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Effectiveness of distance education program on mothers' empowerment in exclusive breastfeeding: A randomized clinical trial

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Abstract:

BACKGROUND: Mothers need the necessary skills to be empowered in successful breastfeeding. This study aimed to investigate effectiveness of the distance education program on the mothers' empowerment in exclusive breastfeeding.

MATERIALS AND METHODS: A randomized clinical trial study was done on 72 nulliparous pregnant women 28–32 weeks with normal pregnancy. The qualified women were randomly assigned to the intervention and control groups based on the random-number table. The breastfeeding training packages were sent to women in the intervention group via Telegram every week from 32 until 37 weeks of gestation. The mothers' empowerment in breastfeeding (primary outcome) and the exclusive breastfeeding rate (secondary outcome) were assessed by questionnaires.

RESULTS: Based on the repeated measured tests, although scores for all domains and also the total score of the mothers' empowerment in breastfeeding between two groups had increased during the study period, there was a significant difference between the increasing trends of the maternal empowerment domains in two groups (interaction P value <0.001). Also, the prevalence of exclusive breastfeeding (secondary outcome) at 6 months was significantly higher in the intervention group (81.8% and 57.1% in the intervention and control groups, respectively) ($P = 0.028$).

CONCLUSION: Distance education could increase all domains of the mothers' empowerment in breastfeeding after delivery. Also, exclusive breastfeeding at 6 months after delivery was significantly higher in mothers who were receiving the distance education packages.

Keywords:

Breast feeding, distance, education, empowerment, pregnant women

Introduction

Exclusive breastfeeding is beneficial for the health of babies (decrease of respiratory infections, allergies, diabetes) and their mothers (decrease of reproductive cancers and type 2 diabetes). Despite the various benefits of breastfeeding, its frequency has not reached the level defined by the World Health Organization (WHO).^[1] The Center for Disease Control and Prevention has reported that the exclusive breastfeeding

rate was 37.7% at 3 months old, and 16.4% at 6 months old of infants in 2013.^[2] This is 37% in the middle- and low-income countries.^[3] The exclusive breastfeeding rates vary from 13% to 77% in the different parts of Iran.^[4] The 65th session of the World Health Organization assembly in 2012 decided to increase this number to at least 50% until 2025.^[5]

Breastfeeding is a social cultural process^[6] and its supporting and promoting should be considered as a public health issue based on

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the available evidences.^[7] Several factors affect a woman's decision to start and continue breastfeeding, such as the mother's age, education, physical condition, family income, socioeconomic conditions, the mother's attitude at decisions about breastfeeding and the first feeding, the breastfeeding knowledge, self-efficacy, perceived negotiation, family support, and empowerment in breastfeeding.^[8-10]

Empowerment in breastfeeding plays a key role in promoting breastfeeding, so that by increasing the level of empowerment, the amount of exclusive breastfeeding will also increase. Empowerment in breastfeeding includes domains of knowledge, attitude, skills of proper breastfeeding technique, skills of preventing and solving breastfeeding problems, breastfeeding sufficiency, negotiation and receiving family support and breastfeeding self-efficacy. All domains are modifiable factors affecting breastfeeding; thus these factors can be considered in designing the educational interventions to support and to improve breastfeeding.^[11,12]

With regards to education, it is the cornerstone of support in breastfeeding. However, the traditional methods of teaching can't always satisfy the learning needs in mothers.^[13] Distance education is considered as a teaching-learning strategy to enhance and promote traditional education.^[14] It comes with more benefits than face-to-face training, and can be used as a teaching method in many health care settings.^[15] Nowadays, mobile and applications based on internet have been applied in the field of health care, clients care for training, counseling, monitoring, making decisions and necessary recommendations.^[16,17]

Although there is some evidence showing the impact of education on some domains of the mothers' empowerment in breastfeeding such as knowledge, attitude, and self-efficacy,^[2] we did not find a study showing the effect of the distance education on various domains of breastfeeding empowerment in Iran.

In the present study, the questionnaire was used to assess the mothers' empowerment in breastfeeding, which has more domains than other studies and can widely show in which domain the empowerment programs should interventional measures be taken. Therefore, this randomized clinical trial was done with the purpose of assessing the effectiveness of distance education on the mothers' empowerment in exclusive breastfeeding.

