TRAufMA CARE

Trauma care—a vision for the future

For want of trauma surgery as a specialty in the UK, the management of major trauma has come to be seen as the responsibility of specialists in accident and emergency (A&E) medicine. The management of major trauma primarily involves trainees than another aspect of the specialty. Consultants all over the country struggle to establish multidisciplinary “trauma teams” and the competition for Advanced Trauma Life Support (ATLS) course places leads to long waiting lists. Yet despite all this interest and activity, the management of the victim of trauma remains suboptimal in many hospitals.

Perhaps the main reason for this is lack of communication between specialties. We have all sat in coffee rooms at antisezial hours and bemoaned the attitude of one or other specialty regarding their response to a particular patient. Yet in many centres, and indeed nationally, there is no culture of specialists training together, learning together, and working together as equals to improve the outcome for trauma patients. It is very easy for specialties, even those in their own specialty, to contribute to suboptimal overall management when working together.

Apart from promoting the best evidence based resuscitation, A&E specialists are ideally placed to promote integrated trauma care. As we have all realised, the optimal management of a patient is more than the optimal management of a patient’s individual injuries. The organisation “Trauma Care” was founded in 1996 to promote just such integrated trauma care. After a successful launch conference in Harrogate in 1997, which was designed to promote the philosophy of integrated, multidisciplinary care, the organisation has grown and now represents all the medical specialties involved in trauma care as well as members of specialties allied to medicine such as nurses, paramedics, and scientists.

The abstracts published below are from our most recent conference in Bournemouth. Four hundred delegates attended and the conference was designed to encourage doctors, nurses, and paramedics to participate. The organisation continues to work towards establishing and promoting multisciplinary, multidisciplinary evidence based best practice.

The review journal Trauma was launched successfully in 1998 and, in 2000, Trauma Care expert working groups will issue evidence based guidelines for best practice in a number of clinical areas. Also in 2000, the conference Trauma 2000 will see the launch of a new manual of trauma care based on the best of European practice.

Trauma Care is currently the only organisation working in the field of trauma that truly represents all specialties and disciplines, and we are delighted that interest in setting up a similar body has been expressed by leading trauma clinicians in a number of other countries. Our sister organisation Trauma Care (South Africa) is currently being established.

In the UK, we intend to develop a wide range of initiatives including educational projects and the promotion of research and best practice. Our research and development committee has recently been formed. We will in due course be moving from a committee based organisation to an open membership with Trauma as our society journal.

May I encourage you to join us in London for Trauma 2000, and to contribute to Trauma Care. The future of this organisation is bright, and the opportunities great but in order to work towards the best possible outcome for trauma victims in this country and abroad, we need your support. If you would like more information about the London conference, please contact the Conference Secretariat at Index Communications Meetings Services, Crown House, 28 Winchester Road, Romsey, Hampshire SO51 8AA.

IAN GREAVES
Consultant in Emergency Medicine, British Army, Accident and Emergency Department, Poole Hospital, Dorset, BH12 3SW

ABSTRACTS

2nd Trauma Care Conference: Improving Trauma Care, Bournemouth, 7–9 June 1999

Oral presentations

Amputations at the Royal London Hospital 1852–57
E Chaloner
Leonard Cheshire Department of Conflict Recovery, University College, London

A retrospective analysis of amputations from the archive records of the Royal London Hospital, Whitechapel.

During the period studied, amputations accounted for 34% (142/400) of all operations performed in the hospital. There were 44 upper limb (25 above and 19 below elbow) and 98 lower limb amputations (51 above and 47 below knee) on 121 males (mean age 29 years; range 1–60) and 15 females with a mean age of 31 years (range 2–75). Six men had bilateral lower limb amputations.

Trauma accounted for 35 arm and 50 leg amputations (60% of the total). Industrial accidents caused 27 out of 72 incidents where the cause of accident was known. Sailors, labourers, and railway workers were especially prone to falling victim to accidents requiring amputation.

The overall mortality was approximately 50% (61 deaths, 69 survivors, six unknown). Of the lower limb amputations carried out for trauma, 34 patients died and 16 survived. Of the upper limb amputations, eight died and 28 survived.

The cause of death (where recorded) was commonly shock (11 cases) or sepsis (32 cases). Chloroform was used in 30 of 136 cases. The mortality where chloroform was used for trauma cases was higher (11 deaths out of 17 cases) than in trauma cases where it was not used (23 deaths from 53 cases).

The above data illustrate the high mortality of amputation in the 19th century. Compared with other contemporary military and civilian figures the mortality is quite high, especially the combination of chloroform and trauma. This may reflect the poor nutritional state of patients in the East End or the effects of anaesthetising patients who were inadquately resuscitated.

The lived experience of resuscitation for accident and emergency nurses
C Williams
Accident and Emergency, West Wales General Hospital, Carmarthenshire

A phenomenological method was used to document the lived experience of resuscitation for accident and emergency nurses. Twelve nurses were purposefully selected after taking part in a resuscitation. Data was collected from two unstructured interviews with each participant, and then analysed using Colaizzi’s (1978) methodology. Findings were written into an exhaustive description of the lived experience, and then returned to the participants for validation.

Recommendations were made to improve organisational factors within resuscitations, increase education for staff in the care of bereaved relatives, and to encourage and sustain the informal social support system already in place.

Emergency management of toxic trauma
D Baker
SAMU 75, Paris, France

Toxic trauma may be defined as the effects on casualties after the accidental or deliberate release of toxic substances. Such a release may occur in both peaceful or war situations. Such environments require a new approach to the rescuers that have been trained in conventional methods of trauma care. The technical problems of resuscitation in toxic trauma are different from those in conventional trauma. The immediate and subsequent effects of toxic substances on the patient are complex and the patient’s response to therapy unpredictable. Serum and other laboratory tests are usually not available due to a lack of equipment in such situations. Our study involved 11 cases of toxic trauma in which we were able to perform emergency management. These cases involved the use of advanced life support equipment in a toxic environment. The possibility of providing advanced life support in a toxic environment is bright, but new equipment and training are required. The technical and practicalities of the use of advanced life support equipment in a toxic zone will be presented within the framework.
of the United Nations hazardous materials convention (HAZMAT).

Accident and emergency nurses' perceptions of the effect of trauma training in clinical practice

1. Introduction

Accident and Emergency, West Wales General Hospital, Carmarthenshire

An exploratory descriptive design was used to explore the perceptions of the effect of trauma training. Twelve accident and emergency (A&E) nurses were purposefully selected from an Accident and Emergency (A&E) department comprising 44 qualified staff. A critical incident technique incorporating semistructured interviews was used to collect data, which was then analysed using content analysis. Four categories emerged: knowledge and skills, perceptions of "self" in the trauma room, promotion of teamwork, and emergence of the trauma trained nurse.

