

## INVITED REVIEW

### Which methods of donor recruitment give the safest donors?

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#### INTRODUCTION

It is the goal of the World Health Organisation (WHO) that all blood donations collected throughout the world are from voluntary non-remunerated donors.<sup>1</sup> The Red Cross, and more recently the European Economic Community have also fostered a commitment to voluntary non-remunerated donation.<sup>2</sup> Paid donation does continue in many countries, particularly developing countries and those involved in the commercial plasma industry. This paper seeks to discuss the benefits of voluntary non-remunerated blood donors and the merits or otherwise of the various alternative types of blood donors and donation systems which are used throughout the world including paid volunteer donors, replacement donors, directed donors and the utilisation of unused autologous blood in the general supply.

#### VOLUNTARY NON-REMUNERATED DONORS

The definition of voluntary, non-remunerated donations passed by the VIIIth General assembly of the International Federation of Red Cross and Red Crescent Societies and accepted by the International Society of Blood Transfusion and the Council of Europe states: "Voluntary non-remunerated blood donors are persons who give blood, plasma or other blood components of their own free will and receive no payment for it in the form of cash, or in kind which could be considered a substitute for money. This includes time off work, other than reasonably needed for the donation and travel. Small tokens, refreshments and reimbursement of direct travel costs are compatible with voluntary, non-remunerated donation."

Voluntary, non-remunerated donors are the most common donors used in those countries with highly developed blood transfusion services. In countries such as Australia, the system is based totally on voluntary non-remunerated donations. These donors donate for altruistic

reasons, as an act of consideration and generosity to the community without thought of reward. The use of these donors is strengthened when non-governmental organisations (NGO) collaborate with governments responsible for funding services, the results being advantageous to both as neither are seeking to make a profit.

Experience has shown that voluntary non-remunerated donations have the lowest incidence of disease markers.<sup>1</sup> When combined with intensive donor screening, such as questionnaires, private interview and laboratory testing, very low incidences of infectious disease markers can be obtained. In Australia, in spite of there being over 1,700 cases of AIDS, the incidence of HIV detection in blood donors is only 0.86 per 100,000.<sup>4</sup> Comparative studies have, in a number of countries, shown that there is an increased risk of post transfusion hepatitis following the use of blood and blood products from commercial sources.<sup>5,6,7</sup> A ten fold difference in non-A, non-B hepatitis between commercial and voluntary programmes has been reported.<sup>8</sup> More recently similar data has emerged on hepatitis C.<sup>1</sup>

A further important point needs to be understood about voluntary non-remunerated donors. This relates to the fact that within this group there are a number of factors contributing to safety. The importance of measures such as donor questionnaires and interviewing has already been stated but the ratio of new versus regular donors is also critical. In our experience and others, the great majority of infectious disease markers are found in those donors who have never previously donated. The risk of infectious disease markers fall steeply with the number of previous donations made. Since the commencement of screening in May 1985, HIV has not been found in our Service in any donor who had made more than two previous donations.

Thus, the key must be to create an adequate donor base of regular donors. Obviously, it is not possible or even desirable to eliminate new donors as the long-term continuation of blood

supply is dependent upon their recruitment, however, through effective recruitment and education, their proportion can be minimised. At the New South Wales Red Cross Blood Transfusion Service the proportion of new donors is about 8%-10% while in country areas of New South Wales it is even lower. If new donors are so much more dangerous why use their donations? The answer to this is that in an ideal world it would be better to discard them, however, few are in this position as elimination of these donations would lead to catastrophic shortages of blood and in developing services where the new donor proportion may be 50% or greater the proposition is untenable.

Finally, with regard to voluntary non-remunerated donors, the issue of what exactly is non-remunerated should be discussed further. The definition given above satisfactorily makes the critical points, however, how far services can go in making donors comfortable is still a grey area. Attempts must be made to make the donor's experience pleasant or they will simply not return as altruism will only take them so far. In our Service, hot dogs, milk shakes, muesli bars, cheese and biscuits, tea and coffee and fruit juice are all offered to donors, together with magazines to read and television. Clearly, it is up to individual countries and blood banks to decide what is appropriate.

