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The impact of simple donor education on donor behavioral deferral and infectious disease rates in São Paulo, Brazil

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Abstract

Background—Studies have shown that HIV residual risk is higher in Brazilian than in US and European blood donors; probably due to failure to defer at risk individuals in Brazil. This study assessed the impact of an educational brochure in enhancing blood donor's knowledge about screening test window phase and reducing at risk individuals from donating.

Study design and Methods—This trial compared an educational intervention with blood center's usual practice. The brochure was distributed in alternating months to all donors. After donating, sampled participants completed 2 questions about their HIV window period knowledge. The impact on HIV risk deferral, leaving without donation, CUE use and test positivity was also analysed.

Results—From August–November 2007 we evaluated 33,940 donations in the main collection center of FPS/HSP at São Paulo, Brazil. A significant ($p < .001$) pamphlet effect was found on correct responses to both questions assessing HIV window phase knowledge (68.1% vs. 52.9%) and transfusion risk (91.1% vs. 87.2%). After adjusting for gender and age, the pamphlet effect was strongest for people with more than eight years of education. There was no significant pamphlet effect on HIV risk deferral rate, leaving without donation, use of CUE, or infectious disease rates.

Conclusion—While the educational pamphlet increased window period knowledge, contrary to expectations this information alone was not enough to make donors self-defer or acknowledge their behavioral risk.

Keywords

blood donors; HIV knowledge; education; behavior; Brazil

Introduction

The HIV epidemic hit Brazil about the same time as USA, São Paulo city was the epicenter of the epidemic with the highest number of AIDS cases 57,102 as of Dec 2007¹. To reduce the risk of transfusion transmission of HIV the Brazilian government has taken important measures

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to control the epidemic. To minimize the risk through transfusion, blood donor procedures are strictly regulated by the Brazilian Ministry of Health and most of them follow AABB technical recommendations including a pre-donation interview to assess behavioral risk for sexually transmitted disease²⁻⁴. Routine serological tests are performed for HIV, HCV, HBsAg, anti-HBc, HTLV, Chagas and Syphilis⁵. Voluntary non paid donation is the practice, although recruitment among replacement donors (individuals who donate because a family member or friend needs blood) still represents around 40% of the donations in our blood center and 27.5% for the entire country^{6,7}.

Previous studies from our group have shown that the prevalence of HIV among first-time blood donors is around 13 per 10,000, and contrary to our expectation, it was higher among first-time community-recruited donors than replacement donors⁸. The residual risk among first time and repeat donors was calculated to be 15-17/1,000,000 which is substantially higher than in the USA (1-2/1000,000)⁹ before implementation of NAT testing, suggesting that a significant number of at risk individuals are not being picked up by the health history screening and deferred from donating blood¹⁰.

This unexpected finding has raised concerns that HIV prevalence was high due to test-seeking. Indeed, in a cross-sectional study we identified 8.8% of our donors as possible test-seekers based on responses to questions that measured their expectation in relation to their test results. For them, test-results were a very important goal from the blood donation¹¹. Our results have also shown that test-seekers were more likely to be herpes simplex virus (HSV-2) antibody positive and, although the numbers were low, test-seeking was associated with higher rates of HBsAg, HTLV I/II and HCV. This result suggested that test-seekers represented a group of individuals at risk for HIV. In this same study, test-seekers were less likely to have knowledge about HIV and they tended to be more poorly informed about HIV antibody test performance, particularly regarding the concepts of “window period” and test accuracy than other donors¹¹. These findings raised the question that if a prospective donor truly believes that HIV testing is highly accurate, and would not miss a case, then why should he or she be likely to admit to a risk behaviour. Due to their lack of knowledge about alternative HIV testing sites, perhaps many test-seekers were using the blood bank for HIV testing out of ignorance.

