

ORIGINAL ARTICLE

Effect of Health Literacy Education on Self-Care in Pregnant Women: A Randomized Controlled Clinical Trial

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ABSTRACT

Background: Prenatal care reduces the risk of adverse pregnancy outcomes. The present study aimed to determine the effect of health literacy education on self-care in pregnant women.

Methods: The present randomized controlled clinical trial was conducted at two comprehensive health service centers in Pakdasht (Tehran province, Iran) during January-June 2016. Out of the ten comprehensive health service centers in the city, two centers were selected using a simple randomized sampling and randomly assigned to a control group and an intervention group. From each center, 40 pregnant women were recruited into the study. Dedicated questionnaires on self-care and health literacy during pregnancy were developed by the author as data collection tool. The validity and reliability of the questionnaires were confirmed using the test-retest reliability method and by the opinion of ten experts, respectively. The questionnaires were completed before the intervention, and at 1 and 2 months after the intervention. The intervention consisted of four 45-minute educational sessions and group counseling. The data were analyzed using the SPSS software (version 16.0) with the independent *t* test, Chi-square test, Mann-Whitney test, and repeated measures ANOVA. $P < 0.05$ was considered statistically significant.

Results: There was no significant difference between the groups before the intervention. However, 1 month after the intervention, there was a significant difference ($P < 0.001$) in the mean scores of the total self-care and total health literacy between the control and intervention groups (65 ± 6.23 versus 76.77 ± 4.28 and 30.95 ± 4.63 versus 40 ± 3.54). Similarly, there was a significant difference ($P < 0.001$) between the mean scores 2 months after the intervention.

Conclusion: Intervention for the promotion of physical and mental self-care during pregnancy should emphasize on increasing health literacy in computational comprehension, reading comprehension, and behavior.

Trial Registration Number: IRCT2017030415650N8

KEYWORDS: Health literacy, Intervention, Pregnant, Self-care

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INTRODUCTION

Pregnancy is one of the natural events for every woman of reproductive age.¹ Care during pregnancy can reduce the risk of mortality and problems associated with pregnancy and childbirth. Such care permits the identification and reduction of potential pregnancy risks, and encourages women to correct behavioral factors that could cause undesirable pregnancy outcomes. As a direct result, the birth of a healthy infant is ensured.² Studies have shown that improvement in maternal awareness during pregnancy and childbirth could encourage the mother to practice such care and subsequently reduce complications during pregnancy.³

The highest rate of maternal and neonatal mortality has been reported in the developing countries. Therefore, it is important to determine the factors associated with its root cause in order to improve the quality of life in pregnant women. The nature of these factors could be rooted in social, economic, educational, and information fields.⁴ In 2015, about 303,000 maternal deaths occurred worldwide; a decline of 44% compared to 1990. Maternal death in developing countries accounts for about 99% of all maternal deaths in the world. Maternal mortality ratio (MMR) in developing countries is twenty times higher than in developed countries.⁵ According to the statistics of the World Health Organization (WHO), there were 287,000 maternal deaths worldwide in 2010.⁶ Maternal death in the developed countries is reported at less than 10 in 100,000 live births (Greece: 2, Sweden: 5, Denmark: 5, Australia: 8) whereas in the developing countries it is 500 in 100,000 live births (Kenya: 530, Zimbabwe: 790, Somalia: 1200, Afghanistan: 1400).^{6, 7}

Educational training during pregnancy can play a significant role in reducing diseases and complications, and subsequently promoting the health of pregnant women.⁸ Health literacy includes skills such as reading, listening, analyzing, decision-making, and using these skills in health situations; irrespective of the educational level or general reading ability.

