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Enhancing Blood Donation Intentions using the Train-the-Trainer (TTT) Model: A Field Trial Study

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Abstract

Background: *In Iran, despite various attempts to increase recruitment of female blood donors, women make up less than 10% of blood donors.*
Methods: *The purpose of the study was to evaluate the effect of face-to-face education via the Train-the-Trainer (TTT) model on people's willingness to donate blood, especially women. A field trial study was designed based on a face-to-face educational plan for a population in 22 municipal regions of Tehran, the capital of Iran. The periods from March 2011 to February 2011 and from March 2010 to February 2010 were named as trial 2 and trial 1, respectively.*
Results: *Total number of volunteers in trial 2 was 9,178 cases, including 2,785 females and 6,393 males, compared with 4,074 cases, including 454 females and 3,620 males, in trial 1. Female/male ratios in trials 1 and 2 were 0.13 and 0.44, respectively ($p<0.001$).*
Deferred donors made up 24% (981/4074) of 4,074 in trial 1, and of the 9,178 donors in trial 2, 29% (2693/9178) were deferred ($p<0.001$). The most common cause in trial 1 was erythrocytosis, 20%, and in trial 2 was anemia, 21.5%.
Conclusions: *Overall, face-to-face education is an appropriate method for enhancing safe blood donor motivation and recruitment.*

Keywords: Blood donor, Recruitment, Education, TTT Model, Iran.
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Introduction

One of the important goals of all blood transfusion services is to recruit blood donor volunteers from low-risk groups of society because the demand for blood has increased through population growth and aging populations, as well as through the application of new methods such as organ transplantation and treatment of cancer by more complex surgeries and chemotherapy.[1-3]

Usually, blood collection centers worldwide use pamphlets or brochures as material education in order to inform potential donors and encourage them to register for a future donation.[4] Although these materials may be efficient teaching methods to increase blood donor recruitment, their effectiveness is limited[5] and it seems they often affect retention of a blood donation, for example, Gimble et al.[6] attempted to recruit potential donors through a specially-designed booklet containing information about the need for blood and blood components, the comfort and safety of blood donation processes, and criteria for blood donation. Unfortunately however, this brochure did not show the significant effect on recruitment of new donors compared with existing blood drives. It appeared that, when the most important reasons not to donate blood are fear of needles, pain, and the possibility of vasovagal reactions or other false beliefs about blood donation, educational materials such as pamphlets or brochures may not be enough to persuade donors [7]

On the other hand, recent studies have shown that if ways to motivate volunteers directly focus on donor concerns, they are more successful in enhancing blood donation attitudes and intention to donate.[8,9]

Therefore, any attempt to recruit new donors should be founded on an evidence-based understanding of the determinants of the blood donation. [10]

At present, in Iran, despite more funded efforts to increase recruitment of female blood donors, women constitute less than 10% of blood donors, [11] while in some studies in other countries, it was shown that women seem more willing to give blood than men. [12-14]

It seems that low rate of voluntary blood donation is related to socio-demographic, medical and educational factors and attitudinal influences regarding donation. [15] In Iran,[16,17] poor knowledge and false beliefs about blood donation are two major causes of the low percentage of women blood donors. Previous studies have shown that for determining recruitment strategies, women require special attention.[18,19]

Based on an extensive review of the relevant available literature, it became clear a face-to-face education method,[20,21] may be appropriate for motivating blood donation volunteers, because this method can correct false beliefs in these volunteers.

When health care providers need more trained trainers in clinical settings, the TTT model would use to increase rapid training capacity. The most prominent advantage of this model is that more trainers are trained and more training can be conducted.[22] In this model, the main trainers teach materials based on a designed curriculum to intermediate trainers, and then they transfer the content to the target group. In order to disseminate knowledge and skills, a TTT model is frequently implemented in business,[23] education,[24] and health interventions.[25,26] The TTT model has been applied in training

programs for HIV-related services[27-29] and in other clinical areas.[30-32] However, this model has not been used for encouraging volunteers to donate blood so far.

In this study, the TTT model was applied to educate a large number of blood donor volunteers, so the purpose of the study was to show the effect of face-to-face education on people's willingness, especially women, to donate blood.

