechanism, and state. Results: From 2000 to 2009, the overall annual unintentional injury death rate decreased 29%, from 15.5 to 11.0 per 100,000 population, accounting for 9,143 deaths in 2009. The rate decreased among all age groups except newborns and infants aged <1 year; in this age group, rates increased from 23.1 to 27.7 per 100,000 primarily as a result of an increase in reported suffocations. The poisoning death rate among teens aged 15-19 years nearly doubled, from 1.7 to 3.3 per 100,000, in part because of an increase in prescription drug overdoses (e.g., opioid pain relievers). Childhood motor vehicle traffic-related death rates declined 41%; however, these deaths remain the leading cause of unintentional injury death. Among states, unintentional injury death rates varied widely, from 4.0 to 25.1 per 100,000 in 2009. Conclusions and Implications for Public Health Practice: Although the annual rate is declining, unintentional injury remains the leading cause of death among children and adolescents in the United States, led by motor vehicle traffic-related deaths. Death rates from infant suffocation and teen poisoning are increasing. The 2012 National Action Plan for Child Injury Prevention provides actions in surveillance, research, communication, education, health care, and public policy to guide efforts in saving lives by reducing injuries.

Full text available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm61e0416a1.htm?s_cid=mm61e0416a1_e


The objective of this study was to describe the characteristics and outcome of pediatric patients presenting to an emergency department (ED) following out-of-hospital primary cardiac arrest (OHPCA), to determine if long-term survival is influenced by specific resuscitation interventions. Methods: This was a prospective observational study of cases of OHPCA during sport or exertion in young patients presenting to an ED over a 5-year period. Cases were identified from a resuscitation database, which documented patient demographics, nature of event, emergency treatment, response times, and clinical progress. These data were analyzed to determine outcomes. Results: Nine children were identified who presented following OHPCA during the study period. The mean age was 10.7 (±4.2) years. All were subsequently diagnosed with an underlying primary cardiac disorder. Six patients (66.6%) survived to make a full recovery. All patients who survived had received early chest compressions (within 5 minutes) and early defibrillation (within 10 minutes). The initial cardiac arrest rhythm in all survivors had been an electrically cardiovertable rhythm. Five (83%) of the 6 survivors did not receive epinephrine during resuscitation. Conclusions: The importance of early chest compressions and defibrillation in collapsed young athletes is highlighted in this report. Use of epinephrine in these patients may be dangerous. We suggest that special consideration should be given to this subgroup of patients in the development of future resuscitation guidelines.


The objectives of this study were to determine the usefulness of cerebral oxygenation monitoring during interfacility helicopter transport of pediatric patients and to determine the effect of changes in altitude during transport on cerebral oxygenation readings in pediatric interfacility transport patients. Methods: A convenience sample of pediatric interfacility helicopter transport patients were monitored using near-infrared
spectroscopy (NIRS) technology. Cerebral oxygenation numbers were collected at baseline and at cruising altitude in patients on room air, supplemental oxygen, and mechanical ventilation. Comparisons among readings were performed to determine the effect of changing altitude during helicopter transport on cerebral oxygenation. Results: Seventeen pediatric patients were monitored at various altitudes during interfacility helicopter transport. When compared collectively, there was no difference in NIRS readings at baseline (B) and at altitude (A): B—65.9% (SD, 9.5%) versus A—65.0% (SD, 9.9%) (P = 0.06). In patients transported at greater than 5000 ft above ground level, there was a statistically significant difference in NIRS readings: B—69.2% (SD, 8.9%) versus A—66.3% (SD, 9.8%) (P < 0.001). Patients requiring mechanical ventilator support also had statistically significant differences in NIRS readings above 5000 ft above ground level: B—78.1% (SD, 5.9%) versus A—75.0% (SD, 3.5%) (P = 0.01). Conclusions: Cerebral oxygenation monitoring, using NIRS technology, can be used as a monitoring tool during pediatric transport. Cerebral oxygenation may change with acute changes in altitude, especially in pediatric patients requiring high levels of respiratory support. This technology has the potential to be used to monitor tissue oxygenation and possibly guide therapeutic interventions during pediatric transport.

The objective of this study was to determine the effects of low–fractional concentration of inspired oxygen (FiO2) continuous positive airway pressure (CPAP) in prehospital noninvasive ventilation (NIV). With increasing concerns about the detrimental effects of hyperoxia, we sought to determine whether CPAP using a low FiO2 (28%–30%) was effective in the prehospital setting. Methods. The study was a six-month prospective, nonblinded observational study conducted in a large, busy urban emergency medical services (EMS) system (Las Vegas, NV). Results. A total of 340 patients participated in the study. Most patients presented with symptoms consistent with a diagnosis of congestive heart failure/acute pulmonary edema (47.4%), followed by chronic obstructive pulmonary disease (COPD) (40.9%), asthma (22.7%), and pneumonia (15.9%). Improvements were seen in respiratory rate (p = 0.00) and oxygen saturation (p = 0.00). The overall CPAP discontinuation rate was 16.5%. The most common reason for CPAP discontinuation was anxiety/claustrophobia. The total number of patients requiring prehospital intubation was 5.6%. Subjective paramedic assessment of patient status at hospital delivery found that 71.5% of patients’ conditions were improved, 15.1% remained unchanged, and 13.4% were worse. Conclusions. CPAP using a low FiO2 (28%–30%) was highly effective in the treatment of commonly encountered prehospital respiratory emergencies.

Objective. 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 OHCA s 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, 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 mechanisms to improve mortality.


Background. Ambulance transport of injured patients to the most appropriate medical care facility is an important decision. Trauma centers are designed and staffed to treat severely injured patients and are increasingly burdened by cases involving less-serious injury. Yet, a cost evaluation of the Field Triage national guideline has never been performed. Objectives. To examine the potential cost savings associated with overtriage for the 1999 and 2006 versions of the Field Triage Guideline. Methods. Data from the National Hospital Ambulatory Medical Care Survey and the National Trauma Databank (NTDB) produced estimates of injury-related ambulatory transports and exposure to the Field Triage guideline. Case costs were approximated using a cost distribution curve of all cases found in the NTDB. A two-way sensitivity analysis was also used to determine the impact of data uncertainty on medical costs and the reduction in trauma center visits (12%) after implementation of the 2006 Field Triage guideline compared with the 1999 Field Triage guideline. Results. At a 40% overtriage rate, the average case cost was $16,434. The cost average of 44.2% reduction in case costs if patients were treated in a non–trauma center compared with a trauma center was found in the literature. Implementation of the 2006 Field Triage guideline produced a $7,264 cost savings per case, or an estimated annual national savings of $568,000,000. Conclusion. Application of the 2006 Field Triage guideline helps emergency medical services personnel manage overtriage in trauma centers, which could result in a significant national cost savings.


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.

29. Lairet KF, Lairet JR, King BT, Renz EM and Blackbourne LH. Prehospital Burn Management in a Combat Zone. Prehosp Emerg Care 2012; 16 (2): 273-6

The purpose of this article is to provide a descriptive study of the management of burns in the prehospital setting of a combat zone. Methods. A retrospective chart review was performed of U.S. casualties with >20% total-body-surface-area thermal burns, transported from the site of injury to Ibn Sina Combat Support Hospital (CSH) between January 1, 2006, and August 30, 2009. Results. Ibn Sina CSH received 225 burn casualties between January 2006 and August 2009. Of these, 48 met the inclusion criteria. The mean Injury Severity Score was 31.7 (range 4 to 75). Prehospital vascular access was obtained in 24 casualties (50%), and 20 of the casualties received fluid resuscitation. Out of the 48 casualties enrolled, 28 (58.3%) did not receive prehospital fluid resuscitation. Of the casualties who received fluid resuscitation, nearly all received volumes in excess of the guidelines established by the American Burn Association and those recommended by the Committee for Tactical Combat Casualty Care. With regard to pain management in the prehospital setting, 13 casualties (27.1%) received pain medication. Conclusions. With regard to the prehospital fluid resuscitation of primary thermal injury in the combat zone, two extremes were noted. The first group did not receive any fluid resuscitation; the second group was resuscitated with fluid volumes higher than those expected if established guidelines were utilized. Pain management was not uniformly provided to major burn casualties, even in several with vascular access. These observations support improved education of prehospital personnel serving in a combat zone.