Nowadays, inadequate health literacy is considered a global issue.⁹ It is of paramount importance that a woman is involved in health promotion and preventive health care for herself and her child.¹⁰ Insufficient understanding of health care by women makes informative decision-making difficult or impossible, leading to undesired health outcomes for herself and her family.¹⁰ Health literacy in pregnant women is important for two reasons. First, pregnancy might be the first experience of a woman with the health care system. In fact dealing with such a complex system for the first time can be full of surprises even for those with adequate literacy skills.¹¹ Additionally, women with limited health literacy would find it very difficult to obtain new information or follow the given instructions. Secondly, the health status of a woman and her understanding of health information before pregnancy, during pregnancy, and in the course of growth and development years will directly affects her child.¹¹ In a meta-analysis in which the results of 85 different studies were reviewed, the prevalence of insufficient health literacy in the United States was 25% and the prevalence of marginal health literacy was estimated at 20%.¹² In Iran, a research in 2013 reported that 88% of women and 73.4% of men had insufficient health literacy.¹³ In another study, only 45.4% of the women had sufficient health literacy.¹⁴

To ensure the birth of a healthy infant, women require a wide range of care to safeguard maternal and child health.¹⁵ For a woman and her family, self-care during pregnancy begins at home.¹⁵ Women do adopt self-care behavior once they realize the extent of their vulnerability, health risks, and associated consequences during pregnancy without such self-care.¹⁶ Self-care can be learned through education and will result in an improved quality of life and reduced medical expenses.^{17, 18}

The existing tools on health literacy are the Test of Functional Health Literacy in Adults (TOFHLA)¹⁹ and The Health Literacy for

Iranian Adults (HELIA).²⁰ These tools are too general and not specific to pregnant women. Moreover, the Maternal Health Literacy and Pregnancy Outcome Questionnaire (MHLAPQ)²¹ only emphasizes on the physical health in self-care and pregnancy outcome. Hence there was a need to develop a specific tool for pregnant women that covered both the areas of physical activity and mental health. Considering the above and the scarcity of such studies in Iran, the present study was instigated to determine the effect of health literacy education on physical and mental self-care in pregnant women.

MATERIALS AND METHODS

The present randomized controlled clinical trial was conducted at two comprehensive health service centers in Pakdasht (Tehran province, Iran) during January-June 2016. From a total of 300 pregnant women, 80 were recruited into the study. The appropriate sample size was determined by detecting the difference between the means of two independent groups. For the control group, 95% confidence level ($z_{\frac{\alpha}{2}}=1.96$), power=0.80, mean=81.87, and standard deviation=7.5 were considered in accordance with a comparable study.²² For the intervention group, mean=86.87, standard deviation=7.5, and precision=5 (increasing 5-score in the mean of self-care) were considered. Accordingly, the sample size in each group was estimated at 35. Assuming 12% loss to follow-up, we decided to allocate 40 individuals in each group.

$$n = \frac{2\sigma^2(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2}{(\mu_1 - \mu_2)^2}$$

$$n = \frac{2(7.5)^2(1.96 + 0.84)^2}{(5)^2} = 35.28$$

In the present study, a multi-stage sampling method was used. Based on a simple randomized sampling, two centers were selected from the ten comprehensive health service centers in Pakdasht. To prevent any information exchange between the

participants, randomly, all pregnant women from one center were assigned to the control group and the participants from the other center to the intervention group (Figure 1). These centers were fully independent of each other and there was no link between them. The inclusion criteria were being a patient at the health service center in Pakdasht, a healthy pregnant woman, having no chronic disease(s) (e.g. diabetes and hypertension), and 12-28 weeks gestational age. The exclusion criteria were relocation or absence (maximum of 2) from training sessions. Pakdasht is a city in the southeast of Tehran (Iran) with a multi-ethnic society, cultural uniformity, no special customs, and a literacy rate of 85%.²³ Based on the maternal indicators of the Pakdasht health care network (family health unit) in 2016, a total of 4,400 pregnant women were cared for at its comprehensive health centers.²³

The data collection tool included two dedicated questionnaires on self-care (21 questions) and on health literacy (24 questions) with a specific focus on the pregnancy period. Both questionnaires were developed by the first author based on a review of various articles, theses, and academic books.

To confirm the face validity of the self-care questionnaire, the questions were initially reviewed by 10 experts and based on their feedback initial modifications were implemented to shorten or clarify the questions. A content validity test was performed and the calculated values for the content validity ratio (CVR) and content validity index (CVI) were 0.85 and 0.92, respectively, without a question being removed. The construct validity of the designed questionnaire was obtained through a study among 120 pregnant women using the method of Varimax rotation in factor analysis (loading factor ≥ 0.5). Based on this test, from the initial 23 questions, two items were removed.

