

## POSTER PRESENTATIONS\*

### How Are Physical Strains at Work Influencing Quality of Life in Rescuers?

J Aleksander

Center for Emergency Medicine, Maribor, Slovenia

**Introduction:** In the past decade, major changes occurred in the field of medical care. The changes were inspired by changing relations toward an individual, community health, and health care. Health care is getting more and more specialized; therefore, conflict situations are common. Working under pressure causes mental problems to the medical staff, and the result of pressure is stress and burnout syndrome.

The work and the development of urgent medical care are shown, as is the pressure under which rescuers work. The most common mental problems, their signs and causes as well as their consequences, are described.

The results of the research on pressure level that rescuers meet at work, level of difficulty at work, and the level of salvaging problems concerning the work are shown. With a questionnaire we tried to see which stress types have the most influence on the quality of life and how to reduce the level of pressure on the medical staff.

**Materials and Methods:** In the research, 114 medical staff with different educational degrees and ages were involved. All participants work in urgent medical centers in Maribor, Celje, and Ljubljana.

**Results:** Results show that the medical staff is under a lot of pressure at work and that their families can feel the consequences.

**Conclusions:** This research opens the possibility of detecting and observing the level of mental pressure on the medical staff at work.

#### References

- Cozens-Firth J, Payne R. Stress in Health Professionals, *Psychological and Organisational Causes and Interventions*. Chichester, John Wiley & Sons, 1999.
- Looker T, Gregson O. Obvladajmo stres: Kaj lahko z razumom storimo proti stresu. Ljubljana, Cankarjeva zalo-ba, 1993.
- Maslach C, Leiter M. Resnica o izgorevanju na delovnem mestu (kako organizacije povzro-ajo osebnosti stres in kako ga prepre-iti). Ljubljana, Cankarjeva zalo-ba, 2002.
- Miller D. *Dying to Care, Work, Stress and Burnout in HIV/AIDS*. London, Routledge, 2000.

### Hemostatic Effects of HBOC-201 in a Swine Hemorrhagic Shock (HS) Model with Controlled Hemorrhage\*

F Arnaud,<sup>1</sup> M Hammett,<sup>1</sup> F Dong,<sup>1</sup> J Rice,<sup>1</sup> N Philbin,<sup>1</sup>  
B Pearce,<sup>2</sup> R McCarron,<sup>1</sup> C Nicholson,<sup>3</sup> and D Freilich<sup>1</sup>

<sup>1</sup>Naval Medical Research Center, Silver Spring, Maryland, USA

<sup>2</sup>Biopure Corp., Cambridge, Massachusetts, USA

<sup>3</sup>National Center for Medical Rehabilitation Research (NCMRR),  
National Institute of Child Health and Human Development (NICHD),  
National Institutes of Health (NIH), Bethesda, Maryland, USA

**Objectives:** To compare the hemostatic effects of the bovine polymerized hemoglobin oxygen carrier, HBOC-201, with hydroxyethyl starch (HEX) as resuscitation agents in a severe model of HS with controlled hemorrhage.

**Methods:** HS was induced in 24 anesthetized mini-Yucatan pigs by 55% EBV catheter withdrawal. Pigs were either not resuscitated (NON) or resuscitated at 10 mL/kg with HBOC-201 or HEX at 20 min.

\*Names of presenters are underlined.

Additional infusions were given if hypotension or tachycardia persisted. The animals were followed for 72 hr. CBC, coagulation assays (PT), thromboelastography (clotting index [CI]), bleeding time in vivo (BT), and in vitro (PFA-CT) were determined during resuscitation.

**Results:** Resuscitation with HBOC-201 and HEX resulted in hypocoagulability at 4 hr as seen with CI and PT (see table), which departed significantly from time 0 for both HBOC ( $P<0.01$ ) and HEX ( $P<0.01$ ). At 4 hr, bleeding time (BT) remained unchanged, but PFA-CT increased ( $P<0.01$ ) probably due to a reduction in platelet number. The nonresuscitated animals showed a transient hypocoagulability (CI decreased at 30 min [ $P<0.001$ ]) before increasing back to baseline ( $P<0.01$ ). There were no significant differences between HBOC-201 and HEX resuscitated animals at 4 hr. Most indices tested returned to baseline by 72 hr. Survival in HBOC-201- and HEX-resuscitated animals (100% and 75%, respectively) was higher than in nonresuscitated animals (25%).

**Conclusions:** The mild and transient hypocoagulation observed with HBOC-201 and HEX did not cause any apparent detrimental effects.

| Indices | Clotting Index (CI) |         |          | PFA-CT (sec) |        |
|---------|---------------------|---------|----------|--------------|--------|
|         | 0                   | 30 min  | 4 hr     | 0            | 4 hr   |
| NON     | 3.2±0.5             | 1.8±0.8 | 3.2±0.3  | 67.7±6.7     | 43±7   |
| HBOC    | 3.1±0.4             | 1.2±1.4 | 0.1±1.3  | 83.3±10.8    | 163±43 |
| HEX     | 2.8±1.2             | 0.4±1.0 | -2.4±3.8 | 74.3±7.6     | 175±20 |

  

| Indices | PT (sec) |          | Platelets (10 <sup>6</sup> /mL) |        |
|---------|----------|----------|---------------------------------|--------|
|         | 0        | 4 hr     | 0                               | 4 hr   |
| NON     | 13.7±0.6 | 14.9±2.0 | 387±76                          | 301±6  |
| HBOC    | 13.4±0.4 | 17.3±1.9 | 368±74                          | 172±46 |
| HEX     | 13.3±0.7 | 18.8±0.6 | 365±82                          | 164±55 |

\*The opinions contained herein are those of the authors and are not to be construed as official or reflecting the views of the Navy department or the naval service at large.

### How Age, Injury Severity Score, and Revised Trauma Score Relate to the Probability of Survival in Our Trauma Patients and If These Correlate with Predictive Outcome

F Attar and P Simms

University Hospital Aintree, Liverpool, UK

**Aim (Background):** Application of simple assessments and measurements has allowed trauma to be quantified and compared. Probability of survival is affected by the Injury Severity Score, Revised Trauma Score, and age and is calculated by these parameters. The aim of this study was to assess the relationship between ISS and RTS with the probability of survival for our trauma patients and test how this compared with the predicted relationship.

**Material and Methods:** A retrospective study was carried out from January 2001 to August 2003. The ISS and RTS scores for 120 trauma patients attending the A&E were calculated. The relationship between ISS, RTS, age, and Ps was assessed using the correlation and regression analysis.

**Results:** Injury severity scores of trauma victims had a mean of 21.69 (range, 2–50). The results showed a strong negative correlation between ISS and Ps, with an  $r$  value of  $-0.692$  ( $P < 0.005$ ). Both the variables RTS and age also showed a strong correlation with Ps, with an  $r$  value for RTS of 0.552 and for age of  $-0.529$  ( $P < 0.005$ ). Using regression analysis, RTS made a stronger contribution to Ps ( $r = 0.594$ ) but the correlation between ISS and age with Ps was strong and statistically significant ( $P < 0.005$ ).

**Conclusion:** The results indicate strong correlations between ISS and Ps. This is helpful for patients in whom TRISS scores cannot be calculated. The results also confirm the multivariable correlation between RTS, age, and ISS with Ps for our patients. This was in keeping with the predicted relationship.

## Bispectral Index Monitoring in the Emergency Department

**H Bailey**

*Drexel University College of Medicine, Philadelphia, Pennsylvania, USA*

**Purpose:** To evaluate whether bispectral index (BIS) monitoring in the emergency department (ED) is useful to the emergency medicine (EM) physician.

**Methods:** The BIS was evaluated in the ED of a university hospital Level 1 trauma center that has an emergency medicine residency program. Both attending and resident physicians were trained in a half-hour session on the indications and utilization of the BIS. Indications for use were patients receiving conscious sedation, mechanical ventilation, or chemical sedation for agitation. Physicians were surveyed after each use of the device.