Materials and Methods

Study design and setting

This study was a randomized clinical trial (RCT) done among nulliparous pregnant women with normal

pregnancy referred to midwifery clinics of educational hospitals in one of the northern cities (Babol).

Study participants and sampling

Seventy-two nulliparous pregnant women referred to the midwifery clinics related educational hospitals of University of Medical Sciences were recruited. It was assumed that a total sample of 72 participants (36 women per each group) with 95% confidence interval, 90% test power and a 30% dropout factor. Inclusion criteria included were nulliparous pregnant women above 18 years of age, with gestational period of 28–32 weeks, with uncomplicated pregnancy, singleton pregnancy, without any physical or mental disease, independency to any drugs in terms of mother's statements, and access to cell phone equipped with Telegram application. Exclusion criteria included were disconnection from the internet for a maximum of three weeks and breastfeeding contraindications in women according to the instructions of the Ministry of Health.

Eligible women were divided into two groups according to computer random-number table: intervention and control by the second author (supervisor). To minimize bias in the study, the questionnaire respondents and the statistical analysts did not know how the codes were assigned to the two groups.

Data collection tool and technique

To investigate the primary outcome of the study (mother's empowerment in breastfeeding), the breastfeeding empowerment questionnaire designed by Heidari *et al.*^[12] in 2015 was used. Its validity and reliability have been performed at 90% confidence level in Iranian society. The questionnaire consisted of 45 items in seven domains, that is, knowledge (5 questions), attitude (6 questions), skills of proper breastfeeding technique (11 questions), skills of preventing and solving breastfeeding problems (6 questions), breastfeeding sufficiency (4 questions), negotiation and receiving family support (6 questions), and breastfeeding self-efficacy (7 questions), using a five-point Likert scale. The scores for each item range from one (totally disagree) to five (totally agree), with a total score range of 45–225.

To assess the secondary outcome (exclusive breastfeeding), a question was asked about exclusive breastfeeding in 4 and 8 weeks, and 6 months after delivery.

Other variables of this study were assessed with the questionnaire designed by researchers. These were fertility variables including five items related to demographic characteristics (mother's age, mother's education, father's education, mother's occupation, sufficiency of income for expenses) and six items related to fertility features (type of delivery, postpartum care

center, number of physiological delivery preparation classes, gestational age at enrollment, gestational age at delivery and baby weight at delivery).

Type of intervention was the provision of Telegram training packages as distance education program. The training packages included breastfeeding information in accordance with the guidelines of the Ministry of Health and credible scientific resources (importance and benefits of breastfeeding for mother and infant, proper breastfeeding techniques, milk adequacy diagnosis, milking and store milk, breastfeeding problems, nutritional risks synthesis and how to deal with the problems of breastfeeding and lactation.^[18] These contents were prepared in 6 training packages in the form of a PDF file with a size of 800 to 1100 kilobyte with lactation images.

After obtaining written informed consent, the numbering questionnaires based on random-number table were completed by eligible women, respectively. At the end of every day by referring to the questionnaire numbers and type of groups (intervention or control), the intervention group was identified. The training package was sent according to the written plan from 32 to 37 weeks of pregnancy via Telegram application every week. The researcher was sure two days after sending the package about receiving the message and reading the training package by the participants. Questionnaires were completed at three time points; in pregnancy at beginning of study, and 4 and 8 weeks after delivery. The question of exclusive breastfeeding as secondary outcome was also asked at three time points of 4, 8 weeks, and 6 months after delivery [Figure 1].

After completing the questionnaires, data was analyzed using Statistical Package for Social Sciences (SPSS) software version 16 with descriptive tests, Chi-squared, Fisher's, and independent *t* tests, and repeated measure. Index of the number needed to treat (NNT) was calculated (the most applicable index of intervention effectiveness assessment) to determine the measurement of the intervention effect on the exclusive breastfeeding rate as a secondary outcome (qualitative variable). The website https://www.medcalc.org/calc/relative_risk.php was used to determine it. The significance level for all tests was considered to be less than 0.05.

