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ORIGINAL ARTICLE

Assessment of the Blood Donation Process at Four Major Centres in Jamaica

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ABSTRACT

Background: A major challenge for blood banks is to provide a safe and regular supply of blood to meet the patients' needs through voluntary donation. In this study, we investigated the process of blood donation at four major donating centres in Jamaica. **Materials and Method:** The research was carried out at four blood donation centres under the National Blood Bank, during routine blood collection, in a period of five working days in September 2004. It involved the systematic random sampling of 42 blood donors by using a 17-item, self-administered, anonymous questionnaire. **Results:** Of the 42 donors, (51%) were voluntary and 49% were replacement donors. The motivation drivers of first time donors were as a result of certain personal considerations such as to assist family or relatives in need. Seventy six percent of donors were repeated and 24% were first timers. Four (10%) of 42 applicant donors were rejected and the most frequent reasons for deferral were high/low blood pressure and anaemia. Forty-five percent of the donors were fearful of the process and the greatest fears highlighted by donors were that of the needle size and the stinging sensation experienced upon venipuncture. The majority of the donors (78%) found that the facilities at the blood donation centres were adequate, while 22% found that they were clustered. **Conclusion:** The results provide useful insights that can be used to make effective plans and to implement strategies to encourage the current donors to donate blood more often and to motivate the persons who are eligible to donate, in order to support Jamaica's transfusion needs.

Keywords: blood donation; volunteer, Jamaica, first-time

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Introduction

The majority of the world's population has an urgent need for safe blood. Unfortunately, worldwide, there is a shortage of active blood donors to meet the increased demand for blood [1,2]. Of the estimated 80 million units of blood which are donated annually worldwide, only 38% are collected in the developing world where 82% of the world's population live [3]. Efforts are continuing worldwide to establish and maintain sufficient numbers of regular, volunteer blood donors to ensure an adequate and safe blood supply. The constant concern in the efforts to meet the demands for blood is the fact that only a small percentage of the eligible population actually chooses to donate blood on a regular basis and that a significant percentage of eligible donors are deferred temporarily or permanently because of strict deferral criteria being continuously added in the name of blood safety [4]. At the same time, the demand for blood and blood products in most countries continues to increase because of the rise in human life expectancy and the implementation of new and aggressive surgical and therapeutic methods requiring large quantities of blood and blood products [5].

The safety and adequacy of the blood supplies depend on the commitment of each national health authority to the establishment of a well organized, nationally coordinated blood donation program. This requires the official recognition of a specific organization with the sole responsibility of blood transfusion services, an adequate budget and a national blood policy and plan supported by a legislative and regulatory framework that governs all activities [6]. The National Blood Transfusion Service (NBTS) in Jamaica has an outstanding record of providing good quality blood and blood products to the health sector. There are ten collection centres island-wide and on an average, 24,000 units of blood are collected annually by the NBTS [7]. However, the national need is approximately 50,000-75,000 units. While an estimated 50,000 units of blood are needed to cover the annual demand of blood, over the years, Jamaica has been experiencing a consistent shortage. The country's annual collection is said to be an average of 22,000 to 25,000 units. In 2008, 26,300 units were collected, with only 30% from voluntary donors. The NBTS is working to meet its annual target of 50, 000 units and it encouraged persons to become voluntary donors and to play their part in achieving the target [8]. There are a number of reasons why Jamaica, like many countries, would like to increase the number of regular volunteer donors. The number of donations is insufficient to cover the demand, leading to the importation of blood from abroad almost every year. Also, volunteer donors are generally associated with safer blood supplies in terms of transfusion-transmitted diseases [9]. In fact, the World Health Organization and the Council of Europe recommend that blood and blood components should only be collected from voluntary, non-remunerated repeat donors [10,11]. In turn, blood donation systems that rely on volunteer blood donors who donate on a regular basis can better manage blood supplies and can schedule transfusions.

The NBTS in Jamaica consist of 10 blood collection centres, each of them operating within a certain geographical area and providing services to residents within a respective area. The centres perform the following activities: blood donor recruitment, blood collection and the preparation of blood products. Anyone willing to donate blood may do it at a centre that is of greatest convenience, during the centre's office hours. Each donated blood unit is tested against the markers of such transfusion-transmittable diseases as Hepatitis B and C, HIV and syphilis [12]. The aim of this research was to investigate the process of blood donation at four major donating centres in Jamaica, as the service offered is crucial for the improvement of donor recruitment and retention effectiveness.

