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Journal

Transfusion, 57(1)

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Publication Date

2017

DOI

10.1111/trf.13882

Peer reviewed

Published in final edited form as:

Transfusion. 2017 January ; 57(1): 102–107. doi:10.1111/trf.13882.

A randomized trial to evaluate the use of text messaging, letter and telephone call reminders to improve return of blood donors with reactive serologic tests

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Abstract

Introduction—Low return rates for notification and counseling among donors with reactive serologic screening tests have been reported worldwide. A randomized trial to test the effectiveness of text message, letter or telephone call reminders to improve return among non-responding first-time blood donors with reactive serologic tests was conducted.

Methods—Donors with serologically reactive screening test results who had a cell phone and resided in the metropolitan telephone area code of São Paulo in the period from August 2013 through July 2014 were eligible. A consecutive sample of first-time donors with reactive screening tests who had not responded to a standard letter requesting the donor return to the blood center were randomly assigned to receive a text, a new letter or a telephone call requesting return for notification and counseling. Return rates were measured over the subsequent 30 days.

Results—Return following a phone call reminder was better than a text message (39.8% vs. 28.4%; OR=1.66; 95%CI 1.05–2.64) but not better than a letter (39.8% vs. 34.4%; OR=1.32; 95%CI 0.83–2.12). Older age was a predictor of higher rate of return with each year increase in age associated with a 2% increase in the odds of return (OR=1.02; 95%CI 1.01–1.04).

Conclusion—In non-responding serologic reactive donors, telephone call led to a higher return rate than text message. The results of this study suggest that use of text messages, while attractive for its simplicity, will not lead to increased donor notification success following serologically reactive marker results from blood donation in Brazil.

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Conflicts of Interest: none declared

All of the authors contributed to the design, data collection, writing and review of this manuscript.

Keywords

blood donors; text message; telephone; letter; randomized control trial; Brazil

INTRODUCTION

About 108 million blood donations are collected worldwide per annum. The prevalence of transfusion-transmissible infections in blood donations varies by country. While rates of donation are lower in low income countries, the average hepatitis B prevalence in such countries is 3.6% and in high income countries 0.02%.[1] Each year millions of donors may donate and be determined to have reactive screening tests requiring notification and counseling. Repeat reactive donors require additional testing to confirm the results from donation testing. Donors who are determined to have a false-positive test result can be potentially reinstated to the pool of blood donors, while those whose donation testing result is confirmed need to be counseled and guided to seek care. Notification and counseling by blood banks has an important public health role to help break the chain of additional transmission of some viral, bacterial and parasitic infections, such as human immunodeficiency virus (HIV), hepatitis B and C virus (HBV and HCV), human T-lymphotropic virus (HTLV), syphilis and Chagas disease. Notification therefore brings benefits not only to donors but also potentially to others who could be exposed to infection and to society if onward transmission is reduced.

Even at the stage of recruitment, different approaches applied to contact potential blood donors, including telephone calls or emails, may contribute to differential presentation rates in donors. Germain and Godin found a higher proportion of donors registered to give blood when contacted by email and phone call, compared just to email or phone alone.[2] Godin and colleagues showed that in first-time donors phone call reminders about giving blood again had a significant positive effect on return.[3] Similar factors may influence return for notification after donation. An important indicator of the success of the notification process is donor return for additional laboratory tests and counseling. However, low donor return rates of in persons with reactive serologic screening tests have been described, and there are few reported data regarding donor counseling and follow-up. A recent publication in India reports response rates for counseling and notification among serologic reactive donors varying from 23.3% to 59.8%.[4] Use of reminder technologies, such as text messages, have been assessed for a variety of uses in health care, including as a means to enhance return among patients failing to attend hospital appointments, a method for provision of health information, a pathway for remote diagnosis, and monitoring chronic conditions or adherence to medical treatments.[5] Text messaging is widely available, inexpensive and instant, and it can be accessed at any time according to the message recipients' convenience. Based on a systematic review there is moderate quality evidence suggesting that mobile phone text message reminders are more effective than not providing reminders to improve health care appointment attendance among patients.[6] Additionally, text message reminders may be more cost-effective compared to telephone call reminders.[7]

In donors who had not answered a standard notification letter, we conducted a randomized trial to evaluate the use of text message, letter and telephone call reminders to improve return for counseling among first-time blood donors with reactive serologic tests. A secondary objective was to evaluate return according to demographic characteristics and time to return among the different contact modalities.