Trauma resuscitation was described as a stressful event that engendered feelings of being overwhelmed. Training was perceived to have increased knowledge, skills and confidence levels, contributing to improvements in injury recognition and effective communication. Skills and perceptions of an ability to positively influence patient care and outcome were associated with these findings. Occasional feelings of frustration were caused by failure to follow a systematic approach and perceptions of physician failure to act on concerns expressed by the nurse. Effective role performance and teamwork were seen as a result of undertaking a joint training programme. In the initial stages, the emergence of trauma trained nurses caused feelings of inadequacy among those nurses who had not yet been trained. This resulted in a degree of staff conflict which diminished as more nurses became trauma trained and visible benefits were observed.

Recommendations are made that nurses involved in trauma care should be educated following the universally recognised protocols of the Advanced Trauma Life Support and that they should participate in joint learning programmes.

Expertise in trauma care? Get it recognised

V A Heath
University of Plymouth, Faculty of Human Sciences, Institute of Health Studies

One of the outcomes of successful trauma care is the recognition of clinical expertise. Expertise in practice is, however, very much a shared multi/interdisciplinary outcome. So what of the individual trauma nurse who plays a specific, but essential role. How does that individual gain recognition on an individual basis? Certainly one's self esteem elevates considerably, but how can one gain recognition that will support you in your aim to provide evidence for your own personal and professional development purposes?

The flexibility offered through Accreditation of Prior (Experiential) Learning (AP(EL)) encourages both professional and personal growth through presentation of clinical evidence of value. This is clearly a critical factor at a time when declining resources (particularly that of time), present practitioners and employers with considerable difficulties in providing opportunities for professional development. The opportunity for those nurses who consider that practical expertise in trauma care will be recognised as equal to academic award by the employer and the provider of nurse education can only auger well for all.

The way forward for your clinical expertise to be recognised? AP(EL).

Are blood samples obtained from bone marrow useful for blood analysis?

J Hurren
Wissets Regional Burns Unit, Salisbury

Introduction—Under circumstances of vascular collapse intraosseous cannulation provides an important second line access to the circulation for resuscitation in children. It would clearly be desirable if intraosseous cannulation placed blood could be drawn off for haematological and biochemical analysis. The aim of this study was to investigate the potential of bone marrow and peripheral venous blood samples for analysis.

Method—Fourteen adult patients undergoing routine bone marrow aspiration as a haematological investigation were investigated. Ethical committee approval and patient consent was obtained. To assess the value of bone marrow samples, each sample was compared with two blood samples taken from a peripheral vein by routine laboratory analysis.

Results—Haemoglobin, sodium, urea, creatinine, glucose, and calcium concentrations were found to be similar in samples from the bone marrow and peripheral venous blood. Observed differences were so small they would be unlikely to be of clinical consequence. The value for potassium was consistently higher in bone marrow samples compared with peripheral venous blood. However, the 95% confidence interval was +0.002 to 0.510 mmol/l. This difference is sufficiently small so as to still give a clinically useful indication of the true serum potassium concentration. The values for white cell count and platelet count were very different between bone marrow and peripheral venous samples. Two of the aspirated samples were very fatty and unsuitable for analysis.

Conclusion—This study suggests that blood samples taken from the bone marrow can be analysed for potassium and clinically useful marrow concentrations of the principal blood and serum parameters that are required in the initial stages of resuscitation.

Delayed diagnosis of odontoid peg fractures

N Ashwood, J Parfait, P Hallam, J Goodall
Central Middlesex Hospital, London

Odontoid peg fractures generally occur during high energy injuries in association with head injuries and it is estimated that 40% of these fractures are missed in the early post-injury period. Our experience identifies a large subgroup of patients who sustained the same fracture after minor trauma and in whom the diagnosis is often delayed.

We prospectively identified 12 patients presenting to the accident and emergency (A&E) department at our institution with a final diagnosis of odontoid peg fracture. There were seven patients who had initially been diagnosed with minor injuries to the neck, four after assaults and the remaining three from falls from less than one metre. All seven reattended at least 1.3 weeks after their injury. Three via the radiology department after radiography organised by the general practitioner and four via the A&E department. Clinically the patients noted continuing neck pain and limited range of motion. Two had significant cervical kyphosis in two cases, but no patients in the series had neurological impairment. Treatment involved surgical stabilisation in two cases with transpedicular screws, three were managed in halo braces for 4–6 weeks, and the remainder were treated conservatively. We contacted 20 A&E consultants, 12 (60%) of whom reported a missed odontoid peg fracture in their department within the last year.

In conclusion, a high index of suspicion is necessary to diagnose odontoid fractures. The mechanism of injury can be trivial, historical, and presentation delayed.

Day surgery hand trauma: preliminary experience at the Queen Victoria Hospital

J Garner, F Schonauer, J Pereira, M Pickford
Queen Victoria Hospital, East Grinstead, West Sussex

Trauma is now responsible for 40% of the workload carried out by the plastic surgery department and the vast majority of trauma cases are being performed on an outpatient basis. This is a complex and requires admission and inpatient treatment, but a sizeable proportion of these injuries can be reasonably managed on an outpatient basis. In order to utilise resources more efficiently and provide a better service for patients, we introduced a system whereby appropriate hand injuries were managed on a day case basis. This study was designed to assess the impact of this system.

The case notes of the first 66 hand trauma patients managed as outpatients at the Day Surgery Unit between November 1998 and January 1999 were retrospectively reviewed with emphasis on type of injury, surgery performed, and clinical outcome.

The commonest procedures performed were isolated digital nerve repair (13/66) and repair of the flexor digitorum profundus tendon (9/66). Regional or local anaesthetic techniques were used in 64 patients. Two patients required general anaesthetic. No patients required admission to hospital.

The introduction of a day surgery hand trauma service offers several potential benefits for both patients and the hospital. The patients receive their treatment in a timely manner with early involvement of the hand therapists. Inpatient beds are used more effectively for elective surgery cases. Moreover this system has enabled consultant supervision of the majority of hand trauma surgery.

Perioperative blood transfusion in femoral neck fractures—too much transfusion?

O Oudemala, C Ayekoloye, G Packer
Southend Hospital NHS Trust, Essex

Objective—To identify factors that determine blood transfusion and analyse if they were appropriately transfused, based on the guidelines of the American College of Physicians (ACP).

Methods—A prospective longitudinal study of 110 consecutive patients operated on for fractured neck of femur. Patients were assessed for the risk of myocardial or cerebral ischaemia as outlined by the ACP guidelines. Weighing swabs and measuring the drainage volume in the suction apparatus assessed operative blood loss.

Results—The study population comprised of 20 men and 90 women; mean (SD) age was 81.6 (12.3) years. Over one third of patients (34.5%) had blood transfusion. Significant variables associated with blood transfusion were the preoperative haemoglobin, postoperative haemoglobin, and postoperative blood
loss (p<0.05). Patients at risk and American Society of Anaesthesiologists (ASA) class III and IV patients were given more blood but it was not statistically significant (p=0.05).