Objectives. To evaluate the frequency of use, placement site, success and misplacement rates, and need for intervention for tube thoracostomies (TTs), and the complications with endotracheal intubation associated with TT in the prehospital setting. Methods. We performed a five-year, retrospective study using the records of 1,065 patients who were admitted to the trauma emergency room at a university hospital.
and who had received chest radiographs or computed tomography (CT) scans within 30 minutes after admission. Results. Seven percent of all patients received a TT (5% unilateral, 2% bilateral). Ninety-seven percent of all patients with a TT were endotracheally intubated. The success rate for correctly placed chest tubes was 78%. Twenty-two percent of the chest tubes were misplaced (i.e., too far in the chest, twisted, or bent); half of those had to be corrected, with one needing to be replaced. There were no statistical differences in the frequency of Monaldi or Büllau positions, or the frequency of left or right chest TT. In addition, the two positions did not differ in misplacement rates or the need for intervention. Helicopter emergency medical services physicians used the Monaldi position significantly more frequently than the Büllau position. In-hospital physicians performing interhospital transfer used the Büllau position significantly more frequently, whereas ground emergency medical physicians had a more balanced relationship between the two positions. Tube thoracostomy had no influence on endotracheal tube misplacement rates, and vice versa. Conclusion. Tube thoracostomy positioning mostly depends on the discretion of the physician on scene. The Monaldi and Büllau positions do not differ in misplacement or complication rates.


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. Conclusions. 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.


Introduction. Without bystander cardiopulmonary resuscitation (CPR), cardiac arrest survival decreases 7%–10% for every minute of delay until defibrillation. Dispatcher-assisted CPR (D-CPR) has been shown to increase the rates of bystander CPR and cardiac arrest survival. Other reports suggest that the most critical component of bystander CPR is chest compressions with minimal interruption. Beginning with version 11.2 of the Medical Priority Dispatch System (MPDS) protocols, instructions for mouth-to-mouth ventilation (MTMV) and pulse check were removed
and a compression-first pathway was introduced to facilitate rapid delivery of compressions. Additionally, unconscious choking and third-trimester pregnancy decision-making criteria were added in versions 11.3 and 12.0, respectively. However, the effects of these changes on time to first compression (TTFC) have not been evaluated. Objective. We sought to quantify the TTFC of MPDS versions 11.2, 11.3, and 12.0 for all calls identified as cardiac arrest on call intake that did not require MTMV instruction. Methods. Audio recordings of all D-CPR events for October 2005 through May 2010 were analyzed for TTFC. Differences in TTFC across versions were compared using the Kruskal-Wallis test. Results. A total of 778 cases received D-CPR. Of these, 259 were excluded because they met criteria for MTMV (pediatric patients, allergic reaction, etc.), were missing data, or were not initially identified as cardiac arrest. Of the remaining 519 calls, the mean TTFC was 240 seconds, with no significant variation across the MPDS versions (p = 0.08). Conclusions. Following the removal of instructions for pulse check and mouth-to-mouth ventilation (MTMV) as well as other minor changes in the MPDS protocols, we found the overall time to first compression (TTFC) to be 240 seconds with little variation across the three versions evaluated. This represents an improvement in TTFC compared with reports of an earlier version of MPDS that included pulse checks and MTMV instructions (315 seconds). However, the MPDS TTFC does not compare favorably with reports of older, non-MPDS protocols that included pulse checks and MTMV. Efforts should continue to focus on improving this key, and modifiable, determinant of cardiac arrest survival.


Emergency medical services (EMS) traditionally administer naloxone using a needle. Needleless naloxone may be easier when intravenous (IV) access is difficult and may decrease occupational blood-borne exposure in this high-risk population. Several studies have examined intranasal naloxone, but nebulized naloxone as an alternative needleless route has not been examined in the prehospital setting. Objective. We sought to determine whether nebulized naloxone can be used safely and effectively by prehospital providers for patients with suspected opioid overdose. Methods. We performed a retrospective analysis of all consecutive cases administered nebulized naloxone from January 1 to June 30, 2010, by the Chicago Fire Department. All clinical data were entered in real time into a structured EMS database and data abstraction was performed in a systematic manner. Included were cases of suspected opioid overdose, altered mental status, and respiratory depression; excluded were cases where nebulized naloxone was given for opioid-triggered asthma and cases with incomplete outcome data. The primary outcome was patient response to nebulized naloxone. Secondary outcomes included need for rescue naloxone (IV or intramuscular), need for assisted ventilation, and adverse antidote events. Kappa interrater reliability was calculated and study data were analyzed using descriptive statistics. Results. Out of 129 cases, 105 met the inclusion criteria. Of these, 23 (22%) had complete response, 62 (59%) had partial response, and 20 (19%) had no response. Eleven cases (10%) received rescue naloxone, no case required assisted ventilation, and no adverse events occurred. The kappa score was 0.993. Conclusion. Nebulized naloxone is a safe and effective needleless alternative for prehospital treatment of suspected opioid overdose in patients with spontaneous respirations.


Objectives. To examine prehospital emergency medical services (EMS) scope of practice for acute cardiovascular events and characteristics
that may affect scope of practice; and to describe variations in EMS scope of practice for these events and the characteristics associated with that variability. Methods. In 2008, we conducted a telephone survey of 1,939 eligible EMS providers in nine states to measure EMS agency characteristics, medical director involvement, and 18 interventions authorized for prehospital care of acute cardiovascular events by three levels of emergency medical technician (EMT) personnel. Results. A total of 1,292 providers responded to the survey, for a response rate of 67%. EMS scope of practice interventions varied by EMT personnel level, with the proportion of authorized interventions increasing as expected from EMT-Basic to EMT-Paramedic. Seven of eight statistically significant associations indicated that EMS agencies in urban settings were less likely to authorize interventions (odds ratios <0.7) for any level of EMS personnel. Based on the subset of six statistically significant associations, fire department–based EMS agencies were two to three times more likely to authorize interventions for EMT-Basic and EMT-Intermediate personnel but were less likely to authorize any one of the 11 interventions for EMT-Paramedics. Greater medical director involvement was associated with greater likelihood of authorization of seven of the 18 interventions for EMT-Basic and EMT-Paramedic personnel but had no association with EMT-Intermediate personnel. Conclusions. We noted statistically significant variations in scope of practice by rural vs. urban setting, medical director involvement, and type of EMS service (fire department–based/non–fire department–based; volunteer/paid). These variations highlight local differences in the composition and capacity of EMS providers and offer important information for the transition towards the implementation of a national scope of practice model.


Treatment with hypothermia has been shown to improve outcome after cardiac arrest (CA). Current consensus is to rewarm at 0.25–0.5 °C/h and avoid fever. The aim of this study was to investigate whether active rewarming, the rate of rewarming or development of fever after treatment with hypothermia after CA was correlated with poor outcome. Methods: This retrospective cohort study included adult patients treated with hypothermia after CA and admitted to the intensive care unit between January 2006 and January 2009. The average rewarming rate from end of hypothermia treatment (passive rewarming) or start active rewarming until 36 °C was dichotomized in a high (≥0.5 °C/h) or normal rate (<0.5 °C/h). Fever was defined as > 38 °C within 72 h after admission. Poor outcome was defined as death, vegetative state, or severe disability after 6 months. Results: From 128 included patients, 56% had a poor outcome. Actively rewarmed patients (38%) had a higher risk for poor outcome, OR 2.14 (1.01–4.57), p < 0.05. However, this effect disappeared after adjustment for the confounders age and initial rhythm, OR 1.51 (0.64–3.58). A poor outcome was found in 15/21 patients (71%) with a high rewarming rate, compared to 54/103 patients (52%) with a normal rewarming rate, OR 2.61 (0.88–7.73), p = 0.08. Fever was not associated with outcome, OR 0.64 (0.31–1.30), p = 0.22. Conclusions: This study showed that patients who needed active rewarming after therapeutic hypothermia after CA did not have a higher risk for a poor outcome. In addition, neither speed of rewarming, nor development of fever had an effect on outcome.


