

## Application of Health Belief Model to assess Knowledge and Attitude of Women Regarding Preconception Care

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### ABSTRACT

**Background & aim:** Effective preconception care requires childbearing women's knowledge and attitude to improve maternal and neonatal health by the early recognition of risk factors related to pregnancy. The aim of this study was to investigate knowledge and attitude of Iranian women regarding preconception health based on the health belief model.

**Methods:** This cross sectional study was conducted on 110 married women aged 15-49 years in Mashhad, Iran, during 2016. Sampling was carried out through a multi-stage process. Data collected using questionnaires on demographic and obstetric data, knowledge and preconception risk assessment as well as health belief model questionnaire encompassing four constructs of perceived barriers, sensitivity, severity, and benefits, which considered as attitude. Data analysis was performed in SPSS using Pearson's correlation, Mann-Whitney U test, and Kruskal-Wallis test.

**Results:** The knowledge of preconception care was poor in 36.4% of cases and moderate in 63.6% of participants. The score of attitude were neutral and good among 79.1% and 20.9% of participants, respectively. The scores of constructs of sensitivity (80%), severity (77.3%) and perceived barriers (67.9%) were neutral, and only the construct of perceived benefit was at a good level among most women (63.3%). The scores of the all constructs had a significant correlation with scores of knowledge and attitude ( $P < 0.05$ ).

**Conclusion:** The majority of women had moderate knowledge and neutral attitude regarding preconception care. Therefore, educational intervention based on a health belief model is recommended to improve the knowledge and attitude of women and develop preconception care behaviors in these individuals.

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## Introduction

Preconception care targets women's health care before pregnancy (1). This care aimed at the identifications of the risk factors associated with fertility and reduction of these risks through appropriate training, prevention, and treatment (2). Preconception care as a supplement to prenatal care can improve the outcome and health status of women by the implementation of a long-term approach (3). Nearly half of the pregnancies are unplanned in the United States (4). The review of 49 studies indicated that the prevalence of unplanned pregnancy in Iran

is 30.6% (5). Moreover, one-third of all pregnancies in Mashhad are unintended (6).

Despite the integration of preconception care in maternal care program of all medical universities of the country since 2006 (7), the preconception care rate is still low in Iran. In a study conducted in Iran during 2013, more than 50% of women performed no preconception care (8). According to the current review, the majority of studies in the field of preconception care have reported that the level of knowledge, attitude, or performance is below the expected

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levels of preconception care behavior. The lack of knowledge about preconception care has also been reported among women in Italy (9), Ethiopia (10), Jordan (11), England (12), Denmark (13), and Egypt (14).

In a study performed by Barchloo et al. (2013), it was reported that 59.9% and 18.5% of women had moderate and weak knowledge about folic acid consumption and knowledge, respectively. In addition, 37.6% of the subjects had a false attitude toward the effects of folic acid, whereas 34.5% of the participants were unaware of the effects of folic acid (15). In a recent study, Firouzi and Ebrahimi (2017) declared that knowledge and attitude regarding preconception care had not been investigated previously. Accordingly, they suggested to implement further studies in this field and evaluate performance and effective factors in this regard (16). Moreover, Bayrami et al. concluded that before pregnancy, women require to be educated on issues related to prenatal care to prevent potential health problems (8). On the other hand, ShamshiriMilani et al. (2016) indicated that limited knowledge and community's unawareness about preconception care and services in healthcare centers were considered as the most perceived barriers posed by participants (17). In health education, two variables of knowledge and attitude are important behavioral determinants. Knowledge is considered as the base in the study of the perception of risk and beliefs while attitude plays a role as a predisposing an individual factor in affecting behaviors (18).

The use of models of health education will help researchers recognize the factors affecting health behaviors. Among health education models, the health belief model is one of the most effective models in the cognitive psychology to determine health behaviors that shows the relationship between health beliefs and health behaviors and emphasizes on the intrinsic factors of individuals, such as knowledge, attitudes, beliefs and behavior (19, 20). The health belief model was the first theory, exclusively used for "health-related behaviors", in particular for designing programs to prevent inappropriate health behaviors that are based on people's attitudes and beliefs. This model encompasses four main concepts, including

sensitivity, severity, benefits and perceived barriers (20).

