JOURNAL SCAN

Journal scan

Edited by Jonathan Wyatt; this scan coordinated by Andres Izquierdo-Martin

Missed injuries in patients with multiple trauma

G Buduhan, D I McRitchie

J Trauma 2000;49:600–5

Objective—To determine the incidence, contributing factors and clinical outcomes of missed injuries among multiply injured patients treated at a Canadian Level I trauma centre.

Method—This retrospective study reviewed the hospital notes of injured patients who were admitted to hospital over a 27 month period, with particular reference to “missed injuries”. The definition of a “missed injury” was one that was not diagnosed during the first 24 hours of admission—as a result, patients who were discharged directly from the emergency department, or who died within 24 hours of hospital presentation were excluded. The characteristics of patients with missed injuries were examined and compared with those without missed injuries using χ^2 and Student’s *t* tests.

Results—Of 567 patients who were admitted to hospital and who survived for more than 24 hours, 46 (8.1%) had a total of 63 injuries that were “missed”. Thirty one (49%) of the missed injuries were fractures. The mean delay in diagnosis was 14.6 days. The missed injury population contained a significantly higher proportion of patients with GCS ≤ 8 and had “significantly higher mean injury severity scores”. Of the 46 patients with missed injuries, in seven the delay was judged to be clinically significant, including one where the delay in diagnosis was judged to have resulted in death. Inadequate clinical assessment was implicated as the most common reason for injuries to be missed.

Conclusions—The authors concluded that patients with missed injuries tended to be more severely injured and neurologically compromised. Assessment of how injuries were missed suggested that while some of the factors involved were “unavoidable”, many were potentially avoidable given repeat clinical assessments and a high index of suspicion.

Critique—The issue of missed injuries in the multiply injured is certainly an important one. The authors of this paper faced a difficulty in deciding exactly how to define a “missed injury”. The definition used excluded certain patients and this, together with the retrospective design of the study, has almost certainly resulted in an underestimation of the extent of the problem. The statistics used and the way that some of the results were presented seem to

be less than optimal (for example, comparisons between “mean” injury severity scores and use of the Student’s *t* test). These factors, together with the inevitably rather subjective methodology (in terms of judging how injuries were missed and whether each was clinically significant), mean that the conclusions are perhaps less than robust. However, this study does underline the importance of being vigilant in the search for occult injuries in multiply injured patients. This advice seems to particularly apply to those with reduced conscious levels.

A randomized controlled trial on the effect of educational interventions in promoting airway management skill maintenance

G Kovacs, G Bullock, S Ackroyd-Stolarz, *et al*
Ann Emerg Med 2000; 36:301–9

Objective—To determine the natural history of airway management skill decay and examine the effect of independent practice and periodic feedback on airway management skill maintenance.

Method—This prospective randomised controlled study used a convenience sample of Canadian undergraduate health sciences students with no prior airway management experience. All students (subjects) were trained to perform tracheal intubations using advanced airway manikins. Students were then randomly assigned to one of three groups: control ($n=24$), periodic feedback only ($n=30$) and independent practice plus periodic feedback ($n=30$). Performance at airway maintenance was evaluated by blinded evaluators on four separate occasions over 40 weeks using a modification of a previously devised evaluation tool.

Results—Eighty four subjects were evaluated after initial training. At this time there were no statistically significant differences in mean scores between the groups. Control group performance fell by the time of the second evaluation and remained lower at subsequent evaluations. Scores in the “independent practice plus feedback” group remained stable over time and were significantly higher than the control group at the times of all four evaluations. The scores in the “feedback only” group were not significantly different to the control group.

Conclusion—The authors concluded that airway management skill performance declines after initial training. The training model based upon a combination of both independent

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practice and feedback was an effective method of maintaining skills.