The 388 patients were transfused with a total of 92 units of homologous SAM-M blood of which 56 units (63%) were inappropriate. Seventeen units (18%) were given perioperatively and haemodynamically stable patients and 39 units (45%) transfused in asymptomatic patients to achieve a haemoglobin concentration of 100 g/l (10 g%). High risk patients, patients in ASA classes III and IV, and blood loss were significantly higher in appropriately transfused patients. (p<0.05). The preoperative and postoperative haemoglobin and mortality were similar in both groups (p>0.05).

Conclusion—There is need to review blood transfusion practices and the emphasis on haemoglobin concentrations discouraged. The ACP guidelines will reduce unnecessary transfusions.

Sensory neuropeptide in orthopaedic patients
G N Onuoha, E K Alpar
University of Birmingham

An intact nociceptor system of primary afferent sensory nerves is important for the induction of the inflammatory process and successful tissue repair. Dysfunction of this system with accident or trauma could be a contributing factor for the delayed wound healing in orthopaedic patients. The ability of the sensory peptides in modulating wound healing is known by taking into account the modulatory interaction effects between the peptides. This study was designed to examine the release mechanism of these wound modulatory peptides in patients with long bone fractures. We have measured the peripheral plasma concentrations of sensory regulatory peptides (calcitonin gene related peptide (CGRP) and substance P) immunoreactivity in orthopaedic patients (mean age 70, range 20–90 years, n=18) within two days of injury and compared with healthy control subjects (mean age 39.2, range 17–91 years, n=17). Neuropeptides were measured by enzyme immunoassay while elastase, creatine kinase, and myoglobin were measured by ELISA techniques.

Mean (SD) ng of CGRP was higher in patients both in day 1 (309.7 (195.6)) and day 2 (184.4 (161.2)) compared with controls (65.8 (26.9)); p<0.05. Substance P also increased in the patients (day 1, 63.9 (43.8); day 2, 47.0 (7.2)) compared with controls (8.1 (4.0)); p<0.05. Furthermore, elastase (a predictor of post-traumatic complication), was examined and found to be higher in patients in both days of injury (day 1, 192.6 (126.3); day 2, 169 (140.0)) than controls (95.8 (32.6)) but the different in release within groups was not significant. Myofibrillar proteins were accordingly higher in patients than the control subjects; however the release of the proteins were higher in the second day of the study than the day of admission.

This study shows that sensory nerve peptides are increased and increased fracture-related injuries, an increased level that is maintained 24 hours after hospital admission. In comparison with healthy controls this study also suggests that the release mechanism of substance P is slightly higher than CGRP in the peripheral circulation of these orthopaedic patients. However the clearance rate of the two peptides from the circulation were about the same. This release mechanism could be of significant in the inflammatory and healing processes observed in this group of patients.

The pre-burns unit management of the burnt patient
H Ashworth and T Cubison
Queen Victoria Hospital, East Grinstead, West Sussex

Objectives—To review the accuracy of burn percentage assessment in the casualty department, the adequacy of fluid resuscitation and analgesia, and to transfer to a specialist burns unit and the transfer documentation.

Method—A retrospective analysis of the notes of all the UK patients admitted to the burns unit between January 1998 and July 1998, who had a body surface area (BSA) burn of over 15% in adults or 10% in children.

Results—There were 14 patients, seven adults and seven children; seven were male and seven female and the average burn size was 26% (SD 12%). Six patients had their burn underestimated by average of 8.25% BSA, seven patients were overestimated by an average of 8.5% BSA. Twelve patients had intravenous fluids. In six patients the formula used was documented, but only in three was it used correctly. The fluid volumes given and urine output were poorly documented. Twelve patients received opiates, one by infusion, seven with intravenous boluses, three intra-muscularly, and one orally.

The average time to the burns unit from the burn was 11.6 hours, to the referring hospital 8.3 hours, and the average time taken for resuscitation and transfer was 4.5 hours. Nine patients had letters of referral either as a letter or simply a burn proforma.

Conclusions—There is considerable variation in the standard of initial burn management and there may be a role for a new burn proforma to improve transfer documentation and provide an immediate source of reference.

Diagnosis and management of acute compartment syndromes: a two year review of one hospital's experience
W J Hart, N Reynolds
Frenchay Hospital, Bristol

We reviewed 60 patients with compartment syndrome treated at Frenchay Hospital over a two year period. Our outcome was the mechanism of injury, fracture patterns, demographic details, and onset of symptoms. We go on to review the method of diagnosis, the use of intra-compartmental monitoring, and the placement of fasciotomy incisions. In the postoperative period we look at techniques for reconstruction and direct closure. All patients have had at least 12 months of follow up and assessment of functional outcome. The paper concludes by looking at the incidence of compartment syndrome with respect to fracture location, the age of the patient, and the mechanism of injury.

An analgesic protocol for military and civilian disaster relief operations
G Hocking, W F DeMello*
Royal Devon and Exeter Hospital, Exeter, Devon and *Ponfret Hospital General Infirmary, Ponfret, Yorkshire

We previously designed an analgesic protocol to improve the efficacy and safety of opioid based analgesia for the injured serviceman in the absence of medical expertise. We now present an advanced version of the analgesia protocol for use both in military and civilian disaster relief operations (fig 1, see next page).

Our aim was to provide the maximum analgesic benefit for the maximum number of patients using the minimum drugs and personnel. Therefore we considered factors such as drug availability, expertise of the personnel, logistic constraints, and the aetiology and chronological evolution of the pain. Analgesia is only administered to those patients who have cardiorespiratory stability, are alert, and tenderly responsive, and say they are in pain. If the cause of the pain is known the treatment is based on the VAS and its trends. The analgesic ladder has three choices ranging from enteral non-opioid drugs to intravenous opioids. Non-steroidal anti-inflammatory drugs are considered if cardiorespiratory stability is attained. Antiemetics and antiemetic rotation is also included. Our choice of drugs are based on those available to British forces in Bosnia; however alternative drugs could equally be used using the same algorithmic protocol.

We feel that this protocol offers a framework for the safe administration of analgesia to patients in pain in either military or civilian disaster relief operations.

Management of isolated sternal fractures
J R Sadaba, D Oswal, C M Munsch
Yorkshire Heart Centre, Leeds General Infirmary, Leeds

Objectives—To determine the risk of blunt cardiac injury in isolated sternal fractures.

Method—(1) Review of hospital records of 37 consecutive patients admitted to a cardiothoracic unit, with the diagnosis of isolated sternal fracture, from April 1995 to March 1997 and those of the six patients admitted with the same diagnosis, between September 1997 and September 1998. (2) Analysis of questionnaires sent to 27 cardiothoracic units in the UK on the management of isolated sternal fractures.