Today, it is believed that individuals must feel threatened by their current behavioral patterns to succeed in behavioral change, as desired in the health belief model. In addition, they must believe that a particular type of behavior leads to a valuable outcome with an acceptable outcome (21). Therefore, in order to conduct a healthy behavior (e.g., preconception care), one must believe that s/he is susceptible to the disease (perceived susceptibility), fully understand the depth of the risk and the seriousness of its various complications in his/her life (perceived severity), and consider the proposed behaviors, such as preconception care, useful to reduce the risk or severity of the disease (perceived benefits) to overcome the inhibiting factors (perceived barriers) (22).

Preconception care is considered a preventive measure in the provision of maternal and neonatal health. Therefore, it is important to employ a health belief model in studies related to preventive health behaviors and investigate the role of knowledge and attitude as well as health belief model on intra-individual factors (e.g., knowledge and attitude). Given the above-mentioned issues and the lack of research on the use of the health belief model in assessing women's knowledge and attitudes regarding preconception care, this study aimed to determine the knowledge and attitude of women regarding preconception care based on the health belief model in Mashhad, Iran, during 2016.

## Materials and Methods

This descriptive-analytical and cross-sectional study was conducted on married women aged 15-49 years covered by comprehensive health centers in Mashhad. The participants were planning to become pregnant and had preconception care conditions. The sample size was estimated at 97 individuals using the mean estimation formula in the community and results of a study conducted by Firouzi and Ebrahimi (2017) (16) with the mean and standard deviation of 8.13 and 1.5 for knowledge of women, as well as 95% confidence interval and 0.3 error rate. In addition, the sample size was calculated at 104 women based on positive attitude (98.9%). Accordingly, a total

of 110 women were enrolled in the study. The inclusion criteria were willingness to participate in the study, age range of 15-49 years, Iranian nationality, married, residency in Mashhad, willingness to become pregnant, and no education or occupation related to health.

After the approvals from the ethics committee of Mashhad University of Medical Sciences, the researcher referred to the selected comprehensive healthcare centers and initiated data collection. Sampling was carried out in a multi-stage process. Firstly, two of the five healthcare centers of Mashhad were selected. It is notable that the selection of centers was carried out due to various cultural issues to guarantee the generalizability of the results. Therefore, two comprehensive healthcare centers of Shahid Hasheminejad and Imam Hasan Mojtaba, Mashhad, Iran, were randomly selected, and 110 eligible women from 4 different centers were entered into the study through convenience sampling technique.

Initially, the researcher explained the objectives and methods of the study to women referring to the above-mentioned centers. In case the subjects were eager to participate, they were required to fill out the research checklist of unit selection. Afterward, those who met the inclusion criteria entered the study. It is noteworthy that the subjects were ensured of the confidentiality terms regarding their personal information. In addition, written informed consent was obtained from the participants prior to the study. Data collection tools included the demographic and midwifery characteristics, preconception risk assessment checklist, knowledge questionnaire, and health belief model questionnaire. Preconception risk assessment checklist was designed with 33 risk factors for preconception risk in accordance with preconception care records. Knowledge questionnaire consisted of 19 items with a score range of 0-19 (1 is allocated to a correct answer and 0 is assigned to a false response). In addition, the health belief model questionnaire encompassed 61 items in 4 sections of perceived sensitivity (17 items), perceived severity (15 items), perceived benefits (18 items), and perceived barriers (11 items).

Items were scored based on a five-point Likert scale (totally agree, agree, neither agree

nor disagree, disagree, completely disagree). The score range of each item was between -2 and 2+, and the obtained scores were within the range of +122 and -122. The health belief model questionnaire was designed using Champion's health belief model questionnaire (23). Regarding the structures of perceived sensitivity and severity, researchers applied the framework proposed in the Kim Witte parallel process model (24). The results of the four constructs estimated women's attitudes. The researcher tools were developed by the researcher with the help of supervisors and counselors. In the next step, seven faculty members of Mashhad University of Medical Sciences were asked to evaluate the content and face validity of the questionnaire. The final questionnaire was designed after making all the necessary modifications.