Ethical consideration

The implementation of this project began after receiving the code of ethics from the Ethics Committee of Babol University of Medical Sciences (IR.MU Babol HRI. REC.1397.031) in July 2018 and submitting the project to the IRCT site and receiving the clinical trial registration code (IRCT Id: IRCT20180520039728N1).

Results

The mean age of the pregnant women participating was 26 ± 4.9 years in the study. The majority of them had university education in both groups (55.6% in intervention group and 69.4% in control group) and housewives (75% in intervention group and 83.3% in control group) [Table 1].

Regarding fertility variables, the mean gestational age at the enrollment was 31.4 ± 1.2 weeks in the intervention group and 31.3 ± 1.3 weeks in the control group. Most of them had attended more than five sessions in the preparation classes for physiological delivery (67.6% in intervention group and 62.9% in control group) [Table 2]. According to the data, there was no significant difference between the two groups in terms of these variables.

Primary outcome

By repeated measures test analysis, the results showed that the rate of all domains of mothers' empowerment in breastfeeding [Table 3] and its total score increased [Figure 2] in both groups during 4 and 8 weeks after delivery, but the increasing trend in the intervention group was significantly more than the control group. In other words, interaction test *P* value showed that there was a significant difference between the increasing trends of the two groups in all domains (interaction *P* = 0.000).

Secondary outcome

To assess the secondary outcome of the study, there was no significant difference between the two groups in rate of exclusive breastfeeding 4 and 8 weeks after delivery, but the rate of exclusive breastfeeding 6 months after delivery was significantly higher in the intervention group (*P* = 0.028) [Table 4].

Table 1: Demographic characteristics of participants in the distance education and control groups

Demographic characteristics	Intervention group	Control group
Age (years)		
18-24	14 (38.9)	14 (38.9)
25-30	16 (44.4)	16 (44.4)
>30	6 (16.7)	6 (16.7)
Mother's Education		
Under university	16 (44.4)	11 (30.6)
University	20 (55.6)	25 (69.4)
Father's Education		
Under university	16 (44.4)	19 (52.8)
University	20 (55.6)	17 (47.2)
Female Occupation		
Housewife	27 (75)	30 (83.3)
Employed	9 (25)	6 (16.7)
Sufficiency of Income for expenses		
Completely	11 (30.6)	13 (36.1)
To some extent	25 (69.4)	23 (63.9)

All data are given as *n* (%)

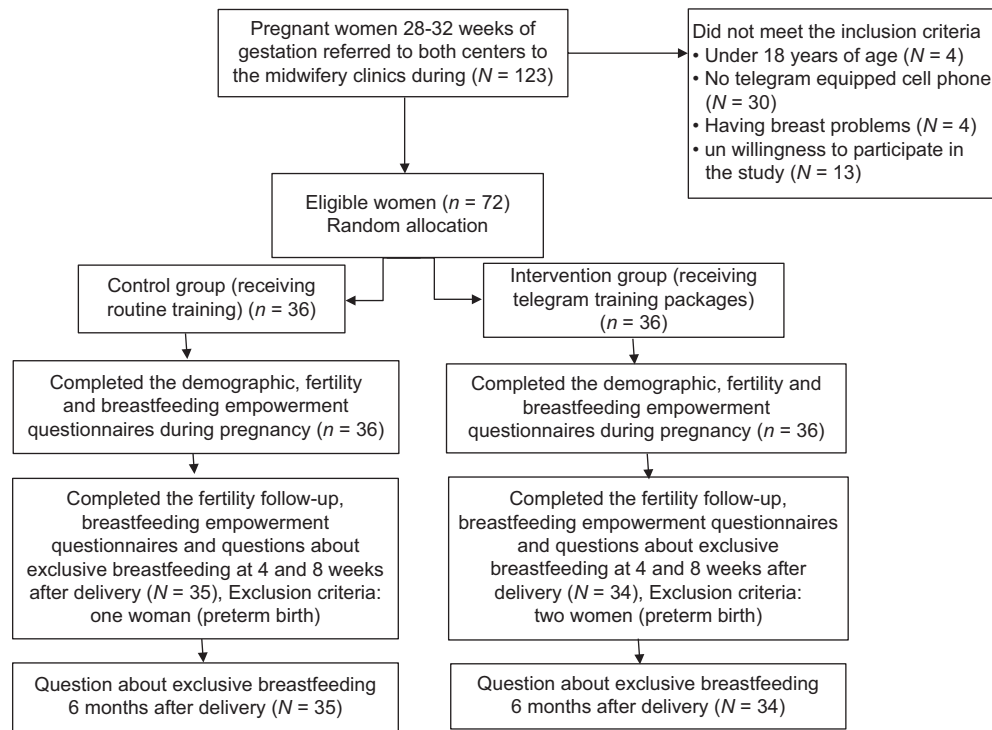


Figure 1: Recruitment process

Table 2: Fertility characteristics of participants in the distance education and control groups