**Results:** Twenty surveys were completed in the initial trial period. Indications for use were mechanical ventilation (60%), conscious sedation (25%), and chemical sedation (15%). EM physician use by level was 45% attending, 40% senior resident, and 15% intern. All physicians rated the BIS easy to use, and no physician felt that BIS use hindered or delayed any aspect of patient care. Medication and dose were at the discretion of the physician. Lorazepam and midazolam were the sedatives used. Fifty-five percent of physicians gave an increased amount of medication based on the BIS. No physician gave less medication than usual. Eighty percent of patients undergoing conscious or chemical sedation received an increased amount of sedation based on the BIS. Seventy percent of physicians felt that patient sedation was improved. No patient required reversal agents or ventilatory assistance.

**Conclusion:** BIS monitoring in the ED setting was easy to use with minimal training. Emergency physicians felt that the BIS enhanced patient care by improving patient sedation.

## Trauma Retrieval Costs in North Queensland, 2002

**J Brennan,<sup>1,4</sup> J Hanby,<sup>2,4</sup> K Jones,<sup>3,4</sup> and LM Aitken<sup>4</sup>**

<sup>1</sup>*The Townsville Hospital, Townsville, QLD*

<sup>2</sup>*Cairns Base Hospital, Cairns, QLD*

<sup>3</sup>*Mackay Base Hospital, Mackay, QLD*

<sup>4</sup>*Queensland Trauma Registry, CONROD,*

*The University of Queensland, Brisbane, QLD, Australia*

Trauma care in North Queensland presents specific challenges to care providers. A large landmass, remote communities, and vast distances between townships affect the ability to retrieve patients to definitive care in an optimum timeframe.

This preliminary study was designed to investigate the patient numbers and costs related to retrieval and hospitalisation of trauma patients in North Queensland. Inclusion on the Queensland Trauma

Registry required patients to have an injury (ICD-10AM category: S00–S99 or T00–T78) and to be admitted for  $\geq 24$  hours for acute treatment of that injury. Demographic data, injury, and treatment variables were collected retrospectively via chart review by trained coders.

In total, 2,450 patients were admitted to Cairns, Mackay, and Townsville Hospitals in 2002, with 95.5% survival. The majority of these patients (2,221 [91%]) were categorised as having a minor injury (Injury Severity Score [ISS]  $< 16$ ), while 239 (9%) had major injuries. Fixed-wing retrievals of trauma patients cost an estimated \$800,000, while rotary-wing retrievals cost an estimated \$1.8 m. These patients used 779 ICU bed days cost in excess of \$1.6 m as well as 14,616 hospital bed days costing in excess of \$14.3 m.

In conclusion, a moderate proportion of trauma patients in North Queensland require retrieval to definitive care, which impacts on demand for retrieval and hospital resources and is associated with significant cost.

## Primary Trauma Diversion in Hong Kong: Pilot Study

**NK Cheung, JHH Yeung, PA Cameron, CA Graham, and TH Rainer**

*Accident & Emergency Medicine Academic Unit, Chinese University of Hong Kong, Trauma & Emergency Centre, Prince of Wales Hospital (PWH), Shatin, NT, Hong Kong*

**Aim:** Trauma is the leading cause of death in people under 40 years old in Hong Kong. Delays to definitive trauma care are associated with poorer outcomes. This study examines the effect of a pilot primary trauma diversion (PTD) policy in the New Territories of Hong Kong.

**Methods:** A diversion protocol for ambulance crews was introduced based on three physiologic and seven anatomic criteria. Crews completed a trauma diversion record and could contact PWH ED staff for advice. Patients directly transported to PWH from outside its catchment area (PTD) were identified prospectively by a trauma nurse coordinator, along with all secondary transfers from a local district hospital. Patients were followed up for 30 days after admission to identify their impact on resource utilisation at PWH.

**Results:** Three-month pilot study; 20 PTD patients and 14 secondary transfer patients. PTD patients: mean age 42 years, M:F ratio 11:9. Traffic-related injuries (6/20), falls  $< 1$  m (7/20), and penetrating trauma (3/20) predominated for the PTD patients. Traffic-related injuries were most common in the secondary transfer group (6/14) along with penetrating trauma (4/14). Time to definitive care was 41 minutes less for PTD patients compared with secondary transfers. PTD led to an increase of 0.4 patients per day. Agreement was high between ambulance and medical staff for PTD criteria.

**Conclusion:** PTD reduced the time to definitive care without adding significantly to the clinical workload. Exclusion criteria have been revised to bring paediatric and mass casualty incident patients to PWH as part of PTD.

## Traumatic Cardiac Arrest: Who Are the Survivors?

**K Crewdson, D Lockey, and G Davies**

*London Helicopter Emergency Medical Service, Royal London Hospital, Whitechapel, London, UK*

**Aim:** Patients who suffer traumatic cardiac arrest have a poor outcome, and some consider resuscitation of this patient group futile. This study identified patients who had trauma-related out-of-hospital cardiac arrest and survived.

**Method:** The London Helicopter Emergency Medical Service is a physician-based trauma service. Dispatch criteria target high-risk trauma patients. A retrospective database review identified all trauma patients who received prehospital cardiopulmonary resuscitation between May 1999 and May 2004. The primary outcome measure was survival to hospital admission and discharge.

**Results:** 509 patients had cardiopulmonary resuscitation on scene and 421 (84%) died on scene or in the emergency department. Outcome was unavailable for six of them. 82 (16%) patients survived to leave the emergency department. Of these early survivors, 36 (7%) survived to hospital discharge, 46 died, and 5 were lost to follow-up.

The 36 long-term survivors fell into distinct groups. Eight appeared to have had "medical" cardiac arrests that occurred before, which were usually the cause of their trauma. Four had cervical spine trauma. Sixteen had asphyxial or hypoxic insults, e.g., drowning, mechanical asphyxia, inhalational injury, electrocution. Five had on-scene thoracotomy for penetrating chest trauma and two recovered after decompression of tension pneumothorax. One patient had isolated head injury.

**Conclusion:** This study confirms the poor outcome for trauma-associated cardiac arrest. However, it does demonstrate that in our patient population the few survivors are from very specific subgroups. Aggressive out-of-hospital resuscitation can produce good outcomes in the patients in these groups.

## Epidemiology, Outcome, and Complications following Operative Management of Clavicular Nonunion: Limb Reconstruction Unit Experience

R Dharmarajan, R Kulshreshtha, K Venu, J Ong, G Groom, and G Kakarala

*Limb Reconstruction Unit, Kings College Hospital, London, UK*

**Aim:** To find out the epidemiology, outcome, and complications following internal fixation of clavicular nonunion.

**Material and Methods:** We identified 12 patients from our limb reconstruction database. Out of these 10 were males and 2 were females, with average age of 38 yr (range, 16–50 yr). Fracture pattern varied from Allman type I in 8, type II in 1, and type III in three cases. The data were analysed for mechanism of injury, need for bone grafting, time to surgery, time to clinical and radiological union, and time to return to work. Surgical intervention included reconstruction plate in 10 patients and hook plate and DCP, one each in two patients. All the patients had autograft with internal fixation. All these patients were then asked to complete a questionnaire, including SF-12 (short form) and constant score to assess their outcome.

**Results:** Average follow-up was 3 years (range, 1–6 years). All fractures went on to union, except one patient who had implant failure, which needed further internal fixation and bone graft. Complications included paraesthesia in the upper limb in two patients and paraesthesia along the lateral cutaneous nerve of the thigh in one patient. Three patients had their metal work removed because of local discomfort after fracture union. A detailed discussion of our results and implications to current practice will be presented.

## Abdominal CT in Paediatric Trauma: Irradiate or Procrastinate?

GB Farrow and T Lawrence

*Children's Hospital at Westmead, Sydney, NSW, Australia*

**Introduction:** Abdominal CT is used frequently in the assessment of the abdomen in trauma. CT can be particularly valuable in detecting occult intra-abdominal injury in blunt abdominal trauma and multiple trauma with head injury, especially in the paediatric age group.

However, concerns have been raised in radiology literature concerning the long-term effects of radiation in paediatric patients, and questions have been asked locally regarding the need for CT in some cases.