Cronbach's alpha coefficient was utilized to assess the internal consistency of the tools. In this regard, the internal consistency of the knowledge questionnaire and was confirmed ( $r=0.68$ ). The reliability of the health belief model questionnaire was estimated at  $r=0.93$  (perceived sensitivity [ $r=0.92$ ], perceived severity [ $r=0.85$ ], perceived benefits [ $r=0.93$ ], and perceived barriers [ $r=0.89$ ]). The questionnaires were completed by women through self-report. The mean scores of knowledge <50%, 50-70%, and >75% were weak, moderate, and good, respectively. In addition, the mean score of constructs from -1 to -2 were considered weak, whereas the scores of -1 to +1 and above +1 were neutral and good, respectively. Data analysis was performed in SPSS (version 16) using Pearson's correlation coefficient, Mann-Whitney U, and Kruskal-Wallis tests. Moreover, P-value less than 0.05 was considered statistically significant.

## Results

The mean age of women was  $31.07\pm 6.55$  years. Most of the subjects (87.3%) were housewives, and 53.6% of all participants had a diploma. The spouses of the women in most cases (70.9%) had a high school or a lower level degree, and the majority of their income (83.6%) was sufficient enough to make needs meet.

Most of the research units (73.6%) had a history of two pregnancies. In reviewing the

women's encouragement for preconception care, the highest percentage (31.8%) was attributed to the encouragement by healthcare providers at the comprehensive health centers (Table 1).

The results of the preconception risk

assessment checklist showed that among 110 women, only 5 individuals had no risk factors, 14 (12.7%) had at least one risk factor, and 28 (25.5%) had at least three risk factors. Among the 33 preconception risk factors, 8 factors had the highest rate. The highest risk factor for oral

**Table 1.** Distribution frequency, mean, and standard deviation of knowledge and attitude of women toward preconception care based on demographic and midwifery characteristics

		N (%)	knowledge		p-value	attitude	
			Mean± standard deviation			Mean± standard deviation	test result
<b>Occupational status</b>	Employed	14 (12.7)	10.42±2.7	P*=0.47	45.11±7.8	P*=0.8	
	Housewife	96 (87.3)	11.1±3.3		47.24±2.00		
<b>Level of education</b>	Below diploma	27 (24.5)	10.1±3.4	P**=0.04	42.2±6.4	P**=0.8	
	Diploma	59 (53.6)	10.9±3.3		47.22±6.1		
	Academic	24 (21.8)	12.3±2.5		50.5±5.5		
<b>Income level</b>	Insufficient	17 (15.4)	12.2±3.8	P*=0.1	45.19±6.8	P*=0.8	
	Sufficient	92 (83.6)	10.8±3.1		47.23±2.4		
<b>History of pregnancy</b>	Once	33 (50.8)	10.93±3.23	P*=0.41	43.9±23.4	P*=0.33	
	Twice	32 (49.4)	11.5±3.39		49.37±22.7		
<b>Preconception risk factor</b>	Dental problems	no	44 (40.0)	10.65±3.67	P*=0.82	47.1±27.4	P*=0.6
		yes	65 (60.0)	11.3±2.95		47.00±19.4	
	Abnormal BMI	no	66 (62.3)	11.36±3.06	P*=18	47.2±24.4	P*=0.7
		yes	40 (37.7)	10.5±3.32		47.47±20.8	
	Major medical disease	no	69 (73.4)	11.31±3.33	P*=0.15	48.42±24.3	P*=0.7
		yes	25 (26.6)	10.32±3.33		46.71±22.4	
	Family marriage	no	74 (67.3)	11.25±3.43	P*=0.13	46.98±24.4	P*=0.9
		yes	36 (32.7)	10.52±2.83		46.94±19.4	
	Age above 35 years	no	82 (74.5)	11.11±3.27	P*=0.73	46.26±24.2	P*=0.6
		yes	28 (25.5)	10.75±3.26		49.03±18.4	
	History of cesarean section	no	86 (78.2)	11.18±3.28	P*=0.33	47.63±24.5	P*=0.5
		yes	24 (21.8)	10.42±3.15		44.58±15.2	
	Child below the age of two	no	96 (87.3)	11.00±3.22	P*=0.83	46.8±23.7	P*=0.3
		Yes	14 (12.7)	12.14±3.75		48.00±16.1	
History of miscarriage	no	96 (87.3)	11.18±3.04	P*=0.19	48.19±24.5	P*=0.7	
	Yes	14 (12.7)	9.85±4.40		23.3±38.575 7±23.3		
<b>Women's incentive resources for preconception care</b>	Treatment staff	31 (28.2)	10.0±3.2	P**=0.4	46.7±21.2	P**=0.03	
	Comprehensive healthcare center	35 (31.8)	12.0±3.5		54.5±21.3		
	Other	44 (40.0)	10.9±2.9		41.18±22.3		