Background: In emergency medicine, the gastric tube (GT) has many purposes, however in prehospital settings, the only indication is gastric decompression. To date, there is lack of recommendation on the diagnostic methods to verify correct GT placement in prehospital. The aim of
this study is to estimate diagnostic accuracy of ultrasound in confirming gastric tubes placement in a prehospital setting. Method: This was a prospective multicentre study conducted in two French towns (Marseille and Grasse) over a one-year period from May 2010 to May 2011. Results: One hundred and thirty patients were included in the study with an M/F sex ratio of 77/53 and a mean age of 55.7 ± 19.8 years. The GT position was confirmed by ultrasound, with direct visualization in the gastric area in 116 of the 130 patients. In 14 cases, the ultrasound failed to visualize the tip of the GT; these results were due in 2 cases to gas interposition and in 12 cases the GT was shown by final X-ray to be located in the end of the oesophagus. Direct visualization by ultrasound thus has a sensitivity of 98.3% [94–99.5] and a specificity of 100% [75.7–100], a positive predictive value of 100% and a negative predictive value of 85.7%, Youden’s index of 0.98. GT size affects ultrasound visualization; the larger the GT, the easier it is to see. Conclusion: Bedside ultrasound thus appears to constitute an effective and reliable diagnostic procedure for confirming correct gastric tube placement in prehospital settings.

Many consider attempted resuscitation for traumatic out-of-hospital cardiac arrest (OHCA) futile. This study aims to describe the characteristics and profile of paediatric traumatic OHCA. Methods: The Victorian Ambulance Cardiac Arrest Registry (VACAR) was used to identify all trauma related cases of OHCA in patients aged less than 16 years of age. Cases were linked with their coronial findings. Results: Between 2000 and 2009, EMS attended 33,722 OHCAs including 2187 adult traumatic OHCAs. There were 538 (1.6%) OHCAs in children less than 16 years of age of which n = 64 were due to trauma. The median age (IQR) of paediatric traumatic OHCA was 7 (4.5–13) years and 44 were male (69%). Bystander CPR was performed in 22 cases (34.4%). The first recorded rhythm by EMS was asystole seen in 42 (66%), PEA in 14 (22%) cases and VF in 2 cases (3%). Cardiac output was present in 7 (11%) cases who subsequently had an EMS witnessed OHCA. EMS attempted resuscitation in 35 (55%) patients of whom 7 (20%) achieved ROSC and were transported, and 1 (3%) survived to hospital discharge with severe neurological sequelae; 14(40%) were transported with CPR of whom none survived. Coronial cause of death was multiple injuries in 35%, head injury in 33%, head and neck injury in 10%, chest injuries in 10% and other causes (12%). Conclusions: Traumatic aetiology of OHCA when compared to the incidence of adult traumatic OHCAs is uncommon. Resuscitation efforts are seldom effective and associated with poor neurological outcome.

Many consider attempted resuscitation for traumatic out-of-hospital cardiac arrest (OHCA) futile. This study aims to describe the characteristics and profile of adult traumatic OHCA. Methods: The Victorian Ambulance Cardiac Arrest Registry (VACAR) was used to identify all trauma related cases of OHCA in patients aged ≥16 years. Results: Between 2000 and 2009, EMS attended 33,178 OHCAs of which 2187 (6.6%) had a traumatic aetiology. The median age (IQR) of traumatic OHCA cases was 36 (25–55) years and 1612 were male (77.5%). Bystander CPR was performed in 201 cases (10.2%) with median (IQR) EMS response time 8 (6–11) min. The first recorded rhythm by EMS was asystole seen in 1650 (75.4%), PEA in 294 (13.4%) cases and VF in 35 cases (1.6%). Cardiac output was present in 208 (9.5%) cases who subsequently had an EMS witnessed OHCA. EMS attempted resuscitation in 545 (24.9%) patients of whom 84 (15.4%) achieved ROSC and were transported, and 27 (5.1%) survived to hospital discharge; 107 were transported with CPR of whom 8 (7.4%) survived to hospital discharge. Where EMS
attempted resuscitation in traumatic OHCA, survival for VF was 11.8% (n = 4), PEA 5.1% (n = 10) and asystole 2.4% (n = 3). In EMS witnessed traumatic OHCA, resuscitation was attempted in 175 cases (84.1%), 35 (16.8%) patients achieved sustained ROSC before transport of whom 5 (14%) survived to leave hospital and 60 (28.8%) were transported with CPR of whom 6 (10%) survived to leave hospital. Compared to OHCA cases with ‘presumed cardiac’ aetiology traumatic OHCA were younger [median years (IQR): 36 (25–55) vs 74 (61–82)], had resuscitation attempted less (25% vs 48%), were less likely to have have a shockable rhythm (1.6% vs 17.1%), were more likely to be witnessed (62.8% vs 38.1%) and were less likely to receive bystander CPR (10.2% vs 25.5%) (p < 0.001, respectively). Multivariate logistic regression identified factors associated with EMS decision to attempt resuscitation. The odds ratio [OR (95% CI)] for ‘presence of bystander CPR’ was 5.94 (4.11–8.58) and for ‘witnessed arrest’ was 2.60 (1.86–3.63). Conclusion: In this paramedic delivered EMS attempted resuscitation was not always futile in traumatic OHCA with a survival of 5.1%. The quality of survival needs further study.

Public access automated external defibrillator (PAD) programs have been shown to be successful in several municipalities. This study sought to determine the usage of and survival rate from a large, urban PAD program in the first 10 years since its implementation.

Methods: This was a prospective, longitudinal, observational study from January 2002–2012 conducted in Los Angeles, California, a city with a population of 3.8 million. An incremental rollout resulted in a current total of 1300 automated external defibrillators (AEDs) in place in city-owned buildings and other public places, including all 3 area airports, golf-courses, and public pools. All instances where an AED was applied were included in the study.

Results: There were 59 incidents of cardiac arrest with a public access AED applied, of which 42 (71%) occurred at an airport. 51 (86%) of the patients were male, with a median age of 64 years (interquartile range, 56.5 to 70 years). A shockable rhythm was detected and shocks were applied in 39 (66%) patients, with 30 (77%) of these patients achieving a return of spontaneous circulation (ROSC). Of those patients who received shock(s) by public access AED, 27 (69%) survived to hospital discharge. The youngest survivors were a 25 year old male and a 34 year old female. Conclusion: While the majority of PAD cases occurred at an airport, there were also survivors from other public locations. AEDs deployed as part of a large PAD program resulted in a very high survival rate for patients with cardiac arrest.

Guideline XX: Automated external defibrillation

Purpose: Evaluate the rate, type and severity of medication errors occurring during Medical Emergency Team (MET) care at a large, tertiary-care, academic medical center.

Methods: A prospective, observational evaluation of 50 patients that required MET care was conducted. Data on medication use were collected using a direct-observation method whereby an observer documented drug information such as drug, dose, frequency, rate of administration and administration technique. Subsequently, a team of three clinicians assessed rate, type and severity of medication errors using definitions consistent with United States Pharmacopeia MEDMARX system. Severity was assessed on a scale of minor, moderate and severe.