These findings led us to develop educational materials designed to enhance blood donor's knowledge about sexually transmitted and blood-borne infectious disease. A small intervention study was carried out at our blood center in Sao Paulo, Brazil to assess the impact of this educational brochure, designed to enhance donor knowledge about screening test performance, and to reduce test-seeking behaviour among donors. The assumption was that at risk blood donations could be reduced through educational interventions that stressed that infected units might not be detected due to the presence of the test's window period. It was hypothesized that after reading the pamphlets, donors who were infected with HIV or had high risk behaviors would be more likely to self defer from donating or use CUE to exclude their donations from being used, when compared with other donors.

Materials and Methods

Setting

São Paulo, with a population of nearly 11 million, is the largest city in South America¹². The blood bank Fundação Pro-Sangue/Hemocentro São Paulo (FPS/HSP) is based at the major public hospital in the city. FPS/HSP is one of the largest blood banks in Latin America, processing 130,000 units of blood annually. There are four locations for blood collection. The present study was conducted at the main location, in the largest public hospital of Brazil, that collects approximately, two-third of the total units (Hospital das Clinicas).

Overall study design

We conducted this trial, using a non-random sequential design to compare the educational intervention with usual practice on outcomes including knowledge of the HIV window period and transfusion infection, and rates of behavioral risk deferral, voluntary donor departures, use of confidential unit exclusion (CUE) and positivity for infectious diseases.

Study subjects and Sampling

Study subjects were all persons 18–65 years old who came to donate blood regardless of whether they were qualified or deferred for blood donation.

Educational Brochure

A three-page pamphlet with the following slogans was developed:

1. Get tested in the correct place (a list of free HIV testing sites was provided).
2. Being honest also saves lives (an explanation of the screening test window period and why we ask behavioral risk questions).
3. Help us not make a mistake (we focused on explaining that an infected unit may test negative and that it can still transmit HIV). The only way to avoid transmission is for donors to respond honestly to all questions at screening.

The pamphlets were developed by a group of university faculty and students well trained in marketing research. The design of and the language of the pamphlet was examined and approved by experts in the field of marketing and blood donation. Similar educational materials provided by the Brazilian Ministry of Health are regularly distributed across most blood centers in Brazil.

Intervention study

The pamphlets were distributed in alternate months. All donors who came to donate blood in our main collection center at the Hospital das Clínicas complex in São Paulo during the months of September and November 2007 received the pamphlets at the time they presented to donate and provided their ID. After this, donors waited until they were called for anemia testing and then went through the blood donor health screening questionnaire performed face-to-face by a trained nurse, under medical supervision. Donors who came to the hospital for donation in August and October did not receive the pamphlets and therefore served as comparisons for this study.

In the second half of each month (August through November), a short anonymous survey questionnaire about donors' knowledge of HIV infection was distributed after the blood donation to assess knowledge regarding the HIV window period. The questionnaire was composed of three questions about donor's gender, age, education, a TRUE/FALSE question about the window period for HIV infection, and another TRUE/FALSE question about HIV infection through blood transfusion. The two questions were: 1) Persons infected with HIV will be tested negative within the first 15 days of infection, and 2) In case this person donates blood within these 15 days, the person who will receive the blood will be contaminated by HIV. This questionnaire was to evaluate whether the distribution of the pamphlet improved donors' knowledge about the HIV window period and the likelihood of HIV infection through blood transfusion from window period donations.

Statistical Analysis

Two different datasets were compiled: one for the donation and deferral data, and the other for the survey data. Two sets of statistical analyses were conducted for the donation and deferral

data. First, non-parametric statistics were used to examine the univariate association between Pamphlet status and the outcome variables including overall deferral rates, deferral rates for questions related to HIV infection, deferral rates for donors leaving without donation, the rates of CUE use, and the prevalence of infectious disease markers among the donations. Donor demographics derived from the operational data base, including gender, age group, education level, donation type (replacement or community), and donor type (first time vs. repeat), were also examined by pamphlet status.