BMI: body mass index

\*P=Mann-Whitney U, \*\*P=Analysis of covariance results

and dental problems was reported by 65 individuals (59.6%) and 2 risk factors, including children under 2 years and abortion history, reported as the lowest risk in 14 (12.7%) cases.

The mean score of women's knowledge was 11.0±3.2 out of 19. Knowledge about preconception care was moderate in the majority

of cases (63.6%), and there was no proper knowledge of preconception care. The mean score of women's attitude was 46.9±22.8 from 122. Women's attitude regarding preconception care was neutral in 79.1% of the cases. In most women, the scores of perceived sensitivity (80%), severity (77.3%), and barriers (67.9%) indicated

neutral level, and only the score of perceived benefit construct was good in the majority of

women (63.3%) (Table 2).

**Table 2.** Mean and standard deviation of knowledge, as well as perceived attitude, sensitivity, severity, and benefits of women toward preconception care

	Mean±standard deviation	Weak N (%)	Moderate N (%)	Good N (%)	Neutral N (5)
<b>Knowledge</b>	11.01±3.25	40 (36.4)	70 (63.6)	-	-
<b>Attitude (total four structures)</b>	46.97±22.80	-	-	23 (20.9)	87 (79.1)
<b>Perceived sensitivity</b>	11.51±10.79	2 (1.8)	-	20 (18.2)	88 (80)
<b>Perceived severity</b>	11.53±7.50	-	-	25 (22.7)	85 (77.3)
<b>Perceived benefits</b>	20.45±7.71	-	-	70 (63.3)	40 (36.7)
<b>Perceived barriers</b>	3.46±7.34	1 (0.9)	-	34 (31.2)	75 (67.9)

Regarding the relationship of knowledge and attitude (total constructs of the model) with demographic variables, the knowledge score for preconception care had a significant association only with the level of education ( $P=0.03$ ) and encouragement resources ( $P=0.04$ ), resulting from Kruskal Wallis and Mann-Whitney U test. In addition, the Kruskal Wallis test showed that there was a significant difference between the mean score of the attitude of women and encouragement resources ( $P=0.03$ ).

The evaluation of the correlation between knowledge and health belief model constructs using Spearman's correlation coefficient

demonstrated that knowledge had a significant and direct relationship with perceived sensitivity ( $P=0.001$ ,  $r_s=0.309$ ), perceived severity ( $P<0.001$ ,  $r_s=0.342$ ), perceived benefits ( $P=0.002$ ,  $r_s=0.287$ ), and perceived barriers ( $P=0.043$ ,  $r_s=0.193$ ).

The correlation between attitude and constructs of health belief model using Spearman correlation coefficient showed that the components of health model (perceived sensitivity, perceived severity, perceived benefits, and perceived barriers) had a significant relationship with women's attitude toward preconception care ( $P<0.001$ ).

**Table 3.** Correlation of knowledge and attitude of women regarding preconception care with the constructs of health belief model

Variable	Knowledge	Perceived sensitivity	Perceived severity	Perceived benefits	Perceived barriers	Attitude (total four constructs)
<b>Knowledge</b>	1	$P=0.001^{**}$ $r_s=0.309$	$P<0.001^{***}$ $r_s=0.342$	$P=0.002^{**}$ $r_s=0.287$	$P=0.043^*$ $r_s=0.193$	$P<0.001^{***}$ $r_s=0.365$
<b>Perceived sensitivity</b>		1	$P=0.002^{**}$ $r_s=0.289$	$P<0.001^{**}$ $r_s=0.375$	$P=0.001^{***}$ $r_s=0.318$	$P<0.001^{***}$ $r_s=0.733$
<b>Perceived severity</b>			1	$P<0.001^{***}$ $r_s=0.415$	$P=0.007^{**}$ $r_s=0.255$	$P<0.001^{***}$ $r_s=0.614$
<b>Perceived benefits</b>				1	$P=0.008^{**}$ $r_s=0.253$	$P<0.001^{***}$ $r_s=0.691$
<b>Perceived barriers</b>					1	$P<0.001^{***}$ $r_s=0.643$