Results: One hundred eighty six doses were observed for 36 different medications. A total of 296 errors were identified; of these 196 errors (66%) were inappropriate aseptic technique. Of the remaining 100 errors, 46% were prescribing errors, 28% administration technique errors, 14% mislabeling errors, 10% drug preparation errors and 2% improper dose prescribing. Examples included: (1) prescribing errors, (2) administering wrong doses, (3) mislabeling, and (4) wrong administration technique such as not flushing intravenous medication
through intravenous access. The rate of medication administration errors was 1.6 errors/dose including aseptic technique and 0.5 errors/dose excluding aseptic technique. A notable portion (14%) of errors was considered at least moderate in severity. Conclusions: One out of 2 doses was administered in error after errors of using inappropriate aseptic technique were excluded. There is a need for education and systematic changes to prevent medication errors during medical emergencies as an effort to avoid harm.


Objectives: Emergency medicine is increasingly recognized as a medical specialty in Japan. However, comprehensive studies evaluating emergency airway management practice are lacking. We describe emergency department (ED) airway management using a large multi-center registry. Methods: We formed the Japanese Emergency Airway Network, a consortium of 10 academic and community medical centers in Japan, and prospectively collected data on ED intubations from April 2010 to February 2011. All patients undergoing emergency intubation were eligible for inclusion. Data were entered in real time by the intubator using a standardized data form. Variables included patient's age, sex, weight, indication for intubation, methods of intubation, drugs, level of training and specialty of the intubator, number of attempts, success or failure, and adverse events. We present descriptive data as proportions with 95% confidence intervals. Results: We recorded 1486 intubations (compliance rate 99%). Intubation was ultimately successful in 99.7%. The initial method of intubation varied substantially among the hospitals, including rapid sequence intubation (0–79%), sedation without paralysis (4–88%), paralysis without sedation (0–18%), and oral without medication (12–67%), in non-cardiac arrest encounters. Success rates in first and ≤3 attempts ranged from 40 to 83% and from 74 to 100%, respectively. The overall adverse event rate was 11%, without significant difference by the method used. Conclusions: In this multi-center study characterizing ED airway management across Japan, we observed a high overall success rate but a high degree of variation among hospitals in the methods of intubation and success rates.

42. Hasler RM, Nuesch E, Juni P, Bouamra O, Exadaktylos AK and Lecky F. Systolic blood pressure below 110mmHg is associated with increased mortality in penetrating major trauma patients: Multicentre cohort study. Resuscitation 2012; 83 (4): 476-81

Introduction: Non-invasive systolic blood pressure (SBP) measurement is a commonly used triaging tool for trauma patients. A SBP of <90 mmHg has represented the threshold for hypotension for many years, but recent studies have suggested redefining hypotension at lower levels. We therefore examined the association between SBP and mortality in penetrating trauma patients. Methods: We conducted a prospective cohort study in adult (≥16 years) penetrating trauma patients. Patients were admitted to hospitals belonging to the Trauma Audit and Research Network (TARN) between 2000 and 2009. The main outcome measure was the association between SBP and mortality at 30 days. Multivariate logistic regression models adjusted for the influence of age, gender, Injury Severity Score (ISS) and Glasgow Coma Score (GCS) on mortality were used. Results: 3444 patients with a median age of 30 years (IQR 22.5–41.4), SBP of 126 mmHg (IQR 107–142), ISS of 9 (IQR 9–14) and GCS of 15 (IQR 15–15), were analysed. Multivariable logistic regression analysis adjusted for age, gender, severity of injury and level of consciousness showed a cut-off for SBP at <110 mmHg, after which increased mortality was observed. Compared with the reference group with SBP 110–129 mmHg, mortality was doubled at SBP 90–109 mmHg, was four-fold higher at 70–89 mmHg and 10-fold higher at <70 mmHg. SBP values ≥150 mmHg were associated with decreased mortality. Conclusion: We recommend that penetrating trauma patients with a SBP < 110 mmHg are triaged to resuscitation areas within dedicated, appropriately specialised, high-level care trauma centres.

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

ALS

Reviews


Objective: To describe the reported impact of Pandemic (H1N1) 2009 on EDs, so as to inform future pandemic policy, planning and response management. Methods: This study comprised an issue and theme analysis of publicly accessible literature, data from jurisdictional health departments, and data obtained from two electronic surveys of ED directors and ED staff. The issues identified formed the basis of policy analysis and evaluation. Results: Pandemic (H1N1) 2009 had a significant impact on EDs with presentation for patients with ‘influenza-like illness’ up to three times that of the same time in previous years. Staff reported a range of issues, including poor awareness of pandemic plans, patient and family aggression, chaotic information flow to themselves and the public, heightened stress related to increased workloads and lower levels of staffing due to illness, family care duties and redeployment of staff to flu clinics. Staff identified considerable discomfort associated with prolonged times wearing personal protective equipment. Staff believed that the care of non-flu patients was compromised during the pandemic as a result of overwork, distraction from core business and the difficulties associated with accommodating infectious patients in an environment that was not conducive. Conclusions: This paper describes the breadth of the impact of pandemics on ED operations. It identifies a need to address a range of industrial, management and procedural issues. In particular, there is a need for a single authoritative source of information, the re-engineering of EDs to accommodate infectious patients and organizational changes to enable rapid deployment of alternative
45. Walthall K and Foex B. BET 3: *In a penetrating chest wound is a three-sided dressing or a one-way chest seal better at preventing respiratory complications?* Emerg Med J 2012; 29 (4): 342-3
A short-cut review was carried out to establish whether the traditional three-sided dressing is better than a one-way chest seal at preventing the respiratory complications from penetrating chest trauma. Only one animal study, two guidelines and two case reports provided published evidence relevant to the question. The author, date and country of publication, patient group studied, study type, relevant outcomes, results and study weaknesses of these papers are tabulated. The clinical bottom line is that there is very little evidence, but that the one-way seals may have practical advantages, particularly in the out-of-hospital setting.

Recent advances in resuscitation science have revolutionized care of the cardiac arrest patient. Dramatic departures from time-honored advanced cardiac life support therapies, such as cardio-cerebral resuscitation and bundled post-arrest care, have given rise to a new paradigm of resuscitation practices, which has boosted the rate of neurologically intact survival. Objectives: This article reviews the pathophysiology of the post-cardiac arrest syndrome, the collective pathophysiology after return of spontaneous circulation, and presents management pearls specifically for the emergency physician. This growing area of scientific inquiry must be managed appropriately to sustain improved outcomes. Discussion The emergency physician must understand this pathophysiology, manage resuscitated patients according to the latest evidence, and coordinate with appropriate inpatient resources. Conclusion: The new approach to cardiac arrest care is predicated on a chain of survival that spans the spectrum of care from the prehospital arena through the emergency, intensive, and inpatient settings. The emergency physician is a crucial link in this chain.

Maintenance of upper airway patency remains a cornerstone of adequate airway management. Although various opening manoeuvres are recommended by neonatal resuscitation guidelines, none of these have been well evaluated in newly born infants. The aim of this article was to review the available literature about airway opening manoeuvres in newborn infants. We reviewed books, resuscitation manuals and articles from 1860 to the present with the search terms “Infant, Newborn”, “airway management”, “airway manoeuvres”, “chin lift”, “jaw thrust”, “neutral position”, “shoulder roll”, “neonatal resuscitation”, “positive pressure respiration” and “continuous positive airway pressure”. Only human studies were included. During mask PPV, jaw thrust appears to be more effective in achieving a patent upper airway and might help to reduce airway obstruction. The additional application of chin lift might reduce leak during mask ventilation. However given the lack of available data these conclusions remains speculative and further research in this area is required.

