LETTERS TO THE EDITOR

Intramuscular or intravenous adrenaline in acute, severe anaphylaxis?

EDITOR—The consensus guidelines on the emergency medical treatment of anaphylactic reactions by the Project Team of the Resuscitation Council (UK) are an excellent guide for first medical responders, whether general practitioners or emergency department staff.

They are pragmatic, safe, and emphasise the importance of first line treatment with oxygen, adrenaline (epinephrine) and fluids, and as Hughes and Fitzharris in their BJM editorial suggest, rightly deserve to “... adorn the five per cent of anaphylactic deaths are due to adverse outcomes to adrenaline occur when it is used as single-dose intramuscular or intravenous adrenaline at 1 mg/min or more.”

However, many of the same drugs are also used regularly in emergency medicine departments and intensive care units to facilitate interventional airway care. Continuous electrocardiographic, blood pressure, and pulse oximetry monitoring are now routine in all these areas and are essential for the safe use of intravenous adrenaline. As Hughes and Fitzharris point out, the guidelines are somewhat vague in empirically recommending repeated intramuscular adrenaline every five minutes, or intravenous adrenaline as slowly as seems reasonable in the absence of clinical improvement or if deterioration occurs, particularly with profound shock.

Emergency medicine has come a long way in the last decade. We now have a much higher level of senior supervision, routine access to the minimum standards of monitoring suggested above, and widespread collective expertise in managing anaphylaxis. It is now time to consider in any monitored area, whether the emergency department, intensive care unit, or high dependency unit, in experienced hands low dose, high dilution adrenaline is the optimal care for a patient with severe or rapidly progressive, life threatening anaphylaxis whether from shock or acute respiratory distress. Administration of 0.75–1.5 µg/kg of 1:100 000 adrenaline intravenously at 1 ml/kg per minute may reverse all the life threatening effects of anaphylaxis and inhibits further mast cell mediator release by raising intracellular cyclic AMP.

The 1:100 000 dilution, as the guideline suggests, not only allows precise titration to response, but avoids inadvertent rapid or excessive dosage. In addition, the therapeutic response to the adrenaline is immediate and assured. The Project Team of the Resuscitation Council (UK) must be congratulated on an important document that will undoubtedly improve first responders’ knowledge and outcome, and indeed be of benefit to us all.

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Medical treatment of anaphylaxis

EDITOR—We have read with grave concern the project team’s recommendations for the medical treatment of anaphylaxis and believe very strongly that the advice against intravenous adrenaline (epinephrine) is potentially very dangerous. We also find the omission of reference to guidelines for the management of anaphylaxis in the accident and emergency (A&E) department published in the same journal as very regrettable if deliberate, or puzzling if the project team had no knowledge of their existence.

The project team’s guidelines have also failed to emphasise the relevance of grading the severity of anaphylaxis and that its treatment should be directed to the severity of the attack encountered.

We agree that the project team’s guidelines should be used by the inexperienced and invariably pre-hospital responders. We also agree that the subcutaneous route is unreliable and should be avoided. However, we suggest that A&E seniors or supervising trainees and well supported juniors lack clinical credibility to administer high dilution intravenous epinephrine carefully titrated against response in the fully monitored patient in the resuscitation room is insulting to the specialty of A&E. It also shows that in spite of having A&E representation the project team fails to understand fundamental principles of A&E involvement in the management of the critically ill.

To suggest that patients with clinical signs of shock should be administered intramuscular epinephrine as epinephrine can be rapidly absorbed is in physiological terms most bizarre advice.

We conclude that the project team’s guidelines need urgent revision as they will lead to patients dying due to failure to urgently administer intravenous epinephrine. We will continue as we hope the majority of A&E departments will do similarly, to use the published A&E guidelines and we believe that they are currently the best available guidelines for treating anaphylaxis in the A&E department.

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(adrenaline) should have been given intramuscularly. We believe this to be true, but it was most certainly not our intention to condemn all use of intravenous adrenaline by experienced medical practitioners either in emergency departments or elsewhere. In retrospect we should have been more explicit on this point. We agree totally with Dr Brown's statement that adverse outcomes for adrenaline occur when it has been given too rapidly, inadequately diluted, or in excessive dosage. We also recognise that emergency medicine has progressed a long way in the last decade with a much higher level of senior supervision and greater possibilities for treatment under monitored conditions.

Our guidelines were intended specifically for those first medical responders who are inexperienced in the management of this emergency. They are unlikely to have monitoring facilities available. For these, cautious recommendations are appropriate with intravenous use of adrenaline restricted to emergencies judged to be immediately life threatening.

The examples that we gave for indications for intravenous adrenaline were clearly not intended to be comprehensive, and experienced physicians in monitored areas will appropriately make their own decisions. We did mention the value of infusions of 1:10 000 of adrenaline—which permits titration of dose against need. It may also be worth emphasising that in asphyxia from upper airway oedema and hypoxia from severe bronchoospasm, there are additional priorities—not related to parenteral adrenaline—such as oxygenation and nebulised inhaled bronchodilators. Dr Brown's comments do, of course, add to our own guidelines by making sound recommendations for expert management that was outside the remit of our article.

