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EDITORIAL

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Supply and demand of organs for donation

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Organ transplantation was one of the great successes of the past century. The ability to remove diseased organs and replace them with healthy, fully functional ones is a dream that physicians have had for centuries. Modern developments in anaesthesia, blood transfusion, immunology and intensive care mean that all but the sickest of patients can have a transplant with a good chance of surviving the operation and returning to a good quality of life. For example, age, cancer and infection with HIV, once absolute contraindications, are no longer barriers to transplantation. The only problem with this success story is that the organs are in short supply. Whereas a patient has a good chance to survive the operation and to have a well functioning organ, the chances of an organ being available for the transplantation are decreasing. Improvements in car design, and in road layout and the use of safety equipment mean that the number of serious brain injuries is declining. If patients are injured, roadside and immediate in-hospital resuscitation have become more aggressive and lessen the injury [1, 2]. In the ICU better care also reduces the injury. Similarly, changes in the care of patients with cerebrovascular accidents have also become more aggressive, also with a reduction in the severity of injury [3, 4]. This is good news for the victims of such injuries, since they are more likely to survive. However, this also means that the number of donors is not increasing and may be decreasing. At the same time the number of potential recipients is increasing, and the balance between demand and supply therefore worsens.

How then can we improve the supply of organs while improving the outcome of patients with a brain injury? There is no easy answer to this question, and many different approaches around the world are being tried. Living donation is one option [5]. A healthy person donates a kidney or part of a liver for a patient. However, it does have both short-term operative risks and longer term risks of organ failure in the otherwise healthy donor. Payment for living organ donation has always been frowned upon and considered unethical. In the United Kingdom and the United States the subject has been aired again as a way to increase donation [6, 7, 8], but for the moment it must remain a theoretical solution only.

Cadaveric organ donation remains the main source for transplantable organs. Death, unfortunately, is common amongst critically ill patients, reaching 20% in many ICUs. In some hospitals death outside of the ICU is rare. Only 10% or so of ICU deaths involve brainstem death [9]. However, ICU physicians sometimes forget that organs can be retrieved from patients without a brain injury. In the mortuary corneas, heart valves, bone and skin can all be retrieved. Within an hour after cardiac arrest the kidneys can be removed and function after transplantation. More recently lung and liver have also been retrieved in this way. The limiting factor is the period of warm ischaemia after cardiac arrest. This can be reduced if the timing of the cardiac arrest can be prepared for. With this in mind several centres have developed a protocol for taking hopelessly ill patients receiving mechanical ventilation to the operating theatre for withdrawal of this support. If they die after tracheal extubation, the organs are retrieved rapidly after cardiac arrest. If they continue to breathe, the patient is returned to the ward. While unpleasant, since the act of dying occurs in an operating theatre, it does seem an ethical way to improve organ donation, assuming that proper consent has been obtained [10]. More disturbing is the recent trend towards the giving of drugs such as heparin to anticoagulate the patient before extubation, so that the

organs will be in the best possible condition. In some ways this raises a similar ethical problem to so-called "elective ventilation". This technique involves identifying patients who have had a cerebrovascular accident, and who will shortly become apnoeic and therefore die. Instead they are admitted to a critical care area, and when they become apnoeic, they are intubated [11]. When brain death occurs, the organs are retrieved in the usual way. The difficulty which I have with this is that the intubation and ventilation are not being performed with the patient's best interests in mind. What if the cerebral oedema settles with mechanical ventilation, and the patient is left in a permanent vegetative state? Whose interests have been served then? Not those of the patient or the family, that is for certain. Of course if the patient in life has consented to these treatments and is fully aware of all the risks to them, there is no issue. However, it is doubtful whether informed consent to these treatments can be obtained simply because these are unexpected events, and consent obtained months or years before is unlikely to have given the potential donor information about current practices as transplantation medicine is moving so quickly.