Second, logistic regression analyses were conducted to examine the main effect of pamphlet on the donation and deferral outcomes after controlling for the demographics and donation history. For the deferral outcomes and leave without donation, only gender and age groups were included as covariates since donation and donor type are not recorded for deferred donors. For CUE use and the infectious disease markers, gender, age, education level, donation type and donor type were included as covariates.

Non-parametric univariate analyses and logistic regression analyses controlling for covariates (age, gender, and education level) were also conducted to examine the pamphlet effect on donors' responses to survey questions about HIV window period and HIV infection through blood transfusion.

For education level we have applied the following groupings: individuals with less than 8 years of formal education (have not complete the first basic school in Brazil); completed 8 formal years of education; completed 11 years of formal education; and completed college/university.

All analyses were conducted using SAS/STAT Windows Version 9.1 (SAS Institute)¹³. The alpha level for statistical significance was set at $p < .01$, due to multiple comparisons, to reduce the chances of identifying chance findings as significant.

RESULTS

From August through November 2007, there were 27,752 donations and 6,188 deferrals from the main collection center. Donors who received the survey questionnaires were among those who gave donations successfully. The average response rate across 4 months was 66%. Since the survey was conducted anonymously, no donation information was available for the survey respondents.

Demographic and donation information for all donors during the August-November period and the survey sample by pamphlet status are summarized in Table 1.

Age, gender and education level were similar in both groups: pamphlets (+) vs. pamphlets (-). Individuals with low educational level (Less than 8 years of formal education) for whom reading a pamphlet could be more difficult represent 11% of the population. Among all donors, 50% had at least 11 years of formal education (complete 2nd grade) and 18% had completed university. Overall 58% of donors were 25 to 45 years old.

As shown in Table 1, there were significantly fewer replacement donations (14.2% vs. 17.5%) and fewer donations from first-time donors (26.6% vs. 28.1%) in the pamphlet months (September and November) than in the no pamphlet months (August and October), $ps < .01$. While these differences could be random, the variables were included in the logistic regression analyses to examine the role of pamphlet effect on donation and deferral data controlling for these factors since first-time donors usually have higher deferral rates¹⁴⁻¹⁷, and it has been postulated that infectious disease rates vary by type of donor.

Donation and deferral data

Pamphlet effect—As shown in table 2, there was no significant pamphlet effect on the overall deferral rate, leaving without donating, or rates of CUE use in univariate analyses. Nor were there any significant differences in the positive transfusion transmitted infectious diseases marker rates between the Pamphlet and No Pamphlet groups. The pamphlet effect remained non-significant after adjusting for the covariates: age, gender, donor and donation types (Table 3). In the opposite direction, HIV risk deferral was marginally higher during non pamphlet period (2.53% vs. 2.20%, $p=0.046$). This difference remained marginally significant after adjusting for the other variables, with donors in the non pamphlet group less likely to be deferred for HIV risk behaviors (OR = .86, CI = .74-.99, $p=0.032$).

Gender effect—A significant gender effect was found on deferral outcomes and positive infectious disease maker rates. Male donors were more likely to be deferred for HIV risk (OR=2.45 CI= 2.08-2.88, $p<.001$) and were also more likely to be deferred by positive marker rate when HBcAbs and Syphilis were included (1.57, CI=1.29-1.90, $p<.001$). On the other hand, males were less likely to leave without donation than females (OR = .64, CI = .51-.81, $p < .001$).