Materials and methods

Data collection

The standard operating procedure for the blood donation process was obtained from the NBTS

or the National Blood Bank. The NBTS is the chief authority on issues related to blood donation in Jamaica. It monitors the entire process of blood donations and would therefore, have the required documentation that is used to regulate the process. These standard operating procedures were on the basis of our evaluation of the system. From these, we compared observed practices in relation to stipulated guidelines. The data collection instruments used included two separate questionnaires, one for the donors and one for the technical personnel who were responsible for the performance of the donating and the screening procedures. There were descriptive type questions on each phase of the process of blood donation. The standard operating procedures were examined to determine the guidelines that regulated these. Interview(s) were conducted with the necessary personnel (technical and managerial) to determine their competency, knowledgeable and understanding of the donation and the screening procedures and how they adhered to them.

The research was carried out at four major blood donation centres under the NBTS or the National Blood Bank; three in the Kingston Metropolitan Area and one in the rural area. The survey was conducted during routine blood collection in one week (five working days), in September, 2004. The respondents were asked to fill in a questionnaire after blood donation. The completed questionnaires were placed in a box in the blood collection centre's reception. The research involved systematic random sampling of 42 blood donors at the four centres by using a 17-item, self-administered, anonymous questionnaire. The questionnaire included questions about demographic characteristics, donor behaviour (reasons for donating etc.), intention for future donation, donation history, motivators and barriers to blood donation, donation environment, donor satisfaction with service at donation location, risk perception (perceived risks, fears) and attitudes about blood transfusion.

The study administrator sample was assessed by using a 11-item, self-administered, anonymous questionnaire, which included questions about the number of patients seen weekly, psychological assessment of the patients, criteria for rejection, the number of persons rejected and the major cause for rejection, the validation of the patients' response to the questions and challenges encountered by each blood collection centre.

The statistical package SPSS version 10 (SPSS Inc, Chicago, USA) was used for data entry and analyses, while the charts were made by using Microsoft Office (Microsoft, Washington, USA). A p value less than 0.05 (2-tailed) was considered to be statistically significant. The frequency data were compared by the Chi-square and the Fisher's exact tests wherever appropriate.

Results

Of the 42 donors, 51% were voluntary donors and 49% were from the patients' family members (replacement donors) [Table/Fig 1]. The motivation drivers of the first time donors were a result of certain personal considerations such as to assist family or relatives in need, to find out their blood test results, or sheer interest in trying blood donation [Table/Fig 1]. The majority of the donors at the Cornwall Regional Hospital and the University Hospital of the West Indies donated blood to assist friends and families [Table/Fig 2]. The larger percentage of the donors was of the male gender and had a much lower rejection rate than the female donors. Seventy six percent of the donors were repeated and 24% were first-time donors [Table/Fig 1]. The Cornwall Regional Hospital had the greatest percentage of first time donors, while the University Hospital of the West Indies had the most repeated donors [Table/Fig 3]. The majority of both groups included donors from 18 to 30 years of age and most were from the urban areas. Four (10%) of the 42 applicant donors were rejected [Table/Fig 4]. The most frequent reasons for deferral were high/low blood pressure and anaemia.

Forty-five percent of the donors were fearful of the process. The greatest fears highlighted by donors were that of the needle size and the stinging sensation experienced upon

venipuncture. Some first time donors highlighted the fear of contaminated needles being used, but were still willing to give blood for their families and friends after being reassured of the sterile practices and equipment used during the process.

Variable	n (%)
Type of donor	
First time	10 (24.0)
Repeated	32 (76.0)
Reasons for donating blood	
Friends and family	21 (49.0)
Volunteer	21 (51.0)
Blood-donor rejection	
Yes	5 (11.0)
No	37 (89.0)
Fear factor	
Yes	19 (45.0)
No	23 (55.0)
Comprehension of asked-questions	
None	0 (0.0)
Few	1 (3.0)
Most	4 (10.0)
All	37 (87.0)
Perception of donor on donating milieu	
Not patient friendly	0 (0.0)
Clustered	9 (22.0)
Adequate	33 (78.0)
Opinion on donating area	
Too public	7 (15.0)
Too private	1 (3.0)
Just right	34 (82.0)
Encouraged other to donate blood	
Yes	37 (87.0)
No	5 (13.0)

[Table/Fig 1] Social characteristic of sample.