Materials and Methods

Tehran, with a population of nearly 12 million, is the largest city in Iran.[33] Tehran Blood Transfusion Center (TBTC) is one of the largest blood banks in the Middle East, processing about 350,000 units of blood annually.[34]

There are 18 fixed locations for blood collection. TBTC collected all blood donations only from voluntary non-remunerated (VNR) blood donors.[35]

To show the effect of face-to-face education on people's willingness, we conducted a field trial study using non-concurrent controls to compare the effect of educational intervention. The present study was performed in mobile blood collection sites in 22 municipal regions of Tehran from March 2010 to February 2011 in a cooperative program between the health division of Tehran Municipality and TBTC.

The first phase of the present study provided training for volunteer females. These volunteers had previously been employed by the health division of Tehran Municipality to deliver health information and education to the general population. The number of female volunteers was 1,663. These people were called mediator volunteers for health (MVHs). Volunteers' educational level was bachelor degree and their study field was paramedical. The training sessions for MVHs were done with unique educational materials and by unique trainers related to municipal regions. Each educational session was planned for 4-5 h with three trainers and 30–80 participants in every municipal region of Tehran. MVHs were trained about blood donation facts including blood components definition and their usage and needs, blood donation process, eligible criteria for blood donation and how to recruit and educate blood donation volunteers. Also, they were informed about false beliefs about blood donation and were trained on how to deal with misunderstandings of blood donation. For this purpose, misconceptions and misunderstandings related to blood donation, extracted from other studies,[14-19] were discussed.

Since every MVH is responsible for transfer of health information and materials to the general population based on predetermined specific areas in residential blocks, after he or she were trained, he or she began to educate the residents of each block with a face-to-face interview. She or he trained volunteers about blood donation facts, including blood and blood components needs and usage, blood donation process, and eligibility criteria for blood donation.

Four weeks after face-to face-interview sessions, a blood collection program was established in the same municipal region by a TBTC mobile blood collecting division in cooperation with the health division of Tehran Municipality. In blood collection appointments, volunteers were evaluated and accepted based on Iranian guidelines for blood donation.

Data collected for the study included:

- Donor ID number;
- The session location (municipal region);
- The date of the session (blood donation);
- The donor's status (first time, repeated or regular donor);
- The donor's date of birth, sex, education, occupation;
- Donor deferral causes;
- Screening test results for HIV, HBV and HCV.

Total number of blood donations in 22 municipal regions from March 2009 to February 2010 was considered as non-concurrent control group. Blood collection settings from March 2009 to February 2010 and from March 2010 to February 2011were named trial 1 and trial 2, respectively

Advertising efforts for blood donor motivation were similar in both trials. Donor classification used for this study included: First-time donor; someone who had never donated blood or plasma, Repeat donor; someone who had donated before, Regular donor; someone who routinely donated his or her blood or plasma (minimum two donations in past year).

The program's specific objectives were: Increased intention to donate blood in men and women and, specifically, to increase blood donation by women.

Statistical analyses were performed with computer software (SPSS package program, SPSS for Windows, Version 18, SPSS, Inc, Chicago, IL). Differences were considered significant at a p-value of less than 0.05. To test the significance in this trial, independent t-test and chi square test were used.

Results

From March 2010 to February 2011 we trained 1,663 MHVs in 22 municipal regions of Tehran. However blood collecting sessions were done only in 21 regions, because region 13 did not complete the training course, Figure 1.

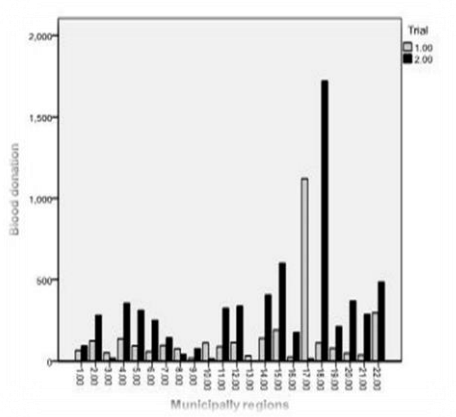

Figure1. Blood collecting sessions based on 22 Tehran municipally regions

Table 1. Demographic characteristics of the 13252 volunteer blood donations were participated to the study