To confirm the reliability of the self-care questionnaire, the test-retest method was used. A total of 15 pregnant women, in similar condition to our participants, reviewed the questions twice with an interval of 10 days.

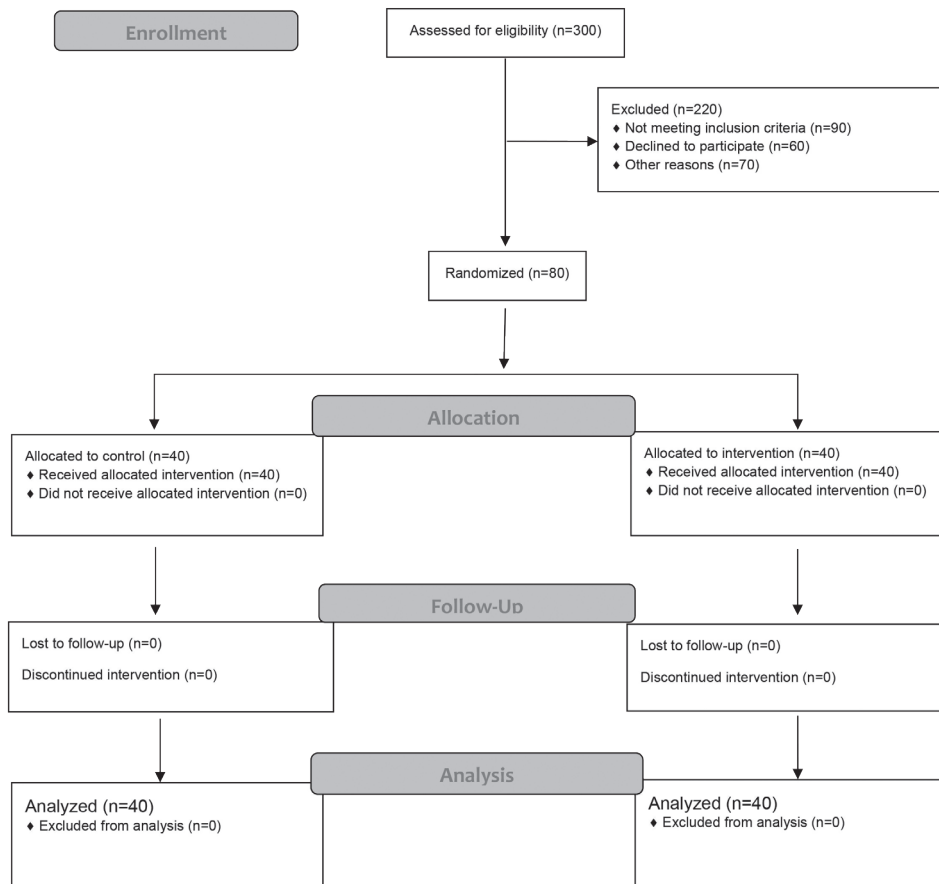


Figure 1: CONSORT flow diagram of the participants

The results from both tests were analyzed and the correlation coefficient for the physical self-care, mental self-care, and total self-care was 0.82, 0.97, and 0.91, respectively. Hence the reliability of the questionnaire was confirmed.

The final version of the self-care questionnaire included 21 items; 14 questions on physical health and 7 questions on mental health. The questionnaire was scored based on a 4-point Likert scale (1=never, 2=sometimes, 3=often, 4=always). The score for the items in the physical health, mental health, and the self-care questionnaire ranged 14-56, 7-28, and 21-84, respectively. The items in the physical health questionnaire were related to sleep, nutrition, and routine checkups by a midwife or a gynecologist. The items in the mental health questionnaire were related to pregnancy satisfaction, readiness to have a child, coping with stress, and awareness of the shortcomings and changes in life.

To confirm the face validity of the health literacy questionnaire, the same procedure

as for the self-care questionnaire was followed. The CVR and CVI were 0.76 and 0.88, respectively, without a question being removed. Based on the construct validity test, from the initial 26 questions, two items were removed. Note that criterion validity of the questionnaire was not applicable since there was no external criterion associated with the measured variable.

To confirm the reliability of the health literacy questionnaire, the same procedure as for the self-care questionnaire was followed. The correlation coefficient for computational comprehension, reading comprehension, behavior, and total health literacy was 0.99, 0.96, 0.87, and 0.95, respectively. Hence the reliability of the questionnaire was confirmed.