METHODS

Fundação Pró-Sangue (FPS) is the largest blood center in Brazil with six collections sites located in public hospitals in the metropolitan area of São Paulo, collecting more than 120,000 blood units annually. Serologic tests for HIV, HBV, HCV, HTLV-1/2, syphilis and Chagas disease and nucleic acid tests (NAT) for HIV and HCV are performed on each donation. Approximately 2.5% of donations are discarded due to reactive screening tests. Routinely, when a donation has a reactive screening result, a letter is sent to the donor within three weeks asking him/her to return to the blood center for notification and collection of a new sample for additional testing. The letter does not inform the donor of the specific test results, rather it requests the donor contact the blood center to schedule a follow-up appointment. If the donor does not return within three weeks, a second letter is sent with the same request for follow-up. Donors who do not return after these two contact attempts are considered non-respondents and their results are flagged in the computer system to trigger follow-up should the donors return in the future.

Donors with serologically reactive screening test results who had a cell phone and resided in the metropolitan telephone area code of São Paulo in the period from August 2013 through July 2014 were eligible. A consecutive sample of first-time donors with reactive screening tests who had not responded to a standard first letter requesting the donor return to the blood center were randomly assigned to receive a text message, a new letter or a telephone call reminder requesting return for notification and counseling. When donors received the telephone call, they were spoken directly to; no messages were left. These reminders were sent 15 days after the second standard notification letter. Research staff was trained to send the letter, text, or to call the donors. The script of the message was the same for different types of reminders. The following message was sent by text, letter or read over the phone:

> “Dear donor,
>
> We need to recheck the tests from your donation. Please return to the site where you donated so that we may collect a new blood sample in the period from Monday to Friday, from 8 to 18 hours, and remember not to have anything to eat for 4 hours before”.

Staff could not be blinded to the intervention. Demographic data and serologic screening results were abstracted from information collected on computerized blood donation record for each donor. Donor return over the next 30 days was recorded. Return rates and demographics were compared among different reminder contact modalities.

One hundred fifty donors per study arm were estimated to be sufficient to detect a difference of 5% in the return rates, assuming a two-sided alpha level of 0.05 and power of 0.80. Return rates by type of reminder, demographic characteristics (gender, age, ethnicity,

educational level) and reactive serologic screening tests among responding and non-responding donors were compared using logistic regression and are presented as odds ratios (OR) with 95% confidence intervals (95% CIs).

Multivariable logistic regression models were developed comparing odds of return between contact methods (text vs. letter, letter vs. phone, text vs. phone). Only factors significant at the alpha ≤0.05 level were retained in each model. Statistical analyses were conducted with R 3.2.1 Software (R Project, r-project.org). No alpha adjustments were made for multiple comparisons.

RESULTS

Between August 2013 and July 2014 there were 122,635 blood donations at FPS. From the total, 3091 (2.5%) donations had reactive screening tests. Out of the total, 45,485 (37.1%) donations were collected from first-time donors with 1405 (3.1%) of these units discarded due to reactive screening tests. Following the first notification letter, 769 (54.7%) donors returned for notification and counseling and following the second notification letter another 152 (10.8%) donors returned. Of the 484 non-returning donors (34.5% of all first-time donors with reactive results) randomized to receive a reminder, 169 (34.9%) received a text, 154 (31.8%) a letter, and 161 (33.3%) a telephone call.

The demographic characteristics of the sample were consistent with the overall demographics of donors with serologic reactive donations at FPS. Most non-returning donors with reactive results were male (56.6%), of mixed race background (45.4%), aged between 24 to 35 years (31.7%), and had 11 years of education (56.3%) – the standard in Brazil before college. The most common serologic reactive marker from donation testing was anti-HBc (40.0%).