Place of blood donation	Reason for donation	
	Volunteer	Friends & family
	n (%)	n (%)
Donor centre		
NBB	5 (26.3)	2 (11.1)
National chest	5 (26.3)	3(16.7)
Cornwall	3 (15.8)	8 (44.4)
UHWI	6 (31.6)	5 (27.8)
	19	18

χ^2 (3) = 4.13, $P > 0.5$

[Table/Fig 2] Reason for donation at the centres.

Place of blood donation	Donor type	
	First time	Repeated
	n (%)	n (%)
Donor centre		
NBB	2 (20.0)	8 (25.0)
National chest	2 (20.0)	6 (18.7)
Cornwall	4 (40.0)	7 (21.9)
UHWI	2 (20.0)	11 (34.4)
	10	32

χ^2 (3) = 1.55, $P > 0.05$

[Table/Fig 3] Place of blood donation by type of donor.

Place of blood donation	Rejected donors at centre	
	Yes	No
	n (%)	n (%)
Donation centre		
NBB	1 (25.0)	5 (14.3)
National chest	2 (50.0)	6 (17.1)
Cornwall	0 (0.0)	12 (34.3)
UHWI	1 (25.0)	12 (34.3)
	4	35

χ^2 (3) = 3.62, $P = 0.25$

[Table/Fig 4] Rejected and accepted donors at blood collection centres.

The majority of the donors (78%) found that the facilities at the blood donation centres were adequate, while 22% found that they were clustered; 94% reported that the staff was attentive throughout the donation process. With respect to the donating environment, a majority (82%) found that the donating area was just right, 15% said that it was too public and 3% said that it was too private [Table/Fig 5]. Eighty nine percent of the donors were encouraged by the staff to encourage others to become voluntary donors. There exists a significant statistical relationship between the place of blood donor-ship and encouraging others to become volunteers [χ^2 (3) = 240.12, $P < 0.0001$] [Table/Fig 6].

Place of blood donation	Opinion on donating area		
	Too public	Too private	Just right
	n (%)	n (%)	n(%)
Donation centre			
NBB	1 (16.7)	0 (0.0)	6 (18.7)
National chest	0 (0.0)	0 (0.0)	8 (25.0)
Cornwall	4 (66.6)	0 (0.0)	7 (21.9)
UHWI	1 (16.7)	1 (100.0)	11 (34.4)

χ^2 (6) = 10.57, $P > 0.05$

[Table/Fig 5] Opinion of donors about the collection sites.

Place of blood donation	Encouraged blood volunteer by centre	
	Yes	No
	n (%)	n (%)
Donation centre		
NBB	5 (15.2)	1 (25.0)
National chest	8 (24.2)	0 (0.0)
Cornwall	8 (24.2)	2 (50.0)
UHWI	12 (36.4)	1 (25.0)
	33	4

χ^2 (3) = 240.12, $P < 0.0001$

[Table/Fig 6] Place of blood donation by encouraging other to become blood volunteers.

The majority (95%) of the donors did not find the interview process which was used to determine their suitability as donor candidates, intrusive upon their personal lives and indicated that they answered the questions which were asked, truthfully. When questioned about the major deterrence faced in regards to making donations, the larger percentage of interviewed donors indicated convenience. They indicated that if arrangements can be made between themselves and the donation centres to accommodate them at times of their convenience, due to their busy schedules, they would be willing to come in and donate. Some donors also indicated that they would appreciate being contacted by the relevant personnel to be informed or called in when time had elapsed for another donation to be made.

Variable	Donation centres			
	NBB	National Chest	Cornwall	UHWI
Average Weekly Donations	250	40	60	200
Average Weekly Rejections	25	10	30	15
Main Rejection Reason	Low Haemoglobin	Low Haemoglobin	Low Haemoglobin	Low Haemoglobin
Greatest Challenge	Filling Demand	Low Donor Numbers	Staffing	Working Conditions
Psychological Assessment	Yes	Yes	Yes	Yes
% Adherence to Protocol	100%	100%	80%	100%

[Table/Fig 7 Information on donors at the four blood collection centres.

