

develop cytopenias.<sup>16</sup> Children who receive additional pulses of parenteral vincristine and steroids or "intensive" multiagent inpatient treatment during maintenance are less likely to relapse.<sup>17</sup> Also, children on maintenance treatment who have lower than average concentrations of intracellular metabolites of 6-mercaptopurine and methotrexate are at greater risk of relapse, independently of other prognostic variables.<sup>18</sup>

Non-compliance is not, of course, the only explanation for low metabolite concentrations in regular clinic attenders. Even under controlled conditions there is considerable variability between individuals in accumulation of intracellular metabolites of both mercaptopurine and methotrexate, and this may be genetically determined.<sup>19</sup> So for some children oral antimetabolite treatment will be insufficient because of their constitution. Also the bioavailability of the native drugs depends on, among other things, timing and whether drugs are taken fasting or with food.<sup>20</sup> If, however, antimetabolite doses are gently and systematically titrated to the point where cytopenias occur, physicians' timidity and patients' idiosyncratic constitutional resistance should cease to be powerful influences. Patient compliance then becomes the major consideration. Arguably this is the point we have reached for most patients in Britain.

So how can non-compliance be eliminated? One way is to avoid oral treatment completely and give all drugs parenterally under medical supervision. Though this may have theoretical advantages, the practical and logistical aspects of such a policy make it almost impossible to achieve. Nor does delegating parenteral treatment to the patient or the parents overcome the potential for poor compliance. The only other way is to educate and inform parents and children about the importance of oral treatment and carefully to monitor progress, such as by regular and conspicuous measurement of drug metabolite concentrations.

We don't know how big the problem of non-compliance with maintenance treatment will prove to be, and it will vary in different communities. We believe it probably contributes to a substantial proportion of unexplained late relapses of "standard risk" childhood acute lymphoblastic leukaemia even in developed countries. If so, and if it could be circumvented, maybe long term disease free survival would increase by 10% even where rates of 75% are already being achieved. On this basis, late relapse might be avoided in around 30-40 children each year in Britain alone, and the figure would be much larger in some other countries.

Apart from being a desirable goal at any price, such an achievement would be economically attractive. Outpatient antimetabolite treatment is inexpensive whereas salvage treatment for relapsed acute lymphoblastic leukaemia, still

unsuccessful in most patients, is extremely costly. The inexorable trend to more intensive, toxic, and expensive first line treatment protocols might also be slowed down. And on a worldwide scale, anything that simplifies and reduces the cost of treatment will eventually lead to more children receiving potentially curative treatment.

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## Prehospital emergency care

*A new faculty and journal are encouraging research and better services*

Many of the people who die of trauma, heart attacks, or stroke die within the first hour. Many do not reach hospital. People have thus long recognised the need to improve the emergency services offered to patients before they reach hospital. But research on what happens at that critical time is hard to do. Many questions remain about who should offer the care and how it can best be offered. In an attempt to encourage research into prehospital emergency care and to develop the services offered, the Royal College of Surgeons of Edinburgh has established a multidisciplinary faculty of prehospital care. Now BASICS (British Association for Immediate Care) and the BMJ Publishing Group are launching a new journal—*Pre-hospital Emergency Care Journal*.\*

BASICS was begun by Ken Easton in 1966 after he had seen serious road accidents poorly managed. It now comprises 1700 doctors around Britain, most of them general practitioners, who are prepared to offer immediate care. Ambulance staff have meanwhile greatly improved their skills. Some ambulance services believe that prehospital care belongs to paramedics,<sup>1</sup> but there is evidence that results are better in a rural setting if a trained general practitioner is called.<sup>2</sup>

Arguments continue over who is the best person to provide care, and research is limited. Defibrillators undoubtedly improve the outcome from cardiac arrest,<sup>3</sup> and first aiders can be trained to use them.<sup>4</sup> The advantages of a paramedic (who can intubate and give drugs) over a technician (who can defi-

brillate) have been challenged.<sup>5</sup> Trained doctors can do all those things. Doctors also have an advantage in that they are allowed to give thrombolytic treatment, which improves the outcome of patients who have had heart attacks.<sup>6</sup> The relative advantages of different staff is unclear in the case of trauma,<sup>7</sup> and two American studies have shown that patients with penetrating injuries attended by either the police<sup>8</sup> or the public<sup>9</sup> had as good or a better outcome than those attended by trained ambulance crews. Patients with severe head injuries often need to be paralysed and ventilated, which usually can be undertaken only by doctors.<sup>10</sup>