Return varied by type of reminder with the odds of return better for phone call than text message (39.8% vs. 28.4%; OR=1.66; 95%CI 1.05–2.64) but not better than letter (39.8% vs. 34.4%; OR=1.26; 95%CI 0.8–1.99). The odds of return for text message compared to letter were also not significantly different (28.4% vs. 34.4%; OR=1.32; 95%CI 0.83–2.12) (Table 1).

Demographic characteristics and ORs for return are shown in Table 1. Considering age as a continuous variable, we found that age was lower among donors who did not return (p=0.01) (Figure 2a). The multivariable logistic regression model results show that for each one year increase in age the odds of return increased by 2% (OR=1.02; 95%CI 1.01–1.04). However, age and rates of return by text message (p=0.06), letter (p=0.99) and telephone call (p=0.09) did not differ among groups (Figure 2b).

DISCUSSION

The use of a randomized trial design allowed us to test the effectiveness of different reminders for non-responding first-time donors with reactive serologic screening results. We sought to study donors with low return rates for notification and counseling. Consequently, we choose first-time donors, considering repeat donors are more likely to return. Regardless

of the reminder modality, return rates were moderate among non-responding donors who had not already returned to the blood center based on standard letter notification. Although text message seems to be a simpler and more convenient reminder than telephone call or letter, it was not more effective with an absolute 10%, and relative 29% smaller proportion of donors returning if contacted using this modality compared to telephone. The more personal interaction that telephone call permits may be more effective. However, return rates among donors who received a letter, although lower than among donors who were called, was not significantly different, suggesting the personal interaction is not the key driver of return. Interestingly, we found that older first-time donors were more responsive to the blood center recall process than younger donors.

Approaches to recruitment and recall have been studied by blood banks, but randomized trials are seldom used to test blood donor recruitment or recall procedures. However, the best-quality scientific evidence is achieved through randomized trial study designs. Hayes and coworkers assigned donors and non-donors to receive standard telephone calls or two different types of experimental recruitment scripts.[8] Reich and colleagues evaluated return rates among first-time donors who received a T-shirt incentive versus none.[9] They also tested two different recruitment scripts, one telling a patient story and another, a complimentary message which included information on the donor's blood type. Germain and Godin also tested return rates of donors randomized to receive a phone call only, an email only or a phone call plus email.[2] These studies found that different telephone approaches can achieve different return rates, but they did not definitively conclude that telephone call is superior to email to sensitize candidates to donate blood. To the best of our knowledge, the study we report is the first randomized trial to evaluate return rates among blood donors with reactive serologic tests. The design of the trial, study procedures development, and implementation were straightforward and can be applied to answer other research questions in blood banking beyond recruitment and recall of donors. For example, evaluating interventions to prevent donor reactions, such as providing water before donation to prevent reactions[10,11] as well as the use of transfusion of prophylactic components.

Brazil has 200 million inhabitants, 273 million cell phones[12] and 43.83 million landlines.[13] In the State of São Paulo alone there are 66 million active cell phones, a ratio of 1.5 cell phones per inhabitant.[14] Although text messages are more convenient and potentially less expensive than the other reminders tested in our study, use of texts was not shown to be more effective. On one hand, there has been a trivialization of text messages because they are now ubiquitous. On average, each Brazilian with a cell phone sends 29 text messages a day.[15] Text messages are now also extensively used by business enterprises. For example, our blood center sends mass appeal text messages when the stock of blood decreases to encourage donors with negative screening tests to return for a new donation. Among other texts donors receive, blood donors with serologic reactive results may not paid attention to the specific request for return message used in this study. Indeed, we did not have a way to assess or determine whether the text message was read. On the other hand, a mailed letter, with delivery confirmation receipt, guarantees that blood center communication has been delivered, but not necessarily read. In the case of a telephone call, the personal approach may play an important role that enhances return through interpersonal interaction. By using

a telephone call, one can assure that the request for return message had been delivered and that the purpose of the communication was not misunderstood.