Critique—Airway management is an essential skill for emergency physicians and other health care professionals working in a variety of acute care environments. However, many medical professionals perform advanced airway management relatively infrequently, raising understandable concerns about maintenance of skill competence. This original yet simple study has findings that are clearly relevant to the training of those working in accident and emergency. The natural decay in airway management skills in the absence of regular practice underlines the need for frequent recertification, practice and training. The current development of various advanced airway management courses for emergency medicine trainees will help to resolve this issue.¹

1 Ellis C, Hughes G. Use of human patient simulation to teach emergency medicine trainees advanced airway skills. *J Accid Emerg Med* 1999;16:395–9.

Cost effectiveness analysis of intravenous ketorolac and morphine for treating pain after limb injury: double blind randomised controlled trial

T H Rainer, P Jacobs, Y C Ng, *et al*
BMJ 2000;321:1247–51

This study from an accident and emergency (A&E) department in Hong Kong investigated the cost effectiveness of intravenous ketorolac compared with intravenous morphine in relieving pain after isolated blunt limb injury. The study design was a double blind, randomised, controlled trial with cost consequences analysis. One hundred and forty nine patients were randomised to receive either ketorolac or morphine. No difference was found in the median time taken to achieve pain relief at rest between the two groups. The patients in the morphine group were 16 times more likely to develop adverse effects than the ketorolac group. The mean cost per person was significantly higher for the morphine group compared with the ketorolac group. This difference in costs was attributed to both extra time spent in the hospital by the morphine group and to the costs treating the greater complications observed in this group. The authors concluded that intravenous ketorolac is a more cost effective analgesic than intravenous morphine in the management of isolated limb injuries in an A&E setting.

Comment—This was a well designed original study, involving an economic evaluation alongside a randomised controlled trial. The inclusion criteria were clearly defined. However, the use of intravenous morphine to provide initial analgesia for any limb injury is not standard practice in most A&E departments, so it could be argued that the study should have focused solely upon patients with clinically obvious limb fractures or dislocations, or both. In this respect, it would also have been interesting to know the results for those 66% of patients comprising the fracture subgroup, as these are the patients most likely to be given morphine in most A&E departments at the present time. It

is not clear from the data presented that ketorolac was necessarily “better” for this group.

Although the study claimed to be double blinded, in reality (as the authors acknowledge) the participants had enough clinical clues to guess which drug was given—this could have introduced some bias. As expected, morphine had more adverse effects than ketorolac. Some of them are minimised in current practice with the routine coadministration of an intravenous antiemetic. Obviously, one result of this would be to increase the drug cost of the morphine group, but this might be offset by reduced cost managing adverse effects. The presence of drowsiness in 59% of the participants in the morphine group could be argued as a not undesirable effect, rather than an adverse effect, in those patients with fractures needing admission.

This interesting study provides an indication that ketorolac could be at least as effective as morphine in relieving pain with less adverse effects and with greater patient satisfaction. It is difficult to know if the cost differences observed between morphine and ketorolac in A&E in Hong Kong would be similar elsewhere, but the results of this study suggest an alternative to the morphine used in current practice.

Outcomes of rapid defibrillation by security officers after cardiac arrest in casinos

T D Valenzuela, D J Roe, G Nichol, *et al*
N Engl J Med 2000;343:1206–9

This prospective observational study of sudden cardiac arrest in casinos in the United States investigated the role of automated external defibrillators used by trained casino security officers. The casinos aimed to have installed sufficient defibrillators so that no more than three minutes elapsed from collapse to defibrillation. The primary outcome studied was survival to hospital discharge.

Automated external defibrillators were used in 105 patients whose initial cardiac rhythm was ventricular fibrillation. Fifty six patients (53%) survived to hospital discharge. Of the 105 patients, 90 had a witnessed collapse, of whom 59% survived to hospital discharge. Among subjects in this subgroup, the survival rates were 74% for those who received their first defibrillation within three minutes of collapse and 49% for those who received their first defibrillation after three minutes. The mean interval from collapse to first defibrillation shock was 4.4 minutes, compared with 9.8 minutes from time of collapse to arrival of paramedics. The authors conclude that rapid defibrillation by non-medical personnel using an automated external defibrillator can improve survival after out of hospital cardiac arrest caused by ventricular fibrillation.