The final version of the health literacy questionnaire included 24 items; 8 questions on computational comprehension, 6 questions on reading comprehension with respect to context, and 10 questions on behavioral aspects during pregnancy. The scale of items

in both the computational comprehension and reading comprehension was true (1 score) or false (0 scores). The score for the items in computational comprehension and reading comprehension ranged 0-8 and 0-6, respectively. The scale of items in the behavioral questions was yes (3 scores), slightly (2 scores), and no (1 score) with a range 10-30.

Initially, the self-care and health literacy questionnaires were completed by all participants in both groups at the corresponding comprehensive service centers. In accordance with the results of the pre-test, the educational content was designed and modified in cooperation with the experts. The intervention group followed four sessions of the educational program; covering topics on health literacy and self-care during pregnancy and its impact on self-care in pregnant women. Each session lasted 45 minutes and was in the form of lectures, group discussion, question and answer session, counseling, practical exercises, and educational materials (e.g. booklets and films about pregnancy). The sessions were held in the comprehensive health service center in Pakdasht. The group sessions included 10-12 pregnant women. The trainers were an MSPH student in health education and a midwife. The topics of the educational intervention in each session were:

- First session
 - Anatomical and physiological changes during pregnancy
 - Advanced complaints during pregnancy and how to deal with them
- Second session
 - Pregnancy tests
 - Risk symptoms during pregnancy and how to deal with them
- Third session
 - Habits and dietary behaviors
 - Individual health
- Fourth session
 - Total mental health
 - Satisfaction with pregnancy
 - Readiness to have a child
 - Coping with stress

- Awareness of shortcomings and changes in life

The participants in each group received the routine educational program. However, the intervention group additionally followed the educational intervention sessions. The effect of the routine educational material was evaluated in the control group.

The study was approved by the Research Ethics Committee, Iran University of Medical Sciences, Tehran, Iran (code: ir.iiums.rec.1395.95-04-27-30279). A written informed consent was obtained from the participants. To assist the participants in completing the questionnaires, supportive information was provided. To ensure confidentiality of the information, the names of the participants were not registered on the forms. Upon the completion of the study, for the benefit of the participants in the control group, a brief training program similar to that of the intervention group was carried out. Considering the enthusiasm of the participants and attractiveness of the educational program, lost to follow-up was zero.

The data were analyzed using the SPSS software, version 16.0. The normality of quantitative variables was investigated using the Kolmogorov-Smirnov test. Based on the distribution of the variables, appropriate parametric and non-parametric tests were used for data analysis. The analysis included the independent *t* test, Mann-Whitney test, Chi-square test, Fisher exact test, and repeated measures ANOVA test. The data were presented as mean±SD and $P < 0.05$ was considered statistically significant.

RESULTS

The Kolmogorov-Smirnov test showed a normal distribution of self-care, health literacy, (except for the reading comprehension) and demographic variables. Both groups were homogeneous in terms of the demographic variables (Table 1).

Based on the independent *t* test, as shown in Table 2, there was no significant difference between the mean scores of physical ($P=0.48$),

mental (P=0.41), and total self-care (P=0.83) in both groups before the intervention. However, at 1 and 2 months after the intervention, there was a significant difference between the mean scores of physical, mental, and total self-care in both groups (P<0.001 for all variables) (Table 2).

Before the intervention, there was no significant difference between the mean

values of the computational comprehension (P=0.59), reading comprehension (P=0.97), behavior (P=0.7), and total health literacy (P=0.62) in both groups. However, at 1 and 2 months after the intervention, there was a significant statistical difference (P<0.001) for all variables (Table 3).

The Reliability and Maintainability Analysis (RMA) showed a significant difference in

Table 1: Comparison of demographic variables in both the control and intervention groups.