Results—(1) Electrocardiography (ECG) was performed in all 37 patients and showed no abnormality in 26. Twenty nine patients underwent echocardiography, which failed to demonstrate significant effusion in all cases. Out of 10 patients who had creatinine kinase levels tested, five had values above 140 IU/l. Only one patient developed a complication in the form of atrial fibrillation. Based on recent reports and on our findings we introduced new guidelines for the management of isolated sternal fracture by which patients presenting with this condition, who are otherwise fit and well and who have normal ECG and chest radiography, are discharged home. After this, only six patients with isolated sternal fracture were admitted over a 12 month period. (2) Management of isolated sternal fractures in cardiothoracic units in the UK is quite heterogeneous.

Conclusion—Patients presenting with isolated sternal fracture and who are otherwise fit and well can be safely discharged home providing that chest radiography and ECG show no abnormality. Careful implementation of this policy has reduced unnecessary burdens in an already busy cardiothoracic surgical unit.
Use of audit improve to accident and emergency senior house officers’ assessment of functional anatomy of the hand
H Guly, D Boon, P Riou
Accident and Emergency Department, Frenchay Hospital, Bristol

Objectives—It was felt that new senior house officers (SHOs) in accident and emergency (A&E) are poor in their assessment of hand anatomy and function. This audit was undertaken to assess this level of knowledge and to reassess after intervention in the form of a tutorial.

Method—Two investigators evaluated 32 A&E SHOs from emergency departments in the South West region using a 30 point questionnaire on anatomy and function of the hand. Standards were set such that 22 points were considered as essential knowledge. The other eight were considered minor and were given less weighting. They were then given a tutorial with an opportunity to demonstrate their new learnt skills. They were re-examined towards the end of their posts to audit retention of knowledge.

Results—Preaudit confirmed poor performance. Mean score for the total of major and minor points was 17.7. After intervention these scores improved dramatically showing that the tutorial was successful and that knowledge was retained. Mean score after intervention was 24.5 (p<0.01). Apart from one all made an improvement. For the major points mean score before intervention was 14.6 and after was 19.3 (p<0.05).

Conclusion—Examination of the hand by SHOs in A&E is poor but with appropriate tuition this can be improved significantly.

Integration with host nation medical facilities: an evolution in military contingencies medicine
D Blake, T Burge
1st Medical Group, Langley AFB, Virginia, USA

The transition of military contingencies to small theatre conflicts has necessitated the simultaneous evolution of military contingency medical support. Medical assets now need to be more compact, more rapidly mobilised, and more adapted to the specific theatre of operations. Recently, medical teams from the United States and the UK were mobilised in support of Operation Desert Fox/Bolton. These teams were comprised of surgeons, anaesthetists, nurses and technicians, as well as necessary administrative support personnel. This coalition medical team was stationed at a host nation, 260 bed tertiary care facility. The mission of this team was to integrate directly with the staff of this facility and develop an operational plan to support coalition military action in the Kuwait theatre of operations. The goal of this endeavour was then to establish a possible contingency facility for use in the event of future military action in this theatre. We present our assessment of this integration, and discuss briefly its impact on overall future military operations.

Effects of surgery on plasma natriuretic peptides release in orthopaedic patients
G N Onuoha, E K Alpar
University of Birmingham

Atrial stretch results in myocyte release of the atrial natriuretic factor (1–126) and alpha atrial natriuretic peptide 1–28 (aANP). The N terminal (1–30) fragment, proatrial natriuretic peptide (proANP) is release on an equimolar basis with the C terminal (99–126) active

Figure 1 Analgesic protocol (see Hocking and Demello on previous page).
Involvement of a UK regional cardiothoracic unit in cardiothoracic trauma care
Cardiothoracic Unit, Queen Elizabeth Hospital, Birmingham and *Multiple Injuries Unit, Selly Oak Hospital
The University Hospital Birmingham Trust has an accident and emergency unit and multiple injuries unit at Selly Oak Hospital and a cardiothoracic unit at the Queen Elizabeth Hospital, which are two miles apart. This is a retrospective review of 23 months (1 April 1997 to 28 February 1999) involvement of the cardiothoracic unit with in trust cardiothoracic trauma referrals (and two out of trust). The cardiothoracic unit runs a trauma registry on a PATS computer database of referrals and interventions. The database records patient details, consultation details, nature of injuries, cardiothoracic interventions, and outcome.
Results—There were a total of 43 patients reviewed; 33 (76.6%) were male. The mean age was 35.3 years. There were seven (16.3%) iatrogenic injuries, 17 (39.5%) road traffic accidents, seven (16.3%) penetrating injuries, 23 (53.5%) with blunt trauma, 33 (76.6%) had a diagnosis of a major surgical condition and 14 (33.3%) had emergency operative interventions, 17 (39.5%) intercostal drains, and 11 (25.5%) deaths.
Summary—This is a review of an imperfect but typical UK practice as the cardiothoracic unit is the site from which the patient is transferred to the trauma unit. These data suggest that with an almost 50% operative interventions rate versus only a 40% intercostal drain insertion rate that the cardiothoracic unit could have a larger involvement in cardiothoracic trauma care within the trust. In the future the trauma registry data should be collected with a view to an integrated trauma registry with the trauma unit. The relative high incidence of iatrogenic trauma is a reflection of the Queen Elizabeth Hospital’s specialist services which perform a high rate of great vessel intravascular access.

Revised Glasgow coma scale
J Batchelor, A McGuinness, J Ryan
Department of Accident and Emergency and Trauma Unit, Royal Infirmary of Edinburgh
Objectives—The aim of the study was to identify some of the weaknesses in the adult Glasgow coma scale (GCS) with a view to developing a modified coma scale.
Method—To address some of the weaknesses in the GCS. (A) The GCS does not accurately define the clinical state of patients with a GCS of 15 and hence is a poor discriminator of patients with so called “minor head injuries”.
(B) The GCS was designed as a linear analogue scale, however because the scale begins at 3 and not 1 the definition of zero is unclear. (C) The GCS more correctly describes a conscious scale and not a coma scale.

Revised GCS

- Uses the same three components as in the conventional GCS.
- Linear scale from 1–5.
- Score 1: Head injury with concussion symptoms.
- Score 2: Head injury with persistent vomiting.
- Scores 3–5: The same as the conventional scale but in reverse order.

Conclusion—The revised adult GCS provides an alternative linear analogue approach to the assessment of patients with head injuries.
Pre-hospital training courses—time to stop teaching chest drain insertion?
R Steyn, C Cheseeman
West Midlands CARE Team, Selly Oak Hospital, Birmingham

Background—Chest injuries are the primary cause in 25% of trauma deaths and are implicated in an additional 25%. Of these 25% may be preventable. Trauma teaching emphasises the importance of the “golden hour” which starts from the time of injury. Pre-hospital training teach chest drain insertion. Chest drain insertion is an important cause of iatrogenic chest injury in hospital. Pre-hospital insertion in less than ideal circumstances is even more difficult and has a greater risk.

