Current issues in donor health and safety

Hong Kong Red Cross Blood Transfusion Service, Hong Kong, China

Blood donation is a rather simple procedure, and most people have done so and feel that they can make it at any time. However, it is not uncommon for the public, blood donors and blood service operators to overlook the health and safety issues that could carry impact to both donors and blood donation. In this short review, we try to present an overview of the interaction between donor health and safety and blood donation in either direction. Strategies have been developed to protect prospective donors from ineligible donation that could affect their health, minimize the risk of blood-donation-related adverse reaction and prevent long-term impact on donors and blood donation.

Key words: adverse reaction, blood donation, blood donor, health, safety

Introduction

Blood donors are healthy volunteers who give either whole blood or blood components by apheresis for altruistic motives. Though blood donation is in general considered to be safe, it does carry some risk and adverse reactions that can occur during and after blood donation. Therefore, safe blood donation in the perspectives of donor safety and satisfactory experience is the two important targets to achieve. It is observed that the overall incidence of adverse reaction directly related to blood donation is about 1% [1] of which they are generally more common in women, in younger and in first-time donors [2–4]. However, when one considers a large number of people giving blood each day worldwide and the likely effects of adverse reaction that could bring forward, measures must be existed to avoid or minimize as far as possible.

Of all adverse reactions, vasovagal episodes and soft-tissue injuries (bruises and haematoma at the venepuncture site) are the most common adverse reactions [1, 5]. Although majority of them are minor and donors are usually expect to recover quickly and completely, they are indeed of concern to donors and reassurance should always be provided to alleviate their uncertainties and anxiety. On the other hand, serious complications such as nerve injury and arterial puncture, which occur much less frequent, may require medical care outside the blood service and may lead to prolonged symptoms or incapacity. Training in the recognition and management of adverse donor reactions is obviously the key measures but one should be aware that monitoring and reporting are as important because they could provide valuable information in the development of preventive or risk minimization measures [6]. Indeed, all adverse events and reactions in donors should be identified, documented and reported. These data should be regularly analysed for possible corrective and preventive actions. The goal of donor vigilance is to reduce the occurrence of adverse events and reactions and improve the outcomes both for donors and patients [1, 5, 7].

In fact, the donor health and safety are not limited to adverse donation reactions. Recently, low predonation haemoglobin and iron deficiency in blood donors have become a hot topic in blood service in many countries. As iron deficiency not only affects the availability of donors (blood supply) but also could have adverse effect, therefore, it is prudent for any blood service to have better understanding on the topic in its own population.

The paper aims to discuss several important issues before during and after blood donation with an objective to protect donor health and safety. It is hoped that blood service could look into their own cultural, societal and donor characteristics and develop their own strategies to ensure donor health and safety, enhance donation experience and minimize the adverse donation reaction risk.

How to ensure donor health and prevent unnecessary risk in blood donation

As adequate safe and quality blood supply depends solely on healthy and volunteer blood donors, blood service has
its obligation to minimize the risk of harm not only to the transfusion recipient but also to the blood donors. Therefore, thorough screening on prospective donors not only ensures safe blood products for the patients, but also protects the well-being of blood donors from unnecessary and/or unexpected injuries [2, 3, 8]. In most developed countries, the screening of donors’ medical illnesses aims to minimize the risks on the blood donor side. It mainly comprises of a number of questions addressing the following area in relationship to donor health and safety: (i) present health and any risk exposure that render prospective donors unsafe to donate and/or the donation may carry risk to recipients; (ii) past medical illnesses or significant events; (iii) other like drug allergy, occupation or hobbies that may affect their health after blood donation (see Table 1).

Prospective donors with recent medical problems or significant health events like surgical operation are more likely to defer temporarily until the problems have been resolved. It is of no doubt full recovery in the prospective donors is a must before eligibility is granted but in a small proportion of case, that consideration has to be made at other risk. Traditionally, blood service establishes its own policy-taking reference to international guidelines such as those from WHO, US AABB, Council of Europe or UK NHSBT with modification based on the local regulatory requirement and safety concern. To illustrate, taking an example for an elective colonoscopy under the setting of health screening, a routine screening for health purpose with normal findings would not constitute a donor deferral. However, if this is performed in other setting, then temporary deferral is required until the underlying problem is resolved and prospective donor can declare free from medical illness. Similarly, for those elective minor operations like knee arthroscopy after sport injury, donors may need to be deferred for up to 3 months until full recovery. With elective major operations, the deferral period may extend to 6 months. If one has a recent major emergency operation, it is not uncommon to defer for 12 months in order to ensure full return of donors’ health. Besides, the higher chance of having blood transfusion during emergency operation is another reason for the deferral.

While it would be easier to understand how to protect donor health when one presents with more recent medical problems, for those with chronic medical illnesses that may or may not be under regular treatment, sometimes it may not be as clear cut as possible and individual assessment may be necessary. As such, prospective donors may need to carefully explain and counsel on the rationale behind. Otherwise, dissatisfaction may result because they may interpret themselves rather healthy with just ‘simple medication’ and regular follow-up. Below are some examples on prospective donors with history of chronic medical illnesses, their eligibility to blood donation and their rationale in protecting donor health and safety.