Age effect—There was a significant age effect on all of the outcomes except CUE use (Table 3). Compared with donors younger than 25 years of age, older donors were less likely to be deferred for HIV risk behaviors (OR = .53, CI = .45-.62 for age 25-35 years; OR = .31, CI = .25-.39 for 35-45 years of age; OR = .32, CI = .24-.42 for 45-55 years of age; OR = .12, CI = .06-.24 for 55-65 years of age, all p 's < .001). 35-45 years old donors were less likely to leave without donation than donors younger than 25 years old (OR = .56, CI = .39-.81, $p=.002$). However, older donors were also more likely to test positive for infectious diseases including HIV, HBsAg, HCV, and HTLV than donors 25 years old and younger, (OR = 2.78 CI=1.36-5.70, $p = .005$ for 25-35 years of age; OR = 4.13, CI = 1.92-8.91, $p < .001$ for 35-45 years of age; OR = 4.87, CI = 2.09-11.37, $p<.001$ for 45-55 years of age; and OR = 5.31, CI = 1.61-17.58, $p=.006$ for 55-65 years of age). The same age effect was observed for infectious disease marker rates that also include HBCAB and Syphilis (OR = 2.90, CI = 2.13-3.94 for 25-35 years old; OR = 4.26, CI = 3.07-5.91 for 35-45 years old; OR = 5.97, CI = 4.21-8.47 for 45-55 years old; OR = 6.70, CI = 4.22-10.65 for 55-65 years old; all p 's <.001). There was no significant age effect on CUE use.

Education effect—In the logistic regression analyses of CUE use, we found a significant education effect (Table 3). Compared to those who completed 11 years of education, donors who completed 8 years (OR = 1.92, CI=1.39-2.64, $p<.001$) or less than 8 years of education (OR=2.75, CI=2.02-3.75, $p<.001$) were more likely to use the CUE option. Education was not associated with HIV, HBsAg, HCV, HTLV positive marker rates. However, when HBCAB and Syphilis was also included, less education was a significant predictor of infectious disease markers. Compared with those who completed 11 years of school, donors with less than 8 years of education were more likely to test positive (OR = 1.43, CI = 1.11-1.85, $p = .006$), whereas donors who completed university were less likely to test positive (OR = .63, CI = .46-.85, $p = .002$).

Donor Status—When compared with repeat donors, first-time donors were more likely to use the CUE option (OR = 1.60, CI=1.25-2.05, $p<.001$), test positive for HIV, HBsAg, HCV, and HTLV (OR = 32.76, CI = 14.0-76.7, $p <.001$) as well as for infectious disease markers including HBCAB and Syphilis (OR = 11.89, CI = 9.37-15.08, $p < .001$).

Donation Type—No significant differences were found between replacement and community donations.

We also tested the models with interactions between Pamphlet and the covariates (pamphlet by gender, pamphlet by age category, pamphlet by education, pamphlet by donation type, and pamphlet by donor type). None of the interactions were significant. Inclusion of these interactions in the logistic regression models did not result in any significant change in the Pamphlet effect. Therefore, results from these models are not reported.

Survey data

The questionnaire data comparing donors' responses to two questions about HIV knowledge by pamphlet status were analyzed. For the question **about HIV window period** "Persons infected with HIV will be tested negative within the first 15 days of infection", 52.9% donors in the No Pamphlet group and 68.1% donors in the Pamphlet group answered the question correctly, $p < .001$. A significant pamphlet effect was also found on the 2nd question, "In case this person donates blood within these 15 days, the person who will receive the blood will be contaminated by HIV"; with 87.2% correct responses in the No Pamphlet group and 91.1% correct responses in the Pamphlet group.

In the multivariate logistic regression analysis on Question 1 (Table 4), when gender, age, and education levels were adjusted, a significant pamphlet by education interaction was found ($p = .004$), suggesting that the pamphlet effect was associated with education levels. Using No Pamphlet group a reference, greater impact of pamphlet was associated with higher levels of education (OR = 1.18, CI = .86-1.63 for less than 8 years of education; OR = 1.61, CI = 1.19-2.18 for 8 years of education; OR = 2.12, CI = 1.84-2.43 for 11 years of education; and OR = 2.18, CI = 1.73-2.76 for complete university). No significant effect of age was found except that 25-35 year old donors were slightly more likely to provide correct responses than donors younger than 25 years old (OR = 1.16, CI = 1.01-1.33). In addition, there was an overall education effect, donors who completed university were more likely to answer Question 1 correctly than those who had 11 years of education (OR = 1.46, CI = 1.21 – 1.76). There was no gender effect on responses to Question 1.