	Trial one	Trial two	*P*.V
Total donor attendances	4074	9178	
Age (Mean ± SD)	36.6 ± 9.91	37.91 ± 10.40	<0.01
Sex	(N%)	(N%)	
- Female	454(11.14)	2785(30.34)	<0.001
- Male	3620(88.86)	6393(69.66)	<0.001
Education			
- Illiterate	43(1.06)	228(2.48)	<0.001
- <12 years	1244(30.54)	3072(33.47)	0.032
- 12 years	1624(42.62)	3754(40.90)	0.062
- >12 years	1163(28.55)	2124(2.14	0.003
Age groups			
- 1(≤ 20 years old)	116(2.85)	326(3.55)	0.074
- 2(21-30 years old)	1219(29.92)	2383(25.96)	<0.001
- 3(31-40 years old)	1254(30.78)	2745(29.91)	0.171
- 4(41-50 years old)	1062(26.07)	2348(25.58)	0.142
- 5(51-60 years old)	401(9.84)	1347(14.68)	<0.001
- 6(61 years old ≤)	22(0.54)	29(0.32)	0.113
Donation status			
- First time blood donors	2161(53.04)	6018(65.57)	< 0.001
- Repeated blood donors	1061(26.04)	1813(19.75)	< 0.001
- Regular blood donors	852(20.91)	1347(14.68)	< 0.001
Marital status			
- Single	3365(82.60)	7947(86.59)	<0001
- Married	709(17.40)	1231(13.41)	<0.001
Employment status			
- Homemaker/ student/ retired	474(11.63)	2564(27.94)	<0.001
- Non-governmental	1227(30.12)	4112(44.80)	<0.001
- Governmental	2298(56.41)	632(6.89)	<0.0001
- Unemployed/others	75(1.84)	1870(20.38)	<0.0001

Total number of volunteers in trial 2 was 9,178, including 2,785 females and 6,393 males, compared with 4,074 volunteers in trial 1, which included 454 females and 3,620 males. Female/male ratios in trials 1 and 2 were 0.13 and 0.44, respectively (P<0.001). Flow diagram of the study is shown in Figure 2.

Total blood donor volunteers in trials 1 and 2 were 13,252. Demographic characteristics of these participants are shown in Table 1.

Donors who attended and were deferred in each year are shown in Table 2. The results show statistically significant differences in the deferral rates between two years, not only in total deferrals but also when analyzed for donation status, age, sex, education and marital status.

Of the 4,074 donors in trial 1, 24% (981/4074) were deferred based on the Iranian blood donation questionnaire, and in trial 2, this was 29% (2693/9178) of the 9,178 donors deferred (p < 0.001). The most common causes of deferred donors in trials 1 and 2 were secondary erythrocytosis, 20% (197/982), and anemia, 21.5% (581/2693), respectively. Donor deferral causes are shown in Table 3.

Total deferral rates in trials 1 and 2 were 24% and 29%, respectively, but deferral rates in gender subgroups in trials 1 and 2 were 22.3% and 22.4% for males (P=0.34), and 38% and 45% for females (P<0.01), respectively.

Blood donor attendances and deferrals in the two trials by sex and donation status are seen in Table 4. In addition, permanent deferral/ total deferral ratios in female and male blood donation volunteers were 9% and 15%, and 7% and 20% in trials 1 and 2, respectively. The number of forms of confidential unit exclusions were 13 and 79 in trials 1 and 2, respectively (P<0.01).Distribution of donor deferral in the two trials is shown in Figure 3.

Mean age of HBS Ag positive test results was 41.25±11years old, compared with 36.5±10 in the negative test results (P=0.008); however, mean age for HCV Ab positive test results was 35.2±7.7 compared with 37.5±10.5 in negative test results (P>0.05). (Table 5)