The concerns of Mr Gavalas and his colleagues were similar, but there seems also to be an element of misreading of our document. They say that they "believe very strongly that the advice against using intravenous adrenaline (epinephrine) is potentially very dangerous". We must reiterate that we did not advise against its use, but urged only that it should be used in the most serious cases and by experienced clinicians.

Our guidelines stated in paragraph 4.4 that: "Intravenous adrenaline (epinephrine) in a dilution of at least 1:10 000... is hazardous and should, therefore, be reserved for patients with profound shock that is immediately life threatening and for special indications".

We also added in paragraph 5.2: "The use of epinephrine (adrenaline) by the intravenous route in the special circumstances given in paragraph 4.4 should usually be reserved for medically qualified personnel who have experience of it, who know that it must be administered with extreme care, and who are aware of the hazards associated with its use".

The footnote to the legends state very clearly: "Consider slow intravenous (IV) epinephrine (adrenaline) 1:10 000 solution. This is hazardous and is recommended only for an experienced practitioner who can also obtain IV access without delay".

There are some practitioners who have made the habit of always using adrenaline intravenously, whereas others have preferred the subcutaneous route, and many are afraid to give it at all. We believe that we have given the correct advice—that intramuscular adrenaline is the norm for the emergency treatment by first medical responders, with IV adrenaline reserved for special and life threatening situations. This is far from advising against its use!

There is one charge to which we must plead guilty. Of course we were aware of the previous paper published in the Journal of Accident & Emergency Medicine in 1998, and it was indeed our intention to reference it together with the other specialist recommendations. That omission was not deliberate, and one of us (BAMC) must take responsibility for that important last minute oversight.

We do not accept that the guidelines need urgent revision. Neither does the Project Team with its wide representation accept that the recommendations were intended and are insidious to the specialty of accident and emergency. We are conscious that we all have the same aims: better and safer treatment of an important medical emergency.

Future inpatient management of patients with minor head injuries

We feel that the compulsory wearing of a helmet when cycling is essential for the future inpatient management of patients with minor head injuries. We do not yet know how we will resolve this issue locally, but would welcome other views on ways of managing the patient.
Playing in the back seat

EDITOR,—We read with interest the letter of fatal intra-abdominal injury associated with incorrect use of a seat belt and would like to present another aspect of seat belt misuse.1 A pair of 7 year old identical twins presented to the accident and emergency (A&E) department after being involved in a head-on road traffic accident. Both had been restrained in four point child seats in the back of the car.

In the department, one was complaining of abdominal pain, the other none. On examination of the twins, both were haemodynamically stable. Twin 1 had bruising to her abdomen, the other none. This bruising was linear in nature across her abdomen, “the seat belt sign”. She had no focal tenderness.

In view of the seat belt sign, twin 1 was admitted and an abdominal ultrasound was performed at this stage. The ultrasound showed a small amount of fluid in the pouch of Douglas, but no other free fluid or lacerations of visceral organs.

Overnight she remained painful, but haemodynamically normal. A further ultrasound was performed the next day which showed free fluid within her abdomen.

A laparotomy was performed that confirmed turbid fluid and this was converted to a laparotomy. Three lesions were found in her jejunum, one full thickness and two partial. A 15 cm resection of her jejunum was performed with anastomosis. She made an uneventful recovery.

On detailed questioning while in the A&E department, she stated that she had been playing a game with her twin sister and had wriggled out of her shoulder straps. This had converted her four point child seat into a lap belt. Twin 2 had remained properly restrained in her child seat.

Lap belt use has been recognised as a mechanism of blunt injury to the small bowel. The seat belt sign is associated with an increased likelihood of intestinal injury.2,3 This lap belt injury in children usually occurs when children are too large for their safety seats and too small for adult seat belts.4

This case highlights the importance of the seat belt sign, but more importantly that children within their own safety seats need to be restrained properly within them. Incorrect usage results in injury similar to adult lap belts.

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1 Carnall D. Cycle helmets should not be compulsory. BMJ 1999;318:1905.

Oesophageal rupture

EDITOR,—I read with interest the article by Onyeka and Booth present an interesting case of tension pneumothorax associated with Boerhaave’s syndrome.2 I have previously described a similar case in a 47 year old man who survived his ordeal in 1996.3 As the authors note, awareness of the condition is the mainstay of diagnosis.

Aside from these two cases, tension pneumothorax has been described in association with rupture of a Barrett’s oesophagus1 and after rupture of an oesophageal diverticulum.4 It is worth noting that by far the commonest cause of oesophageal rupture is endoscopy. Regardless of the cause of rupture I agree with the authors that a gastrografin oesophagram is the diagnostic procedure of choice.

Conservative management of oesophageal rupture is now a well established option in iatrogenic rupture and has been described in Boerhaave’s syndrome,5 although as the authors note, immediate surgery comprising drainage and repair is the mainstay of curative treatment.