Table 7 showed that the average weekly donation at each blood collection centre was 50. The average weekly rejection varied between 20-60%. The main reason for rejection was low haemoglobin levels. A psychological assessment was done on all the donors. The challenges experienced by the blood collection centres included inadequate staff, suboptimal working conditions and a low number of donors.

Discussion

The results of the present study reveal interesting facts regarding public behaviour and the perception of blood donors in Jamaica towards blood donation. If used effectively, such results can ultimately help in the effort to attract and retain more volunteer donors in general and to convert the currently large pool of replacement donors into volunteer donors. This will enable correct scheduling and adequate supplies of safer blood and blood products.

In our study, 24% were first-time donors while 76% were repeated donors. Admittedly, research has identified a number of willingness factors with respect to first-time donors. Piliavin et al. reported that social pressure, curiosity, specific replacement requests, guilt and the need to master fear were all important triggers [13]. Some demographic descriptors of the typical blood donors were also available. Donors tended to be between the ages of 20 and 50, male, and generally donated via organized social or professional groups [14]. Furthermore, they tended to be motivated by humanitarian or altruistic reasons [15] and by peer social pressure. Research has also shown that the predictive power of the factors associated with blood donation changes, as people progress from being first-time donors to donating on a regular basis [16]. Callero and Piliavin, for example, reported that first-time donors were more influenced by external social pressures (e.g. friends) and were more concerned about pain, whereas regular donors were more likely to mention a 'concern for others' as a motivation to donate blood and were more concerned about having to wait [17].

In our study, 51% were voluntary donations and 49% were replacement donors. The percentage of volunteers in our study was more than the national average of 30% donors in 2008 [8]. The motivation drivers of the volunteer donors were a result of certain personal considerations, such as to help family or

relatives in need. In a study by Alam and Masalmeh, 63.9% of blood donors donated blood for their family members or friends [18]. This response reflects a situation in which blood is donated largely for a family member in need (replacement) and implies that donation for any other reason (altruism) is a low priority. This is in accordance with studies that have observed a low percentage of voluntary donors in developing countries as compared to the more developed nations [19]. A study from Saudi Arabia revealed 14.8%, 48.7% and 36.5% donors were volunteer, replacement and statutory blood donors, respectively [20]. This is in contrast to an anonymous survey involving 92,581 donors in the United States, where it was found that the major reasons for donating blood were altruism (75-87%) and the awareness of the need for blood (34-43%) [21]. Another study in Baltimore, Maryland Metropolitan Area, showed that low rates of volunteer blood donors by the general public have been attributed to a variety of socioeconomic, medical and attitudinal factors. Lack of awareness of the need for donation, fear of donating blood related to the perceived risk of contracting the human immunodeficiency virus (HIV) and loss of physical vitality after donation have been proposed as the potential reasons for ethnic and racial disparities in blood donation [22].

Results from the study addressing risk perception indicated that one-half of the donors were concerned about a range of factors discouraging blood donations (e.g. the needle size, the stinging sensation experienced upon venipuncture, etc). Some first time donors highlighted the fear of contaminated needles being used. These findings are similar to that from other studies, for example, fear of the collection process was the dominant factor for avoiding donation among young Canadian college students [23]. In a study on young African American women, the most important reason for not donating was inconvenience, followed by fear of needles and taking too much time.[24] New recruitment efforts should therefore address these risk factors and ensure that the appropriate, realistic perspective is communicated to the public, so as to attract new donors.

In our study, the majority (95%) of donors did not find the interview process which was used to determine their suitability as donor candidates, intrusive upon their personal lives and indicated that they answered the questions which were asked, truthfully. The donors did not feel that the screening questionnaire contained personal questions regarding their personal life (their sexual preference, etc.). In contrast, Marantidou et al. reported that both volunteer donors and replacement donors admitted to having hidden the truth about their background [25]. The authors found that the corresponding percentage is higher for replacement donors than for volunteer donors. The reason given by more than half of the volunteer donors for having hidden the truth was that they did not consider the question important. In contrast, replacement donors reported having hid the truth to ensure that their relatives or friends received the transfusion that they needed [25]. Such a finding raises concern and highlights the dangers which are related to the replacement blood donations, both in the form of risk to those being transfused, as well as the risk to the donors. The fact that some people hide the truth about their background shows that more attention must be given to the medical history by educating the staff in personalizing the manner in which they solicit information, depending on the educational level of the donor. These findings must be evaluated in combination with the fact that these are commonly recognized incentives for donation in other countries as well [26].