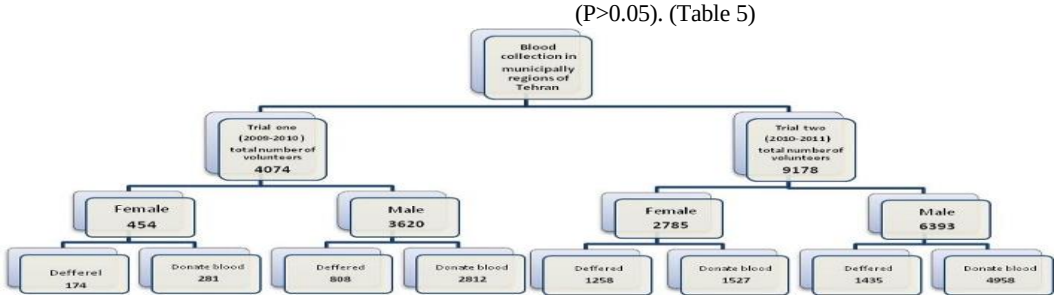

Figure 2. Flow diagram of the study

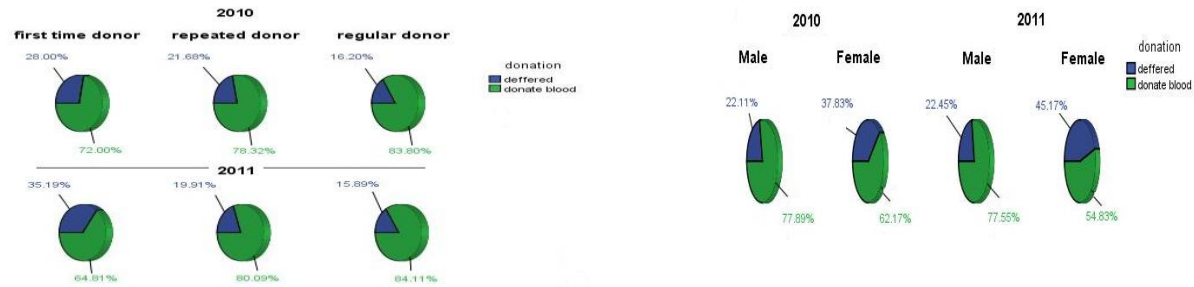

Figure 3. Distribution of donor deferral in two trials

Table 2. Deferred donor`s Characteristics in two trials

Deferral cause categories	Trial one N (%)	Trial two N (%)	*P* V
Donor deferral total	982 (24.10)	2693 (29.34)	<0.001
Gender			
- Female	174 (17.72)	125 (46.42)	< 0.001
- Male	808 (82.28)	1434 (53.25)	< 0.001
Education			
- Illiterate	16 (1.63)	107 (3.97)	< 0.001
- <12 years	369 (37.58)	1107 (41.11)	0.426
- 12 years	341 (34.73)	891 (33.09	0.149
- >12 years	256 (26.07)	588 (21.83)	< 0.001
Age groups			
- 1(≤ 20 years old)	28 (2.86)	114 (4.23)	0.066
- 2(21-30 years old)	307 (31.27)	752 (27.92)	0.048
- 3(31-40 years old)	271 (27.60)	697 (25.88)	0.310
- 4(41-50 years old)	257 (26.17)	692 (25.70)	0.766
- 5(51-60 years old)	108 (10.90)	422 (15.67)	< 0.001
- 6(61≤ years old)	11 (1.12)	16 (0.59)	0.184
Donation status			
- First time blood donors	618 (62.93)	2118 (78.64)	<0.001
- Repeated blood donors	230 (23.42)	361 (13.41)	< 0.001
- Regular blood donors	134 (13.65)	214 (7.95)	< 0.001
Marital status			
- Single	752 (76.58)	2301 (85.44)	< 0.001
- Married	230 (23.42)	392 (14.56)	< 0.001
Employment status			
- Homemaker/ student/ retired	154 (15.68)	1016 (37.73)	< 0.001
- Non governmental	282 (28.72)	819 (30.41)	0.778
- Governmental	519 (52.85)	144 (5.35)	< 0.001
- Unemployed/others	27 (.75)	714 (26.51)	< 0.001
Donors who deferred			
- for transient causes	844 (85.95)	2377 (88.27)	0.092
- for permanent causes	138 (14.05)	316 (11.73)	0.671
- Because donor safety	450 (45.82)	1587 (58.93)	< 0.001
- Because recipient safety	532 (54.18)	1106 (41.07)	< 0.001