**Systematic review and meta-analysis of animal trials.** Resuscitation 2012; 83 (4): 417-22

**Aim:** There are conflicting findings from observational studies regarding the nature of the association between hyperoxia and risk of mortality in patients admitted to intensive care following cardiac arrest. This systematic review and meta-analysis evaluates animal data investigating the effect of administration of high concentrations of oxygen following cardiac arrest on neurological outcome and the clinical applicability of this data. **Methods:** A systematic search of Medline and Embase identified controlled animal studies modelling cardiac arrest with subsequent cardiopulmonary resuscitation that compared ventilation with 100% oxygen to lower concentrations following return of spontaneous circulation. Eligible studies were included in a meta-analysis in which the inverse variance weighted differences were calculated for the standardised mean difference of the primary outcome measure, the neurological deficit score. **Results:** Ten studies met the criteria for inclusion in the systematic review. In a meta-analysis of six studies, with 95 animals, treatment with 100% oxygen resulted in a significantly worse neurological deficit score than oxygen administered at lower concentrations, with a standardised mean difference of 0.64 (95% CI 1.06 to 0.22). In four of five studies, histological evidence of increased neuronal damage was present in animals that received 100% oxygen therapy. **Conclusions:** The administration of 100% oxygen therapy is associated with worse neurological outcome than lower oxygen concentrations in animal models of cardiac arrest. However, due to limitations in study design and poor generalisability of the animal models to the situation of post cardiac arrest resuscitation in humans, the clinical applicability of this data is uncertain.

**Animal, manikin & cadaver models**

---


**Objective:** Endotracheal intubation is a challenging procedure in emergency medicine. Junior doctors lack experience and confidence in this task. The use of a gum elastic bougie (GEB) to facilitate intubation may improve success rates, especially in difficult situations. **Methods:** Junior doctors working in the ED were studied. Endotracheal intubation was simulated using part-task trainers in “easy” positioning and “difficult” positioning modes. Intubation was attempted in both positions using either an endotracheal tube, with re-inforcing stylet (ETT-S), or insertion of a gum elastic bougie (GEB), with subsequent passage of the endotracheal tube over the bougie. Success rates and time to complete intubation were measured with GEB, and with ETT-S. Participants were asked to record the perceived ease of intubation. **Results:** One hundred and four intubations were performed by 26 study subjects. Overall, mean time to intubation with ETT-S technique was 16.14 s (14.49–17.98 95% CI), and was faster than with GEB 24.18 (21.45–27.25 95% CI) in both airway difficulty grades (P < 0.01). The success rate for intubation using the GEB was 100%, compared with 92.9% with ETT-S. This difference was not statistically significant. Perceived ease of intubation was similar for GEB and ETT-S (VAS 6.808 vs 6.904). **Conclusion:** The use of a GEB marginally increases the time taken to perform endotracheal intubation. Success rates for novice practitioners attempting endotracheal intubation were not significantly different between the two techniques. Success rates for novice practitioners using a GEB were high after even limited instruction and practice.

Objective: To evaluate whether endotracheal intubation in patients with cervical spine immobilisation by a semi-rigid neck collar is easier using the Disposcope endoscope (DE), a new video laryngoscope, than with the Macintosh laryngoscope (ML). Methods: Sixty-eight medical interns who participated in a training programme for endotracheal intubation using the DE and ML were recruited to the randomised crossover trial 1 week after completing the training programme. In the trial, they used both the DE and the ML to perform intubation on a manikin wearing a semi-rigid neck collar. The time required to view the vocal cords and to complete intubation, successful endotracheal intubation, modified Cormack-Lehane classification (CL grade) and dental injury were recorded and analysed. Results: The mean (SD) time to view the vocal cords was significantly shorter with the DE than with the ML (10.0 (7.0) vs 20.8 (18.9) s; p<0.0001). There were higher rates of CL grades 1 and 2a (69.1% and 22.1%) using the DE than with the ML (10.3% and 14.7%). All 68 participants had a higher rate of successful endotracheal intubation using the DE than using the ML (68 (100%) vs 47 (69.1%); p<0.0001). It took less time to complete endotracheal intubation with the DE than with the ML (p<0.0001). Conclusions: In patients with cervical spine immobilisation by a semi-rigid neck collar, the DE may be a more effective device for endotracheal intubation than the ML.


Objective: Compared with no music (NM), does listening to ‘Achy breaky heart’ (ABH) or ‘Disco science’ (DS) increase the proportion of prehospital professionals delivering chest compressions at 2010 guideline-compliant rates of 100–120 bpm and 50–60 mm depths?

Methods: A randomised crossover trial recruiting at an Australian ambulance conference. Volunteers performed three 1-min sequences of continuous chest compressions on a manikin accompanied by NM, repeated choruses of ABH and DS, prerandomised for order. Results: 37 of 74 participants were men; median age 37 years; 61% were paramedics, 20% students and 19% other health professionals. 54% had taken cardiopulmonary resuscitation training within 1 year. Differences in compression rate (mode, IQR) were significant for NM (105, 99–116) versus ABH (120, 107–120) and DS (104, 103–107) versus ABH (p<0.001) but not NM versus DS (p=0.478). Differences in proportions of participants compressing at 100–120 bpm were significant for DS (61/74, 82%) versus NM (48/74, 65%, p=0.007) and DS versus ABH (47/74, 64%, p=0.007) but not NM versus ABH (p=1). Differences in compression depth were significant for NM (48 mm, 46–59 mm) versus DS (54 mm, 44–58 mm, p=0.042) but not NM versus ABH (54 mm, 43–59 mm, p=0.065) and DS versus ABH (p=0.879). Differences in proportions of subjects compressing at 50–60 mm were not significant (NM 31/74 (42%); ABH 32/74 (43%); DS 29/74 (39%); all p>0.5). Conclusions: Listening to DS significantly increased the proportion of prehospital professionals compressing at 2010 guideline-compliant rates. Regardless of intervention more than half gave compressions that were too shallow. Alternative audible feedback mechanisms may be more effective.


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.

Paediatric airway management


Aim: To compare a novel, pressure-limited, flow adaptive ventilator that enables manual triggering of ventilations (MEDUMAT Easy CPR, Weinmann, Germany) with a bag-valve-mask (BVM) device during simulated cardiac arrest. Methods: Overall 74 third-year medical students received brief video instructions (BVM: 57 s, ventilator: 126 s), standardised theoretical instructions and practical training for both devices. Four days later, the students were randomised into 37 two-rescuer teams and were asked to perform 8 min of cardiopulmonary resuscitation (CPR) on a manikin using either the ventilator or the BVM (randomisation list). Applied tidal volumes (VT), inspiratory times and hands-off times were recorded. Maximum airway pressures (Pmax) were measured with a sensor connected to the artificial lung. Questionnaires concerning levels of fatigue, stress and handling were evaluated. VT, pressures and hands-off times were compared using t-tests, questionnaire data were analysed using the Wilcoxon test. Results: BVM vs. ventilator (mean ± SD): the mean VT (408 ± 164 ml vs. 315 ± 165 ml, p = 0.10) and the maximum VT did not differ, but the number of recorded VT < 200 ml differed (8.1 ± 11.3 vs. 17.0 ± 14.4 ventilations, p = 0.04). Pmax did not differ, but inspiratory times (0.80 ± 0.23 s vs. 1.39 ± 0.31 s, p < 0.001) and total hands-off times (133.5 ± 17.8 s vs. 162.0 ± 11.1 s, p < 0.001) did. The estimated levels of fatigue and stress were comparable; however, the BVM was rated to be easier to use (p = 0.03). Conclusion: For the user group investigated here, this ventilator exhibits no advantages in the setting of simulated CPR and carries a risk of prolonged no-flow time.


