**Relationship between first-year blood donation, return rate for subsequent donation and demographic characteristics**

Leila Kasraian, Alireza Tavassoli

*Blood Transfusion Research Centre, Higher Institute for Research and Education in Transfusion Medicine, Shiraz, Iran*

---

**Introduction**

Blood banks need to provide an adequate, safe supply of blood\(^1\). However, despite the increasing demand for blood due to increases in the number of clinical procedures that require transfusions, the number of eligible blood donors is declining\(^2-4\). This decline is due to new screening guidelines and donor qualification criteria used to guard against transfusion-transmitted diseases\(^1-3\). Many studies have investigated the factors that encourage people to donate blood, and have identified altruism as the most important motive\(^5-14\). To meet the potential needs for adequate blood supplies, it is beneficial to increase the number of blood donors and the blood donation rate\(^5\). Moreover, planning programmes to encourage donors to donate more often and recruit first-time blood donors are essential to compensate for those who stop donating because of increasing age, illness, or positive results in screening tests\(^14-19\).

Repeat donors play a major role in providing adequate, safe blood supplies\(^20,21\). Repeat donors are easier to recruit because of their better cooperation and fewer donor reactions\(^22,23\). In addition, the rate of blood-transmissible diseases may be lower in these donors\(^24-30\), and they are more likely to donate for altruistic reasons and feel greater responsibility toward recipients\(^5\). A previous study showed lack of time and self-exclusion for medical reasons to...

---

**Background.** The aim of this study was to determine any relationships between return rates of first-time donors, number of donations in the first year and the donors' demographic characteristics.

**Materials and methods.** Data from 1,500 volunteer, first-time donors who donated blood at Shiraz Blood Transfusion Centre (Iran) were obtained from the donor database. The donors' demographic characteristics (sex, age, educational status) and donation histories were obtained for a 3-year period and the number of donations and interval between the first donation and the following donation within a 1-year period were recorded. We searched for correlations between return rate and demographic characteristics and the number of donations in the first, second and third years. The data were analysed with the chi-squared test, multiple logistic regression and Spearman's correlation tests. P values less than 0.05 were considered statistically significant.

**Results.** More than half of the first-time donors returned to donate again (n=776, 51.7%) during the 3 years after the first donation. The mean number of donations in the whole 3-year period was 0.69±0.49, while it was 1.33±0.62 (median 1) in the first year, 0.4±0.7 (median 0) in the second, and 0.3±0.65 (median 0) in the third year. The return rate was directly correlated with the number of donations in the first year (r=0.74, P<0.001). The return rate increased as the interval between the first and second donations decreased (P<0.05, OR=1.03). The return rate was higher for male donors and single donors (P<0.05), but was not related to age or educational level (P>0.05).

**Discussion.** In this study 51.7% of first-time donors returned to donate again, a high figure indicating the success of our recruitment strategy. Understanding the importance of the number of donations in the first year for donors' return rate and planning recruitment programs and more effective measures to encourage donors in the first year may help to increase return rates.

**Keywords: blood donor, first-time donor, donation pattern, return rate.**
be the most frequent reasons for ceasing to donate. Despite the fact that large numbers of people are eligible to give blood, only relatively few people donate and only a small proportion of them become regular, committed donors. A study by Schreiber et al. found that only 38.5% of first-time donors returned to donate during a 6-year follow-up period; those authors suggested that first-time donors who returned to donate soon after the first donation were more willing to become regular donors. Understanding the pattern of blood donation, return behaviour and the factors that affect donor return rates is essential in order to design new recruitment strategies. Blood donor return rates may be related to patterns of blood donation and the interval between the first donation and the next donation.

We designed the present study to evaluate the pattern of blood donation in first-time donors and to determine whether first-time donors who gave blood more frequently during the first year following their first donation were more likely to donate more frequently during the subsequent 2 years. We also searched for relationships between donor return rates and their demographic characteristics.

Materials and methods
The participants in this retrospective study were 1,500 allogenic first-time blood donors who donated blood between 16 February 2006 and 16 February 2007 at Shiraz Blood Transfusion Centre, one of the main transfusion centres in Iran. All donors were volunteers. The data for a randomly selected sample of 1,500 first-time donors who were eligible for donation and had negative results in screening and confirmatory tests were obtained from the donor database, built in Negare software (v. 4.562, IBTO, Tehran, Iran). The follow-up period was 3 years. The demographic characteristics (sex, age, educational status) of these donors were collected and the donations they made, if any, were monitored. The interval between the first donation and the following donation within a 1-year period was surveyed. The Institutional Ethics Review Committee of the Blood Transfusion Organisation approved the study protocol.

The average number of donations, the average number of donations during the first year and the average number of donations during the second and third years after the first donation were recorded. In order to control for confounding variables we used a multiple regression model. We searched for correlations between return rates and demographic characteristics, the number of donations in the first year, and the interval between the first and next donation. We also searched for correlations between demographic characteristics and the number of donations in the first, second and third years. The data were analysed with the chi-squared test, multiple logistic regression and Spearman's correlation tests. P values less than 0.05 were considered statistically significant.