There are no donor risks as long as the international standards for blood collection are observed. These standards prescribe blood collection volume and frequency in relation to donor gender and weight, age limits and donor qualification (observance of set eligibility criteria). In addition, the collection facilities must comply with specific hygiene/sanitation, safety and comfort standards. The blood services personnel must be trained, courteous and adept at interpersonal communication. In this study, the administrators reported that they adhered to the protocol at all times and observed

international regulations in collecting blood from donors. Furthermore, the majority of the donors (78%) found that the facilities at the blood donation centres were adequate, while 22% found that they were clustered; ninety four percent of the donors reported that the staff was attentive throughout the donation process. With respect to the donating environment, the majority (82%) of the donors found that the donating area was just right, 15% found it too public and 3% found it too private. Eighty seven percent were asked by the staff to encourage others to become voluntary donors. Multiple aspects of the donation experience influenced donor return behavior, including staff treatment and waiting time [27]. Retention of the donors was also largely dependent on donor satisfaction with the blood collection services [28]. So, it is vital to help them feel at home at the blood collection centres. Another crucial aspect is making the donors feel that their blood donations are useful for the community and are appreciated by it.

In our study, the majority of the donors indicated the major deterrence faced in regards to making donations is convenience. They indicated that if arrangements should be made between themselves and the donation centres to accommodate them at times of their convenience, due to their busy schedules, they would be willing to come in and donate. Some donors also indicated that they would appreciate being contacted by the relevant personnel to be informed or called in when time had elapsed for another donation to be made. Our efforts should therefore definitely ensure that reminding mechanisms are in place and should pay particular attention to reaching eligible blood donors who are willing to donate, but simply need to be reminded. One way to increase the frequency of the donations is through more effective communication with the donors. Our current efforts must be rendered more methodical and accomplished through a wider range of tools (e.g. telephonic or electronic reminders, via television, advertisements and letters). Other factors such as the distance of its location [w1]do not seem to be significant barriers to blood donation, as described in other studies [29]. It is important to know that people in Jamaica can donate blood at any hospital and the donation centres are generally open all day.

Conclusion

We believe that the results provide useful insights that can be used to make effective plans and to implement strategies to encourage the current donors to donate blood more often and to motivate persons who are eligible to donate to support Jamaica's transfusion needs. Greater emphasis on the social benefits of blood donation may possibly lead to the higher involvement of organizations and higher education establishments. Promotional activities of blood donation should also be adapted to rapidly evolving communication technologies. Further research should be done into the attitude to the donation issue among the non-donor population, which would enable to identify predominant prejudices or fears that contribute to the development of negative attitudes to blood donation. This information is relevant in the development of information packages for donor recruitment campaigns, as well as for the formation of a positive attitude towards blood donation.

References

[1] Reid M, Wood A. Motivating non-donors to donate blood. In Shaw, R.N., Adam, S., McDonald, H., (Eds.). Proceedings of the Australian and New Zealand Marketing Academy Conference. Melbourne: Bowater School of Management and Marketing, Deakin University, 2002:3411-7.

[2] Gillespie TW, Hillyer CD. Blood donors and factors impacting the blood donation decision. Transfusion Medicine Reviews 2002;16:115-30.

[3] World Health Organization/Western Pacific Region. Blood safety and voluntary Donations. 10 June 2004.

[4] http://www.wpro.who.int/media_centre/fact_sheets/fs_20040610.htm

[5] Riley W, Schwei M, McCullough J. The United States_ potential blood donor pool: estimating the prevalence of donor-exclusion factors on the pool of potential donors. Transfusion 2007;47:1180-8.

[6] Mathew S.M, King MR, Glynn SK, Dietz SK, Caswell SL, Schreiber GB. Opinions about donating blood among those who never gave and those who stopped: a focus group assessment. Transfusion 2007;47:729-35.

[7] WHO. Global database on blood safety. Summary report, WHO. Blood transfusion safety; 1998-1999. ;414-420.