**Methods:** A retrospective review was conducted of computerised patient records of all trauma patients presenting to CHW over a 2½-year period. Mechanism of injury, indications for CT, and need for surgery were recorded. Indications included vital signs, pain, bruising, haematuria, and coexistent head injury.

**Results:** 128 abdominal CTs were performed. MVAs were the cause of half of these cases, of which 2/3 were passengers and 1/3 pedestrian, followed by falls, bicycle crashes, and sport injuries. There were 69 normal and 59 abnormal studies. In the normal group, haematuria and head injury were over-represented, although numbers were small. Bruising and pain were equally represented in both groups. Vital signs were poorly recorded and could not be analysed. Thirteen laparotomies were performed, 12 with positive CTs and 1 where CT missed a duodenal injury.

**Conclusion:** A 46% (59/129) positive rate for CT leaves room for improvement. However, no clinical signs measured showed increased sensitivity for positive CT, but haematuria alone was a poor indication, and head injury alone was also a questionable indication.

## Outcome Assessment Instruments: Are They Useful for Trauma Registries?

B Gabbe, O Williamson, and P Cameron

*Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, VIC, Australia*

A detailed knowledge of trauma incidence and outcomes is necessary to evaluate management approaches, guide prevention research, and improve public health program planning. Whilst trauma registries have the potential to collect information about patient outcomes, the most commonly quoted outcome measure is the mortality rate, which represents only a small proportion of the total trauma population. Many more patients experience ongoing disability following injury, which prevents full social and work participation, information commonly captured by outcome assessment instruments. However, the routine monitoring of morbidity outcomes such as disability, functional loss, and quality of life requires outcome assessment instruments validated for use in broad trauma populations and suitable for use in trauma registries.

An international and interdisciplinary consensus meeting in 1999 suggested the use of the SF-36, a global measure of health status, and the GOS for assessing outcome in a broad trauma population. A modified version of the FIM has been recommended as a core component of trauma registries by the American College of Surgeons whilst other authors have suggested the FIM and GOS as standard instruments for measuring patient outcomes for trauma registries and trauma populations. Although these instruments have been recommended, none has been specifically developed for, nor adequately validated in, the broad trauma population captured by trauma registries. Commonly used instruments for assessing trauma outcomes will be discussed, with an emphasis on the validity and utility of these instruments for use in routine monitoring of trauma outcomes through trauma registries.

## Management of Organophosphate Compound Poisoning

**N Ganapathy**

*Dhanvantri Critical Care Center, Erode, Tamil Nadu, India*

**Learning Objectives:** To learn the clinical features, diagnostic evaluation, and management of patients with organophosphate compound poisoning and to develop skill in handling patients with this condition.

**Aim:** Millions of people lose their lives every year due to suicide by consuming poison and improper management. The organophosphate insecticides that have a high degree of toxicity toward humans are the commonest cause of suicidal death in agricultural countries such as India. These compounds have muscarinic, nicotinic receptor, and central nervous system effects. With the use of atropine for muscarinic effects, oximes for nicotinic effects, and mechanical ventilation for ventilatory failure, full recovery can be attained.

**Methods:** This study was conducted in our hospital from February 1986 to December 2003. All patients with organophosphate intoxication were included. They were treated with atropine sulfate, pralidoxime, and ventilator for ventilatory failure patients.

**Results:** The total number of patients treated was 463. Eighty-nine patients received ventilator support. Thirteen patients expired. The mortality rate was 2.8%. The primary cause of death was ventilatory failure.

### Organophosphate Poisoning Patients (N=463)

|                                | No. | %   |
|--------------------------------|-----|-----|
| With ventilatory support       | 89  | 19  |
| Without ventilatory support    | 367 | 79  |
| Expired on ventilatory support | 13  | 2.8 |

**Conclusion:** The triad of atropine sulfate, pralidoxime, and mechanical ventilation can protect 100 to 200 times the dose that would be fatal without proper treatment.

## Comparison of Ventilatory Pressures and Resistance of Easytube and Combitube in a Lung Model

**S Göbler, T Piepho, AR Thierbach, and C Werner**

*Clinic of Anaesthesiology, Johannes Gutenberg-University, Mainz, Germany*

**Aims:** The EasyTube (EzT) as well as the established Esophageal-  
Tracheal Combitube (ETC) are double-lumen tubes for managing unanticipated airway difficulties. A major difference between both devices is the design of the orifices serving as supraglottic ventilation outlets.

This study evaluates airway pressures and resistance of both devices in an in vitro setting.

**Methods:** The ventilation of a lung model (Vent Aid Training Test Lung) was successively performed with the two devices recommended to ventilate adult patients (EzT 41F and ETC 37F) and a Draeger respirator (Cato). All parameters were measured during ventilations at a frequency of 10/min and tidal volumes from 300 to 1,000 mL.

**Results:** Airway pressures were significantly lower with tidal volumes of >800 mL through the EzT. Likewise, the resistance of the EzT was significantly lower ( $P<0.05$ ) compared with the ETC.

**Conclusion:** In comparison with the ETC with its eight little orifices, the design of the EzT incorporating one big orifice relates to a significant reduction of airway pressures due to its significantly lower resistance. The reduced the influence of the tube design on ventilatory parameters may be especially beneficial in patients posing

problems (e.g., asthma or morbid obesity) during ventilation. This advantage in its design has to be evaluated in patients as well.

| Tidal Volume (mL)                          | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 |
|--|-----|-----|-----|-----|-----|-----|-----|-------|
| Resistance ETC (cm H <sub>2</sub> O/L/sec) | 8   | 9   | 10  | 11  | 11  | 12  | 13  | 14    |
| Resistance EzT (cm H <sub>2</sub> O/L/sec) | 5   | 6   | 7   | 8   | 8   | 9   | 10  | 11    |

## Mortality after Trauma Intubation without Drugs in Scottish Emergency Departments

**CA Graham,<sup>1</sup> GM Wares,<sup>2</sup> D Beard,<sup>3</sup> and PT Munro<sup>4</sup>**

<sup>1</sup>A&E Medicine Academic Unit, Chinese University of Hong Kong, Hong Kong

<sup>2</sup>Department of Anaesthesia, Western Infirmary, Glasgow, Scotland, UK

<sup>3</sup>Scottish Trauma Audit Group, Royal Infirmary of Edinburgh, Scotland, UK

<sup>4</sup>Emergency Department, Southern General Hospital, Glasgow, Scotland, UK

**Aim:** Airway management is a core aspect of trauma. Recent work has suggested that trauma patients who are intubated prehospital without drugs have a very poor prognosis. This study aimed to identify the outcome of trauma patients intubated without drugs in Scottish emergency departments (EDs).

**Methods:** Retrospective cohort study using prospectively collected data from the Scottish Trauma Audit Group between 01.01.1999 and 31.12.2002. Patients who were intubated were identified from the database and the number of patients who required drugs for intubation was determined. The mortality of those who were intubated with and without drugs was calculated. Statistical analysis: chi-square test for categorical data and Mann Whitney U test for non-parametric data (GCS, ISS, age).

**Results:** 24,756 patients in the STAG database, 1,503 intubations: 1,244 with drugs and 218 with no drugs (41 unknown). No significant difference in the proportion of males (80.8% with drugs, 86.2% without,  $P=0.57$ ) or median age (38 years with drugs, 36 without,  $P=0.51$ ). Median GCS was 8 in the drugs group and 3 in the no-drugs group ( $P<0.001$ ). Higher proportion of patients in the no-drugs group were intubated by emergency physicians (as opposed to anaesthetists), 50.7% vs 21.4%,  $P<0.001$ . Median ISS higher in the no-drugs group (30 vs 25,  $P<0.001$ ) and mortality higher in the no-drugs group (75.7% vs 30.2%,  $P<0.001$ ).

**Conclusion:** Trauma patients in Scottish EDs who are intubated without drugs have high mortality rates. Outcome is not universally fatal, but morbidity is unknown and requires further research.