For Question 2, although the interaction between pamphlet and education was not significant in the logistic regression model ($p = .345$), follow up analyses testing whether the interaction term for Question 2 was different than that for Question 1 indicated no difference ($p = .115$). Since there is no statistical evidence against the pamphlet by interaction for the Question 2, and that there is statistical evidence for the interaction for Question 1, we presented the results for the model with the interaction term (Table 4). As for Question 1, the effect of pamphlet on correct responses to Question 2 was embedded in education levels. However, unlike for Question 1 where the pamphlet effect was observed at all education levels, the pamphlet effect on responses to Question 2 was only observed for 11 years of education (OR = 1.72, CI = 1.37-2.15) and complete university (OR = 1.59, CI = 1.05-2.40). Additionally, there was an overall education effect ($p < .001$). Donors who completed university were more likely to give a correct answer to Question 2 than those who completed 11 years of education (OR = 1.43, CI = 1.06-1.95). There was no significant effect of age groups ($p = .944$) or gender ($p = .053$) on correct responses to Question 2.

Discussion

Our study has evaluated the impact of an educational brochure about HIV and the screening test window period. We detected an increase in donors' knowledge about HIV testing and window phase, however, this intervention did not result in parallel changes in blood donor deferrals.

With the pamphlet use, correct response to the question about the HIV window period increased from 53 to 68% and was positively associated with educational level. However, there are still

concerns about the remaining 32% of donors who did not know the correct answer for the HIV window period, indicating they might not be aware that donating with risk behaviours could put the recipient at risk.

This rate of knowing about the window period compares favourably with the rate of correct response to a similar question in the US, where no intervention was used, that was also associated with educational level¹⁸.

Ruggere et al.¹⁹ also found that minority, less educated, those screening test-reactive and HIV-test-seeking and those not reporting a risk behavior were more likely to find the materials difficult to understand. Using written materials might not be the optimal way to increase knowledge among donors with lower education levels. Contrary to our primary hypothesis, our results show that increase in knowledge about the HIV window period did not change blood donor deferral behavior: there were no significant statistical differences among those receiving the pamphlets and those who did not regarding HIV risk deferral, leaving without making a donation, CUE use and positive markers rates for all serological tests (HIV, HBsAg, HCV, HTLV HBV and Syphilis).

Surprisingly, the HIV risk deferral rate did not increase, in fact it was slightly lower during the pamphlet period, although not statistically significant. This outcome is hard to explain. One hypothesis was that the pamphlet would better inform those donors who are not aware of the blood donation procedure about the importance and limitations of the screening process. So, if they were practicing risk behaviors, they would be deferred, not donate or use CUE. Almeida Neto et al.²⁰ have reported in a prior case-control study in our institution that 48.5% of HIV-positive blood donors have acknowledged risk factors when notified about their serologic status. This finding has raised concerns that the non admission of risk behavior at predonation interview but subsequent admission of risk on test notification may reflect the desire of individuals to be tested for HIV, and their realization that they could not admit to risk behavior since they know they will be deferred if they do so. In this sense the pamphlet has provided more information to the donors, however, these individuals were not willing to refrain from donating on that day. Consequently, this intervention could have facilitated them to falsely respond to the interview to be accepted to donate. Alternatively, the pamphlets might have provided the at risk donors with the idea that the screening tests are very sensitive and pick up most positive donors, thereby minimizing in their minds the need to admit if they were practicing a deferrable risk behavior.

Rugege et al.¹⁹ suggested that some high-risk donors may still continue donating irrespective of how improved the educational material is.