We recognize limitations in our study. First, the limitations described above are inherent to communications sent by text message, letter or email. Even with delivery confirmation receipts, as available in newer smartphones, one cannot know with certainty messages were read and understood. Second, in the trial we followed donors for return up to one month. A longer follow-up period would be needed to evaluate if delayed return improves. Even so, we would expect the relative proportion of return over time to be generally consistent across the modes of communication.

Recall of donors with screening test results from donations that have potential infections is a challenge for blood banks. Contrary to our initial hypothesis that text message would improve donor return, we observed a moderate return rate among donors who had not already responded to standard letter notification and found that a more personal approach, telephone call, proved to be more effective than text message. The results from this randomized trial can be used in other blood centers to help guide donor notification procedures. The experience gained in the assessment of different recall modalities for non-respondent donors can be extended to other areas of medicine where patients do not respond to standard notification approaches. Our results suggest that while text messages are easy to send, they may not enhance or improve interaction with health care services, suggesting that ease of delivery of the message alone is not adequate to lead to increased health care seeking behavior.

Acknowledgments

We would like to acknowledge the mentorship and the grant received from BSRI and the University of California, San Francisco, USA, received during the Training in Clinical Reaserch International Transfusion Safety Program in Manaus, Brazil, June 20–29, 2012. We also want to thank our statistical consultant Lucas Petri Damiani.

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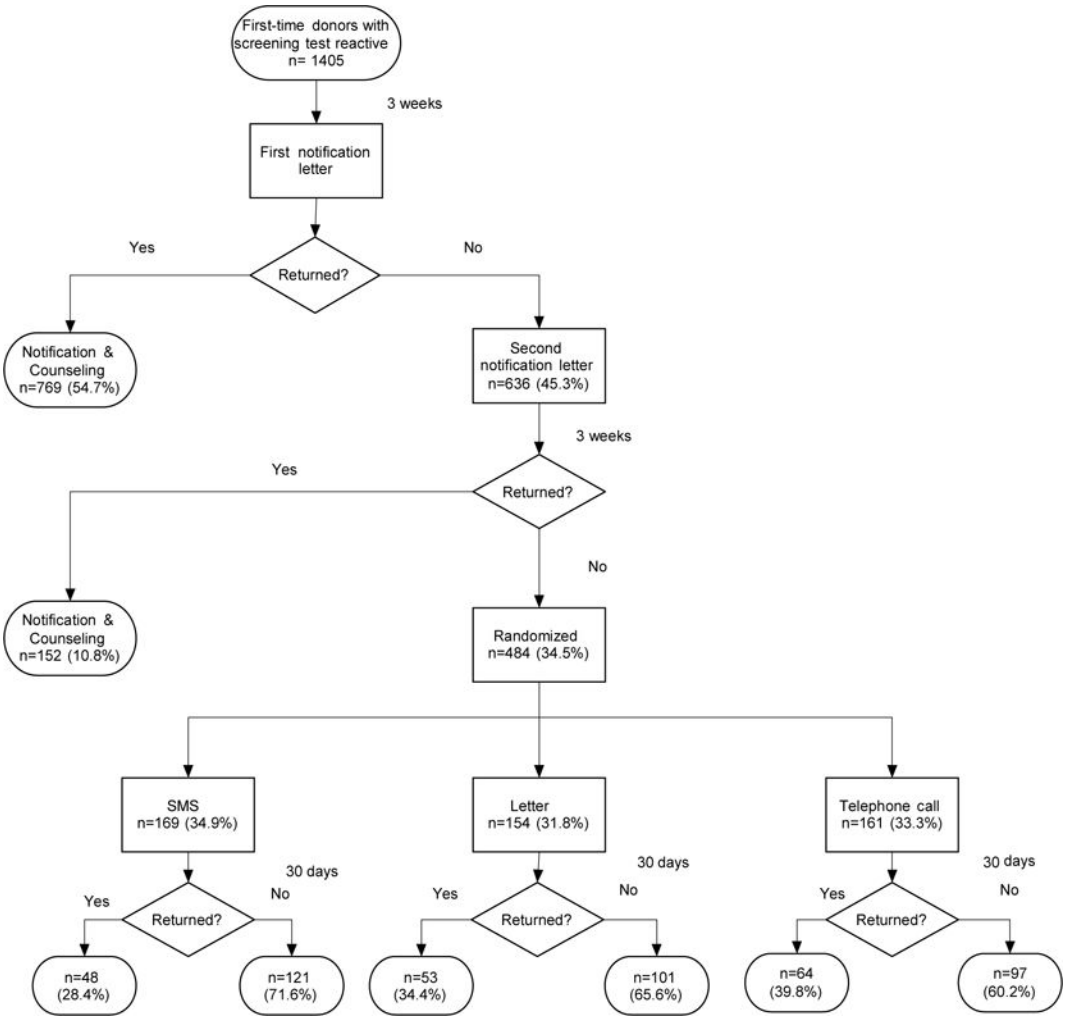