To take further into trivial area in protecting donor health, let move into minor issues in donor perspective but important to blood service. Most consider blood donation procedure is a simple venesection, but it does involve the use of some drugs and chemicals such as lignocaine as local anaesthesia, and skin disinfectant like alcohol and chlorhexidine gluconate. Therefore, if the prospective donors report this type of allergy during the medical history screening, then collection staff is not only cautious in avoiding the use of these drugs or chemical

<table>
<thead>
<tr>
<th>Persons with</th>
<th>Eligibility</th>
<th>Rationale in protecting donor health and safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of past myocardial infarction</td>
<td>Permanent deferral</td>
<td>Protect them from suffering from adverse circulatory reactions for volume shift during blood donation</td>
</tr>
<tr>
<td>Poorly or fairly controlled hypertension and with recent change in antihypertensive drug regime</td>
<td>Permanent deferral</td>
<td>As above. However, those with stable and good blood pressure control can donate blood after adequate medical assessment and pre- and postdonation care</td>
</tr>
<tr>
<td>Asthma with stable control with no recent asthmatic attack</td>
<td>Can donate</td>
<td>Those with unstable control or recent asthmatic attack may have element of infection.</td>
</tr>
<tr>
<td>Neurological disease such as epilepsy</td>
<td>May or may not donate</td>
<td>Long years of convulsion free and discontinuation of medication. However, those remain on medication might carry additional risk of convulsions or epileptic attack postdonation.</td>
</tr>
<tr>
<td>Diabetes mellitus on insulin therapy</td>
<td>Permanent deferral</td>
<td>May have additional risk of fainting or vasovagal syncope. Also due to the use of bovine insulin for vCJD donor deferral policy (product safety)</td>
</tr>
<tr>
<td>History of lymphoma and leukaemia or cancers</td>
<td>Permanent deferral</td>
<td>May not have full haematological recovery and also worry of side-effect of treatment and cancer risk</td>
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</tbody>
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to prevent the development of additional discomfort from donation but also needs to properly documented in the records and computer system if available so as to protect them from unnecessary exposure in the future donation. On the other hand, one should never ignore the need to look for those who are or will engage with hazardous occupations and hobbies on the day of blood donation. Though they may be well prepared or adapted to blood donation, cautions have to be taken to alert and prevent them from developing possible despite minor adverse reactions like dizziness as it could pose serious life-threatening risk if occurred. Using the same token, screening for the general status of donors on the day of donation is very important in protecting both donor and blood safety. Donors may not be aware of the potential problem rendering them ineligible, and hence, they declare themselves fit and healthy. At the same time, donors may look uneasy but insist to donate. Therefore, if the screening staff is able to detect, he or she should clarify further with the donors with an aim to ensure their well-being before and after donation. However, controversial example does occur in some countries: that sleeplessness, stress or tiredness without any obvious risk in donor health are used to defer them [4].

To elaborate further on how screening to protect donor health, an interesting group of potential donors that deserves special attention and understanding on the rationale on the eligibility. Pregnant women may come forward to blood donation for a number of reasons. However, almost all blood service will defer them for a period up to 6 months postdelivery or termination of pregnancy as volume shift in blood donation may affect fetomaternal circulation [2]. Moreover, pregnancy should be regarded as a major undertaking of any woman, and she should be protected until full recovery postdelivery.

**Issues of donor health and safety at blood donation**

**Venepuncture related complications**

As blood donation involves insertion of a needle into a blood vessel of the arm followed by a loss of 10% of the total blood volume within a few minutes, mild discomfort such as pain and sore sensation is always anticipated. Those repeated donors may feel at ease but new donors are usually scared. Good venepuncture techniques and selection of good sized vein are essential elements for minimal complication. However, needle-related problems still exist and by far haematoma, that is, extravasation of blood, represents the most very common complication in blood donation. Local nerve irritations or nerve injuries are also frequent due to variations in nerve branch anatomy are common. However, serious complications, such as arterial puncture, pseudoaneurysm, arteriovenous fistula or compartment syndrome, are very rare [9, 10]. While most of these complications are expected to resolve, but full recovery especially in relationship to nerve injury or irritation may not be in full. Besides, subjective sensory disturbance can be a frequent complaint from donors when postcomplication management is not adequately covered with detailed counselling and reassurance. Therefore, early detection and follow-up of this complication are indeed not only important in limiting the severity of injury, but also preventing bad donor feeling from the symptoms and signs they have. It is of no doubt that preventive measure like good training in venepuncture skill including careful selection of suitable vein is a must. Moreover, monitoring of the staff venepuncture performance and complication together with regular refresher training can provide additional assurance to good venepuncture.