Method—The West Midlands CARE Team comprises doctors and nurses specially trained and equipped for pre-hospital care and are tasked by the ambulance service to attend the more serious incidents. Most of the doctors hold the Diploma in Immediate Medical Care and all are well versed in chest drain insertion. All patients treated by the West Midlands CARE Team between 1 September 1995 and 31 October 1997 were reviewed.

Results—1356 patients were treated (road traffic accident 461 (34%), other trauma 353 (26%), sepsis 542 (40%)). Thirty had chest injuries (11 penetrating, 19 blunt trauma). Eleven needle thoracotomies were performed. No patients required pre-hospital intercostal drainage. Pneumothoraces were present in seven with blunt trauma, one had a tension pneumothorax.

Conclusion—Intercostal drainage is infrequently required pre-hospital. Most doctors attending pre-hospital training courses have rarely inserted chest drains and hence are unlikely to retain the skills required. Doctors with appropriate experience should not be restricted in inserting chest drains pre-hospital, but intercostal drainage should not be a routine component of basic level pre-hospital training courses.

The StRUS Project—towards a determination of which weapons cause “superfluous injuries unnecessary suffering”
S J Mannion, Robin M Coupland
International Committee of the Red Cross, Geneva

The 1977 protocol I addition to the Geneva Conventions specifies that “it is prohibited to employ weapons, projectiles and materials of warfare of a nature to cause superfluous injury and unnecessary suffering”. Although the use of such weapons has long been illegal under international law, there has been no widely accepted definition of what constitutes “superfluous injury and unnecessary suffering”. The StRUS project is an attempt to bring objective measurement into this above concept, using the scientifically measurable injuries caused by legitimate weapons as a baseline. The data for this baseline were derived from the database of real trauma courses teach chest drain insertion. The of the Red Cross (ICRC), which documents the wounds of over 28 000 war injured victims. In order to determine the collective effects of convention violations, the database was analyzed looking specifically at the parameters of mortality, proportion of large wounds (ICRC classification), duration of hospital stay, number of operations required, transfusion requirements, central compared with peripheral injuries, and permanent disability in survivors.

By reference to the baseline defined above four objective criteria are proposed in an attempt to define a weapon that causes “superfluous injury and unnecessary suffering”. If the weapon results in:

1. Specific disease, specific abnormal physical or psychological state, specific and permanent disability or disfigurement.
2. Field mortality of more than 25% and hospital mortality of more than 5%.
3. Grade 3 wounds as measured by the Red Cross wound classification system.
4. Effects for which there is no recognised and proved treatment.

The medical and related professions have a unique responsibility for the treatment of the victims of war. The StRUS project does not purport to make a moral judgment relating to the use of weapons in war but does attempt to establish objective criteria upon which weapon systems can be judged and then international law applied.

Evaluation of border crossing helicopter trauma care
P Groenendijk, S Rödel, A van Walsum, P Vierhout
Department of Surgery, Medical Spectrum Twente, Enschede, The Netherlands

Since 1985 there has been cooperation between two German trauma centres and our hospital in the Netherlands concerning the emergency treatment of trauma patients. An area of 7850 km² is covered by a border crossing system of helicopter trauma care.

Every year approximately 1000 flights are carried out by a German helicopter service. After triage at the accident scene approximately 100 patients are transported to one of the three hospitals by helicopter. We evaluated the admitted in our hospital in the years 1995, 1996, and 1997.

There were 56 patients, 40 male and 16 female, with a mean age of 31 years (range 4–64). Cause of trauma was a traffic accident in 46 patients, a fall from height in seven, a sports injury in three, and a suicide attempt by gunshot in one patient. All patients were stabilised by an emergency physician at scene. Fifty three patients were intubated and ventilated, eight patients received a thoracic drain, and two patients were primarily resuscitated. Mean time between announcement and arrival of the patient in our hospital was 33 minutes.

Forty nine patients were (haemodynamically) stable at admission. Forty six admissions concerned a neurotrauma, 26 a thoracic trauma, 25 a severe injury of the extremities, and eight an abdominoal trauma. Twenty nine of the 56 patients required urgent surgery. Intervention surgery because of haemodynamic instability was carried out in seven patients; this was successful in four patients.

Overall 10 of the 56 patients died in our hospital, six on the day of admission, two after two days, one after three days, and one after six days. For the patients who died the mean injury severity score (ISS) was 32 (range 20–66), for the surviving patients the mean ISS was 22 (range 4–59). For all patients the mean ISS was 22 (range 4–66). Duration of admission for extensive care unit varied between 0 and 79 days.

Approximately 18% of the trauma patients in our large border crossing region presented and were admitted to our hospital. Mean time between announcement and arrival was half an hour. Altogether 18% of the patients died in our hospital. Retrospectively, we were not able to define the revised trauma score for all patients. Therefore, registration of all trauma patient data is now carried out by a computer program designed for the Dutch Association for Traumatology.

TRISS methodology; a flawed mathematical model
J Batchelor, M Gavallas, A McGuinness, J Ryan
Department of Accident and Emergency and Department of Conflict Recovery, University College London

Objectives—The aim of the study was to review some of the weaknesses in the TRISS methodology and to identify some new concepts upon which trauma scoring models might be based.

Methods—The revised trauma score (RTS) has an inherent weakness in that it uses the same arithmetic scale for each of its three components despite the fact that the three components, given the range of physiological response. This results in bias with head injuries being over-scored and shock states being under-scored.

Results—Elimination of bias from the RTS may partly be achieved by defining four physiological states—(1) minor, (2) moderate, (3) severe, and (4) uncompensated—for the three components of the RTS and scoring each response equally.

Conclusion—This study has defined a four level physiological response model which may enable a more effective mathematical model to be applied to trauma scoring.

Pre-hospital management of burn patients: time for some coordination
K Allison
This study was commissioned on behalf of the Faculty of Pre-hospital Care at the Royal College of Surgeons of Edinburgh

The aim of the study was to assess the current management of burn patients by the UK ambulance services, given the range of importance placed on clinical governance and advances in pre-hospital care, specifically anaesthesia and dressing.

An expert UK ambulance service was contacted via a postal questionnaire and given approximately two months to reply; one reminder was sent to non-responders.

Eight simple questions related to the provision of burn care were asked.

• 31 replies were received from a total of 39 questionnaires (79% response).
• 10 (32%) services said that they had a treatment policy for burns patients, six (19%) said that they followed IHCD/BASIC ambulance guidelines, and 18 (58%) said that they had no treatment policy.
• 30 (97%) services sent patients to their nearest accident and emergency department.
• Seven (23%) services had a local bypass policy for burn patients.
• 26 (84%) services employed cooling and 14 (45%) used dressings as basic first aid.
• 12 different types of dressing were used for burn patients.