## Comparison of Outcome Prediction Ability of MEESc, CRAMS, and TS in Trauma Patients

**S Grmec, M Spindler, and A Jus**

*Centre for Emergency Medicine Maribor, Slovenia*

**Introduction:** Outcome prediction of patients with severe trauma is a challenging task. The aim of this study was to assess the outcome prediction ability of three different prehospital scoring systems (MEESc, TS, and CRAMS). MEESc is a new scoring system (combination of MEES and values of capnometry).

**Patients and Methods:** In the prehospital setting, values of the CRAMS, MEES, TS, and capnometry (initial and final) were collected from each patient. The study group consisted of 104 patients hospitalized for major trauma (defined as Injury Severity Score >15) with requirement for intubation in the field. Patient less than 16 years

old were excluded from the study. There were 79 males and 25 females involved. Their ages varied from 16 to 88 years, with a mean  $47.6 \pm 21.3$ . Sensitivity, specificity, and correct prediction outcome were measured by the chi-square method in three different scores. For each score, ROC curve was obtained.

**Results:** For prediction of mortality, the best cut-off points were 22 for MEESc, 7 for CRAMS, and 9 for TS. The area under ROC curve was 0.72 for MEESc, 0.75 for CRAMS, and 0.91 for TS. There were significant statistical differences among MEESc and TS and MEESc and CRAMS ( $P < 0.05$ ).

**Conclusion:** The MEESc had the best results in outcome prediction in trauma patients. The MEESc could be an efficient communication tool between prehospital trauma care and hospital care.

## Transport of the Paediatric Trauma Patient with Actual or Potential Spinal Cord Injury: Variation in UK Practice

**SW Hancock, SA Russ, MJ Quinton, and RJ Moore**  
Sheffield Children's Hospital Retrieval Service,  
Sheffield Children's Hospital NHS Trust, Sheffield, UK

**Aims:** Failure to immobilise patients at risk of spinal cord injury may have devastating consequences. Previous studies in the UK have looked at numbers of at risk patients immobilised,<sup>1</sup> but not methods of immobilisation during transfer (movement of patients between hard surfaces in close proximity) and transport (patient movement between facilities). This study reviews current UK practice.

**Methods:** Postal questionnaires were sent to the retrieval coordinators in 18 UK PICUs, asking about methods of cervical spine immobilisation (CSI), transfer and transport of paediatric trauma patients, and existence of guidelines for management of that population.

**Results:** There was an 83% (15/18) response rate. Twenty-six percent (4/15) of retrieval services employed best practice guidelines. For patient transfer, 33% (5/15) of retrieval services utilised a patslide device alone and 47% (7/15) utilised a patslide in combination with a vacuum mattress (VM) and/or spinal board (SB). For patient transport, 60% (9/15) of services had a consistent approach. Devices used were VM alone (3), SB alone (2), VM + SB (1), SB + padding (2), trolley alone (1). VMs either alone or in combination with another device were in use by 60% (9/15) of services. One hundred percent of retrieval services use hard collar + blocks + tapes for CSI.

**Conclusion:** There is wide variation in the method of immobilisation utilised by UK retrieval services. This may be partly explained by the lack of best practice guidelines. Despite evidence that SBs have a role only during extrication,<sup>2</sup> they continue to be used frequently.

### References

1. Skellett S, Tibby SM, Durward A, Murdoch IA. Immobilisation of the cervical spine in children. *BMJ* 2002; 324:591-3.
2. Chan D, Goldberg R, Tascone A, et al. The effect of spinal immobilisation on healthy volunteers. *Ann Emerg Med* 1994; 23:48-51.

## Anaesthesia during the 2003 Gulf Conflict: The Experience at One Field Hospital

**J Henning, G Nordmann, S Gupta, and J McNicholas**  
34 Field Hospital, Strensall Barracks, York, UK

Two British Army Field Hospitals were deployed to the Gulf region to provide medical cover for the recent conflict in the area. 34 Field Hospital moved forward during the early phases of warfighting,

and the demographics of the anaesthesia provided there are described. We also describe some of the equipment used.

During the conflict, 142 surgical episodes were recorded on 80 patients. Unusual for a modern conflict, gunshot wounds were the predominant injury in patients who required surgery. Most patients required a second operation. No deaths were recorded in the operating theatre.

Several critical incidents are described, including air conditioning failure and power cuts. Methods of overcoming the extreme heat and other environmental problems are also described.

## Dual Shockroom Equipped with Sliding Gantry, Multislice CT Scanner Prevents Unnecessary Patient Transfer

**N Hoogerwerf,<sup>1</sup> CP Henny,<sup>1</sup> C van Kuijk,<sup>2</sup> DR Kool,<sup>2</sup> K Ponsen,<sup>3</sup> JC Goslings,<sup>3</sup> and SK Luitse<sup>3</sup>**

Departments of <sup>1</sup>Anaesthesiology, <sup>2</sup>Radiology, and <sup>3</sup>Trauma Unit, Academic Medical Centre, University of Amsterdam, Amsterdam, The Netherlands

In our Level 1 trauma center was a need for a renewed shockroom, dedicated to the emergency care of life-threatening injured patients. During the development process, we worked out (in companion with our industrial partner Siemens) a new concept of a shockroom equipped with a CT scanner with a sliding gantry. In the past, patients had to be transferred multiple times during the diagnostic process. Now, the patients only have to be carried over onto a carbon-fibre backboard after presentation by the ambulance team. The patient remains on this board during the primary and secondary surveys, during CT scanning, as well as during transportation to the OR, and finally during transport to the ICU. That is the second time for the patient to be carried over, into the ICU bed. Thus the moments with a high risk (for disconnecting tubing) and with a high level of inconvenience for the medical personnel were reduced to only two. Since transportation and moving the patient to other rooms and floors are minimized, there also is a major improvement in time between admission and final diagnostic moment, thus coming closer to the ideal "golden hour" in trauma care, with a lesser chance of complications.

## Developing Trauma Reception Teams in Rural Settings

**K Hyett and A Rudock**

Bendigo Health Care Group, Bendigo, VIC, Australia

Bendigo Health Care Group's Collaborative Health Education and Research Centre (CHERC) is the lead agency for a project designed to develop methods and innovative strategies to ensure timely availability of multidisciplinary trauma reception teams for major trauma patients in rural settings.

Six hospitals have been selected to participate in the project based on level of trauma service and major trauma throughput. Each of the five Department of Human Services regions in Victoria has at least one hospital participating in the project.

Key personnel from each site have been identified as "champions" for the creation and implementation of a trauma team model for their level of trauma service. Active nurturing of the sites by the project team via site visits and learning sessions facilitated the development of the model.

Learning sessions provide a forum to discuss strengths and weaknesses of and barriers to the project. Creative solutions and strategies are developed to enable the project to progress. Information gleaned from learning sessions is utilised actively in

project evaluation. Teams introduce these concepts to their respective organisations through Plan–Do–Study–Act cycles.

Evaluation is ongoing, focusing on timeliness of care, time to transfer, and patient outcome.

Improvements measurable during the life of the project include the following:

- Improved management of trauma patients.
- Improved timeliness in the management of trauma patients.
- Improved timeliness in the transfer of trauma patients to the appropriate level of trauma service.
- Improved communication and networking between individuals and hospitals involved in the management of trauma patients.

## A Case of Reversible Ischemic Neurological Deficit (RIND) Associated with Blunt Cervicofacial Injury

**A Kanazawa, H Manaka, T Yokoyama, Y Moriwaki, N Suzuki, and M Sugiyama**

*Critical Care and Emergency Center, Yokohama City University Medical Center, Minami-ku, Yokohama, Japan*

We report a case of reversible ischemic neurological deficit (RIND) associated with blunt cervicofacial injury.

**Case:** A 50-year-old man whose neck was caught in a machine (belt conveyor) for 10 minutes when checking it was transferred to our center. His consciousness level was E3V2M5 (Glasgow Coma Scale) on arrival to our center. He presented with right hemiparesis and aphasia. The urgent brain CT scan and MR imaging showed neither traumatic nor ischemic lesions. Skull x-ray showed left zygomatic and mandibular fracture. Because we suspected the left carotid artery was injured, we performed cerebral angiogram in emergency. It showed that the left external carotid artery was occluded at the distal point of the facial artery and the left internal carotid artery was patent but its wall had enhanced irregularity at the proximal of the petrous portion. We diagnosed those findings as the vasospasm. We did not undertake any intervention for this condition. Fortunately, a few days later, both his symptoms and the irregularity of the wall of the left internal carotid artery were improved.