What can be done to improve organ donation within the existing structure? The first thing is to improve recognition of the potential donor and identify any organisational obstacles to donation. In a contribution to *Intensive Care Medicine* a group from Paris now report having performed an interesting 2-month audit of all patients admitted to ICUs with a Glasgow Coma Score less than 8 [12]. These studies present many large organisational difficulties often not addressed in some studies, resulting in poor data. In this study the entry form to the study was completed by the physicians in the ICU soon after the patient was admitted, even before brain death was considered, usually in conjunction with a transplant coordinator. This is to be preferred to retrospective completion of the forms weeks after the patient has died by trawling through the notes, which introduces obvious inaccuracies. The completed forms were also validated by comparison with the hospital information systems, again essential to ensure that all the deaths have been identified. One shortcoming of this study was that it was carried out for only 2 months, and a longer period of study might have given slightly different results. Despite this shortcoming this study gives us valuable information.

Hospitals with both a neurosurgical and a transplant unit had the highest rate of donation. This is probably a mixture of case mix and interest in that hospital. Various organisational issues are very interesting. The number of transplant coordinators was directly related to the number of donors. This is a feature shown in Spain where hospitals employ procurement officers (often physicians) to go around various wards and identify potential donors before death [13]. This has led to a large increase in organ donation and has made the need for living related donation, with its attendant risks, almost nil. In the United Kingdom a similar approach using nurses has been tried and shown to increase non-heart-beating donors, and while it is early in the programme, the initial results with heart beating donors are encouraging.

In France there is the convention of presumed consent, but physicians there also ask the relatives. Worryingly, the Parisian group found an increase in the opposition to donation. Unfortunately, they do not discuss the reasons for this. In the United Kingdom the commonest reason for the failure to donate on the part of a potential organ donor is refusal by a relative, and this appears to be increasing [14]. There are many reasons for this. Unfortunately, a number of high-profile cases in which physicians have misbehaved has led to an increase in public distrust in the medical profession.

One other reason for refusal is asking relatives to make a difficult decision at a time of grief. The only way to lessen the emotional impact of the situation and remove some of the stress is to know the wishes of the potential donor in life. In the United Kingdom we have an Organ Donor Card, but often this is lost at the time it is needed. To overcome this a voluntary, a computerised record of the wishes of the population has been started. So far 18% of the population have registered, and it is hoped to have almost 25% on the register by 2010. Other countries have approached this problem differently. Belgium, for example, has an opting-out policy [15]. The state assumes that you want to donate your organs unless you enter your refusal on a computerised register. The donor's wishes are always paramount and cannot be overridden by the surviving family. Transplant coordinators must check the register carefully before donation to see whether any objection has been recorded. Only 2% of the population object. Organ donation rates are high, and, again, living related donation is uncommon.

Some of the other organisational difficulties in Paris are related to the licensing of hospitals to retrieve organs from donors, those that are unlicensed do not retrieve and the organs are therefore lost. This does seem to be a waste of a precious resource. Within Europe several alternatives have been tried. Moving the donor to another hospital, as suggested by the authors is one option. However, this may add to the already considerable emotional distress of the relatives. It may also risk instability in the donor with the loss of some or all the organs. Mobile retrieval teams are another option, and these are widely used. Interestingly, although usually consisting of a surgeon and a nurse relying on the donor hospital to provide an anaesthetist, some centres are now planning to take a technician to look after the body during retrieval, the argument being that if they are dead, a physician is not needed to give drugs, fluids etc.

Another feature of the French team's paper is the high number of patients who were considered medically unsuitable. The boundaries for suitable donation are constantly moving because of improved donor care. Now

the only contraindication to donation is a transmissible fatal disease in the organ, for which there is no cure (C. Rudge, personal communication).

The supply of and demand for organs is unlikely ever to be matched in my professional lifetime. For now all that we can do is recognise each potential donor, and although it constitutes a tragic loss to their family and friends, seeing it as an opportunity that can bring health to other patients and in so doing benefit society as a whole. We should not shy away from the difficult ethical, moral and clinical problems that organ donation poses to the physician, but rather confront, discuss and solve these problems so that the valuable gift of donation and the resource that it provides us is not wasted. In the future it is likely that some diseases now treated by transplantation will have alternative treatment or cure, and that those patients still needing replacement organs will obtain them from sources other than the partially worn organs from dead humans. Until then we must use what we have wisely.

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