The following were prescribed for burn patients included

1. Naohibine hydrochloride (23 or 74%), Entonox (30 or 97%), Calpol (one or 3%), diamorphine (two or 6%), and tra- mado (three or 10%).
2. 23 (74%) services gave oxygen to all burn patients and 28 (90%) cannulated patients, with or without fluid administration.
There seems to be a wide variation in the basic approach to the first aid and pre-hospital care of burns patients. We feel that it is time to get a standard approach across all ambulance services for this large group of patients. We propose to coordinate this through the Faculty of Pre-hospital Care and with liaison with burns units and ambulance services, leading to a position statement for the pre-hospital management of patients with burn injuries.

Recent advances in military trauma
J Naveen, J Ryan
MIMUS/USHS

Combat casualty care is fundamentally different from trauma care in the civilian setting. Civilian trauma care is based on the Advanced Trauma Life Support (ATLS) programme which does not translate readily to the operational environment. Nor does it match the skills, resources, or isolation of a medic managing a casualty in a hostile environment. An extensive and multispecialty evidence base has developed to underpin ATLS and guide the civilian trauma team; the same has not been true of the military.

There is no evidence that the point of wounding is considerably more complex than is generally understood. The operational environment impacts directly on care of the casualty and casualties also directly impact on the operational needs of forward hospitals need to adapt to changing tactics. Modern conflicts are highly mobile and large, relatively immobile hospitals are no longer appropriate. Surgical doctrine must adapt accordingly, but where is the experience, let alone evidence, to support such changes?

In 1992, trauma programmes for Special Forces medics were developed in the UK and US. Workshops followed which began to “internationalise” the process, adding expertise from Israel, Russia, and France. The International Committee of the Red Cross (ICRC) and military programmes developed the surgical management of war wounded and the process culminated in joint military/ICRC conferences on the management of war wounded in 1998. This paper describes the process to date.

Poster presentations

Clinical evaluation of the “respiometer”: a new disposable respiratory rate counter
A Breakell, C Townsend Rose
Department of Accident and Emergency Medicine, Royal Liverpool University Hospital, Liverpool

Objectives—To clinically evaluate a new, disposable mask mounted respiratory rate counter for use in the emergency setting.

Methods—Random visits to a local accident and emergency (A
d) department were made and all patients wearing oxygen masks were recruited into the study. The sensor was attached to the outside of the mask. One researcher (clinician or the blindfolded), the other counted the sensor activity. Respiration was counted over one minute. A total of 40 patients were recruited into the study. If the sensor did not detect more than two breaths compared with auscultation, it was recorded as a sensor failure.

Results—The respiratory rates of 40 patients were measured. There were 28 males and 12 females. Twenty-six patients were wearing a Hudson 100%, 14 a System 22 mask. Over one minute the sensor gave a perfect score in 28 cases (70%). It was accurate to within one breath in 37 cases (93%), to within two breaths in 98% of cases, and in one case the sensor failed.

Conclusion—The sensor is inexpensive, disposable, accurate, and attaches to any currently available oxygen mask. The sensor is unaffected by patient position, mask type, and oxygen flow. The sensor has a digital counter and can be used to monitor breathing in many clinical situations, particularly in pre-hospital, in the A
de department, in disaster and war zones, in-flight care, and in military and civilian shipping.

Advanced transfer bridge
S Robbins
Queen’s Hospital, Burton on Trent

With constant transfer of critical patients, the need to develop and provide a safe and accurate system that transfers patients is vital. At present most intensive care and accident and emergency units do not have a standardised procedure. Most of the time required for the journey is placed upon the trolley sides or by other unacceptable means.

Personally I have many years’ experience in transfer and, with the help of a local company, I have devised a complete safe way of transferring patients to and from hospitals. I have decided to call this new way of transferring patients the advanced transfer bridge (ATB) system. It comprises a fitted frame that carries the equipment over the patient’s legs. On top there is enough room for monitoring, ventilation, infusion pumps, suction, and oxygen. Through the centre of the frame is a cradle to allow a “D” cylinder of oxygen for transferring from ambulance to the receiving unit.

It is estimated that 10 000 patients are transported each year between hospitals.1

Innovation in the realm of trauma coor-
dination, clinical supervision, education, and development
A Hutchings
Southampton University Hospitals NHS Trust

Several different models of trauma coordina-
tion can be found in the UK. Some follow American models while others have developed to meet local needs. This paper outlines a model aiming to improve the standards of care experienced by patients/families and reduce the stress and anxiety experienced by practitioners after accident and emergency care.

The nature of traumatic injuries requires the multidisciplinary team to have a broad knowledge base of the principles of treatment and an appreciation of the multiplicity of injury (Blumberg 1983). The psychosocial im-
pact of injury on the patient and their family may be complex requiring expert knowledge and ability to support people through a stressful event.

As a specialist practitioner I am concerned that we should provide an environment in which the health and well being of staff and the quality of care provided to patients and families is of the highest possible standard.

This paper explores the model we have introduced over the last two years. It describes the support and clinical advice available throughout the process, in addition to the clinical supervision programme within trauma and orthopaedics. It explains the key role in trauma management planning, patient preparation for surgery, and multidisciplinary communication. It goes on to identify the role in the provision of seamless care for patients nursed in a number of care settings by several different teams, clinical expertise in arranging complex transfers from other centres, and the need to explore and solve problems encountered within the system.

Patterns of emergency referrals to a regional plastic surgical unit
A Hazari, F Schonauer, K Anderson, J Pereira, H Belcher
Department of Plastic Surgery, Queen Victoria Hospital, East Grinstead, West Sussex

Acute referrals comprise 40% of the work of a plastic surgery unit. The Queen Victoria Hospital is the regional centre for burns, plastic and reconstructive surgery for the South East Thames region covering Kent, Sussex, and East Surrey with a catchment population of 3.5 million. The on-call senior house officer takes emergency referrals in plastic surgery over the telephone from accident and emergency depart-
ments, general practitioners, and other specialist units. The aim of this study was to quantify the percentage distribution of the various plastic surgical subspecialty emergen-
cies and their outcome. An additional aim was to examine the organisation of the referral sys-
" "
m and identify its strengths and drawbacks.

Data were collected over a period of three months from September to November 1998, and involved accurate documentation on a “trauma card” of the date and time of the call, the referring hospital, clinical details, and advice given. Hand injuries that fulfilled pre-set criteria were booked for transfer to the regional unit where the surgery trauma list operational the next morn-
ing. The management outcome in each patient was recorded.

There were 684 referrals originating from 41 sources, with the 12 main referring hospitals providing 68% of the workload. Hand injuries accounted for 54% of the cases, followed by burns (24%), facial injuries (13%), and lower limb trauma (8%). The management resulted in 61% of the referrals being admitted of which 46% underwent sur-

This system of referral was found to be easy, effective, and suitable for the geographical area of south east England and is likely to be applicable to other similar units.