Pearson's correlation coefficient= $r_s$ , \* $P<0.05$ , \*\* $P<0.01$ , \*\*\* $P<0.001$

In this regard, perceived sensitivity had the highest relationship with attitude score ( $P<0.001$  and  $r_s=0.733$ ), and subsequently the perceived benefits ( $P<0.001$  and  $r_s=0.691$ ) and perceived barriers ( $P<0.001$  and  $r_s=0.643$ ) had the highest correlation with the attitude score (Table 3).

## Discussion

The present study aimed to determine the knowledge and attitude of women referring to Mashhad comprehensive health centers regarding preconception care based on the health belief model. According to the results, the

mean score of women's knowledge was  $11.0 \pm 2.3$  from 19, and women's knowledge of preconception care was weak and moderate in 36.4% and 63.6% of women, respectively, and not good in any participants. In a study conducted by Ayalew (2017), the knowledge level of women in Ethiopia about preconception care was relatively low and there was no good knowledge (10), which is in line with the findings of the current study. The similarities that make the results consistent can be the type of study, the method of implementation, scope of the questions related to the measurement of knowledge, and subjects of the study regarding the reproductive age.

In another study, Firouzi and Ebrahimi (2017) assessed the knowledge and attitude of 384 married women aged 15-49 years in Natanz, Iran. The knowledge score of women was  $8.13 \pm 1.5$  from 10, showing a favorable knowledge of women in this regard (16). These results are inconsistent with our findings, which might be due to the use of the health belief model in the present study and differences in the method and population of the study. In the current research, 19 items were designed for knowledge with regard to all preconception care components. However, Firouzi and Ebrahimi (2017) assessed their subjects with six items on knowledge. In addition, subjects in the mentioned study were married women aged 15-49 years with tubectomy or vasectomy. In the present study, willingness to become pregnant and the lack of health-related education or occupation were considered.

In a study conducted by Firouzi and Ebrahimi (2017), the mean age of women was 32 years, 61.4% of the participants had high school diploma and higher, and 83.08% were housewives, which were line with the findings of the current study. Considering the differences in knowledge levels of women in Mashhad and Natanz regions, comparison of the knowledge levels with the same tools in different regions of Iran can be made in subsequent studies and the results of homogeneous studies can be compared.

In the present study, there was a significant relationship between the knowledge level and education ( $P=0.04$ ) and encouraging resources

for preconception care ( $P=0.04$ ), in a way that the increase of the educational level of women elevated knowledge scores. In the study by Firouzi and Ebrahimi (2017), there was no significant difference between the knowledge score and educational level ( $P=0.228$ ) (16). In a study performed by Ayalew (2017) (10) and Barchloo et al. (2013) (15), there was a significant relationship between the knowledge and education of women, which is consistent with the present study.

This similarity might be due to the type of study, method of implementation, range of questions related to knowledge measurement, and the investigated subjects. In addition, some of the reasons for consistency with Barchloo's research (2013) (15) included similarity in the level of education and employment of women. However, the only factor which had a significant relationship with attitude in the present study was encouragement resources ( $P=0.03$ ). Studies conducted by Barchloo et al. (2013) (15) and Firouzi and Ebrahimi (2017) (16) showed that there was a significant relationship between attitude and level of education, which is not in accordance with the findings of the current study.

The most significant encouraging source preconception care for women was comprehensive health centers (31.8%), which is consistent with results obtained by Rezaei et al. (2010) (25). The consistency in this regard might be due to the same type of study and research setting. Barchloo et al. (2013) introduced midwives as the primary source of encouragement, followed by physicians, and comprehensive health centers (15). In the present study, midwives (15.5%) and physicians (12.7%) had a significant contribution after comprehensive health centers. The results obtained by Firouzi and Ebrahimi (2017) showed that the source of information was radio and television (73.2%) in the majority of cases and staff of health centers (67.2%) (16). These results were inconsistent with our findings. In the present study, the least encouragement was radio and television (3.6%).