Objective: We wanted to study the effect of continuous dispatcher communication on CPR technique and performance during 10 min of simulated cardiac arrest. Methods: We reviewed video recordings and manikin data from 30 CPR trained lay people who where left alone in a simulated cardiac arrest situation with a manikin in a home-like environment (in a small, confined kitchen with the disturbing noise of a radio). CPR was performed for 10 min with continuous telephone instructions via speaker function from a dispatcher. The dispatcher was blinded for CPR performance and video. Dispatcher communication, compression technique and ventilation technique was scored as accomplished or
failed in the 1st and 10th minute. Results: 29/30 rescuers were able to hear instructions, answer questions from the dispatcher and perform CPR in parallel. Rescuer position beside manikin was initially correct for 13/30, improving to 21/30 (p = 0.008). Compression technique was adequate for the whole episode, with an insignificant trend for improvement; 29 to 30/30 using straight arms, 28 to 30/30 in a vertical position over chest and 24 to 27/30 counting loudly. 17/29 placed their hands between the nipples initially, improving to 24/29 (p = 0.065). Mean compression rate improved from 84 to 101 min\(^{-1}\) (p < 0.001), and compression depth maintained adequate (43 to 42 mm). Initially, 17/29 used chin-lift manoeuvre, 14/30 used head-tilt and 19/29 used nose pinch to manage open airways, compared to 18, 20 and 22/29 (ns) in the 10th minute, respectively. Successful delivery of ventilation improved from 13/30 to 23/30 (p = 0.006). Conclusion: Bystander and dispatcher can communicate successfully during ongoing CPR using a telephone with speaker function. CPR technique and quality improved or did not change over 10 min with continuous dispatcher assistance. These results suggest a potential for improved bystander CPR using rescuer–dispatcher teamwork.


Objectives: Ischemic post-conditioning (PC) with “stuttering” reintroduction of blood flow after prolonged ischemia has been shown to offer protection from ischemia reperfusion injury to the myocardium and brain. We hypothesized that four 20-s pauses during the first 3 min of standard CPR would improve post resuscitation cardiac and neurological function, in a porcine model of prolonged untreated cardiac arrest.

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


Aim: To study the effects of the combination of adrenaline (epinephrine) and vasopressin compared to adrenaline alone on initial resuscitation success, 24 h survival, and neurological outcome in a swine model of asphyxial cardiac arrest (CA). Methods: This prospective randomized experimental study was conducted at a laboratory research department. Twenty female Landrace/Large-White pigs, 12–15 weeks of age, were investigated. Asphyxial CA was induced by clamping of the endotracheal tube. After 4 min of untreated CA, resuscitation was initiated by
unclamping the endotracheal tube, mechanical ventilation, chest compressions and adrenaline (Group A) or a combination of adrenaline with vasopressin (Group A + V) administered intravenously. In case of restoration of spontaneous circulation (ROSC), the animals were monitored for 30 min and then observed for 24 h. Results: Hemodynamic variables were measured at baseline during CPR and in the post-resuscitation period. Statistically significant difference was observed in groups A and A + V regarding coronary perfusion pressure (CPP) during the first minute of CPR. In both groups, ROSC and survival rates were comparable (p = NS). Neurological deficit score (NDS) was significantly higher in the combination group 24 h following CA (p < 0.001). Brain histological damage score (HDS) was also better in the combination group (p < 0.001). Total HDS and NDS showed a statistical significant correlation (p < 0.001). Conclusions: In this porcine model of asphyxial CA, adrenaline alone as well as the combined administration of adrenaline and vasopressin resulted in similar ROSC and survival rates, but the combination of adrenaline and vasopressin resulted in improved neurological and cerebral histopathological outcomes.

Case studies, letters & editorials

57. Lyon RM and Wiggins C. Do not move player requiring resuscitation on field until return of spontaneous circulation. BMJ 2012; 344 e2448
The recent case of the footballer who had a sudden cardiac arrest on the football pitch highlights key points regarding field of play resuscitation. The decision about when to move patients from the field of play, particularly if they remain in cardiorespiratory arrest is crucial. Effective continuous chest compressions are closely correlated to survival—even an interruption of only a few seconds can be detrimental. A high “hands on the chest ratio” allows coronary perfusion pressure to increase, improving the chance of successful defibrillation. Recent research has shown that effective manual chest compressions cannot be performed while moving a patient on a stretcher or in an ambulance. Ambulance personnel are now encouraged not to move a patient in cardiopulmonary arrest, particularly in a shockable cardiac rhythm (ventricular fibrillation/pulseless ventricular tachycardia) until return of spontaneous circulation has been achieved or prolonged resuscitation efforts have failed. A cardiac arrest on the field of play is a high profile incident with many onlookers. There will be pressure to move the patient early to maintain privacy. Sports medical teams must be confident in performing uninterrupted resuscitation on the field of play. Provision of privacy on the field of play would reduce pressure to move the patient and maximise the chance of survival.

Letter

58. Manjaly JG, Konieczny K and Holland NJ. Ice in the mouth for epistaxis. BMJ 2012; 344 e2573
The recent article on epistaxis by Mulla and colleagues covers a simple condition that can be fatal. The authors suggest that placing ice packs on the nose can stop further bleeding. Despite this method being widespread, evidence suggests that application of ice packs to the nose or the neck (also common) has little effect on blood flow to the nasal mucosa. Ice placed in the mouth, however, decreases nasal mucosal flow by as much as 23%. We suggest that this is a more effective and evidence based method for stopping further bleeding and find it to be an effective adjunct for more posterior bleeds while definitive treatment is planned. Children can be encouraged to suck on flavoured ice lollies.

Letter

Endotracheal intubation remains the definitive skill needed for airway management of both medical and surgical patients treated in the prehospital and hospital arenas. Subsequently, rapid sequence intubation (RSI) protocols have been established for various first-line emergency service providers. Because RSI results in the paralysis of skeletal muscles, with a subsequent period of apnea and an increased potential for oxygen desaturation, the accuracy of pulse oximetry (SpO2) data is critical in guiding pre-oxygenation efforts and indicating abandonment of intubation attempts to avoid hypoxic injury. Latency of up to 120 s has been demonstrated in conditions producing peripheral vasoconstriction. The influence of peripheral oximetry on the decision-making process during the establishment of a definitive airway has not, to our knowledge, been previously investigated in the prehospital setting. Objective: To demonstrate how signal latency may manifest itself as a perceived oxygen desaturation with a subsequent premature abortion of a primary RSI attempt or erroneous extubation. Case Examples: We document endotracheal extubation associated with pulse oximetry signal latency during prehospital RSI with the use of digital SpO2 probes. Two case examples are presented that are taken from a retrospective analysis of pre-hospital RSI data recorded by the City of San Diego Emergency Medical Services. Conclusion: To avoid the possibility of mistaking oximetry signal latency for oxygen desaturation during pre-hospital RSI, we propose a conservative approach of aggressive pre-oxygenation to SpO2 values >94%, and the use of quantitative continuous capnometry for decision-making regarding whether the endotracheal tube is correctly placed. In cases of hypoxemia despite a properly placed tube, focus should be turned to other causes of post intubation hypoxemia.

ALS airway


We present a case of successful resuscitation from cardiac arrest after 25 minutes of ventricular fibrillation (VF) secondary to peripartum cardiomyopathy. This case highlights a rare disease, but also, more importantly, the successful use of the five links of survival: early access to 9-1-1, early cardiopulmonary resuscitation (CPR), early defibrillation, early advanced life support, and postresuscitative care. We also demonstrate the importance of high-quality resuscitation practices in order to achieve a successful outcome. Manual compressions can be performed at a guidelines-compliant rate. With training, users are able to achieve high compression fractions. Pre/post shock delays can be minimized to further increase compression fraction. Nationally, CPR interruptions are often long. We recommend closer attention to uninterrupted 2-minute cycles of CPR, minimizing delays in CPR through training, and a focus on a closely choreographed approach. User review of transthoracic impedance feedback data should play a vital role in a cardiac arrest quality-improvement program.


The rate of premature infant mortality has decreased over the last several decades, with an accompanying decrease in the gestational age of premature infants who survive to hospital discharge. Emergency medical services (EMS) providers are sometimes called to provide prehospital care for infants born at the edge of viability. Such extremely premature infants (EPIs) present medical and ethical challenges. In this case report,
we describe an infant born at 24 weeks into a toilet by a mother who thought she had miscarried. The EMS providers evaluated the infant as nonviable and placed him in a plastic bag for transport to a local emergency department (ED). The ED staff found the infant to have a bradycardic rhythm, initiated resuscitation, and admitted him to the neonatal intensive care unit. The infant died seven days later. We review the literature for recommendations in resuscitation of EPIs and discuss the ethics regarding their management in the prehospital setting.