Qualitative variables	Fertility characteristics	
	Intervention group n (%)	Control group n (%)
Type of delivery		
Natural vaginal delivery	18 (52.9)	22 (62.9)
Emergency Cesarean section	16 (47.1)	13 (37.1)
Baby gender		
Female	15 (44.1)	11 (31.4)
Male	19 (55.9)	24 (68.6)
Postpartum care center		
Urban health center	21 (61.8)	22 (62.9)
Rural health center	13 (38.2)	13 (37.1)
Number of physiological delivery preparation classes		
<5	11 (32.4)	13 (37.1)
≥5	23 (67.6)	22 (62.9)
	M (SD)	M (SD)
Quantitative variables		
Gestational age at enrollment (week)	31.4 (1.2)	31.3 (1.3)
Gestational age at delivery (week)	39.2 (0.9)	38.9 (1.1)
Birth weight (g)	3371.1 (381.2)	3393.1 (398.1)

The index of number needed to treat (NNT) for exclusive breastfeeding 6 months after delivery was calculated at about 4.053; that means almost one in four mothers who received the distance education benefited.

Discussion

In the present study, breastfeeding empowerment was considered in seven domains: knowledge, attitude, skills of proper breastfeeding technique, skills of preventing

and solving breastfeeding problems, breastfeeding sufficiency, negotiation and receiving family support and breastfeeding self-efficacy in both intervention and control groups.

The first and second domains of breastfeeding empowerment were the mother 's knowledge and attitude about the benefits of breastfeeding for the mother and baby, and the disadvantages of using a pacifier. The findings of this study showed that after

Table 3: The mother's empowerment in breastfeeding in the distance education and control groups

Empowerment domains	Before intervention (M±D)	4 weeks after delivery (M±D)	8 weeks after delivery (M±D)	Repeated Measured, P
Knowledge				
Intervention group	19.7±2.7	21.7±2.4	22.2±5	<0.0001
Control group	19.4±2.4	19.8±2.2	20±2	0.231
	Interaction P=0.002			
Attitude				
Intervention group	23.3±2.5	27.9±1.9	28.4±1.8	<0.0001
Control group	23.7±2.9	26±2.6	26.1±2.9	<0.0001
	Interaction P=<0.0001			
Skills of proper breastfeeding technique				
Intervention group	35.5±6	47.1±4.8	49.8±4.6	<0.0001
Control group	37.2±5.7	42.1±5.9	44.4±5.2	<0.0001
	Interaction P = 0.0001			
Skills of preventing and solving breastfeeding problems				
Intervention group	15.3±4.4	24.9±3.3	26.9±3.3	<0.0001
Control group	15.8±5.4	21.8±3	23.8±3.1	<0.0001
	Interaction P =0.005			
Breastfeeding sufficiency				
Intervention group	13.8±2.1	18.1±2.8	18.4±3	<0.0001
Control group	14±2	16.3±2.5	16.6±2.8	<0.0001
	Interaction P=0.007			
Negotiation and receiving family support				
Intervention group	24±3.9	26.7±2.4	27.2±2.2	<0.0001
Control group	23.6±3.6	23.3±2.8	23.7±2.8	0.640
	Interaction P=0.001			
Breastfeeding self-efficacy				
Intervention group	26.9±3.4	32±2.6	33.1±2.4	<0.0001
Control group	27.6±3.5	28.7±2.9	30±2.8	<0.0001
	Interaction P- :0.0001			