These results are in accordance with other studies, which have demonstrated that educational materials have not always been effective in changing blood donor's attitudes. Some negative findings have already been described by other authors at blood donor settings^{21, 22}. For instance, pamphlets were not effective in improving the safety and donor eligibility. The pamphlets were not sufficient to motivate actual donation, however they were successful to improve attitudes towards anxiety, self-efficacy and donation intention²². The learning process is a complex issue, involving knowledge, personal skills and changing attitudes, and it is only considered complete when these three aspects are achieved.

While knowledge may be a necessary first step in changing behavior, the literature suggests it is frequently not sufficient for behavior change. The theory of reasoned action²³ and the theory of planned behavior^{24,25,26} suggest that communications are more likely to increase protection behaviors when the behavior is perceived as desirable, easy to do and under the individual's control and normative pressure exists to engage in the behavior. For certain risk behaviors, knowledge is less influential than motivational factors and normative influences²⁷. The type

of communication materials also influences the likelihood of behavior change. Communication materials that are tailored and personalized are more likely to induce behavior change than mass-produced brochures or pamphlets designed for the general public²⁸. A meta-analysis suggests that health campaigns in general have modest effects on behavior change in the short term. The effect sizes vary by type of behavior and whether there is an enforcement component to the campaign²⁹.

This study shows that it is not easy to reduce high risk donations and that education efforts might have unintended consequences. However, it is possible that although the information given was not sufficient to achieve donor self deferral after they made an effort to come to the blood bank on that particular day, it may be effective in encouraging at risk donors to not return for another donation. This cannot be measured using currently available data. In Brazil it appears that relying on the knowledge of donors as a tool for blood transfusion safety is not prudent. The effect of educational materials might vary in other countries and we encourage blood center to examine the impact of providing this type of donor education.

This study had several limitations; the first one was the temporal relationship between the survey administration and the pamphlet receipt; the pamphlets were given to the blood donors at almost the same time they were asked the knowledge questions. Those with higher education level might be more likely to then give the correct answer. For those with lower educational level, they might not have had enough time to read the pamphlets. Given more time, for instance at home, or even at the blood bank with more privacy, they probably would have provided more accurate answers. While we attempted to make the materials as easy to read as possible, we were not able to assess the readability of the pamphlets among the study participants. There was no cognitive debriefing to establish that the pamphlet was indeed providing the educational information in a way a blood donor could understand. While we distributed the pamphlet to all donors we also do not know how many actually read the materials. Each of these factors might help explain that over 30% of the respondents still answered the knowledge questions incorrectly, thus being unaware that donating in the window period with risk behaviors could put the recipient at risk. How to reach these donors is another question. If the distributed materials are not read they will not be effective in changing knowledge. Further research is clearly needed on how to best inform potential donors, to evaluate their comprehension of the messages delivered, and the best way to convey the information that is important for the donor to understand. Additionally, since the survey was conducted anonymously, it was not possible to link the questionnaire responses to the donation history information. Thus we were not able to identify which subgroups of donors (first-time or repeat; replacement or community) were more likely to give the correct response to the questions, since information on the type of donor was not available. In assessing the outcome variables such as test positivity, deferral, and CUE use, we were dealing with fairly rare events as shown. Thus, even though we had a fair sample size the power to detect differences due to the intervention was limited. While we did not show statistically significant differences in the subgroup analyses, the direction of the relationships were consistent, the pamphlet group generally had higher marker rates and lower levels of deferral and CUE use, perhaps suggesting that the information on testing imparted by the brochure might be giving the potential high risk donor the impression that the sensitivity of the tests reduces safety risk.

Our results indicate that it is possible to increase knowledge about the window phase among blood donors in Sao Paulo with written information; however it appears that better tools are necessary to reach less educated people. Information alone is not enough to make donors self defer or acknowledge their behavioral risks. Other steps such as informing them of nearby test centers are necessary that will hopefully decrease the incentive of using the blood center for infectious disease testing. Understanding motivation for donating among HIV positive blood donors may help us with new ideas on how to reach at risk individuals.