Table 3. Donor deferral causes in two trials

Deferral cause	Trial one N (%)	Trial two N (%)	*P*.V
Medical	173 (17.62)	424 (15.74)	0.01
Surgical	7 (0.71)	16 (0.59)	0.091
Dental	9 (0.92)	21 (0.78)	0.214
Traveling (malaria)	9 (0.92)	23 (0.85)	0.320
Risk of blood born diseases:	113 (11.51)	240 (8.91)	0.01
- History of:			
- Hepatitis	4 (3.54)	21 (8.75)	0.061
- Cupping/Hedjamat	26 (23.01)	39 (16.25)	0.079
- Addiction/IDU	44 (38.94)	89 (37.08)	0. 032
- Unsafe sexual contact	23 (20.35)	37 (15.42)	0.088
- Ear piercing	0	3 (1.25)	0.210
- Transfusion	1 (0.88)	9 (3.75)	< 0.001
- Acupuncture	1 (0.88)	6 (2.50)	< 0.001
- Tattoos	2 (1.8)	14 (5.83)	0.098
- Unreliable history	12 (10.62)	22 (9.17)	0.214
Hypertension/hypotension	169 (17.21)	455 (16.90)	0.087
Cold/Flu	46 (4.68)	99 (3.68)	0.035
Medication use	85 (8.66)	192 (7.13)	0.120
Underweight/too old/ donating too soon/too young	96 (9.78)	224 (8.32)	0.01
Neoplasia	1 (0.10)	5 (0.19)	< 0.001
Pregnancy related	1 (0.10)	14 (0.52)	0.068
Anemia	76 (7.73)	581 (21.57)	< 0.001
Erythrocytosis	197 (20.06)	399 (14.82)	< 0.001

Table 4. Sex and donation status in blood donors who attendances and deferrals in two trials

Donation status	Attendance		*P*.V	Deferral		*P*.V
	Trial one N (%)	Trial two N (%)		Trial one N (%)	Trial two N (%)	
First time donors						
- Female	338(8.30)	2407(28.23)	< 0.001	145(14.77)	1139(42.29)	< 0.001
- Male	1823(44.74)	3611(39.34)	< 0.01	473(48.17)	979(36.35)	< 0.001
Repeated donors						
- Female	76(1.87)	237(2.58)	0.094	19(1.93)	76(2.82)	0.511
- Male	985(24.18)	1576(17.17)	< 0.001	211(21.47)	285(10.58)	< 0.001
Regular donors						
- Female	40(0.98)	141(1.54)	0.089	10(1.02)	43(1.60)	0.142
- Male	812(19.93	1206(13.14)	< 0.001	124(12.63)	171(6.35)	< 0.001
Total	4074(100)	9178(100)		982(100)	2693(100)	

Table 5. Positive test results in two trials by sex

Positive test results	Trial one		Trial two		*P*.V
	Number	Rate	Number	Rate	
HBS Ag	17	5.5/1000	39	6/1000	0.886
- Female	1	3.5/1000	6	4/1000	0.924
- Male	16	6/1000	33	6.6/1000	0.657
HCV Ab	6	2/1000	8	1.2/1000	0.401
- Female	1	3.5/1000	0		0.156
- Male	5	2/1000	8	1.6/1000	0.863
HIV Ab	0		0		
All positive test results					
- (HBV & HCV)	23	7.4/1000	47	7.2/1000	0.899
- Female	2	7/1000	6	4/1000	0.361
- Male	21	7.5/1000	41	8.2/1000	0.791

Discussion

Although in the study we did use non concurrent controls, results suggest that face-to-face education has effects on blood donation, which is accompanied by an increase in number and quality of donations. However, providing easy and timely access to blood collection centers, are the important predictors of the behavior of blood donors, according to a similar arrangement for blood donating in the control group (trial 1), it seems that the present results are not made only to response an advertisement program or facilitating approach.[36]

Our findings showed that face-to-face education is an effective method for motivation and recruitment of female blood donors. In trial 2, women constituted 30% of blood donors, however in trial 1, women's participation was 11%.

Each year, the TBTC tries to recruit new donors by means of posters, leaflets and other motivational activities. The effectiveness of definite motivational programs has not been evaluated, but it appears that blood donor recruitment has had boundless success, especially for women. Since recruitment of new donors in the TBTC has not been based on an evidence-based conception of the determinants of the decision to donate blood, applying present results would be a helpful way for donor motivation and recruitment, especially for women. Past research on blood and organ donation,[37,38] has showed that the decision process progresses from knowledge to attitude to behavior, and that donation is suffering because of people's values and the risks they perceive in blood donation.