Figure 1.
Study flow diagram and return rates of participating blood donors.

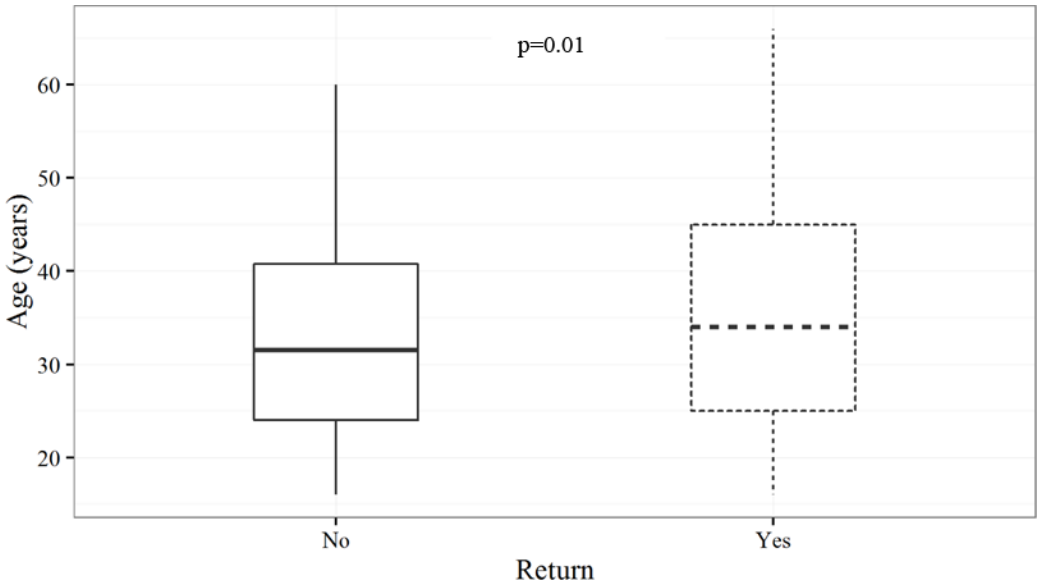

Figure 2a.
Age distribution and return rates among blood donors with serologic reactive screening tests