According to the present study, women's attitude toward preconception care was neutral in 79.1% cases and good in 20.9% of cases. The study by Barchloo et al. (2013)

showed that 50.4% had a correct attitude, 37.6% had a false attitude, and 34.5% of the subjects were unaware of the effects of folic acid (15). In this regard, the findings of the current study were in congruence with the results of the mentioned study. This consistency could be due to the similarity between the education level and the employment of women. However, Firouzi and Ebrahimi (2017) marked that the attitude of 98.9% of women toward preconception care was positive (16). These results were not in line with the findings of the current research, which might be due to differences in the methods and population of studies. The attitude in this study was measured based on the total of four constructs of the health belief model that considered the components of preconception care and included 61 items. However, the attitude assessment tool used in the study by Firouzi and Ebrahimi (2017) (16) was measured based on 15 items of attitude scored based on a three-point Likert scale.

Considering the components of attitude based on the health belief model, the mean perceived sensitivity score toward preconception care was 11.5%, where the majority of subjects obtained neutral (80%) and good (18.2%) scores. It means that women had a low understanding of the possibility of complications in pregnancy and childbirth in the absence of preconception care. The mean perceived severity score was 11.5, where the majority of subjects received neutral (77.3%) and good (22.7%) scores. This means that most women had a limited understanding of the possible effects of preconception problems on their health and the fetus, as well as the subsequent effects of their life, family, and social relationships. Perceived benefits had the mean score of 20.4%, where 63.3% of the subjects had a good score and 36.7% had a neutral score. This structure had the highest score among the four structures. Perceived benefits considering the effectiveness of the recommended measures aimed to reduce the risk of pregnancy and childbirth, and occurs with the precise introduction of preconception care and how and when it is performed (22). The mean score of perceived barriers was 3.4, where 68.8% of women had a neutral score and 31.2% had a

good score. Perceived barriers regarding the individual's mental value about spending costs can be accomplished by the recommended action (22).

Therefore, in health education programs, in order to create behavior in the context of high-risk pregnancy prevention, it is necessary to increase perceived sensitivity by describing the probability of negative consequences and their risks. It also increases perceived severity by expressing serious negative consequences to learners. The emphasis on the benefits of these acts will increase the perceived benefits and help the reduction of perceived barriers by providing comprehensive coverage on the accuracy of information and helping to correct misguided beliefs (18).

Knowledge had a direct and significant association with each construct and the overall concept of attitude. In line with the findings of the current research, Rahimi et al. (2015) assessed the knowledge, attitude, and performance of pregnant women in Zahedan, Iran, in the context of urinary tract infections based on the health belief model. The obtained results revealed a correlation between knowledge and components of the model (26). In this regard, it can be expected that increasing the knowledge of women will be associated with the higher scores of the model, and consequently improved the attitude of women. The consistency between the results of the mentioned study and the present study might be the type of study, use of tools based on components of the health belief model, and the research setting.

As the most common source of encouragement and direct communication with the knowledge level of women, personnel at health centers indicated a greater impact of this resource on encouraging and raising women's knowledge of other sources. Therefore, holding preconception care classes based on the health belief model in comprehensive health centers can be effective on the increase of women's knowledge and belief. It is hoped that the results of this study will provide appropriate planning and implementation of educational interventions and preconception care programs. One of the strengths of the present study was the implementation of the health belief model. In

addition, one of the major drawbacks of the study was the self-report nature of data collection tools because the researcher trusted the accuracy of the participants' statements. According to the current review, no study was found on the basis of health education patterns to assess the knowledge and attitude of women about preconception care. Therefore, the possibility of comparing the results of the current study with other studies was limited. As such, it is suggested that more studies be conducted in this field.

## Conclusion

According to the results of the present study, the knowledge of the majority of women toward preconception care was moderate and the majority of women had a neutral attitude in this regard. Therefore, it is suggested that health education planners develop educational packages to be used by employees in order to improve the knowledge and attitude of women about preconception care, as well as taking into account the constructs of perceived sensitivity, severity, benefits and barriers. It is recommended to conduct future studies in different regions of Iran to collect more evidence and compare results and design interventions.

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## Conflicts of interest

Authors declared no conflicts of interest.

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