**Discussion and Conclusion:** If a patient has a neurological deficit and carotid artery injury is suspected, we should perform cerebral angiogram even if there is no aberration in the CT scan and MR imaging.

## Effect of Hypertonic Saline (7.5%) Infusion on Postoperative Cellular Immune Function: A Randomized Controlled Clinical Trial

**JA Kolsen-Petersen,<sup>1,2</sup> JO Dich-Nielsen,<sup>1</sup> and E Tønnesen<sup>2</sup>**

*Department of Anesthesia and Intensive Care, Viborg County Hospital<sup>1</sup> and Aarhus University Hospital,<sup>2</sup> Denmark*

**Aims:** Previous studies found hypertonicity to affect immune responses in intact laboratory animals and in human blood cell cultures. In this study, we investigated the cellular immune response to surgery after preoperative infusion of hypertonic saline in humans.

**Methods:** Sixty-two women scheduled for abdominal hysterectomy were randomized to single-blinded infusion of 7.5% NaCl, 0.9% NaCl, both 4 mL/kg, or 0.9% NaCl, 32 mL/kg over 20 min. Blood was collected at baseline; during surgery; and at 1, 24, and 48 hours postoperatively for the determination of leukocyte and

differential count, flow cytometric phenotyping of mononuclear cells, and natural killer cell activity against K 562 tumor cells. Phytohemagglutinin-induced lymphocyte proliferation, plasma elastase, and neutrophil chemotaxis were measured at the same time points, except during surgery. We tested cell-mediated immune function in vivo by delayed type hypersensitivity reaction in the skin. Groups were compared by two-way repeated measures analysis of variance after logarithmic transformation of the data.

**Results:** Surgery/anesthesia induced well-known changes in the cellular immune response, which were unrelated to the tonicity or volume of the infused fluids.

**Conclusion:** Infusion of a clinically relevant dose of hypertonic saline did not appear to modify the postoperative cellular immune response after elective abdominal hysterectomy.

## Motorbike Driver Injuries in Queensland

**J Lang and LM Aitken**

*Queensland Trauma Registry, The University of Queensland, Brisbane, QLD, Australia*

Road traffic accidents (RTAs) account for one-quarter of all injury admissions to Queensland Trauma Registry (QTR) Hospitals annually. This study was designed to identify differences in demographic and injury factors between injured motorbike (MB) riders and injured motor vehicle (MV) drivers.

Inclusion on the QTR required patients to have an injury (ICD-10-AM categories: S00–S99 or T00–T78) and be admitted to hospital for  $\geq 24$  hours for acute treatment of that injury. Data regarding demographic, injury, and treatment variables were collected retrospectively via chart review by trained coders. Relevant hospital and university ethics approval was obtained.

During 2002–2003, 2,452 people required hospitalisation after an RTA at the 15 hospitals included in the QTR. MB riders were predominately male and aged between 10 and 39 years and sustained more minor injuries (Injury Severity Score [ISS]  $< 16$ ) than MV drivers. MB riders more likely sustained injury to the extremities, were engaged in leisure activities, and were injured at a sporting area.

After controlling for ISS and age, it was found that MB riders were hospitalised for a significantly shorter length of time (2.02 vs. 2.22 days for MV drivers,  $P=0.0003$ ) and remained in ICU for a significantly shorter length of time (1.40 vs. 1.72 days for MV drivers,  $P=0.0105$ ). There was no difference in mortality between the groups (OR=0.45, [CI: 0.17–1.20]).

In conclusion, this study highlights the need for continuing health promotion activities to reduce the incidence of injuries to MB riders, particularly in males aged between 10 and 39.

## Elderly Patients at High Risk for Recurrent Fractures Can Be Identified Through Hospital Data

**J Leslie and S Rao**

*Royal Perth Hospital (RPH), Perth, WA, Australia*

Elderly patients with fractures of the femoral neck (#NOF) constitute a large volume of orthopaedic workload. As the proportion of elderly Australians grows, these cases continue to consume more health resources. Tertiary hospital beds are occupied by such patients awaiting placement, adding to the pressure on hospital bed availability for other emergencies. Furthermore, this group of patients has higher mortality rates compared with other trauma patients.

**Aim:** To identify people with high risk for #NOF from hospital data.

**Method:** This study was conducted through data collected by the

Trauma Registry at RPH. Patients >55 years old with a traumatic #NOF were studied. Demographic characteristics, number of trauma admissions, injury patterns, length of stay, mortality, and discharge pattern were analysed.

**Results:** 3,686 patients with a #NOF and age >55 years were identified. Average number of admissions per day was 1.07 (annual mean, 392 cases). Mortality rate was 6%. Eighteen percent had other admissions for traumatic injuries, either before or after the sentinel event (first episode of #NOF). Five percent sustained a second #NOF. Rates of second fracture were 5.7% (females) and 4.4% (males).

**Conclusion:** One in five patients with a #NOF will subsequently have, or have had, a previous admission related to minor trauma. One in 20 will sustain a second #NOF. Patients admitted with such injuries should be targeted through falls prevention programmes, as they are at significant risk of subsequent injuries. Physicians should investigate these men and women for factors that contribute to falls and identify means of improving bone density.

## Delayed Post-Traumatic Cerebral Vasospasm Caused by Traumatic Subarachnoid Hemorrhage

**H Manaka, T Yokoyama, N Suzuki, and M Sugiyama**

*Critical Care and Emergency Center, Yokohama City University Medical Center, Yokohama, Japan*

**Purpose:** Traumatic subarachnoid hemorrhage (t-SAH) is present in 39% of patients with severe head injury. It is known that t-SAH causes delayed cerebral vasospasm similar to aneurysmal subarachnoid hemorrhage. But we thought the incidence of post-traumatic delayed vasospasm is rare compared with aneurysmal subarachnoid hemorrhage and we didn't take care of the mild t-SAH elaborately. We experienced two cases of delayed cerebral vasospasm after t-SAH. We present these cases and discuss them.

**Clinical Material and Methods:** Between October 2002 and April 2004, a total of 19 patients were admitted to our center because of traumatic SAH. Patients with severe brain injury (severe brain swelling, diffuse axonal injury, brain contusion, subdural hematoma, epidural hematoma, etc.) were excluded.

**Results:** Two patients (10.5%) suffered a brain infarction after t-SAH. One was a 61-year-old man and the other was a 78-year-old woman. Particularly, the latter case was very mild t-SAH. Her Glasgow Coma Scale score on admission was 15 and she had no neurologic deficit. She left our hospital with mild delirium and was hospitalized again with right hemiparesis and aphasia. Angiogram showed no cerebral aneurysm but diffuse cerebral vessel stenosis. We administered a vasodilator agent. Several weeks later, her symptoms were improved.

**Conclusion:** t-SAH may cause cerebral vasospasm. We should follow-up t-SAH patients for 2 weeks, even those with mild hemorrhage.

## Nine Years of Trauma Due to Stabbing Presenting to a Major Australasian Metropolitan Teaching Hospital

**SM Mazur and JM Yeung**

*Emergency Department, Royal Perth Hospital, Perth, WA, Australia*

An audit was undertaken to evaluate the incidence, epidemiology, and temporal relationships of trauma due to stabbing presenting to Royal Perth Hospital over a 9-year period, between 1997 and 2003. All cases of stabbing requiring admission to hospital for >24 hours or leading to death in the emergency department were reviewed.

Of the total 415 cases, 56 had ISS >15 and there were 14 deaths. Stabbing occurred primarily in males under the age of 40. Patients with stabbing injuries generally present later in the week and in the early hours of the morning. Influence of alcohol and recreational drug ingestion is reviewed. The majority of stabbings are the result of assault. Injuries most frequently involve the upper limbs, chest, and abdomen. Patient disposition and length of stay are examined.