The research is inconclusive, but well trained doctors undoubtedly have a role in prehospital emergency care. Yet undergraduate medical training is poor preparation, and that is why the Royal College of Surgeons has established a specialist examination in prehospital care. BASICS also offers training and has proposed a system of accreditation so that ambulance services can be sure that doctors are adequately trained. The new faculty is open to doctors, ambulance staff, nurses, first aiders, and others interested in prehospital care, and undoubtedly this difficult work needs teamwork. The roles of first aider, ambulance person, and doctor are complementary.

Research is lacking not only on who should deliver care but also on the best care to offer. Guidelines cannot be automatically transposed from hospital practice to emergency prehospital care. An important element of all prehospital work is the decision of when to transport the patient. Will an intravenous infusion help an exsanguinating patient or simply delay definitive treatment by a surgeon? Giving fluid to patients with blunt chest trauma before transport to hospital increases mortality,<sup>11</sup> as does delaying the transfer to hospital of patients with penetrating trauma in order to wait for the arrival of paramedics.<sup>12</sup> Some types of care can be given safely only in hospital.

Further research is also needed on the best equipment for prehospital emergency care. Some forms of equipment—for instance, extrication devices—are unique to prehospital care, and they have not been adequately assessed. Some equipment may worsen the patient's predicament: pneumatic antishock garments may increase mortality, probably because they compromise respiratory function<sup>13</sup>; and semirigid collars used for immobilising the neck may raise intracranial pressure (G Davies, personal communication). New forms of telemetric equipment are also being pro-

posed that will allow doctors to assist from a remote location. Their use will need evaluation and audit.

The research and audit that are necessary to underpin prehospital emergency care will appear in the new journal. A new body has been proposed to regulate paramedics, and the new faculty is collaborating with BASICS on training and accreditation. All the professional groups need to work together, and the journal will be for them all. These initiatives should ensure better outcomes for patients who need emergency care.

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\* For details of the new journal see the advertisement facing p 1241 (Clinical Research edition), p 1253 (General Practice) and p 1243 (International), and information on the BMJ homepage on the World Wide Web (<http://www.bmj.com/bmj/>).

## A SHOT in the arm for safer blood transfusion

### *A new surveillance system for transfusion hazards*

How safe is blood transfusion in 1996? Despite recent publicity surrounding contaminated blood bags and hepatitis C virus, it is probably safer than it has ever been. More rigorous donor selection, improved viral screening tests, tighter quality control, and accreditation of hospital laboratories have all played a part. But there is no room for complacency. As was highlighted by an editorial in the *BMJ* two years ago, preventable deaths after transfusion still occur.<sup>1</sup>

The commonest cause of transfusion related death in the United States, where reporting to the Food and Drugs Administration is mandatory, is the transfusion of ABO incompatible blood.<sup>2</sup> A British survey revealed that episodes where wrong blood is given to a patient as a result of poor patient identification may complicate as many as 1 in 30 000 transfusions.<sup>3</sup> Mortality is minimised, firstly, because the distribution of blood groups in the British population means that two thirds of "wrong" transfusions are by chance ABO

compatible and, secondly, by the fact that only 1 in 10 ABO incompatible transfusions is fatal.<sup>4</sup> Nevertheless, such episodes, and other near miss events, reveal serious deficiencies in the transfusion process. Rarer immunological complications such as transfusion associated graft versus host disease<sup>5</sup> and transfusion related lung injury<sup>2</sup> also continue to cause fatalities.

What is the situation with transfusion transmitted infection? Recent American figures suggest that the risk from a donor who is infectious but not yet seropositive is about 1 in 500 000 for HIV, 1 in 100 000 for hepatitis C virus, and 1 in 60 000 for hepatitis B virus.<sup>6</sup>

Recent calculations for England suggest even greater safety than in the United States, with estimated current risks of HIV and hepatitis C infectious donations entering the blood supply for any reason of 1 in more than 2 million and 1 in more than 200 000 respectively (K Soldan, JAJ Barbara, unpublished