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Table 1

Demographics of All Donors with Allogeneic, Whole Blood Donation and Deferrals in Sao Paulo (Aug-Nov 2008)

	Total Sample (N = 33940)		Survey Sample (N = 6119)		P-Value
	Pamphlet	No Pamphlet	Pamphlet	No Pamphlet	
Gender					0.746
Male	9547 (56.6%)	9826 (57.5%)	1898 (59.0%)	1724 (59.4%)	
Female	7317 (43.4%)	7250 (42.5%)	1319 (41.0%)	1178 (40.6%)	
Age in years					0.054
< 25	4128 (24.5%)	3964 (23.2%)	886 (27.5%)	740 (25.5%)	
25-35	6031 (35.8%)	6082 (35.6%)	1080 (33.6%)	1036 (35.7%)	
35-45	3762 (22.3%)	4011 (23.5%)	719 (22.3%)	652 (22.3%)	
45-55	2187 (13.0%)	2280 (13.4%)	388 (12.1%)	374 (13.0%)	
55-65	756 (4.5%)	738 (4.3%)	144 (4.5%)	100 (3.5%)	
Missing or unknown	1 (0.0%)	---	---	---	
Education					0.368
Less than 8 yrs of formal education	1850 (11.0%)	1956 (11.5%)	330 (10.2%)	288 (9.9%)	
Complete 8 yrs of formal education	1934 (11.5%)	2009 (11.8%)	385 (12.0%)	314 (10.8%)	
Complete 11 yrs of formal education	8517 (50.5%)	8553 (50.1%)	1811 (56.3%)	1638 (56.5%)	
Complete university	3014 (17.8%)	2911 (17.0%)	691 (21.5%)	662 (22.8%)	
Missing or unknown	1549 (9.2%)	1647 (9.6%)			
Donation Type					p<.01
Replacement	2388 (14.2%)	2993 (17.5%)			
Community	11449 (67.9%)	10922 (64%)			
Missing or unknown	3027 (17.9%)	3161 (18.5%)			
Donor Type					p<.01
First Time	4491 (26.6%)	4790 (28.1%)			
Repeat	9346 (55.4%)	9125 (53.4%)			
Missing or unknown	3027 (17.9%)	3161 (18.5%)			

Table 2

Donation and Deferral Outcomes by Pamphlet Status

Outcomes	Pamphlet n = 16864	No Pamphlet n = 17076	P Value
Overall Deferral Rate (Based on Pre-donation Screening questionnaire)	17.95%	18.51%	0.1801
HIV Risk Deferral (Based on Pre-donation screening questionnaires)	2.20%	2.53%	0.0456
Leave without donation (Leave prior to donation)	0.79%	0.94%	0.1413
CUE use	1.14%	1.06%	0.5333
Positive Marker Rate (HIV.HBsAg.HCV.HTLV)	0.29%	0.25%	0.4681
Positive Marker Rate (HIV.HBsAg.HCV.HTLV, anti-HBc, Syphilis)	1.63%	1.80%	0.2767

Table 3
Odds Ratios (95% CI) from Logistic Regression Models Predicting Donation and Deferral Outcomes*