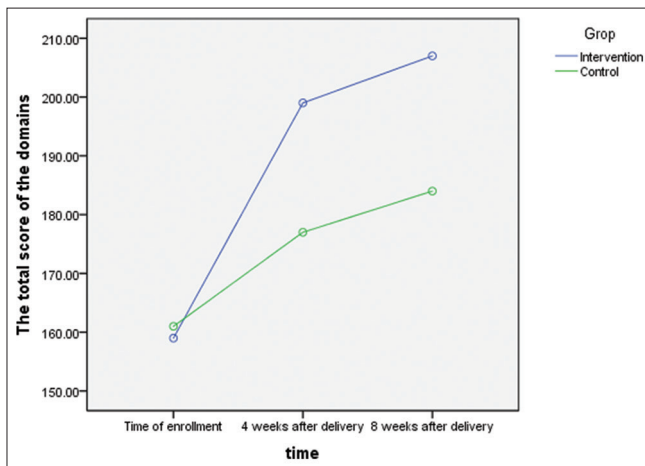


Figure 2: Total domains of the distance education and control groups during the study period

distance education, the scores of these domains increased significantly in the intervention group 4 and 8 weeks after delivery. Mohapatra and Roy showed in their study that providing proper information and counseling about breastfeeding during prenatal care is necessary.^[19] Pitts et al.^[20] reported that use of mobile phone to provide breastfeeding education models was effective in

enhancing women's breastfeeding knowledge and awareness.

The tendency of mothers to breastfeed and positive attitude about breastfeeding are also important predictors for initiation and continuation of breastfeeding,^[21] and women who do not have a favorable attitude to breastfeeding, in fact, are not interested to breastfeed exclusively.^[22] Huang et al.^[23] suggested that a web-based breastfeeding education program may contribute to increasing awareness and attitude of breastfeeding pregnant women. However, Grassley et al.,^[24] in their study, did not find a significant difference in the mean score of the tendency of mothers to breastfeed after an online educational intervention on breastfeeding in pregnancy.

Skills of proper breastfeeding technique is the third domain of breastfeeding empowerment, where the mother knows how to properly hug and breastfeeding the baby and how to milk and storing the human milk. The findings of the present study showed that the skills of proper breastfeeding technique of mothers in the intervention group increased significantly more than the control group. This domain has not been discussed by other researchers.

Table 4: Breastfeeding status in the distance education and control groups

Breastfeeding	Intervention Group	Control Group	Chi-squared Test, P
Breastfeeding the first hour after birth	32 (97)	35 (100)	0.485
Exclusive breastfeeding 4 weeks after delivery	28 (84.8)	31 (88.6)	0.730
Exclusive breastfeeding 8 weeks after delivery	28 (84.8)	30 (85.7)	0.920
Exclusive breastfeeding 6 months after delivery	27 (81.8)	20 (57.1)	0.028

All data are given as n (%)

Skills of preventing and solving breastfeeding problems is the fourth domain of breastfeeding empowerment, where the mother can calm her restless or crying baby, and if she finds a problem with breastfeeding, she can somehow solve it. In the present study, it was found that distance education significantly increased prevention and problem-solving skills in breastfeeding mothers in the intervention group. Kang *et al.*^[25] found that the provision of breastfeeding empowerment programs to help mothers for identifying and resolving breastfeeding problems by themselves caused the breastfeeding empowerment score to increase in the intervention group. Robinson *et al.*^[26] also pointed to the potential positive effects of support through social networking sites such as Facebook in helping breastfeeding mothers to overcome breastfeeding problems.

Breastfeeding sufficiency is the fifth domain of breastfeeding empowerment, where the mother believes that breastfeeding is sufficient for her baby and can satisfy her baby's needs in breastfeeding. It causes the mother's confidence to increase and, consequently, the mother's ability to increase as well. In this research, after receiving the training packages in the intervention group 4 and 8 weeks after delivery, the mean score of this domain increased significantly. In the cross-sectional study aimed to investigate the relationship between exclusive breastfeeding and the domains of breastfeeding empowerment, findings showed that this domain of breastfeeding adequately increased the chances of exclusive breastfeeding about five times; in other words, the interventions should be made to increase this domain.^[27]

