brillate) have been challenged.[5] 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.[6] The relative advantages of different staff is unclear in the case of trauma,[7] and two American studies have shown that patients with penetrating injuries attended by either the police[8] or the public [9] 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.[10]

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 complimentary.

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,[11] as does delaying the transfer to hospital of patients with penetrating trauma in order to wait for the arrival of paramedics.[12] 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[13]; and semirigid collars used for immobilising the neck may raise intracranial pressure (G Davies, personal communication). New forms of telemetric equipment are also being proposed 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.[1]

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.[2] 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.[3] 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.[4] 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 [5] and transfusion related lung injury [2] 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.[6]

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

data). Estimates of risk for hepatitis B infection are complicated by the fact that transmission may arise from donors with chronic hepatitis B infection and undetectable hepatitis B surface antigen. In Britain, there has been only one reported case of HIV transmission from the 26 million units of blood tested since 1985.[7] Rare cases of fatal bacterial contamination of blood also occur,[8] and there has been at least one probable transmission of human T cell leukaemia/lymphoma virus type I by transfusion in Britain.[9]

Unlike the United States, Britain has had no system for comprehensive monitoring of transfusion hazards. Because blood is not a licensed product, the Committee on the Safety of Medicines' yellow card system covering serious reactions to drugs and plasma fractions such as factor VIII has never included whole blood or its components (red cell concentrates, platelets, fresh frozen plasma, and cryoprecipitate). This gap in reporting is now being filled, with the recent launch of the serious hazards of transfusion (SHOT) initiative. Covering the whole of Britain and the Republic of Ireland, the initiative is a voluntary and confidential reporting system for transfusion related deaths and other serious complications. It covers all infectious and major immunological complications of transfusion, as well as all episodes where wrong blood is given, whether or not the patient is harmed. Complications of autologous donation will also need to be reported, since both bacterial contamination[10] and errors in administration[11] have been described.

SHOT aims to improve transfusion safety further by analysing reported information on transfusion hazards and translating the findings into transfusion service policy, clinical guidelines, and training. Similar systems already exist for confidential reporting of maternal, infant, and perioperative deaths, and their value is widely appreciated.

The success of the scheme will depend on the participation of all staff administering blood, so its activities are being directed by a steering group with wide representation from royal colleges and professional bodies. The system will be confidential, with no possibility of identifying patients or hospitals from the final data set. The need for anonymity is paramount to encourage reporting without prejudice to the individuals or institution concerned.

Hospital haematologists responsible for transfusion will have a key role in reporting both infectious and non-infectious hazards. Blood transfusion centres should be rapidly informed about possible viral or bacterial transmissions so that withdrawal of other components and appropriate investigations can begin. Vigilance of reporting of infections to national surveillance centres also continues. Full details of the SHOT scheme, along with the clinical features of the serious complications of transfusion, are described in the recently revised *Handbook of Transfusion Medicine*, provided free to all hospitals.[12]

One example is given to indicate the potential value of the scheme. In 1994, a report was published of three cases of transfusion associated graft versus host disease linked to a new purine antagonist, fludarabine, under trial for chronic lymphocytic leukaemia.[13] During the preparatory period for the launch of SHOT, one of us (LMW) was made aware of three further cases from different parts of the country.[5] As a result, national guidelines now recommend the use of gamma irradiated components to prevent transfusion associated graft versus host disease in patients who receive fludarabine.

Transfusionists face many challenges in today's health service. There are many additional but costly testing and processing manoeuvres to which donated blood could be subjected, but which of these would best improve transfusion safety? Should we be testing for additional viral markers such as antibodies to hepatitis B core antigen and human T cell leukaemia/lymphoma virus, moving to virally inactivated fresh frozen plasma, or undertaking leucocyte depletion of all blood collected? Or would the public be better served by extensive investment in quality assurance and audit of transfusion practice,[15] accreditation of "transfusion prescribers,"[16] basic research into blood and plasma substitutes, or widespread provision of facilities for autologous transfusion?

The SHOT initiative has the potential to provide the data necessary to inform these kinds of decision. Its success will depend on good case ascertainment, which will require vigilance and support from all staff who care for transfusion recipients. We thank Dr John Barbara for invaluable advice and discussions on infection risk.

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