Variable	Classification	Control	Intervention	P value
		N (%)	N (%)	
Age (year)	<20	6 (15)	4 (10)	0.46*
	20-24	12 (30)	7 (17.50)	
	25-29	9 (22.50)	15 (37.50)	
	30-35	9 (22.50)	8 (20)	
	>35	4 (10)	6 (15)	
Literacy	Illiterate	1 (2.50)	0 (0)	0.68**
	Unqualified	18 (45)	19 (47.50)	
	Diploma	16 (40)	12 (30)	
	Academic	5 (12.50)	9 (22.5)	
Number of children	0	19 (47.50)	22 (55)	0.59**
	1	14 (35)	10 (25)	
	2	6 (15)	8 (20)	
	>2	1 (2.50)	0 (0)	
Employment	Housewife	36 (90)	36 (90)	1.00**
	Official job	3 (7.50)	3 (7.50)	
	Self-employment	1 (2.50)	1 (2.50)	
Insurance	Insured	32 (80)	35 (87.50)	0.54*
	Uninsured	8 (20)	5 (12.50)	
Pregnancy age (week)	15-17	11 (27.50)	15 (27.50)	0.8*
	18-20	12 (30)	10 (25)	
	21-23	6 (15)	6 (15)	
	24-26	11 (27.50)	9 (22.50)	
Number of pregnancies	1	13 (32.50)	19 (47.50)	0.24**
	2	17 (42.50)	9 (22.50)	
	3	7 (17.50)	9 (22.50)	
	4	2 (5)	3 (7.50)	
	>4	1 (2.50)	0 (0)	
Number of abortions	0	30 (75)	33 (82.50)	0.33*
	1	8 (20)	4 (10)	
	2	2 (5)	1 (2.50)	
	3	0 (0)	2 (5)	
Receiving information	Yes	30 (75)	34 (85)	0.4*
	No	10 (25)	6 (15)	
Source of information	Health workers	16 (53.30)	9 (26.50)	0.1**
	Media	1 (3.30)	0 (0)	
	Educational courses	1 (3.30)	5 (14.70)	
	Internet	2 (6.70)	4 (11.80)	
	Other sources	10 (33.30)	16 (47.10)	

*Chi-square test; **Fisher exact test

Table 2: Comparison of self-care scores before and after the intervention in both groups.

Stage	Self-care variable	Control	Intervention	P value*
		Mean±SD	Mean±SD	
Before the intervention	Physical	40.28±5.49	41.10±5.11	0.48
	Mental	22.32±2.60	21.80±3.05	0.41
	Total	62.60±6.49	62.90±6.29	0.83
1 month after the intervention	Physical	42.12±5.21	51.55±3.34	<0.001
	Mental	22.88±2.36	25.22±2.17	<0.001
	Total	65±6.23	76.77±4.28	<0.001
2 months after the intervention	Physical	42.80±5.53	52.40±2.90	<0.001
	Mental	23.20±2.24	26±1.72	<0.001
	Total	66±6.72	78±3.98	<0.001

*Independent *t* test

the mean of the total health literacy score before the intervention (30.92±5.31), at 1 month (40±3.54) and at 2 months (40.57±3.09) after the intervention in the intervention group (P<0.001). In addition, there was a significant difference in the mean value of the total self-care score before the intervention (62.90±6.29), at 1 month (76.77±4.28) and at 2 months (78±3.98) after the intervention in the intervention group (P<0.001).

Comparison of the mean difference in the self-care and health literacy scores before and after the intervention showed a significant difference in both groups. However, the difference was more prominent in the intervention group.

DISCUSSION

In the present study, we deduced that the existing

tools on health literacy (TOFHLA and HELIA) were too general and not designed to survey pregnant women. Moreover, the MHLAPQ questionnaire only emphasized on the physical health in self-care and pregnancy outcome. Hence we developed two specific questionnaires on health literacy and self-care during pregnancy and confirmed their validity and reliability.

The results showed that the mean self-care score before the intervention was moderate in both groups. However, after the intervention, there was a slight change in the control group and an increase in the intervention group. Therefore, it was confirmed that an improved awareness of pregnant women led to increased involvement in self-care during pregnancy. This finding is in line with that of some previous studies.^{24, 25} Before the intervention, there was no significant difference between the mean scores of self-care and health

Table 3: Comparison of health literacy scores in both groups before and after the intervention.