### PAID DONORS

In many countries the payment of donors for blood donations is widely practised. Unfortunately, in some cases it is the only way in which a blood supply can be secured. Even in the United States payment of donors, particularly plasma donors, is practised. Some would argue that these are still volunteer donors, however, it is difficult to believe that financial reward leads to truly voluntary altruistic donation. The incidence of infectious disease markers in paid donors is very much higher than the non-remunerated volunteer group. As already stated, comparative studies have shown that there is an increased risk of post transfusion hepatitis following the use of blood and blood products from commercial sources.<sup>5,6,7</sup>

The risk of HIV also appears significantly higher in the commercial system. A study of intravenous drug users in Baltimore showed that more than 20% had continued to donate blood.<sup>10</sup> Of these 88.1% were donating in the commercial sector and 11.9% in the volunteer sector. Some would argue that this does not

matter provided all donations are screened. However, this argument is flawed. The primary risk to the blood supply is not those donors with detectable antibody but rather those infectious donors without antibody, that is, 'window period' donors. These latter donors are the ones whose donations will slip through and contaminate products. In countries with rapidly increasing HIV seroprevalence such as Thailand and Malaysia, the elimination of these donors is critical to the safety of the blood supply. In the Baltimore study, there was a 7-8 times greater chance of a donor being in the 'window period' and slipping through in the commercial sector than the volunteer sector! Sepulveda reported similar data in Mexico where the seroprevalence of HIV was 0.1% in volunteers and 7.0% in paid donors."

Finally, with regard to HTLV-1/11, the incidence is also considerably higher in paid donors. Canavaggio showed that in the United States the prevalence of HTLV-I was ten times higher in commercial donors than volunteer whole blood donors.<sup>12</sup>

Another factor often brought to the defence of commercial systems relates principally to plasma products. Most products such as albumin and factor VIII are prepared with procedures eliminating known viruses including HIV, and some would say that the 'purity' of the source plasma is no longer as critical. There are two arguments against this stance. Firstly, it could only possibly apply to processed products and carries no weight in the issue of fresh products such as whole blood, packed cells, platelets, fresh frozen plasma and cryoprecipitate as these cannot undergo viral inactivation procedures. Secondly, what if a new virus enters the blood supply which has similar characteristics with regard to transmission such as HIV, but is not eliminated by current virocidal procedures?

Another problem with commercial donors relates to the general health of the donors. There is a tendency for such donors to come from lower socio-economic backgrounds and have poorer standards of health and nutrition. Donors may also compound this problem by donating more frequently in order to maximise their financial rewards at multiple sites and/or under different names. There is an increased risk of medical problems, for example anaemia. There is even the possibility of donors donating so frequently that they, themselves, are in need of a blood transfusion.

It can be seen then that paid or commercial donor systems carry risks much greater than the

voluntary system, not only to recipients of the products but potentially to the donors themselves.

### REPLACEMENT DONORS

Many parts of the world including Malaysia widely practise the use of replacement donors. In this form of donation the patient undergoing surgery, especially elective surgery, may be asked to find donors to replace the blood which they use at the time of their surgery. Surgery may not go ahead unless replacement donors are found. The essential problem with this type of system is that there is a degree of coercion involved on the part of the patient to find people to donate blood. Experience in Malaysia has shown that the majority of HIV infected donors come from this replacement donor group.<sup>13</sup> It is also likely that there is a continuing group of paid donors who donate within this frame work particularly in smaller centres. The use of replacement donors in countries with insufficient volunteer donors must be a judicious balance. It must be admitted that using replacement donors is better than having no blood at all, however, as a donor source where most are new donors, and some are paid, it falls far short of the safety of volunteer donors. The aim of all countries must be to progressively reduce their reliance on replacement donors with the only acceptable goal being an entirely volunteer system.

### DIRECTED DONATIONS

Directed donations, also known as designated donations, involve persons donating blood for a specific recipient. In many cases the donor may be a friend or relative of the recipient who is to undergo elective surgery and in fact many replacement donors are giving directed donations. Directed donations are very controversial.<sup>14</sup> On the surface it would seem a particularly effective way of recruiting donors, with the patient selecting relatives and friends known to be "safe" with a lower risk of transfusion transmitted infection than the random donor population. Unfortunately, there is now good evidence that not only are directed donors no safer than random donors they are probably less safe.<sup>15,16</sup> There must be some element of coercion, conscious or subconscious, when directed donors are recruited.

Readers should consider the following scenario. A girl is to undergo elective surgery for which four units of blood will be required. She

is concerned about the safety of blood supply and asks her brother to donate for her. Her brother is, in fact, an intravenous drug user but has never disclosed this to his sister or any other family member. Is this donor, her brother, likely to suddenly disclose this secret perhaps held for many years?

A further factor increasing the risk of this group is that the percentage of new donors amongst the directed donor group is much higher than amongst the random donor group and as already discussed new donors carry greater risk than pedigreed regular donors. It is inevitable that new donors recruited as directed donors will include a group of people who probably have a very good reason for never previously having been a donor, for example, high risk behaviour for HIV.