	HIV Risk Deferral		Leave without Donation		CUE Use		Positive Marker Rate (HIV.HBsAg.HCV.HTLV)		Positive Marker Rate (HIV.HBsAg.HCV.HTLV,HB CAB. Syphilis)	
	OR (95% CI)	P- value	OR (95% CI)	P- value	OR (95% CI)	P- value	OR (95% CI)	P- value	OR (95% CI)	P- value
Pamphlet	.86 (.74-.99)	0.032	.83 (.66-1.05)	0.116	1.10 (.88-1.38)	.401	1.33 (.83-2.11)	.232	.997 (.83-1.20)	.973
Gender: Male vs Female	2.45 (2.08-2.88)	<.001	.64 (.51-.81)	<.001	1.15 (.91-1.46)	.243	1.31 (.82-2.09)	.265	1.57 (1.29-1.90)	<.001
Age in years		<.001		.002		.419		.002		<.001
25-35 vs <25	.53 (.45-.62)		1.01(.76-1.33)		1.03 (.74-1.44)		2.78 (1.36-5.70)		2.90 (2.13-3.94)	
35-45 vs. <25	.31 (.25-.39)		.56(.39-.81)		1.00 (.69-1.46)		4.13 (1.92-8.91)		4.26 (3.07-5.91)	
45-55 vs. <25	.32 (.24-.42)		.59(.38-.91)		1.26 (.84-1.90)		4.87 (2.09-11.37)		5.97 (4.21-8.47)	
55-65 vs <25	.12 (.06-.24)		.97(.56-1.69)		1.48 (.88-2.51)		5.31 (1.61-17.58)		6.70 (4.22-10.65)	
Education [†]				<.001				.192		<.001
< 8 yrs vs. 11 yrs					2.75 (2.02-3.75)		1.20 (.61-2.38)		1.43 (1.11-1.85)	
8 yrs vs 11 yrs					1.92 (1.39-2.64)		1.66 (.91-3.05)		1.17 (.90-1.54)	
university vs. 11 yrs					.74 (.50-1.09)		.67 (.32-1.42)		.63 (.46-.85)	
Donation Type : Replacement vs. Community					.85 (.64-1.14)		.74 (.44-1.24)		.94 (.76-1.15)	
Donor Type : First Time vs. Repeat				<.001	1.60 (1.25-2.05)		32.76 (14.00-76.70)	<.001	11.89 (9.37-15.08)	<.001

* Education, Donation type, and donor type were not included in the analyses of HIV deferral and Leave without Donation as covariates because such information was not available for a substantial number of deferred donors. Pamphlet by education interaction was tested but not significant in the models for CUE use and positive marker rates, therefore it was removed from the final models.

Table 4

Odds Ratios (95% CI) from Logistic Regression Models Predicting Correct Responses to HIV Knowledge Survey Questions – Education*Pamphlet interaction added to the model

	Question 1		Question 2	
	OR (95% CI)	P- value	OR (95% CI)	P- value
Male vs. Female	1.03 (.92-1.25)	.613	.85 (.71-1.00)	.053
Age in years		.018		.944
25-35 vs. <25	1.16 (1.01-1.33)		1.02 (.82-1.26)	
35-45 vs. <25	1.05 (.90-1.22)		1.10 (.86-1.41)	
45-55 vs. <25	.87 (.72-1.04)		1.02 (.77-1.37)	
55-65 vs. <25	1.07 (.80-1.42)		1.08 (.70-1.68)	
Pamphlet vs. No Pamphlet at each Education Level		.004		.345/.115 [†]
Less than 8 years of formal education	1.18 (.86-1.63)		1.23 (.82-1.85)	
Complete 8 yrs of formal education	1.61 (1.19-2.18)		1.20 (.77-1.86)	
Complete 11 yrs of formal education	2.12 (1.84-2.43)		1.72 (1.37-2.15)	
Complete university	2.18 (1.73-2.76)		1.59 (1.05-2.40)	
Education*		< .001		< .001
< 8 yrs vs. 11 yrs	1.13 (.88-1.46)		.58 (.42-.81)	
8 yrs vs 11 yrs	.88 (.69-1.12)		.87 (.61-1.24)	
university vs. 11 yrs	1.46 (1.21-1.76)		1.43 (1.06-1.95)	

[†] p = .35 tested the hypothesis of no interaction between pamphlet and education for Question 2; p = .11 tested the hypothesis that the pamphlet by education interaction for Question 2 is the same as that for Question 1. Since there is no statistical evidence against the pamphlet by interaction for the Question 2, and that there is statistical evidence for the interaction for Question 1, we have presented the interaction for both questions.