Surgery on plasma myosin heavy chain fragments of skeletal muscle
G N Onuoha, E K Alper, M Laprade*, B Dean, D Rama*, B Pau*
University of Birmingham and *Sanoﬁ Recherche, Montpellier, France

Serum concentrations of myosin heavy chain (MHC) were determined in 20 critically ill skeletal muscle trauma patients and 20 ortho-
apaedic patients using a competitive radioim-
munoassay to β-HMC fragments. Fourteen of these patients were surgically treated (pre/post-op) and the others did not receive surgical intervention (OP) within the two day study period. These were compared with 16 non-

orthopaedic control subjects. The time course
of the myosin concentrations are typical and monophasic for all patients. The values for the kinetic parameters of myosin release in these orthopaedic patients are comparable with those previously reported in patients with myocardial infarction. We also measured cardiac troponin-I (cTnI) release in all subjects. cTnI was negligible in all samples measured in the cTnI assay; this therefore excludes a protein release from the heart muscle (cardiac β-type MHC) of these subjects. We further made attempts to compare the release of this contractile protein to other known markers of tissue damage within 48 hours from the onset of injury. Results are shown in table 1.

Bone fractures result in a biphasic myoglobin release profile, delayed creatine kinase (CK) peaks and late MHC fragment concentrations of slow skeletal muscle myosin. These findings also provide myoglobin for an indicator of slow switch skeletal muscle fibres in response to orthopaedic injuries and surgery. From a practical point of view, we observed that early injury does not seem to qualitatively upset myosin kinetics. Furthermore this results indicate that myosin release is a quantitative index for tissue damage especially in late or postoperative diagnoses. It was finally concluded that the titration of serum myosin was probably of little clinical value for therapeutic intervention during the early phase of orthopaedic injuries; it could, however, be a useful tool in detecting any myoskeletal disturbances involving muscle injury or bone fractures resulting in membrane leakage of myoskeletal cells in a retrospective basis, postoperative analysis, or as a prognostic tool.

Fracture/surgery on skeletal troponin-I release  
G N Onuoha, E K Alpar  
University of Birmingham

The skeletal isofrom of troponin-I (sTnI) is a myofibrillar protein highly specific for muscle injury and for identifying the origin (cardiac or skeletal) of muscular damage. We use a recently developed new generation immunoassay with high analytical sensitivity to measure sTnI in orthopaedic patients, before and after operation. We hypothesised that sTnI could detect and monitor muscular damage in patients with bone fracture.

Plasma from 32 individuals (17 healthy controls, 15 orthopaedic patients undergoing operative repairs) were assessed for skeletal/cardiatomic troponin-I (sTnI) using two a different immunonzymometric assay method—one being specific for cardiac troponin-I (cTnI). Creatine kinase (CK), myoglobin, and elastase were measured using the ELISA method. Results are shown in table 2.

<table>
<thead>
<tr>
<th>Age</th>
<th>MHC (µU/I)</th>
<th>CK (IU/L)</th>
<th>Myoglobin (µg/I)</th>
<th>Elastase (µg/I)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP day 1</td>
<td>62.9 (17–80)</td>
<td>93.3 (0.5–566)</td>
<td>230.3 (19–850)</td>
<td>90.1 (23.6–237)</td>
</tr>
<tr>
<td>OP day 2</td>
<td>250.4 (27.5–690)</td>
<td>99.3 (2.3–471)</td>
<td>463.4 (72–276)</td>
<td>140.4 (27.6–738)</td>
</tr>
<tr>
<td>Pre-op</td>
<td>58.2 (24–94)</td>
<td>273.2 (6.5–1022)</td>
<td>122.1 (1.8–41)</td>
<td>74.8 (17.2–310.6)</td>
</tr>
<tr>
<td>Post-op</td>
<td>273.2 (6.5–1022)</td>
<td>72.9 (11.9–173)</td>
<td>294.4 (20–1324)</td>
<td>118.0 (10.2–406.9)</td>
</tr>
<tr>
<td>Control</td>
<td>47.8 (23–70)</td>
<td>97.2 (19–203)</td>
<td>72.9 (11.9–173)</td>
<td>32.0 (16–85.2)</td>
</tr>
</tbody>
</table>

The pelvic stabilisation belt—a cadaveric study  
M Solan, L Ripley, M Lavelle  
Princess Royal Hospital, Haywards Heath and University of Sussex

Rotationally unstable pelvic ring injuries account for nearly one third of all pelvic ring disruptions. Open book (external rotation) injuries in particular are often associated with extreme, blood loss. In haemodynamically unstable cases reduction should be achieved in the resuscitation room. External fixation is widely used for this purpose.

This cadaveric study demonstrates that unstable external rotation injuries can be significantly reduced by bringing the patient's legs together and completely closed using a non-invasive pelvic belt placed over the greater trochanters. The pelvic belt could be used instead of external fixation for haemorrhage control and patient transfer. It can be applied extremely quickly with no need for other equipment or special expertise, and may be particularly useful if there is no immediate orthopaedic cover.

As a method for pelvic reduction and temporary stabilisation this specially designed device has advantages over both other non-invasive techniques and external fixation.

Review and suggestions for management of minor head injuries  
S West, D Shewring, P Evans  
East Glamorgan Hospital, Church Village, Near Pontypool

Objectives—To review the aetiology of head injury. The Glasgow coma scale (GCS), however, was able to completely isolate the effect of the injury. We reviewed orthopaedic patient admissions and the contribution of external trauma to minor head injury in the Cardiff Royal Infirmary was recorded.

Methods—A basic questionnaire was designed to include all the study parameters. This was completed at the time of admission. All patients admitted with a minor head injury over an 11 week period from mid-October 1990 to January 1991 were included.

Results—There were 48 admissions for head injury during the study period. Of these 4.5% were related to sport, 8.9% to road traffic accidents, 24.5% to falls in the home, 26.6% were intoxicated with alcohol but not related to assault, and 35.5% followed alleged assaults. Overall, we found 60% of admissions were intoxicated with alcohol. Admissions rose steadily through the week. Alcohol intoxications followed a similar pattern. In all cases the GCS was never lower than 14.

Conclusions—We feel the results support the use of short stay wards for the management of minor head injuries. The use of such wards may reduce the burden on main hospital wards.

Ambulance work: emotional impact  
D A Alexander, S Klein  
Medical School, Aberdeen

Among health care workers ambulance personnel are among the most likely to retire early on health grounds. Aetiological factors have been sought but no study has explored the impact of “critical incidents” on mental welfare.

Aims—Funded by the Scottish Office this survey identified: (a) the levels of “burnout” and general and post-traumatic symptoms; (b) which incidents are the most emotionally disturbing, and (c) which factors attenuate their effects.
Method—A cross sectional survey by questionnaire and interview of ambulance personnel who provide accident and emergency cover. Results—Univariate and multivariate analyses confirmed the following: (1) Despite high levels of job satisfaction they displayed high levels of “burnout” and high levels of general and post-traumatic symptoms. (2) Exposure to road traffic accidents and medical emergencies, particularly those involving children, severe injury and inadequacy briefing, have deleterious effects that may be due to the psychological trauma. (3) Personality, peer support, and certain coping methods attenuate these effects.