The evidence that directed donors carry greater risk is compelling. A United States study in 1987 found that directed donors had a nearly 2.7 times higher rate of hepatitis B surface antigen than did volunteers.<sup>15</sup>

In New South Wales we have found that as a group, directed donors have a 50% higher risk of hepatitis C and hepatitis B than the random donors.<sup>16</sup> The incidence of infectious disease markers in the directed groups approximates that in new random donors reflecting the high percentage of new donors in the directed group. Cordell also found that the rate of markers between new directed donors and new random donors was similar." While this might seem reassuring the practical effect of large numbers of directed donors being recruited is that the number of first-time donors in the total supply increases. As already discussed anything that increases the proportion of first-time donors is highly undesirable as in an ideal world these donations would be discarded.

Directed donations also bring a multitude of other problems that make them highly undesirable. To begin with, there is an increase in the amount of administration involved. It is obviously more work to ensure that a particular unit is labelled correctly, sent to a particular location, crossmatched for a particular patient, and actually transfused to that patient.

The link between donor and recipient also brings with it a number of highly undesirable medicolegal problems. What happens if the units are lost? What happens if random units are accidentally transfused instead of the directed units? What happens if loss exceeds that predicted and random units are required in addition to the directed units? Should surgery be de-

layed to allow sufficient time to collect directed units?

The list goes on but there is one medicolegal problem that surpassed any of these: confidentiality. In normal circumstances blood transfusion services take enormous steps to ensure that recipients do not know the identity of donors of blood transfused to them, however, with directed donors this dictum is broken. In the event of transfusion transmitted disease resulting from directed units (and as we have seen this more likely than with random units) it would obviously be impossible to protect the donor from litigation.

Directed donations potentially also bring complex medical problems. It is inappropriate for husbands to donate for wives as the risk of red cell immunisation and haemolytic disease of the newborn in future pregnancies is unacceptably high.<sup>18</sup>

Probably the medical problem currently receiving the greatest attention in the literature relates to the recently described problem of graft versus host disease (GVH) occurring in immunocompetent individuals.<sup>19</sup> If a unit of blood is transfused from a donor who is homozygous for one of the HLA haplotypes of the recipient, that recipient may not recognise the donation as foreign. Failure to recognise and reject the lymphocytes of the donor can result in engraftment of the donor lymphocytes and GVH with a 90% mortality. The incidence of this risk is dependent upon the homogeneity of the gene pool in a population, for example, in Japan where the homogeneity is high a risk of one in 659 per transfusion has been reported.<sup>20</sup> Clearly, the risk of donor and recipients sharing haplotypes is greatly increased if they are related, as is obviously often the case with directed donors."

To overcome this risk, directed donations from relatives should be routinely gamma irradiated. This creates logistic problems if access to an irradiator or other source of irradiation is not available. Further, irradiation of red cells damages the membrane with movement of potassium extracellularly. There is now considerable literature concerning the effects of raised plasma potassium levels on recipients. Clearly, for neonates and persons with renal failure there is a particular risk, however, current practice in Australia is to limit the expiry of all irradiated units to five days post irradiation.

Given all the problems of directed donations do they have any role at all? The answer is that there are very few situations where they would

be useful, however, in situations where limiting the number of donors a patient is exposed to, particularly very young children, and where the HLA matching is required, for example in refractories to platelet transfusions, a strong case can be made.

## AUTOLOGOUS DONORS

Autologous blood collection is now promoted as the safest form of blood transfusion for many patients undergoing elective surgery.

Autologous blood collection should be encouraged and should be considered for any patient undergoing elective surgery for whom there is no obvious medical contraindication. Autologous blood should be collected only in those situations where blood would normally be crossmatched for the procedure as there is little point collecting blood for trivial procedures where it is unlikely the blood would be used.

Autologous blood, however, needs to be considered from another side as experience has shown that frequently autologous blood is not required at the time of surgery and the blood remains unused. Many would consider that this is the ideal form of blood donation to supplement the homologous blood supply and cross the units over into that supply. Experience now shows that this is not necessarily a sound practice. A great majority of autologous donors have never donated blood before and our experience has shown that within this group the incidence of infectious disease markers is even higher than in the directed donor group." Thus the transfer of these units into the blood supply effectively increases the percentage of new donors and certainly increases the risk of an infectious unit being transfused. It should also be remembered that it is difficult to describe autologous donors as truly altruistic voluntary donors. Autologous donors must by necessity be donating with some self interest and in fact may be terrified of receiving blood from the random blood supply.

## SUMMARY

Thus, it can be seen that there are a number of ways by which donors can be recruited into the blood supply: voluntary non-remunerated random donors, paid random donors, directed donors, replacement donors and unused autologous units from autologous donors. It can be seen from the data and evidence discussed above, as designated by the World Health Organisation, voluntary non-remunerated donation is far and

away the safest form of blood donation and strenuous efforts must be developed for a strong programme using a core with a high percentage of regular donors in order to maintain the highest possible quality of blood supply.

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