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Carbon monoxide poisoning

EDITOR,—I read with interest the article by Turner et al, providing an update on carbon monoxide poisoning.1 The authors correctly point out that hyperbaric therapy remains controversial, and that no controlled clinical trial had been performed comparing hyperbaric oxygen (HBO) with normobaric oxygen (NBO). Since the date of acceptance of their paper, a prospective, blinded, randomised trial comparing NBO with HBO has been published.2 This trial also included severely poisoned patients and incorporated sham treatments. This study found in 191 patients that three days of HBO (2.8 atmospheres for 60 minutes) offered no advantages compared with three days of NBO (100% for 100 minutes of 100%). Another study is continuing in the United States and the interim results have found no difference in the incidence of persistent neurological sequelae between those treated with HBO compared with NBO, although there is an increased incidence of delayed sequelae in one of the blinded treatment arms.

The authors also recommend careful neurological and cognitive re-examination. It is worth highlighting that cognitive testing in carbon monoxide poisoning is far from standardised. Many studies utilise different screening tests, different time intervals to re-screening, and different HBO regimens. This lack of standardisation makes it difficult to compare studies and no doubt contributes to our inability to provide definitive recommendations in the management of carbon monoxide poisoning.

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The authors reply

We also read with interest the paper by Scheinkestel et al, which was published after acceptance of our article.1 Scheinkestel’s paper was accompanied by a detailed editorial which documented a number of criticisms that preclude implementation of its findings until further data are forthcoming.2 Recommendations from poison information centres, as described in our article, have not been changed and still provide useful guidance on selecting patients for hyperbaric oxygen.

We believe that careful neurological examination, including specific testing of cognitive function, is vital in the management of patients. Physicians should use tests with which they are familiar and apply them serially to the same patient. Standardisation of formal cognitive testing for trials was beyond the scope of our clinically orientated article.


Evidence based and guideline based medicine

EDITOR,—Evidence based and guideline based medicine is justifiably emphasised in current accident and emergency (A&E) medicine practice. At St James’s University Hospital in Leeds, the A&E trainees participate in regular evidence based critical appraisal sessions as part of education development, and such skills are assessed in our Faculties of Accident and Emergency Medicine exit examination.

One source of valued literature is Sackett et al,3 particularly their appraisal cards on the validity, importance, and applicability of a particular type of study. Lacking a photographic memory, I put forward simple acronyms that have helped me to facilitate timely and efficient appraisal for everyday use when selectively scanning relevant journals. Preceding these specific acronyms is a “stand-
ards' acronym that follows Crombie's suggestion that standard questions should be used as a filter for all papers. I hope they are of use to fellow practitioners of evidence-based medicine, and further suggestions will be gratefully received.

**Standards**

**Stated aims?**

**Tests and measures appropriate?**

**Arithmetic (do the numbers add up?)**

**Design appropriate?**

**Relevance to your practice?**

**Different results from previous reports?**

**Sample size/power adequate?**

**Diagnosis**

**Diagnostic test needed?**

**Appropriate population?**

**Gold standard used regardless of test result?**

**Numerogram (2×2 table) constructable?**

**Sensitivity and specificity important?**

**Inferences possible?**

**Safe, cheap, and helpful?**

**Prognosis**

**Prospective study?**

**Representative sample?**

**Objective and blinded outcome criteria?**

**Groups adjusted for prognostic factors?**

**Numbers recruited and followed up adequate?**

**Outcomes likely?**

**Study findings precise?**

**Inferences possible?**

**Similar patients to your own?**

**Guidelines**

**Guidelines needed?**

**User friendly?**

**Identified risks and benefits?**

**Decision options clear?**

**Evidence based decisions?**

**Large variations in current practice?**

**Implementable?**

**NHS benefit?**

**Economical?**

**Safe?**

**Therapy**

**Trial ethically approved?**

**High recruitment and follow up?**

**Equal treatment and assessment in each group?**

**Randomised and how?**

**Appropriate population?**

**Potential benefits for patients?**

**End points applicable?**

**Absolute risk reduction/number needed to treat?**

**Systematic review**

**Systematic search strategy?**

**Randomised and relevant trials?**

**Each trial assessed?**

**Valid results in all trials?**

**Inconsistent populations or results?**

**Evidence of benefit via odds ratios/number needed to treat?**

**Was hypothesis satisfied by the review results?**

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**Weekly web review**

**EDITOR,—**A noteworthy web site exists for emergency department evidence-based medicine enthusiasts. The Weekly Web Review in Emergency Medicine (www.wwrem.com/) is dedicated to the critical analysis of current clinical literature on topics relevant to the practice of emergency medicine. It has a useful rating system for each of the articles reviewed and an archive database. It dovetails with this journal's journal scan and has useful links, notably with the Centre for Evidence Based Medicine at Oxford. I recommend it as a useful adjunct to any emergency physician's continual professional development.

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Evidence based and guideline based medicine

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doi: 10.1136/emj.17.2.154-c

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