This information, in combination with temporal patterns of hospital presentation, has implications for EMS tasking as well as hospital rostering of emergency physicians, trauma surgeons, security, social services, and other ancillary staff.

A public perception that violence in West Australian society is increasing is not supported by the trends in stabbings presenting to a major metropolitan teaching hospital in Perth, Western Australia.

## External Jugular Vein Cut-Down: Should This Be Utilised in the Severely Injured Patient?

**MP McMonagle**

*Department of Surgery, Westmead Hospital, Westmead, NSW, Australia*

**Background:** The ideal venous access site is a) short with a wide-bore, b) rapidly accessible, c) amenable to a cut-down if percutaneous access is not possible, and d) above the level of the diaphragm, especially after severe abdominal trauma.

**Objectives:** To assess if the external jugular vein is a satisfactory model for venous access in the trauma patient and thus should be a learned skill in trauma care.

**Methods:** A venous cut-down was performed in an animal model to demonstrate the technique on the external jugular vein in a timely manner.

**Conclusion:** The external jugular vein is a readily accessible vascular site that should be considered for a cut-down in the severely injured patient when other techniques have failed. Although it is not readily taught in the ATLS/EMST, the technique is similar to saphenous vein cut-down, but without being below the level of the diaphragm, where access may be futile after abdominal trauma. Further evaluation of this technique is needed, perhaps as part of the ATLS/EMST workstations before accepting it as an important technique for emergency care doctors.

## Application of US for Laryngotracheal Injury

**Y Moriwaki, M Sugiyama, K Takahashi, H Toyoda, T Kosuge, M Iwashita, H Fukuyama, J Suzuki, and N Suzuki**

*Critical Care and Emergency Center, Yokohama City University Medical Center, Minami-ku, Yokohama, Japan*

**Aims:** We can easily suspect a blunt laryngotracheal injury (LTI) from subcutaneous emphysema, deep cervical emphysema, or mediastinal emphysema. However, these findings are not specific for blunt laryngotracheal injury. Bronchoscopy often misses the existence of the LTI. We reported the usefulness of CT for diagnosis of LTI at TraumaCare 2002. Recently, we succeeded in detecting LTI by cervical US. The aim of this study is to clarify the usefulness of US findings for diagnosis of blunt LTI.

**Methods:** We examined three patients with blunt LTI by US, whose injured sites were confirmed by CT and bronchoscopy. The US findings were compared with CT and bronchoscopic images. Discontinuity of the laryngotracheal wall, which was thought to indicate dislocation of respiratory tract cartilage, and an abnormal protruded mass into the laryngotracheal lumen, which was thought to indicate hematoma around injured site, were defined as the specific findings of LTI.

**Results:** The specific findings of LTI were detected in two of the three patients, whose injured sites were lateral. The injured site of the other patient, in whom the specific findings were not detected by US, was posterior to the larynx. We could not detect the specific findings immediately after injury because of bulky emphysema. Repeat US showed these findings, despite the existence of emphysema, by mild compression of the probe.

**Conclusion:** We showed the usefulness of US for diagnosis of LTI, not as an "only" diagnostic tool but as one useful tool.

## It's a Long Way to the City

J Neilson, M Burrell, and S Rao

Trauma Registry, Royal Perth Hospital, Perth, WA, Australia

**Aim:** An epidemiologic view of trauma transfer to demonstrate the challenge of vast distances.

**Background:** Western Australia (WA) has an area of approximately 2.5 million square kilometres and occupies a third of the continent. Time to definitive treatment is prolonged due to the remoteness of some trauma locations.

**Methods:** The Trauma Registry prospectively collected data on all major trauma cases (ISS >15) admitted over 10 years. Patients were identified and categorised into eight health regions. Patients were excluded if their time of injury was unknown or if medical assistance was not obtained within 24 hours of injury.

### Results:

| Region                | Percentage of Patients | Median Time from Injury to RPH (hr) | Median ISS | Mortality (%) |
|-----------------------|------------------------|-------------------------------------|------------|---------------|
| Metropolitan (Perth)  | 54                     | 1.1 (0.17–144.5)                    | 25 (16–75) | 18            |
| Goldfields            | 5.7                    | 10.5 (4.7–61.7)                     | 26 (16–57) | 7.6           |
| Gt Southern           | 3.3                    | 8.0 (4.4–53.2)                      | 25 (16–66) | 9.5           |
| Kimberley             | 3.8                    | 19.9 (6.9–70.2)                     | 26 (16–66) | 2.4           |
| Midwest and Murchison | 3.4                    | 10.0 (4.5–89.9)                     | 25 (16–75) | 7.5           |
| Pilbara               | 6.6                    | 11.6 (7.2–106.9)                    | 25 (16–75) | 14.1          |
| Southwest             | 7.8                    | 7.7 (2.1–95.5)                      | 25 (16–75) | 6.3           |
| Wheatbelt             | 9.4                    | 6.3 (3.2–14.3)                      | 26 (16–75) | 12.6          |

RPH, Royal Perth Hospital; ISS, Injury Severity Score

**Conclusion:** Whilst it is evident that the remoteness of some WA areas results in prolonged transfer times, it would appear that the mortality rate for these patients is less than that of those from the metropolitan area. A possible explanation is that some unsalvageable patients survive to hospital in the metropolitan area, whereas rural self-selection occurs. Analysis of trauma outcome data should consider these groups as different subsets.

## Motorcycle Helmets and Cerebral Protection

J Nielson, M Burrell, and S Rao

Royal Perth Hospital, Perth, WA, Australia

**Aim:** To assess the pattern of injuries and the effectiveness of helmets in reducing head injuries in motorcycle crashes.

**Method:** Prospectively collected data from a trauma registry at a major trauma hospital over a 9-year period were analysed for helmet use, speed, head injuries, other injuries, length of stay in hospital, ICU stay, outcome, and the use of alcohol and drugs.

**Results:** 1,530 patients were identified as admissions resulting

from motorcycle crashes. Age and sex distribution are similar to statistics from other studies (median age, 27; 92% males). 272 patients had an ISS >15.

The number of intracranial lesions per patient (on CT scan) was more in patients without helmets. Furthermore, the severity grade (maximum AIS) for head injury was higher in patients without helmets.

Nineteen patients died as a result of injuries. Head injury alone was the cause of death in more than 50%. Overall mortality was higher in the group without helmets compared with those with helmets (2.7% vs 1.6%, respectively).

There was a strong association between the use of alcohol or drugs and noncompliance with helmet use. Twenty-four percent of those with recent consumption of alcohol did not use a helmet compared with 7% of others.

**Conclusions:** Nonuse of helmets by motorcyclists results in 1) higher risk of head injury, 2) increased number of lesions seen on CT scan, and 3) increased severity of head injury. Noncompliance with helmet use is more common in people who have recently consumed alcohol or drugs and in the country regions of WA.

## The Provision of Critical Care in a Field Hospital Environment: Iraq 2003

GR Nordmann,<sup>1</sup> JDR Henning,<sup>2</sup> and DJ Lockey<sup>3</sup>

<sup>1</sup>Specialist Registrar, Defence Medical Services, UK

<sup>2</sup>Consultant, Defence Medical Services, UK

<sup>3</sup>Consultant, Frenchay Hospital, Bristol, UK

The deployment of an intensive care unit with a forward British military field hospital to the conflict in Iraq in March 2003 is described. Initially two intensive care and two high-dependency beds were set up to support a 25-bed hospital. This capability was expanded to 10 beds after 7 days to support a 200-bed field hospital. Forty-seven patients were treated in the first month of hostilities: 11 coalition soldiers, 17 Iraqi prisoners of war, and 19 Iraqi civilians. Thirty-seven were adults and 10 were children. Forty-two (89%) were trauma patients, mostly conflict-related. Sixty-eight percent of patients were ventilated and mortality to discharge was 6%. Mean bed occupancy was five beds, and the mean duration of patient stay was 3.3 days. The capability of the hospital allowed for good respiratory and cardiovascular support with moderate laboratory backup. The major deficiencies were lack of provision for renal support, CT scanning capability, and paediatric equipment. The difficulties of the working environment included the problems of a desert climate, limited water supply, noise from generators and nearby explosions, the threat of chemical or biological attack, and the close proximity to the conflict. Many "critical incidents" occurred, including total power failure, extreme ambient temperatures, and gas attack alarms. Despite these challenges, the facility attempted to provide a standard of intensive care similar to UK practice.