Results
The data for this analysis were from 1,500 first-time blood donors at Shiraz Blood Transfusion Centre. The mean age of the donors was 34.6±10.7 years; most participants (n=1,368, 91.2%) were men, 1,161 (77.4%) were married, and 312 (20.8%) were educated beyond secondary school level.

About two thirds of the donors (n=1,096, 73.1%) donated only once, 321 (21.4%) donated twice, 67 (4.5%) donated three times and 16 (1.1%) donated four times within the first year starting with their initial donation. More than half of the first-time donors returned to make another donation (n=776, 51.7%) during the 3-year follow up starting from their first donation. The mean number of donations during the overall 3-year period was 0.69±0.49. The mean number of donations in the first year was 1.33±0.62 (median 1), that in the second year was 0.4±0.7 (median 0), while the mean number in the third year was 0.3±0.65 (median 0).

The return rate was directly correlated with the number of donations in the first year (correlation coefficient r=0.74, P<0.001). The relation between the number of donations during the first year and return rate in the second and third years is summarised in Table I. Of the individuals who donated only once during the first year, 66.1% failed to return for further donations while only 7.2% of donors who donated four times or more in the first year did not return to donate again in the second or third year (Table I). The return rate increased as the interval between the first and second donations decreased (P<0.05, OR=1.03). During the 3-year study period, 48.3% of the donors did not return. In the second year 29.8% of donors returned, in the third year 25.9%
returned, and 14.3% returned in both the second and third years. Those who had donated less often during the year following their first donation were less likely to return for donation in the second and third years (P<0.05).

Multiple logistic regression analysis showed a statistically significant association between the number of donations during the first year and return rates during the second and third years, after adjustment for demographic characteristics. Those who donated more frequently during the first year were more likely to donate more frequently during the 3-year follow-up period (Table II). In order to control for confounding variables we used multiple logistic regression (Table III). None of the characteristics age, sex, marital status and educational level had any effect on donation rate in the first year (Table III). The return rate was higher in male donors and single donors (P<0.05). The return rate was not related age or educational level (P>0.05) (Table III).

**Discussion**

It is essential to recruit first-time donors and maintain existing donors in order to prepare adequate blood supplies. Although many individuals in the population are eligible to donate, only a small proportion donate regularly. Knowledge of the motivational factors that encourage donors to give blood, those that govern return behaviour and what influences donors to continue or stop donating is crucial in order to design successful recruitment strategies.

Table I - Relationship between proportions of donations in the first year and return rate in the second and third years.

<table>
<thead>
<tr>
<th>Number of donations in the first year</th>
<th>Did not return to donate</th>
<th>Donation in the second year</th>
<th>Donation in the third year</th>
<th>Donation in the second and third years</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>66.1%</td>
<td>23.9%</td>
<td>19.8%</td>
<td>33.9%</td>
</tr>
<tr>
<td>Two</td>
<td>40.2%</td>
<td>42.7%</td>
<td>40.8%</td>
<td>59.8%</td>
</tr>
<tr>
<td>Three</td>
<td>35.8%</td>
<td>52.2%</td>
<td>43.3%</td>
<td>64.1%</td>
</tr>
<tr>
<td>Four</td>
<td>7.2%</td>
<td>9.29%</td>
<td>78.6%</td>
<td>92.9%</td>
</tr>
</tbody>
</table>

Table II - Relationship between number of donations in the first year and number of donations in the following 2 years.

<table>
<thead>
<tr>
<th>Number of times the donor gave blood in the first year</th>
<th>Mean number of donations in the second year</th>
<th>Mean number of donations in the third year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Once</td>
<td>0.29±0.033</td>
<td>0.23±0.03</td>
</tr>
<tr>
<td>Twice</td>
<td>0.57±0.08</td>
<td>0.56±0.08</td>
</tr>
<tr>
<td>Three times</td>
<td>0.95±0.025</td>
<td>0.64±0.02</td>
</tr>
<tr>
<td>Four times or more</td>
<td>1.81±0.05</td>
<td>1.56±0.06</td>
</tr>
</tbody>
</table>

Table III - Results of the logistic regression models.