Comment—This paper underlines the importance of rapid defibrillation in the treatment of cardiac arrest caused by ventricular fibrillation. The study design is limited by the lack of a control group. However, the authors explained that they were unable to

access data from other casinos (which did not have defibrillators installed) because of issues of potential legal liability. Having acknowledged these limitations, the data presented provide compelling evidence in support of more widespread use of external automated defibrillators. Such defibrillators are most likely to be useful if deployed in areas where collapse attributable to cardiac arrest may be witnessed, rapidly recognised and treated by nearby available trained staff.

Errors in emergency physician interpretation of ST-segment elevation in emergency department chest pain patients

W J Brady, A Perron, E Ullman
Acad Emerg Med 2000;7:1256–60

This retrospective review of electrocardiograms (ECGs) of adult patients presenting to a single hospital with chest pain aimed to determine the error rate in emergency physician interpretation of the cause of ST segment elevation. ST elevation was deemed to be present if the ST segment was elevated by ≥ 1 mm in at least two limb leads or ≥ 2 mm in at least two anatomically contiguous chest leads. Initial emergency physician interpretations were compared with final interpretations by a cardiologist supported by results of clinical investigations. Of 202 patients with ST elevation, the cause was correctly diagnosed in 190 (94%). Among the 12 (5.9%) with incorrect initial diagnoses attributed to their ST elevation, the most common difficulties were distinguishing the following: acute myocardial infarction, benign early repolarisation, left ventricular aneurysm and hypertrophy. The authors concluded that emergency physicians show a low rate of ECG misinterpretation in the adult patient with chest pain and ST elevation. They further concluded that the clinical consequences of these misinterpretations were minimal.

Comment—Recognition of the urgent need for early thrombolytic therapy in the treatment of acute myocardial infarction has naturally placed ECG interpretation among patients with chest pain under the spotlight. The main shortcomings of this study were the retrospective design and the use of only one reviewer for final ECG interpretation. The authors do not mention how successful they believe they were in recovering all the data of patients with chest pain. The interpretation of the data is difficult to follow because of apparently conflicting information between the abstract, main body of the article and tables. Some patients had their acute myocardial infarction missed, while in others it was incorrectly diagnosed as being present, yet the paper does not explain why none of these patients suffered from these errors. The conclusion that emergency physician misinterpretation of ECGs had minimal clinical consequences does not therefore seem to be justified.

Finally, this study only considered those patients with a final diagnosis of ST elevation and ignored those patients where the emergency physician made an initially incorrect

judgement of ST elevation. It would have been interesting to know how many such false positive cases there were and how, if at all, these patients were adversely affected as a result.

Advanced or basic life support for trauma: meta-analysis and critical review of the literature

M Liberman, D Mulder, J Sampalis
J Trauma 2000;49:584–99

This meta-analysis examined the effects of Advanced Life Support (ALS) compared with Basic Life Support (BLS) techniques on the trauma patient in a pre-hospital setting. Fifteen studies enabled assessment of the principal outcome (mortality). Numerous other studies enabled analysis of various secondary outcomes (which included: on-scene time, amount of transfused fluids and tracheal intubations). The authors concluded that prehospital ALS was associated with prolonged prehospital times, but without any discernible benefit. They further concluded that intravenous fluid administration to the actively bleeding patient was “not only ineffective but probably harmful” in the prehospital setting.

Comment—Arguments about what constitutes the optimal form of prehospital care for the trauma patient continue on both sides of the Atlantic. It is a shame that the search strategy used in this study resulted in the exclusion of much useful data from Western Europe. The use of a wider search strategy would have improved this paper. Concern about significant differences between the BLS treated and ALS treated groups, in terms of rural/urban settings, and the nature and severity of the injuries, render meaningful comparisons of results in many published studies problematic. Within these constraints, the authors have provided further evidence to question the value of prehospital ALS for the trauma patient. However, until more data become available, the debate is certain to continue.