## Assessment of Emergency Room at Namazi Hospital in Terms of Mortality of Trauma Patients in 1995

F Panahi<sup>1</sup> and HA Malek<sup>2</sup>

<sup>1</sup>Assistant Professor of General Surgery, Baghiatollah University, Tehran, Iran

<sup>2</sup>Professor of Vascular Surgery, Shiraz University of Medical Sciences, Iran

Trauma, a state of shock or injury, is the main cause of death over the world. Many injuries that are followed by any kind of trauma cannot be compensated for physical or financial effects. Trauma causes 50% of the mortality rate in 1- to 4-year-old children, and 55% of the mortality rate in 5- to 14-year-old people. This rate goes up to 80% among 15- to 24-year-old people.

Nemazi Hospital is a referral center in the south of Iran, where most injured people are transported. In this case, assessment of the emergency room is very important to promote services and caring. The mortality rate might be reduced if we changed some particular services.

There are several scoring systems that have special overview and approach. By using these systems, we can evaluate and assess the outcome of injury and victim and we can do it in hospital wards. The most considerable systems are Trauma Index (TI), Illness Injury Severity Index (IISI), Triage Index (TI), Trauma Score (TS), Revised Trauma Score (RTS), Abbreviated Injury Scale (AIS), Injury Severity Scoring (ISS), Therapeutic Intervention Scoring System (TRISS), and Major Trauma Outcome Study (MTOS).

The most considerable and responsible system is TRISS, which we used in this study by standard questionnaires.

We studied 200 injured people (28 women, 172 men). They were over 14 years old. They had been referred to the emergency room. This cross-sectional study lasted 2.5 months in 1995. The greatest number of injuries had been sustained in car accidents, and the main cause of injuries was blunt trauma in all age groups.

The mortality rate was 1 in 20 (5%) during this period of time, which showed that there was no significant difference between mortality rate of the emergency room in Nemazi Hospital and worldwide MTOS standards.

## Infective Gap Nonunion Vascularized Fibular Graft: An Effective Method of Treatment?

**N Prabhu Achuth, D Timilsina, and R Pai**

*Manipal College of Medical Sciences, Pokhara, Nepal*

Treatment of infective nonunion of long bones that do not heal after several conventional surgical trials is always a challenge. The bone gap adds to the problems.<sup>1,2</sup>

Free vascularized fibular grafting technology has been used routinely to reconstruct various bone and joint disorders.<sup>2</sup>

A vascularized bone tissue is advantageous over a nonvascular one, in terms of cellular survival and osteogenic activity. The rationale of the indication for vascularized bone grafting in poor quality recipient beds is that its survival does not depend on the recipient site's vascular or cellular quality.<sup>2</sup>

**Case Report:** A 20-year-old female presented with an infective nonunion of the right radius and ulna, with a gap of 8 cm in the ulna. She was treated with plating for open type 2 (Gustilo's) fracture of radius initially. She developed infection in both the fracture sites and 8 cm of ulna was resected in treating the infection.

She underwent replating with cancellous bone grafting for radius and vascularized fibular grafting with Rush nailing for the ulna. Both fractures united in 4 months with no evidence of infection. The patient regained good range of movements at the elbow, forearm, and wrist.

**Discussion:** Gap nonunion is a complex situation and is rare in the upper limb in comparison with the lower limb. The treatment options for the case available were single bone reconstruct, a ring external fixator with bone transport, or vascularized fibular grafting.<sup>3</sup> Vascularized fibular grafting was chosen for its advantageous biology and shorter duration of postoperative rehabilitation.<sup>2</sup>

### References

1. Dell PC, Sheppard JE. Vascularized bone grafts in the treatment of forearm nonunions. *J Hand Surg (Am)* 1984; 9(5):653.
2. Gonzalez del Pino J, et al. Free vascularized fibular grafts have a high union rate in atrophic nonunions. *Clin Orthop* 2004; Feb(419):38-45.
3. Arai K, et al. One-bone forearm formation using vascularized fibula graft in massive bone defects of the forearm with infection. *J Reconstr Microsurg* 2001; 17(3):151-5.

## Effects of Establishing a Trauma Center

**L Schagerlind, L Klarin, and P Örtenwall**

*Trauma and Emergency Surgery Unit, Department of Surgery and Transplantation, Sahlgrenska University Hospital, Institute of Surgical Sciences, The Sahlgrenska Academy at Göteborg University, Göteborg, Sweden*

**Introduction:** Göteborg is the second largest city in Sweden, with a population of about 500,000 inhabitants. Emergency health care for adults is provided by Sahlgrenska University Hospital with emergency departments at three different hospital facilities within the city. Since 2001, an increasing number of trauma patients were transported directly by the EMS to the largest facility, Sahlgrenska University Hospital/Sahlgrenska (SU/S), which has all the medical specialities required to be considered a Level 1 trauma center, according to the criteria established by American College of Surgeons (ACS).

**Aims:** To study the effects on trauma care during the introduction of a trauma center concept.

**Methods:** Data from all patients with an ISS >8 treated at the three different hospitals within Göteborg were collected prospectively during 2001-2003.

**Results:** The number of patients with major trauma increased at SU/S, resulting in a marked increase of utilisation of ICU resources at this hospital (days on ventilator support as well as length of stay). A corresponding decrease was noted at the other hospitals. The number of penetrating injuries as well as mortality increased during the study period.

**Conclusion:** An increase in numbers of patients with major trauma is directly reflected in the ICU. No clear-cut benefit regarding mortality could be noted.

## Trauma Rapid Sequence Intubation in a Scottish Emergency Department: Five-Year Trends

**J Simpson,<sup>1</sup> PT Munro,<sup>1</sup> and CA Graham<sup>1,2</sup>**

*<sup>1</sup>Emergency Department, Southern General Hospital, Glasgow, Scotland, UK*

*<sup>2</sup>A&E Medicine Academic Unit, Chinese University of Hong Kong, Hong Kong*

**Aim:** Airway management is a core aspect of trauma. Rapid sequence intubation (RSI) creates continuing debate between anaesthetists and emergency physicians in the UK, although similar complication rates for ED RSI have been shown for both specialties. This study examines prospectively collected data on every trauma RSI performed in a university hospital ED in Glasgow over 5 years.

**Methods:** Data were recorded prospectively for every attempted RSI in the ED on a dedicated proforma (same as used in previous studies) between January 1999 and December 2003. Immediate complications were specifically sought in the questionnaire, as was the immediate destination on leaving the ED. Chi-square test for categorical data.

**Results:** Mean of 24 trauma ED RSI were performed (range, 20-29). Emergency physician RSI for trauma increased from 32% in 1999 to 75% in 2003 ( $\chi^2=9.32$ ,  $df=1$ ,  $P=0.002$ ). Complication rates for emergency physician RSI decreased from 43% to 14% for trauma ( $\chi^2=2.55$ ,  $df=1$ ,  $P=0.11$ ), compared with a mean complication rate for anaesthetists for trauma RSI of 17%. The incidence of hypotension has decreased over time, but oxygen desaturation is now the commonest complication.

Patients more commonly go to CT following trauma ED RSI (79% v 42%;  $\chi^2=6.59$ ,  $df=1$ ,  $P=0.010$ ). There has been no observed increase in the proportion of admissions to the intensive care unit.

**Conclusion:** Emergency physician-performed RSI for trauma is increasingly common. There is no evidence of increasing intensive care admission rates when emergency physicians undertake trauma RSI. Effective preoxygenation should be emphasised during training.

## Interhospital Transfer Times in Paediatric Trauma

**SVS Soundappan, AJA Holland, DT Cass, G Farrow, and F Fahy**  
*The Children's Hospital at Westmead, Sydney, NSW, Australia*

**Aim:** After-hour arrival of most transferred patients led us to evaluate interhospital transfer of paediatric trauma patients.