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>S.E.(β)</th>
<th>95% CI</th>
<th>OR</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1: Donation in the first year</td>
<td>age</td>
<td>−0.007</td>
<td>0.007</td>
<td>0.980-1.007</td>
<td>0.993</td>
</tr>
<tr>
<td></td>
<td>sex</td>
<td>0.306</td>
<td>0.221</td>
<td>0.880-2.095</td>
<td>1.358</td>
</tr>
<tr>
<td></td>
<td>marital status</td>
<td>0.204</td>
<td>0.173</td>
<td>0.873-1.721</td>
<td>1.226</td>
</tr>
<tr>
<td></td>
<td>educational level</td>
<td>0.023</td>
<td>0.145</td>
<td>0.770-1.359</td>
<td>1.023</td>
</tr>
<tr>
<td>Model 2: Donation in the second year</td>
<td>age</td>
<td>0.000</td>
<td>0.006</td>
<td>0.988-1.013</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>sex</td>
<td>0.572</td>
<td>0.221</td>
<td>1.148-2.733</td>
<td>1.771</td>
</tr>
<tr>
<td></td>
<td>marital status</td>
<td>0.792</td>
<td>0.181</td>
<td>1.55-3.149</td>
<td>2.208</td>
</tr>
<tr>
<td></td>
<td>educational level</td>
<td>0.109</td>
<td>0.142</td>
<td>0.845-1.473</td>
<td>1.11</td>
</tr>
<tr>
<td>Model 3: Donation in the third year</td>
<td>age</td>
<td>−0.001</td>
<td>0.006</td>
<td>0.987-1.011</td>
<td>0.99</td>
</tr>
<tr>
<td></td>
<td>sex</td>
<td>0.655</td>
<td>0.201</td>
<td>1.298-2.854</td>
<td>1.98</td>
</tr>
<tr>
<td></td>
<td>marital status</td>
<td>1.087</td>
<td>0.168</td>
<td>2.132-4.127</td>
<td>2.85</td>
</tr>
<tr>
<td></td>
<td>educational level</td>
<td>−0.159</td>
<td>0.132</td>
<td>0.659-1.104</td>
<td>0.748</td>
</tr>
</tbody>
</table>

Legend: a: reference level is female, b: reference level is married, c: reference level is more highly educated donors.
In a study in Shiraz, the most important cause of discontinuity of blood donation was lack of time. A study by Piliavin et al. showed that factors such as fear, anxiety and bad experiences with a previous donation can affect the decision to donate again or not, and may affect whether blood donors become "addicted" after three or four donations. Another study by Zilmer et al. showed that negative feelings toward donation decreased as the number of donations increased. A study by James et al. showed that the return rate increased as the interval between the first donor and the second donation decreased. In this study 51.7% of first-time donors returned for donation, which was a rate similar to that in a study by Schreiber et al., who found that approximately 50% of first-time donors returned. These comparable return rates suggest that our recruitment strategy has been relatively successful.

The donor return rate in our study was higher among men than among women (Table III). Another study also found that the return rate was much higher among male donors. In contrast, whereas in our study return rate was not related to educational level, Ownby et al. reported a higher return rate among more highly educated donors. Finally, we did not find that return rate was related to the age of the donors, whereas Whyte did find that return rate increased with donor age. Another study by Schreiber et al. showed that the return rate increased together with donors' age and educational level.

In the present study the return rate increased as the number of donations during the first year increased. This finding is consistent with that of a similar study in the USA. Indeed, Piliavin et al. found that, after three or four donations, donors may become "addicted" to frequent donations. The impact of the number of donations during the first year appears to be a factor that affects donors' long-term commitment. Consequently, recruitment programmes and more effective measures to encourage donors to return during their first year should be targeted to first-time donors.

One of the limitations of our study of blood donor return rates is that the data we analysed were from a single database used at our centre. We were not able to determine whether individual donors had moved out of the geographical area served by our centre and continued to donate blood in other parts of the country; consequently we may have overestimated the failure-to-return rate. In this study we only surveyed the effect of donation intervals on donor return rate and we did not measure the effect of other variables such as fear, anxiety, availability of time and adverse donor reaction on donor return rate. Furthermore, in the present analysis we determine the return rates only for those donors who qualified for donation, and were thus unable to determine the effect of donor deferral on donor return rates. Our follow-up period was limited to 3 years and a longer follow-up period may have revealed different patterns in the return rates. Most of participants (91.2%) in this study were men, which is consistent with the national statistics: in Iran 93% of collected blood is from males and 7% is donated by females (Statistics Committee of the Iran Blood Transfusion Organisation, 2010; unpublished data).

Acknowledgements

We would like to thank Azadeh Mosallai for her help with data collection, Drs. Peyman Jafari and Zahra Bagheri for the data analysis and K. Shashok (AuthorAID in the Eastern Mediterranean) for editing the manuscript.

The Authors declare no conflicts of interest.

References

9) Boulware LE, Ratner LE, Ness PM, et al. The contribution of sociodemographic, medical, and
attitudinal factors to blood donation among the general public. Transfusion 2002; 42: 669-78.
34) Schreiber GB, Glynn SA, Wright DJ, Humphry EL. Viral prevalence in lapsed repeat compared to first-time donors (abstract). Transfusion 2001; 41: 9S.

Arrived: 13 August 2011 - Revision accepted: 27 December 2011
Correspondence: Leila Kasraian
Education and Research Department of Fars Blood Transfusion Organisation
Iranian Blood Transfusion Research Centre
No 164 lane 37, Besat Boulevard
7174715357 Shiraz, Iran
e-mail: LKasraian@yahoo.com