Stage	Variable	Control	Intervention	P value
		Mean±SD	Mean±SD	
Before the intervention	Computational comprehension	3.58±2.09	3.82±2.11	0.59*
	Reading comprehension	3.80±1.96	3.85±1.86	0.97**
	Behavior	22.98±3.07	23.25±3.44	0.70*
	Total health literacy	30.35±4.99	30.92±5.31	0.62*
1 month after the intervention	Computational comprehension	3.68±2.15	7.80±0.68	<0.001*
	Reading comprehension	3.95±1.90	5.80±0.79	<0.001**
	Behavior	23.32±26.40	26.4±2.89	<0.001*
	Total health literacy	30.95±4.62	40±3.54	<0.001*
2 months after the intervention	Computational comprehension	3.80±2.09	7.90±0.49	<0.001*
	Reading comprehension	4.25±1.70	5.95±0.31	<0.001**
	Behavior	23.50±2.82	26.72±2.85	<0.001*
	Total health literacy	31.55±4.56	40.57±3.09	<0.001*

*Independent *t* test; **Mann-Whitney

literacy variables in both groups. However, a significant difference was found at 1 and 2 months after the intervention. This indicated that the educational intervention has led to the promotion of health literacy and increased self-care in pregnant women. Therefore, it is recommended to develop a plan to promote health literacy and self-care during pregnancy.

A previous study reported on the effect of a standard care model and standard educational model on knowledge, social support, and satisfaction in pregnant women.²⁶ Consistent with our findings, it also showed a significant difference in the knowledge score between the intervention and control groups. In the present study, after the intervention, the participants in the intervention group demonstrated appropriate behavior on self-care during pregnancy and a positive change in nutritional behavior, prenatal care, physical activity, and the intake of dietary supplements. These findings were in line with that of previous studies.²⁷⁻³² A study in Australia evaluated the health literacy of Australian mothers.³³ Consistent with our results, they found a significant relationship between the variables of pregnancy and health literacy of the mothers. Another study also noted the effect of increased maternal health literacy on reduced postpartum anemia, reduced low weight births, and increased prenatal care.³⁴ In a state hospital in Nigeria, in line with our results, a significant relationship between maternal health literacy and prenatal care was reported.³⁵ All the above-mentioned studies indicated the need for education to improve maternal health literacy, self-care, and performance of women in health behavior. Comparing the mean scores of health literacy and self-care variables, before the intervention and at 1 and 2 months after the intervention, showed that the mean scores in the intervention group were significantly increased; indicating the effectiveness of such education.

The result of the present study also showed that most of the pregnant women in both groups obtained their information on pregnancy before the intervention. The

participants stated that doctors, personnel of the health centers, and training classes were important sources of information. This finding was in line with a previous study that reported the importance of similar sources of information.²⁶ In another study, most of the participants declared the healthcare personnel as their source of information.²³ Therefore, during pregnancy, the provision of information on self-care by the health care providers is essential. Comparing the mean difference of self-care and health literacy scores before and after the intervention in both groups, a significant effect on the intervention group was evident. Hence the routine education is insufficient and there is a need to improve the health literacy in self-care during pregnancy (i.e. computational comprehension, reading comprehension, and behavior).

The results also showed that the mean of the health literacy score before the intervention was moderate in both groups. A slight positive change was observed in the control group at 1 and 2 months after the intervention, which was the result of the training by the personnel of the comprehensive health center. In the intervention group the mean score of health literacy increased, which indicated the effect of the educational intervention. Therefore, after the intervention women's health literacy during pregnancy was improved. A previous study investigated the relationship between health literacy in pregnant women and prenatal care as well as its effects. Consistent with our results, the mean score of health literacy in pregnant women had increased after the intervention.²⁸

The main limitations of the present study were self-reporting by the participants and the fact that the study was only conducted at the comprehensive centers of one city. Hence it is recommended to replicate the present study using interviews and a qualitative research method that involves pregnant women from comprehensive health centers in other cities.

CONCLUSION

Educational interventions to promote health

literacy in pregnant women of Pakdasht was effective in improving their self-care status during pregnancy. It is recommended that intervention for the promotion of physical and mental self-care during pregnancy should emphasize on increasing women's health literacy in the areas of computational comprehension, reading comprehension, and behavior. The results of the present study can be used to design interventions and educational programs in accordance with the needs of pregnant women in Pakdasht. As a further study, it is suggested to follow-up our participants in order to evaluate the long-term effect of the educational interventions for improving self-care during pregnancy.

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Conflict of Interest: None declared.

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