[8] Available from: URL: http://www.who.int/bloodsafety/global_data base/en.
[9] Ministry of Health, Jamaica. National Transfusion Service 1999. Ministry of Health, Jamaica;1999.
[10] Jamaica Information Service. Ministry of Health: June 14 is World Blood Donor Day. June 12, 2009.
[11] http://www.jis.gov.jm/minhealth/html/20090612t170000-0500_20011_jis_june_14_
[12] is_world_blood_donor_day.asp.
[13] Liu TC, Kuperan P, Tan C, Lin TK, Lee SH. Structuring a safer donor-replacement program. Transfusion 1998;38:368-372.
[14] Dhingra N. Blood safety in developing world and WHO initiatives. Vox Sanguinis 2002;83:173-7.
[15] Council of Europe. Guide to the Preparation, Use and Quality Assurance of Blood Components. 9. Strasburg: Council of Europe Publishing; 2003. Recommendation: Appendix 2, R. 2003;(95):15.
[16] Dodd, RY, Notari, EP, Stramer, SL. Current prevalence and incidence of infectious disease markers and estimated window period risk in the American Red Cross blood donor population. Transfusion 2002;42:975.
[17] Piliavin JA. Why do they give the gift of life: a review of research on blood donors since 1977. Transfusion 1990;30:444-59.
[18] Boulware LE, Ratner LE, Ness PM, Cooper LA, Campbell-Lee S, LaVeist TA, Powe NR. The contribution of sociodemographic, medical and attitudinal factors to blood donation among the general public. Transfusion 2002;42:669-78.
[19] Glynn SA, Kleinman SH, Schreiber GB, Zuck T, McCombs S, Bethel J, Garratty G, Williams AE. Motivations to donate blood: demographic comparisons. Transfusion 2002;42:216-25.
[20] Allen CT, Machleit KA, Kleine S. A comparison of attitudes and emotions as predictors of behaviour at diverse levels of behavioural experience. Journal of Consumer Research, 1992;18:493-504.
[21] Callero P, Piliavin J. Developing a commitment to blood donation: the impact of one's first experience. Journal of Applied Social Psychology 1983:13:1-16.
[22] Alam M, Masalmeh B. Knowledge, attitude and practices regarding blood donation among Saudi population. Saudi Medical Journal 2004;25:318-21.
[23] Wake D, Cutting W. Blood transfusion in developing countries: Problems, priorities and practicalities. Trop Doct 1998;28:4-8.
[24] Bashawri LA. Pattern of blood procurement, ordering and utilization in a University Hospital in Eastern Saudi Arabia. Saudi Med J 2002;23:555-61.
[25] Glynn SA, Kleinman SH, Schreiber GB, Zuck T, Combs SM, Bethel J, et al. Motivations to donate blood: demographic comparisons. Transfusion 2002; 42:216-25.
[26] Boulware LE, Ratner LE, Ness PM, Cooper LA, Campell-Lee S, LaVeist TA, et al. The contribution of sociodemographic, medical, and attitudinal factors to blood donation among the general public: Transfusion 2002;42:669-78.
[27] Hupfer ME, Taylor TW, Letwin JA. Understanding Canadian student motivations and beliefs about giving blood. Transfusion 2005;45:149-62.
[28] Grossman B, Watkins AR, Fleming F, DeBaun MR. Barriers and motivators to blood and cord blood donations in young African-American women. Am J Hematol 2005;78:198-202.
[29] Marantidou O, Loukopoulou L, Zervou E, Martinis G, Egglezou A, Fountouli P, et al. Factors that motivate and hinder blood donation in Greece. Transfus Med 2007; 17:443-50.
[30] Sanchez AM, Ameti DI, Schreiber GB, Thomson RA, Lo A, Bethel J, et al. The potential impact of incentives on future blood donation behaviour. Transfusion 2001;41:172-8.
[31] Gillespie T, Newman JL, Bellamy M. et al. National study of blood donation decision-making: Current and lapsed donors. Transfusion 2002;42:122s-3s.
[32] Politis C. Blood donation systems as an integral part of the health system. Arch Hellen Med 2000;17:354-7.
[33] Schreiber GB, Schlumpf KS, Glynn SA, et al. Convenience, the ban of our existence, and other barriers to donating. Transfusion 2006;46:545-53.