Sir,

As the only randomised, controlled, double-blind trial of adrenaline vs. placebo for out-of-hospital cardiac arrest, the study by Jacobs et al. represents the most rigorously obtained data on this topic to date. A frequentist interpretation of the data requires the admission that we are unable to reject the null hypothesis of no effect on survival to hospital discharge rate because the P value is 0.15 (and correspondingly, the 95% confidence interval crosses unity). However, such an all-or-nothing interpretation has been widely criticised by methodologists for promoting “the P value fallacy, the mistaken idea that a single number can capture both the long-run outcomes of an experiment and the evidential meaning of a single result.” (Goodman SN, Ann Intern Med. 1999;130:995–1004.) We would like to offer instead a brief Bayesian interpretation of the results. While frequentist analysis is largely constrained to making indirect inferences regarding the null hypothesis that the OR = 1 (under the requisite assumption that it is already true), Bayesian analysis can provide an estimate of the probability of any hypothesis of interest, such as whether the OR of interest is between 2 and 4 or any other range. In this case, let us concern ourselves with the probability that the OR for a survival benefit of adrenaline is greater than 1, a probability that is, no doubt, of interest to readers of these particular results. We used the freely available WinBUGS program (version 1.4, Medical Research Council, UK) to perform this analysis. The software uses a Markov-Chain Monte Carlo random algorithm to sample values from a user-defined prior probability distribution and combines these, using Bayes theorem, with samples from the data distribution to arrive at a fully-enumerated posterior probability distribution. For this analysis, we used a noninformative or flat prior probability to represent complete ignorance regarding the OR for adrenaline prior to viewing the study, a rather absurd assumption given the background information available, but one that allows the data to “speak for themselves”. The median OR resulting from this exercise was 2.1 with a 95% credible interval of (0.8–6.6). (The credible interval is the Bayesian analogue of the frequentist confidence interval but represents more explicitly where the analyst would be willing to bet on finding the value for the OR with 95% certainty.) The posterior probability that the OR is greater than 1, demonstrating a benefit of adrenaline, is calculated from this analysis at a rather substantial 0.93 or 93%. The use of any prior probability distribution tending to favor adrenaline would have the effect of increasing this already substantial posterior probability further. Any such “enthusiastic” prior would be arguable from animal data suggesting its benefit. For now, we conclude that the weight of evidence from the Jacobs trial favors adrenaline for survival from cardiac arrest, even in the absence of any prior notion regarding its utility. While 93% is not certainty, it suggests that declarations regarding an absence of benefit from adrenaline in the setting of cardiac arrest are premature.

Dear Editors,

We thank the authors for their comments regarding our study and proposing an alternative approach to the analysis and interpretation of the data. While a frequentist interpretation of the data is what most researchers and readers of the literature are familiar with, it is reasonable that a Bayesian approach be considered. In our study, we reported that patients in the ‘adrenaline’ group had a doubling of the odds of survival to hospital discharge [1]. However the 95% confidence interval included the value of no effect (OR 2.1; 95% CI 0.7–6.3) and from a frequentist perspective statistical significance was not achieved. This was most likely due to the lower than expected sample size. However a favourable treatment effect could not be ruled out. As outlined in the letter by Youngquist and Niemann the Bayesian interpretation is based on the prior probability of the effect of adrenaline on outcome. In their analysis they chose to use a prior probability equal to an unknown effect of adrenaline and subsequently derived similar findings to ours – a doubling in survival to hospital discharge with intervals favouring adrenaline. Of particular note in their Bayesian analysis is that the posterior probability of a treatment effect (OR > 1.0) was 93%.

These data provide additional support for the highly likely benefit of adrenaline in cardiac arrest. We thank the authors for their insight.

64. Scarth E and Cook T. Capnography during cardiopulmonary resuscitation. Resuscitation 2012; Online first (April 12)

Use of waveform capnography during cardiac arrest was recommended in the 2010 International Consensus on Cardiopulmonary Resuscitation (CPR) Science with Treatment Recommendations. A primary benefit includes confirmation that a tracheal tube (or other airway device) has been placed correctly and is providing ventilation of the lungs. Capnography is considerably more reliable than either clinical assessment by auscultation or observation of chest wall movement. The recent 4th National Audit Project of The Royal College of Anaesthetists and Difficult Airway Society examined Major Complications of Airway Management in the UK. It did not focus on airway management during cardiac arrest, but it included 11 instances where failure to use or correctly interpret capnography led to unrecognised oesophageal intubations during cardiac arrest, most of which led to avoidable death or brain injury. We can assume that the incidence of unrecognised oesophageal intubation is higher when waveform capnography is not used during cardiac arrest. There is strong evidence to support the use of waveform capnography in this situation (CPR will generate an attenuated, but not absent, end-tidal CO2 trace), with data demonstrating 100% sensitivity and 100% specificity in identifying correct tracheal tube placement. In contrast to waveform capnography, studies of alternative devices to determine correct tube placement (such as colorimetric end-tidal CO2 detectors, syringe aspiration oesophageal detector, self-inflating bulb oesophageal detector and non-waveform end-tidal capnometers) have been shown to have accuracy that is not substantially better than clinical assessment. During cardiac arrest, waveform capnography may also be used to guide the effectiveness of chest compressions and to provide an early indication of return of spontaneous circulation (ROSC). However, there is currently insufficient evidence to recommend the use of end-tidal CO2 monitoring as a method of prognostication during cardiac arrest.

Letter
by emergency medicine physicians "Comparing proficient performers" and "experts". Resuscitation 2012; 83 (4): 434-9

Background: Training requirements to perform safe prehospital endotracheal intubation (ETI) are not clearly known. This study aimed to determine differences in ETI performance between ‘proficient performers’ and ‘experts’ according to the Dreyfus & Dreyfus framework of expertise. As a model for ‘proficient performers’ EMS physicians with a clinical background in internal medicine were compared to EMS physicians with a background in anaesthesiology as a model for ‘experts’. Methods: Over a one-year period all ETIs performed by the EMS physicians of our institution were prospectively evaluated. ‘Proficient performers’ and ‘experts’ were compared regarding incidence of difficult ETI, ability to predict difficult ETI, and decision for ETI. Results: Mean years of professional experience were similar between the physician groups, but the median ETI experience differed significantly with 18/year for ‘proficients’ and 304/year for ‘experts’ (p < 0.001). ‘Proficient performers’ intubated 130 of their 2170 treated patients (6.0%), while ‘experts’ did so in 146 of 1809 cases (8.1%, p = 0.01 for difference). The incidence of difficult ETI was 17.7% for ‘proficient performers’, and 8.9% for ‘experts’ (p < 0.05). In 4 cases ETI was impossible, all managed by ‘proficient performers’, but all patients could be ventilated sufficiently. Unexpected difficult ETI occurred in 6.1% for ‘proficient performers’, and 2.0% for ‘experts’ (p = 0.08). Conclusions: In a prehospital setting ‘expert’ status was associated with a significantly lower incidence of ‘difficult ETI’ and a higher proportion of ETI decisions. In addition, ability to predict difficult ETI was higher, although non-significant. There was no difference in the incidence of impossible ventilation.