Reasons for people not attempting blood donation have previously been evaluated [16,17,19] and the most frequent response to why they didn't or don't donate blood was the fear of anemia. Lack of time, fear of needles and difficulty in accessing donation sites were additional reasons. In addition, some of the false beliefs about blood donation have been shown in past studies, for example that blood donation is harmful for women, blood donation leads to infertility, blood donation causes hepatitis or HIV infection; therefore, an increase in knowledge about safety of blood donation, and the correction of these false beliefs for evidence-based management, could lead to more blood donor recruitment.

Donor demographics: The donor populations in both trials did not have similar demographic patterns. The results showed an increase in blood donor attendances with <12 and 12 years education, therefore it seems that face-to-face education has more effect on low and middle-educated people in their willingness to donate blood. Based on status of blood donation, face-to-face education was shown to have more effect on first-time blood donors, compared with repeat and regular donors. This finding was similar to the results released[39] that showed first-time donors were reported to be four times more willing than the others. The demographic differences in the two trials showed that women, first-time donors, homemaker/student/retired, and illiterate blood donors have increased willingness to donate, therefore, these findings have explored parallels with past studies[17,40] that have showed that housewives, illiterates and women need to be considered as special target groups for recruiting activities. Despite men being shown to be more likely to respond to social motivation,[41] women in the present study showed a bigger response to face-to-face education on blood donation.

Studies have shown that most prospective donors were informed about blood donation by friends or relatives.[39] This underlines the important effect of experienced blood donors

motivating new donors; however, the present study indicated face-to-face education is also able to motivate new blood donors.

Donor deferral: The present study showed significant increases in donor attendance, also the deferral rate of donations increased from 25% to 29%. When the analysis was done according to gender, deferral rates for male blood volunteers had no significant differences in the two trials, but, the significant increasing donor deferral pattern was seen in trial two among women. Since the greatest numbers of female blood donors were first-time donors and also with regard to deferral rate in first-time donors being higher,[42] our study results could explain this increase. Also, similar to other studies,[43] our results showed more deferral prevalence in females than males. In addition, since mean age of attendance in trial 2 was higher than in trial 1, a higher per cent of deferred donors could be expected to be in the older age group.[44] The deferral rate is, however, significantly higher in trial 2 owing to more first-time and female blood donors.[42] However the deferral rate was decreased in higher levels education.

Although, as a limiting factor, sample size of the present study was small for comparison of screening test results in the two trials, this comparison revealed no significant statistical differences between HBS Ag, HCV Abs, and HIV Abs positive test results in the two trials. However, risk behaviors related to blood-borne infections showed a significant statistical decrease in trial 2. In a positive resultant phenomenon, face-to-face education is able to decrease the numbers of blood donor volunteer recruits with high-risk behaviors. Studies have shown that reduction of even a small number of such individuals could potentially prevent a high-risk donation.[45]

In each trial, the majority of donors who were deferred were first-time donors. This is established with previous documentation and is supported by some evidence on the prevalence of infectious makers in first-time blood donors.[42]

Previous reports have found that media advertising is encouraging people that giving blood is a socially desirable behavior, especially for first-time donors.[41] Since some individuals may also be under the misconception that blood is not capable to transfer an infectious agent,[41] face-to-face education is a good strategy for safe blood donor motivation and recruitment.

A significantly increase in the per cent of deferred donors in age group 5 (51–60 years old), suggests the cause for donor deferral may be a medical problem. Increase of donor deferral rate due to donor safety from 46% to 60% in trials 1 and 2, respectively, could be due to an increase in female blood donor participants in trial 2.

The most important strength of our study is the large sample size and the ability to identify the risk factors for blood donation in this sample. The use of educational potential in order to encourage women to donate blood is another strength of the study. The limitations of this study were the non-current controls and non-random allocation to intervention.

Overall, the findings of this study provide promise that further improvements in blood donation recruitment will be based on education of volunteers. Although we chose to recruit blood donors via face-to-face education, it may be simpler, cheaper and faster if volunteer recruitment is tried in another ways, i.e., of education.

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Conflict of Interest

The authors declare that they have no conflict of interests.

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