**Methods:** Data relevant to interhospital transfers were analysed over a 1-year period from June 2003 at The Children's Hospital at Westmead.

**Results:** Of the 76 recruited cases since February 2004, majority were males ( $n=49$ , 64.5%). The mean age was 6.2 years ( $SD=4.5$  years) with a median of 5.0 years. In terms of severity, half ( $n=36$ ) of the sample scored 9 or above in the ISS. Complete information on the mode of transferral was recorded in only 33 cases: 15 were transferred by ambulance, 15 by a paediatric retrieval unit, and 3 by adult retrieval unit. Falls (12) were the commonest mechanism followed by motor vehicle injury (11) and burns (6). Comparison of medians by injury severity indicated no differences in all time variables, except the retrieval scene time, with the median time for the more severe group (0.42 hr) significantly longer than that of the less severe group (0.13 hr) ( $z=-2.47$ ,  $P=0.014$ ). There were statistically significant differences in the median retrieval time ( $z=-2.84$ ,  $P=0.004$ ) and the retrieval scene time ( $z=-4.28$ ,  $P<0.001$ ) between different modes of transfer, with transferral by ambulance having much reduced times for both. Average referring hospital time was 4.9 hours. One third of the patients needed operative intervention. There was one death, due to severe head injury.

**Conclusion:** The data analysed so far indicate there is scope for improvement in the transfer times of paediatric trauma patients.

## Aortic Injury Advancing Diagnostic Technique

**H Toyoda, T Kosuge, Y Moriwaki, K Takahashi, and M Sugiyama**  
*Critical Care and Emergency Center, Yokohama City University Medical Center,  
Minami-ku, Yokohama, Japan*

**Background:** Aortic injuries account for 16% of deaths in motor vehicle traumas. Mortality at the scene is 85%. In-hospital mortality is 30% to 40% in the first hour, but declines to 1% to 2% per hour in survivors after the first hour postadmission. With the increasing use of high-resolution diagnostic techniques, minimal aortic injuries are being recognized more frequently. Images obtained by an intravascular ultrasound (IVUS) catheter identified intimal and medial tears in the vessel wall that had not been detected by cineangiography. The intimal injury diagnosed by TEE or IVUS may be managed nonoperatively.

**Methods:** A patient suspected of blunt aortic injury by screening the chest radiograph and helical enhanced CT. IVUS imaging of the aorta was performed using a monorail IVUS catheter (6 Fr, 12.5 MHz) (Boston Scientific, Sonicath Ultra) in three patients with suspected aortic injury.

**Results:** Imaging of the aorta from ascending to descending was performed in patients in an average of 10 min. No complications occurred. The correct diagnosis is established by IVUS.

**Conclusion:** IVUS is a technically feasible and safe procedure that can effectively relieve the symptoms. IVUS imaging appears to be a promising new technique for evaluating the gross and minimal events that occur in the vessel wall. IVUS is still in a research phase, but it might play a role in dealing with equivocal CT or angiographic results.

## Reduced Time on the Spinal Board: Effect of Guidelines and Education for Emergency Department Staff

**JHH Yeung, NK Cheung, CA Graham, and TH Rainer**  
*Accident & Emergency Medicine Academic Unit,  
Chinese University of Hong Kong, Trauma & Emergency Centre,  
Prince of Wales Hospital, Shatin, NT, Hong Kong*

**Aim:** Prehospital spinal immobilisation is usually accomplished with a spinal board. Prolonged immobilisation on spinal boards in the emergency department (ED) can be detrimental. This study aimed to reduce the time spent by patients on spinal boards using a staff education program.

**Methods:** Prospective observational study in a trauma centre ED seeing 200,000 attendances/year. Length of time immobilised on spinal board was recorded prospectively by the trauma nurse coordinator. Guidelines on removal of spinal boards were issued after recording period 1 (January to June 2001) and reinforced by several training sessions. Post-training period (period 2) extended from May to October 2003. Patients were excluded from analysis if they were not immobilised on a spinal board or if they had incomplete data for any reason. Medians were compared using Mann-Whitney U test, as data were nonparametric; chi-squared test for categorical data.

**Results:** There were 122 eligible patients in period 1 and 104 eligible patients in period 2. Median time to removal from the spinal board was reduced from 50 minutes to 31.5 minutes (Mann Whitney U test,  $P<0.0001$ , 95% CI for difference in medians, 13–29 minutes). In period 1, 36% (44/122) were removed from the spinal board before leaving the ED, compared with 75% (78/104) in period 2 ( $P<0.0001$ , chi-square test).

**Conclusion:** The introduction of guidelines, reinforced by ED staff education, can significantly reduce the time spent on a spinal board following trauma. It can also increase the proportion of patients who can be removed from the board before leaving the ED.

## GP-Staffed Commercial Helicopter Response in Southern Rural Switzerland: Flexibility and Advantages

**G Zen Ruffinen and P Schoettler**  
*Swiss Air Ambulance, Flugbasen, Zürich, Switzerland  
Department of Anesthesiology and Department of Emergency Medicine,  
University Hospital, Lausanne, Switzerland*

Southern Switzerland is an area of 3600 km<sup>2</sup>, where variations of terrain (altitude variation between 500 and 4800 m above sea level) and population (270,000 to 600,000 in the winter time) call for modularity of the prehospital rescue system.

Air Glacier is a commercial company with one dedicated GP-staffed search and rescue (SAR) helicopter with additional conversion from non-SAR helicopters into rescue units.

Our aim is to describe this unique concept that offers flexibility and efficiency to meet the specific requirements.

**Method:** Retrospective analysis of SAR missions in southern Switzerland during the years 2000 to 2002. Data about time intervals, seasonal variations, reason for helicopter dispatch, and major treatment were collected.

**Results:** During the study period, the dispatch called for 3,147 SAR missions. Forty-five percent of SAR helicopters were dispatched within 5 minutes. Twenty-two percent of commercial helicopters needed 10 minutes to be transformed for SAR and 23% helicopters needed more than 10 minutes for this transformation. Seventy-two percent of the missions were done during the months of January to April of each year.

Rescue helicopter dispatch was motivated by minor trauma to the extremities (47%), minor head injuries (11%), back injuries (11%), resuscitations (5%), and difficult access calling for winch operations (20%). Major analgesia was necessary in 23%; intubation was performed in 2%.

**Conclusion:** The use of a flexible GP-staffed commercial helicopter system allows quick emergency response. It is therefore best suited for our specific requirements.

## 1st World Forum of Rescue, Removal, and Treatment of Victims of Trauma

**Foz do Iguassu, Paraná, Brasil  
August 16-21, 2005**

**Topics:**

- Strategies for Response to Auto, Industrial, Marine Incidents
- Simulation Training in Specialized Rescues
- Ethical Concerns in Emergency Medicine
- Preparedness for Mass Casualty Incidents

*Audience: physicians, nurses, paramedics, firefighters, safety engineers, pilots, hospital administrators, representatives of petroleum/chemical industries.*

[www.worldforumrescue.com](http://www.worldforumrescue.com)

## Aviation Medicine Courses at Otago University, New Zealand



Enrollment is now open for the following 2005 courses:

- Aeromedical Evacuation
- Aviation Medicine
- Occupational Medicine

Internationally recognized courses are offered at the following levels:

Certificate ..... 1 year, part time  
 Diploma ..... 8 months, part time  
 Masters Degree in Health Sciences ..... 4 years, part time  
 PhD ..... 5 years, part time; 3 years, full time

All of our courses are distance taught and therefore can be taken in any country in the world.

Additional information:

[www.otago.ac.nz/aviation\\_medicine](http://www.otago.ac.nz/aviation_medicine)

**Maureen Gordon, Programme Manager**

+64-4-3855590, [deptmed@wnmeds.ac.nz](mailto:deptmed@wnmeds.ac.nz)

**Dr. Robin Griffith, Academic Programme Coordinator**

+64-21-620-620148, [rgriffiths@wnmeds.ac.nz](mailto:rgriffiths@wnmeds.ac.nz)

Wellington School of Medicine

University of Otago, PO Box 7343, Wellington, New Zealand