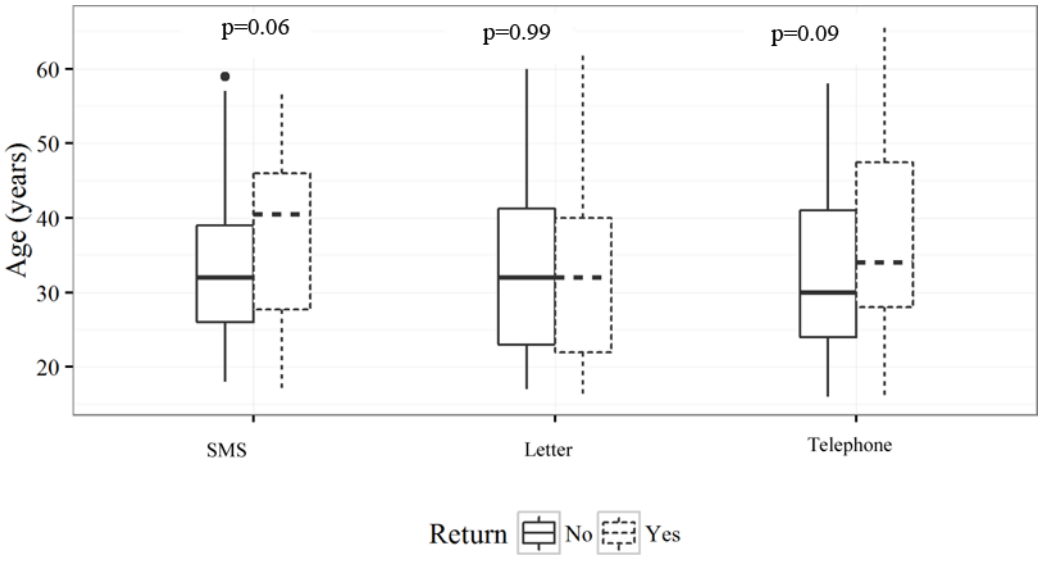

Figure 2b.

Age distribution of return by type of reminder among blood donors with serologic reactive screening tests.

Table 1

Reminder type, demographic characteristics and serologic markers among blood donors with serologic reactive tests.

Characteristic	*Did Not Return*		*Returned*		*Total*		*Odds Ratio (95% Confidence Interval)*	*p-value*
Type of reminders	**N**	**%**	**N**	**%**	**N**	**%**		
Text message	121	71.6	48	28.4	169	34.9	1.0	
Letter	101	65.6	53	34.4	154	31.8	1.32 (0.83–2.12)	0.25
Telephone	97	60.2	64	39.8	161	33.3	1.66 (1.05–2.64)	0.03
Gender								
Female	134	63.8	76	36.2	210	43.4	1.00	
Male	185	67.5	89	32.5	274	56.6	0.85 (0.58–1.24)	0.39
Education (years) *								
<8	29	60.4	19	39.6	48	10	1.00	
8–10	47	66.2	24	33.8	71	14.9	0.78 (0.36–1.67)	0.52
11	179	66.5	90	33.5	269	56.3	0.77 (0.41–1.46)	0.41
>11	59	65.6	31	34.4	90	18.8	0.80 (0.39–1.66)	0.55
Age (years) *								
16–24	85	68	40	32	125	25.9	1.00	
25–34	110	71.9	43	28.1	153	31.7	0.83 (0.50–1.39)	0.48
35–44	75	65.8	39	34.2	114	23.6	1.10 (0.64–1.90)	0.72
45–54	39	54.2	33	45.8	72	14.9	1.80 (0.99–3.28)	0.05
55–67	9	47.4	10	52.6	19	3.9	2.36 (0.89–6.39)	0.08
Ethinicity *								
White	135	66.2	69	33.8	204	42.7	1.00	
Mixed	139	64.1	78	35.9	217	45.4	1.10 (0.74–1.64)	0.65
Black	35	71.4	14	28.6	49	10.3	0.78 (0.38–1.52)	0.48
Other	5	62.5	3	37.5	8	1.6	1.17 (0.24–4.93)	0.83
Serologic marker *								
Syphilis	101	70.1	43	29.9	144	29.9	1.00	
Anti-HTLV-1/2	7	58.3	5	41.7	12	2.5	1.68 (0.47–5.55)	0.40

Characteristic	*Did Not Return*		*Returned*		*Total*		*Odds Ratio (95% Confidence Interval)*	*p-value*
Type of reminders	**N**	**%**	**N**	**%**	**N**	**%**		
Anti-HIV	25	65.8	13	34.2	38	7.9	1.22 (0.56–2.58)	0.61
HBsAg	7	87.5	1	12.5	8	1.7	0.34 (0.02–1.97)	0.31
Anti-HCV	26	72.2	10	27.8	36	7.5	0.90 (0.39–1.99)	0.81
Anti-HBc	122	62.2	74	37.8	196	40.6	1.42 (0.90–2.27)	0.13
Chagas disease	29	60.4	19	39.6	48	9.9	1.54 (0.77–3.03)	0.21

* totals may be less due to missing values