This trial investigated whether advanced paramedics from a UK regional ambulance service have the ability to acquire and interpret diagnostic quality ultrasound images following a 2-day programme of education and training covering the fundamental aspects of lung ultrasound. Method: The participants were tested using a two-part examination; assessing both their theoretical understanding of image interpretation and their practical ability to acquire diagnostic quality ultrasound images. The results obtained were subsequently compared with those obtained from expert physician sonographers. Results: The advanced paramedics demonstrated an overall accuracy in identifying the presence or absence of pneumothorax in M-mode clips of 0.94 (CI 0.86 to 0.99), compared with the experts who achieved 0.93 (CI 0.67 to 1.0). In two-dimensional mode, the advanced paramedics demonstrated an overall accuracy of 0.78 (CI 0.72 to 0.83), compared with the experts who achieved 0.76 (CI 0.62 to 0.86). In total, the advanced paramedics demonstrated an overall accuracy at identifying the presence or absence of pneumothorax in prerecorded video clip images of 0.82 (CI 0.77 to 0.86), in comparison with the expert users of 0.80 (CI 0.68 to 0.88). All of the advanced paramedics passed the objective structured clinical examination and achieved a practical standard considered by the examiners to be equivalent to that which would be expected from candidates enrolled on the thoracic module of the College of Emergency Medicine level 2 ultrasound programme. Conclusion: This trial demonstrated that ultrasound-naive practitioners can achieve an acceptable standard of competency in a simulated environment in a relatively short period of time.


Objective: To assess Emergency Department (ED) relatives' and patients' opinions on: (1) discussing organ donation (OD) with relatives soon after ED death after cardiac arrest and (2) acceptability of organ preservation procedures both before and after discussion with relatives.
Methods: Questionnaire study, convenience sample. Results: 200 questionnaires were completed. 37.5% of participants were male subjects; mean age was 40.4 (SD 16.9; range 15 - 85) years. There was no difference in the number willing to discuss OD after brainstem death in intensive care unit compared with circulatory death in the ED (72% vs 72%; p=0.146). The majority were willing to discuss OD soon after ED death after cardiac arrest (106; 54%), 41 (21%) were not willing and 43 (22%) had no strong views (n=198). Organ preservation procedures (groin tube insertion, continuation of mechanical cardiopulmonary resuscitation and continuation of ventilator) were acceptable to between 48% and 57% of respondents if performed before discussion with family increasing to an acceptability of between 64% and 69% after discussion with family. One in four respondents felt these procedures were not acceptable regardless of the timing of discussion with family and some felt these procedures were more acceptable if the patient was a registered organ donor. 122 (61%) patients wished to donate their organs after death but only 59 (30%) were registered donors. Conclusions: (1) The majority of patients and their relatives are not averse to OD being discussed shortly after ED death. (2) Organ preservation procedures are acceptable to many. Prior discussion and prior organ donor registration may improve acceptability.

68. Winship C, Williams B and Boyle MJ. Should an alternative to the Glasgow Coma Scale be taught to paramedic students? Emerg Med J 2012; Online first (April 13)

Background: The accurate assessment of a patient's conscious state using the Glasgow Coma Scale (GCS) is an important skill for paramedics as it may determine the patient's initial and ongoing management. The objective of this study was to determine if undergraduate paramedic students from a large Australian University were able to accurately interpret a variety of conscious states. Methods: A prospective double-blinded observational pilot study requiring students to interpret the conscious state of four adult patients using the GCS by viewing a simulation DVD package. Results: There were 137 students who participated in the study, of whom 65% (n=87) were female students. The results demonstrated that undergraduate paramedic students were unable to accurately interpret a number of patient conscious states with only 20% and 37% of students able to accurately identify the GCS of patients 2 (GCS=12) and 3 (GCS=7). The motor component of the GCS appeared to be the component where the least accurate interpretation occurred, with only 47% of students being able to accurately identify the criteria that patient 3 displayed. Participants were however able to accurately interpret the GCS of both patient 1 (GCS=14) (86%) and patient 4 (GCS=15) (92%). Conclusion: This pilot study demonstrates that undergraduate paramedic students from an Australian university were unable to accurately interpret a patient's conscious state if their GCS score was <14. These findings have provided academic staff with important information for considering alternative teaching and learning strategies and approaches in conscious state assessment in current paramedic curricula.


This paper explores the prevalence of 'near death experience' phenomena associated with a resuscitation event and examines the current state of evidence for causation. Patients' reports of unusual recollections associated with a period of unconsciousness (perceived as approaching death) have fascinated individuals and the medical fraternity. Near death experiences (NDE) are reported in 9% of general community members and up to 23% of critical illness patients, although they can occur in healthy individuals who may think they are in peril. One explanation is that paranormal visions that include seeing bright lights, a tunnel and having feelings of peace may be a stage of enlightenment as death
approaches. More objective explanations point to neuro-chemical changes in a stressed or dying brain as explanation for nearly all the elements of near death experience. However if this is so, NDE should occur in all patients who are critically ill and near death. In general, patients report positive psychological outcomes after a near death experience. Nurses can support patients during a time of crisis by assisting them and their families to comprehend the experiential event using effective communication and listening skill.

70. Martin M, Hubble MW, Hollis M and Richards ME. Interevaluator Reliability of a Mock Paramedic Practical Examination. Prehosp Emerg Care 2012; 16 (2): 277-83
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.

Introduction: There is an increasing interest in human factors within the healthcare environment reflecting the understanding of their impact on safety. The aim of this paper is to explore how human factors might be taught on resuscitation courses, and improve course outcomes in terms of improved mortality and morbidity for patients. The delivery of human factors training is important and this review explores the work that has been delivered already and areas for future research and teaching. Method: Medline was searched using MESH terms Resuscitation as a Major concept and Patient or Leadership as core terms. The abstracts were read and 25 full length articles reviewed. Results Critical incident reporting has shown four recurring problems: lack of organisation at an arrest, lack of equipment, non functioning equipment, and obstructions preventing good care. Of these, the first relates directly to the concept of human factors. Team dynamics for both team membership and leadership,
management of stress, conflict and the role of debriefing are highlighted. Possible strategies for teaching them are discussed. Conclusions: Four strategies for improving human factors training are discussed: team dynamics (including team membership and leadership behaviour), the influence of stress, debriefing, and conflict within teams. This review illustrates how human factor training might be integrated further into life support training without jeopardising the core content and lengthening the course.

A busy day for ED clinicians… especially if you’re female. And…do we really need the excuse?

Objective: To determine work activity patterns undertaken by ED consultants. Methods: A single observer time-motion study of consultants rostered to clinical shifts: primarily administrative (Duty) or clinical (Resuscitation). Direct observation of 130 h was undertaken using purpose developed time-stamping software. Primary outcome was task number and time spent in predetermined categories of activity. Comparisons occurred by role delineation, sex, weekday and time of day. Results: For each observed hour consultants performed 101 discrete tasks. A high proportion was spent multitasking; 77 min of overlapping activity in each hour of observation. Consultants spent 42% of each hour on communication, 35% on direct clinical care and 24% on computer use; only 9% was spent on non-clinical tasks. Consultants spent little time (0.6%) accessing e-resources. Duty consultants undertook more tasks than Resuscitation consultants, 111 versus 90, and more time was spent on communication (47% vs 35%) and computer use (32% vs 15%) with less on clinical care (29% vs 43%). Female consultants undertook 119 tasks per hour compared with 93 for male consultants; more time was spent on communication (51% vs 38%) and computer use (28% vs 22%). No difference in activity occurred by time of day or weekday. Conclusion: ED consultants have very high hourly task rates dominated by communication and clinical activities and frequently multitask. The activity is relatively constant throughout the week but is influenced by sex and role delineation. Appreciation of activity distribution might allow informed interventions to realign the workload or divert tasks to supporting resources.

That alcohol provides a benefit to creative processes has long been assumed by popular culture, but to date has not been tested. The current experiment tested the effects of moderate alcohol intoxication on a common creative problem solving task, the Remote Associates Test (RAT). Individuals were brought to a blood alcohol content of approximately 0.075, and, after reaching peak intoxication, completed a battery of RAT items. Intoxicated individuals solved more RAT items, in less time, and were more likely to perceive their solutions as the result of sudden insight. Results are interpreted from an attentional control perspective.