**Vasovagal reactions**

It is by far the most frequent complications of blood donation which occurs more common in woman, first-time donors and the youngers [2–4]. It was reported to occur in 2–5% of blood donors with 0.34–0.8% of donations progressing to syncope [9]. Vasovagal reaction constitutes a group of subjective symptoms such as discomfort, weakness, dizziness and objective symptoms such as sweating, pallor and hyperventilation. They can be further categorized into reactions with or without loss of consciousness: of immediate or delayed type (i.e. symptoms occurring after the donor left the blood bank but within 24 h). Syncope possibly is a reaction to the sight of blood or the result of a blood pressure fall which can happen before, during or immediately after donation, at refreshment table and offsite and usually within 1 h. Anxiety, inadequate preparation to blood donation, lack of or inadequate fluid intake before and after blood donation are some of the factors leading to vasovagal reactions.

Effects of vasovagal reactions on donors and blood service are of several folds. Although most minor to moderate reactions are usually self-limiting, they can be really unpleasant experience to many blood donors. It has been observed that those donors with this adverse reaction during their first donation usually will abstain from future blood donation and this could create a negative impact to blood service and hence blood supply. On the other hand, more severe reaction albeit infrequent may lead to syncope and even convolution. In such scenario, donors may suffer from physical injury and even hospitalization, potentially having long-term sequela [11, 12].
Therefore, blood service must have to develop preventive measures to minimize the risk of its occurrence and damage if unfortunately happens. Psychological and physiological preparations of donors to blood donation are two important tactics. In the hardware, a relaxing and comfortable blood donation environment would certainly reduce the anxiety level of a blood donor, and this can further reduce the occurrence of vasovagal reactions due to stress. Nowadays, most blood centres are designed and furnished with comfortable blood donation chairs, TV and a relaxing sofa waiting area. At the same time, blood donors should be well prepared on the donation process and encouraged to have adequate fluid intake before blood donation and drinks are provided in donation centres. Other measures that may not be of important to collection staff but indeed, crucial to blood donors including their perceived confidence in venepuncture techniques; a brief but assertive reminder to them on the need of adequate fluid intake are of beneficial in reducing vasovagal reaction occurrence. Indeed, optimizing water intake is one of the most suggested methods on prevention of vasovagal reactions. Recently, there is report on the relative effectiveness of isotonic plasma volume expansion with sodium supplementation versus the consumption of water alone [13]. It is hypothesized that the effect of isotonic plasma volume expansion with sodium supplementation that persists for hours can reduce delayed reactions with injuries which are related to plasma volume dependent as water drinking alone is unable to achieve this. However, further studies are clearly needed to document whether it is effective.

Iron deficiency

Iron deficiency is getting more common among regular whole blood donors in developed countries. Theoretically, the present interval between blood donation and dietary intake could allow replenishment of blood and iron loss. However, for a number of reasons, it is observed that regular donors have progressively decreased in iron store with increasing number of blood donations. Therefore, it constitutes a major concern among blood services in many countries. With ongoing iron depletion, it not only could lead to anaemia but also more donor deferrals due to failed predonation haemoglobin check. Moreover, studies have shown that after referral for low predonation haemoglobin, 15% of repeat donors never return and another 14% return by once only [14].

At present, the best laboratory measures available for assessment of body iron stores are plasma ferritin and soluble transferrin receptor concentrations [15, 16]. In the RISE study, there are around 66-1% women and 48-7% men had iron-deficient erythropoiesis among the frequent donors [17, 18]. Similar observation is also reported locally [19]. Donation frequency appears to have the greatest impact on the iron deficiency but other risk factors such as lower weight and female gender are also important. In the latter, with menstrual blood loss, female usually has a lower iron reserves. Apart from iron deficiency anaemia, iron deficiency could lead to fatigue, decreased physical and job performance and cognitive changes [20] which is also of concern.

In order to protect the donors from those adverse symptoms due to iron deficiency of regular blood donation, blood service should not only monitor on the donor haemoglobin and iron status but also have measures to alert donors to improve iron intake. Education remains an effective measure but usually not easy to assess its efficacy. To tackle the problem more proactively, iron supplement has been considered in some blood service. It is believed that iron supplement not only brings some effects on iron replenishment but more importantly raises the awareness among blood donors on their dietary iron intake, dietary habit and physiological blood loss like excess menstrual loss. It is hoped that all these measures can alleviate the donor deferral rate and hence the dissatisfaction from the deferral due to low predonation haemoglobin.

Conclusion

In summary, although for most blood donors, the procedure of blood donation is simple, it is not without risk to donor health and safety. Careful selection and evaluation of blood donors by experienced and trained nurses closely attend the blood donors during and immediately after blood donation plays an important role not only in protecting the safety of blood donors but also assisting the donor retention that lead to adequate local blood supply. Understanding and conveying the rationale behind these proactive and protective measures in donor health and safety could help both donors and blood service achieving a higher degree of satisfaction and effective outcome in blood supply. Besides, it has to stress that blood service should develop and implement their surveillance and monitoring mechanisms on donor health and adverse postdonation measures, and develop their own risk reduction strategies that are applicable to their local donor population. Donor vigilance has become a valuable tool to monitor and compare the performance and allows experience sharing among different blood services.

Conflict of interests

The authors declare no conflict of interests.
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