Ultrasound in the diagnosis of fractures in children

U Hübner, W Shlicht, S Outzen, *et al*
J Bone Joint Surg Br 2000;82-B:1170–3

This paper attempted to evaluate the use of ultrasound as a diagnostic tool for fractures in children. The results obtained by an “experienced” operator using ultrasound were compared with those from radiographs (the current “gold standard”). One hundred and sixty three children with 224 suspected fractures were studied. The overall accuracy of ultrasound was 86.6%, with wide variations according to the site of injury. Ultrasound seemed to be most accurate in correctly identifying fractures of the femur and humerus (94% and 90% respectively), and least successful when attempting to evaluate the hand, foot, knee and elbow (only 68% correct, with both false negatives and false positives proving to be a significant problem). The authors concluded that routine diagnosis of fractures by ultrasound is possible and postulated that ultrasound may become a future substitute for radiography in certain situations.

Comment—The idea of using ultrasound instead of radiographs for diagnosis of fractures in children is quite appealing. Ultrasound, without the attendant risks of ionising radiation, could potentially be safely repeated several times and could be used to compare the appearance with the unaffected (normal) other limb. Unfortunately, the data presented suggest that there is a great scope for both missing fractures (false negatives) and for incorrectly diagnosing fractures that are not present (false positives). Also, there must be some doubt about how generalisable the results presented are, considering that the fracture prevalence in the population study seemed rather high (53%) and that all ultrasound examinations were performed by one of three experienced enthusiasts. Given that ultrasound is user dependent, data relating to inter-operator differences would have been interesting, but were not presented. Considering the current staffing structure of most accident and emergency departments, the inexperience of junior doctors in using ultrasound and the frequency with which ultrasound missed fractures in this study, the future role of ultrasound does not seem as certain as the authors propose.

The treatment of convulsive status epilepticus in children

The Status Epileptics Working Party

Arch Dis Child 2000;**83**:415–19

A new treatment guideline for acute tonic-clonic convulsion in children (including established convulsive status epilepticus) is proposed by the Status Epilepticus Working Party. This working party have produced a national guideline based upon available evidence. A literature search using computer databases and hand searching yielded 1100 papers, of which 371 included potentially relevant data. The only real criticism of the method of searching was the (understandable) limitation to English language papers. The guideline is primarily designed for use in accident and emergency

departments. It does not cover the treatment of seizures in neonates.

The guideline does deviate from previously “standard” treatment in several ways, such as the replacement of intravenous diazepam with lorazepam. The various steps of the guideline are discussed and justified in terms of the strength of the recommendations based on the level of evidence available. The main shortcoming is that many of the recommendations are based on “clinical experience” rather than evidence, but this simply reflects the current lack of evidence. In recognition of this, the working party plan to establish several randomised controlled trials to test the recommendations and investigate the subject further. Until more data are published, A&E clinicians can follow the guideline in the knowledge that it reflects best available evidence.

The semantics of ketamine

S M Green, B Krauss

Ann Emerg Med 2000;**36**:480–2

This lively editorial argues passionately that ketamine should not be regarded as a general anaesthetic agent, but reclassified in a class of its own. The authors believe that the current classification may thwart the full use of ketamine in its important role to assist the management of injured children presenting to emergency departments in North America. Despite some supportive research, use of ketamine in accident and emergency in other parts of the world seems to be currently less widespread¹—the arguments in this editorial could be used to assist those wishing to introduce it. Given that there is no perfect alternative drug to facilitate the performance of painful and/or emotionally disturbing paediatric procedures, there seems certain to be further debate regarding the future role of ketamine.

¹ McGlone R, Fleet T, Durham S. A comparison of intramuscular ketamine with high dose intramuscular midazolam in children before suturing. *Emerg Med J* 2001;**18**:34–8.