The sixth domain of breastfeeding empowerment in this study is family support, where the mother feels that she is being supported by her family and her spouse in breastfeeding, and they will help to solve her problems and accommodate to the difficulties of breastfeeding. Perceived support is the experienced support of a woman when she receives care, interest, understanding and respect, consultation, encouragement, and practical help.^[11] In this study, by the distance education intervention, there was a significant increase in the mean score of negotiation and receiving family support in the intervention group, while there was no increase in the control group. Another study also reported that when women feel that their partner and mother preferred

breastfeeding, they are more likely to breastfeed their infant.^[22]

The last domain of breastfeeding empowerment is breastfeeding self-efficacy. A self-effacing mother has the ability to counteract the misconceptions about breastfeeding and she refers to proper breastfeeding information, and she also feels good with her management of breastfeeding. In the present study, the findings showed that there was a significant difference between the two groups in the mean score of this domain. Song *et al.*^[28] confirmed that a breastfeeding empowerment program increased self-efficacy, adaptation, and continued lactation in primiparous women in the intervention group. Parsa *et al.* also reported a significant difference in the mean postpartum breastfeeding self-efficacy score between the two groups after four sessions of verbal and individual breastfeeding counseling and three telephone counseling sessions during four months postpartum for primiparous women. The intervention group who had higher breastfeeding self-efficacy score also had higher breastfeeding continuity.^[29] Grassley *et al.*^[24] didn't find any significant difference in the mean score of breastfeeding self-efficacy before and after the intervention of the online training program in pregnancy.

Generally, the findings showed that receiving the breastfeeding training packages via Telegram app in the intervention group had a significant effect on the empowerment of mothers in breastfeeding. In other words, although the rate of breastfeeding empowerment in the control group also increased as time passed and received the routine care, the mother's empowerment scores in the intervention group was significantly higher than the control group, and the results indicated that distance education was an effective training method for empowering mothers about breastfeeding. Militello *et al.*^[30] in their systematic review, suggested mobile phones as a unique opportunity to fill the health diversity gap and more accurate intervention research is necessary to strengthen clinical procedures and efforts to change health behavior using mobile technology.

The results of the present study showed that there was no significant difference between the two groups in the rate of initiation of breastfeeding during the first hour after birth, and exclusive breastfeeding 4 and 8 weeks after delivery. But as time passed, this was significantly

higher in the intervention group 6 months after delivery than in the control group. It indicates a more lasting effect of the mother's education in the intervention group. Harari *et al.*^[31] suggested that the bi-directional text messages may increase breastfeeding in the mothers receiving the message. Flax *et al.*,^[32] in a study in Nigeria, found that by using text messages and voice messages via cell phone and sharing them weekly between small groups of five to seven, intervention to promote optimal breastfeeding style was easier and more acceptable and participation in phone messages increased the chances of exclusive breastfeeding by up to 6 months; it showed that messages could help change behavior. However, Kimani *et al.*^[33] in their study on the effect of breastfeeding counseling and support at home with key text messages about breastfeeding didn't find significant difference between the intervention and control groups in exclusive breastfeeding, and even the exclusive breastfeeding rates decreased with increasing infant age at 2, 4, and 6 months in both groups.

The strength of this study is the questionnaire used to assess the mother's empowerment in breastfeeding which has more domains than other studies and it can widely show in which domain of the programs should interventional measures be taken.

Limitations of the study

The study had limitations due to the nature of the research and the type of training; it was not possible to blind the study, but the researcher took steps to minimize bias in this study, including using the researcher's second SIM card for postnatal contact (in which the names of participants were not stored), and also the code number of participants in the study groups was unknown to the statistical analyst.

Conclusion

In conclusion, the results of the present study showed that the distance education program using a cell phone (Telegram app) has been effective for the mother's empowerment in breastfeeding after delivery in all domains of the breastfeeding empowerment program. Distance education also caused higher rate of exclusive breastfeeding 6 months after delivery in the intervention group. Applying this educational method without the need of sharing place and time for communication is recommended to the planners to promote exclusive breastfeeding.

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by the Ethics Committee of ... University of Medical Sciences (IR. MU.... HRI.REC.1397.031).

Ethical approval

Code of Ethics from the Ethics Committee of Babol University of Medical Sciences (IR.MU Babol HRI. REC.1397.031). "This RCT was registered (IRCT Id: IRCT20180520039728N1) with [IRCT site] on [2018-07-03]."

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Conflicts of interest

There are no conflicts of interest.

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