Conclusions—It is concluded that: (1) Repeated exposure to emotionally disturbing events compromises the emotional welfare of ambulance personnel. (2) Job satisfaction is not a valid barometer of emotional well being. (3) An ambulance service must address selection, training, welfare provision, and managerial practices.

Ocular trauma: psychiatric sequelae
D Alexander, R Kemp, S Klein, J Forrester
Medical School, University of Aberdeen

Our understanding of the impact of trauma has derived mainly from the annals of military combat and major catastrophes. Recently, efforts have been made to identify the effects of daily trauma including assault, motor vehicle accidents, and industrial accidents. The subject of ocular trauma has been a neglected area of research. This study aims to: (1) describe the prevalence of post-traumatic psychopathology and problems of adjustment following ocular trauma and (ii) to identify those factors that are predictive of such sequelae.

Method—This casenote and interview study included approximately 40 patients admitted to the ophthalmology ward of Aberdeen Royal Infirmary. Data were collected from: (i) structured interview, (ii) standardised measures of psychopathology and social adjustment, and (iii) theatre records and hospital computer database.

Results—All patients were male, aged between 18 and 65 years. Injuries included penetrating, blunt, chemical and thermal ones, 55% of which were as a result of industrial injury. The level of psychiatric “caseness” was identified at 45%. By univariate and multivariate analyses, factors related to this level of psychopathology and other problems of adjustment were identified.

Conclusions—It is concluded that: (1) Ocular trauma is strongly related to psychopathology and problems of adjustment. (2) It is possible to identify factors relating to poor prognosis and adjustment. (3) There are opportunities for early psychiatric intervention.

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Carpal tunnel decompression during buttsed plating of the distal radius—is it necessary?
O Odufumua, C Ayekoloye, G Packer
Southend Hospital NHS Trust, Essex

The objective of this study was to evaluate the effectiveness of prophylactic carpal tunnel decompression in preventing median nerve dysfunction during buttsed plating of the distal radius. A comparative study of 69 unselective consecutive patients with distal radial fractures managed by volar plating between 1995 and 1998. Patients' clinical notes were assessed for clinical parameters of median nerve dysfunction and all patients followed up for a minimum of six months. Twenty four patients had prophylactic carpal tunnel decompression and 45 patients had not. The study population consisted of 42 females and 27 males and mean (SD) age was 56 (19.9) years. Overall 17 patients (25%) developed median nerve dysfunction postoperatively. Nine patients had formal prophylactic carpal tunnel decompression and eight patients had not; this was not statistically significant (p=0.07). In addition prophylactic decompression to compressed patients had more than twice the relative risk (2.1; confidence interval 0.94 to 4.74) of developing median nerve dysfunction. All cases resolved spontaneously except for three cases that required carpal tunnel decompression of which two patients were not prophylactically decompressed.

We conclude that median dysfunction does not alter the cause of median nerve dysfunction and may increase postoperative morbidity.

Management of minor head injuries by non-specialists
N Buxton, H Pau, M Cartmill
Department of Neurosurgery, University Hospital, Nottingham

Objective—To assess the nature and outcome of patients admitted with a minor head injury (MHI) to a hospital containing a regional neurosurgical unit.

Design—A retrospective analysis of the admissions to this hospital in 1996 with a diagnosis of MHI.

Subjects—All patients aged 16 years or over admitted with a diagnosis of MHI, defined as Glasgow coma score ≥12; a total of 618 fulfilled this criteria of whom 89 (14.4%) were referred to the regional neurosurgical unit (male:female 63:26; 70.8%:29.2%).

Results—The reason for referral was: no accident and emergency beds in 47 (53%), not stated 65% (range 25-123), “social reason” in four (4%), and in two (2.5%) because they had been under a neurosurgeon some years previously for totally unrelated conditions. Only two of 24 (8.3%) patients who had computed tomography during their admission had anything abnormal detected, neither of whom needed any intervention beyond simple observation. There was one late complication, a seizure five months after the MHI.

Conclusion—It is our contention that no MHI need be admitted under the care of neurosurgeons in this country and that patients with MHI who do need specialist neurosurgical input can be identified by neuro-observers in a non-specialist setting and referred for advice or action accordingly.

Transfer of the critically ill; a three year prospective survey
M Sanders, S Cockcroft
Intensive Care Unit, Salisbury District Hospital, Wiltshire

Over a three year period we have prospectively collated data relating to the interhospital transfer of intensive care unit (ITU) and high dependency unit (HDU) patients from Salisbury District Hospital.

In addition to demographic data, transfer timings, destination, diagnosis, and data relating to patient support were collected. Any critical incidents were also recorded. During this period 86 transfers to other hospitals were conducted. The transfer was conducted for specialist treatment in 70% of instances and in 30% the transfer was necessary due to excessive demands upon the local ITU facilities. Average distance travelled was 35.6 miles (range 25–123). From acceptance by the receiving hospital, a mean delay of 100 minutes occurred before the transfer started (range 5–450). In 72% of transfers the patients required full ventilatory support. In 43% of transfers the accompanying physician was of senior house officer grade whereas only 17% were accompanied by a consultant. Critical incidents occurred during 26% of the transfers.

We conclude that the interhospital transfer of ITU and HDU patients is a task that requires adequate equipment provision and medical expertise and training to avoid potential patient morbidity and mortality. Continual audit is essential to ensure that the standards recommended by the Intensive Care Society in “Guidelines for the transport of the critically ill adult” are met.

Use of helicopters in the Peak District Mountain Rescue Organisation
James Williams, Adam Brooks
Peak District Mountain Rescue Organisation

The Peak District was the first national park in the UK, established in 1951. Seventeen million people live within 60 miles of its boundary. With 20 million people visiting each year it is the second most commonly visited national park in the world.

The Peak District Mountain Rescue Organisation (PDMRO) consists of seven individual teams. In 1998 they were involved in 134 incidents, including 21 mountain accidents, 33 non-mountain incidents (mainly searches for missing people), 23 rock climbing accidents, three hang gliding/paragliding accidents, one mountain bike accident, and three sheep rescues. There were six fatalities.

The PDMRO can use either the RAF Sea King helicopter from Leconfield or police helicopters from Manchester or Sheffield to assist in incidents. They are used for casualty evacuation, for searches, or for deployment of mountain rescue team personnel onto the hill-side.

In 1998 we have analysed the use of helicopters by the PDMRO in 1998 to determine the appropriateness of the individual helicopters to specific mountain rescue team tasks and to review the criteria used for their deployment.

Helicopters were used on 33 occasions (25% of incidents), with the police helicopter deployed on 76% of these, mainly for searches and the RAF Sea King on 24% of occasions, predominately for the evacuation of injured casualties.

Helicopters are very useful in the mountain rescue environment, but the appropriateness of individual helicopters for specific mountain rescue team tasks must be recognised in the call out criteria.

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