Original Article

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Validity and Reliability of the Vietnamese Version of Diabetic Self-care Knowledge Questionnaire-30 Used for Assessing Self-care Knowledge of Patients with Type 2 Diabetes Mellitus in Vietnam

Phung Van Loi, Ph.D.[1,2], Ngo Huy Hoang, Ph.D.[3], Pham Tuan Vu, Ph.D.[2], Dao Thanh Xuyen, M.D.[4]

[1]Faculty of Nursing, Nam Dinh University of Nursing, Nam Dinh 420000, Vietnam.

[2]Faculty of Nursing, Thai Nguyen University of Medicine and Pharmacy, Thai Nguyen 250000, Vietnam.

[3]Faculty of Nursing, Nam Dinh University of Nursing, Nam Dinh 420000, Vietnam.

[4]Outpatient Department, Thai Nguyen National Hospital, Thai Nguyen 250000, Vietnam.

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Abstract:

Objectives: To translate and adapt the Diabetic Self-care Knowledge Questionnaire-30 (DSCKQ-30) questionnaire to be suitable for Vietnamese conditions and culture. To examine the reliability and validity of the Vietnamese version of the DSCKQ-30 questionnaire.

Material and Methods: The questionnaire was forward translated, from English into Vietnamese and vice versa, by four independent translators. After that, an expert panel resolved any disagreements in translation regarding 4 criteria: semantics, idioms, experiences and concepts. The questionnaire then underwent a pilot study, on a sample of 100 DM patients to assess its clarity and readability; from June 1, 2021, to June 15, 2021. Finally, a test-retest study was conducted on a sample of 279 patients, over one month to examine internal consistency, stability and construct validity of the questionnaire; from July 1, 2021 to July 30, 2021. This study was approved by the Research Ethics Committee of the Thai Nguyen National Hospital.

Results: The Vietnamese translated diabeté self-care knowledge questionnaire had content validity of 1.00, Cronbach's alpha of 0.899 and Kappa coefficient of 0.700 or greater, except for question 15: with a Kappa coefficient of 0.658 (acceptable).

Conclusion: The translated, adapted version of the DSCKQ-30 is valid, reliable and a feasible tool for practice, education and research in the future.

Keywords: questionnaire, self-care knowledge, type 2 diabetes mellitus

Contact: Phung Van Loi, Ph.D.
Faculty of Nursing, Thai Nguyen University of Medicine and Pharmacy,
Thai Nguyen 250000, Vietnam.
E-mail: phungvanloi@tump.edu.vn or phungloiyk@gmail.com

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Introduction

According to the International Diabetes Federation (IDF) in 2017, there were 425 million people with diabetes mellitus (DM) worldwide; of which contained approximately 90% of type 2 diabetes mellitus (T2DM). This number has been predicted to be 629 million by 2045. Diabetes is a pandemic, killing more than 5 million people every year; whereas, every 6 seconds one person dies from this disease. In Viet Nam, there are 3.53 million people with diabetes mellitus, and at least 80 people die from this complaint every day. The cost of treating diabetes along with its complications is estimated at USD 673 billion dollars per year (12% of total worldwide spending). In Vietnam, the average cost of treatment is USD 162,700, per patient. Costs increase with the severity and complications of the disease, T2DM causes a heavy burden on individuals, patients' families and the community because it affects the quality of life and requires both long-term and comprehensive health care[1]. Early intervention to control T2DM, using appropriate therapies, is, therefore, crucial to reduce disease impact and progression[2]. For most people, T2DM is a manageable disease, with a focus on factors; such as medication regimen, diet and physical activity[3].

However, self-care is challenging and difficult to maintain for people with T2DM[4], as self-care skills require the patient to be more knowledgeable about his or her illness. Knowledge of diabetes is considered an essential prerequisite for effective self-care activities and favorable health outcomes[5]. Diabetes knowledge is an important predictor of glycemic self-monitoring and self-care practices for T2DM[6,7]. Understanding diabetes mellitus is an indicator of knowledge that has been shown to influence self-care activities in people with diabetes[8]. It has been found that a lack of knowledge on the disease has led to a lack of knowledge about diabetes mellitus, high HbA1c, less self-control and less physical activity[8-10]. People with diabetes are now encouraged to take part in structured education programs, which will have positive results on blood glucose, and bring about a reduction in complication rates. This will enable patients with diabetes to become more responsible and successful in self-managing their condition. The need to improve self-care knowledge and control of diabetes mellitus has necessitated the incorporation of measures to improve the quality of life of diabetic patients in Viet Nam.

The Diabetic Self-care Knowledge Questionnaire (DSCKQ-30) is a 30-item tool developed by Adibe et al in 2011[11]. The questionnaire includes 30 questions regarding lifestyle changes, compliance and consequences of poor glycemic control (Cronbach's alpha: 0.89). The DSCKQ-30 questionnaire in the English version has been widely used; however, it has not been translated nor used in other languages. Therefore, this much-needed DSCKQ-30 questionnaire was translated and evaluated in the Vietnamese language and Vietnamese culture. Vietnamese clinicians and nurses can utilize it to evaluate patients during treatment and care. An adapted tool, in a new context, requires to be valid and reliable[12,13]. Hence, the aim of this study was to translate and adapt the DSCKQ-30 questionnaire to suit Vietnamese culture and to examine the reliability and validity of the Vietnamese version of the DSCKQ-30 questionnaire in patients with type 2 diabetes.

Material and Methods

Design

This study consisted of two phases. Firstly, the DSCKQ-30 tool was translated and adjusted, then reviewed by an expert panel. Secondly, the translated and modified DSCKQ-30 questionnaire underwent a pilot study and a test-retest study.

Settings

The translation and adjustment of the questionnaire as well as testing the reliability and validity of the questionnaire were carried out at the DM Outpatient Clinic,

at Thai Nguyen National Hospital, with plays an important role in Vietnam's healthcare system and is a special class hospital. The hospital provides healthcare services for people living in Thai Nguyen province as well as the northern provinces of Vietnam.

Phase one: Translation and adjustment of the DSCKQ-30 questionnaire

The guidance of Beaton et al (2007) was used to translate and adapt the questionnaire (DSCKQ-30)[14]. The instrument was translated into Vietnamese using a five-step process (Figure 1). Firstly, the forward translation of the

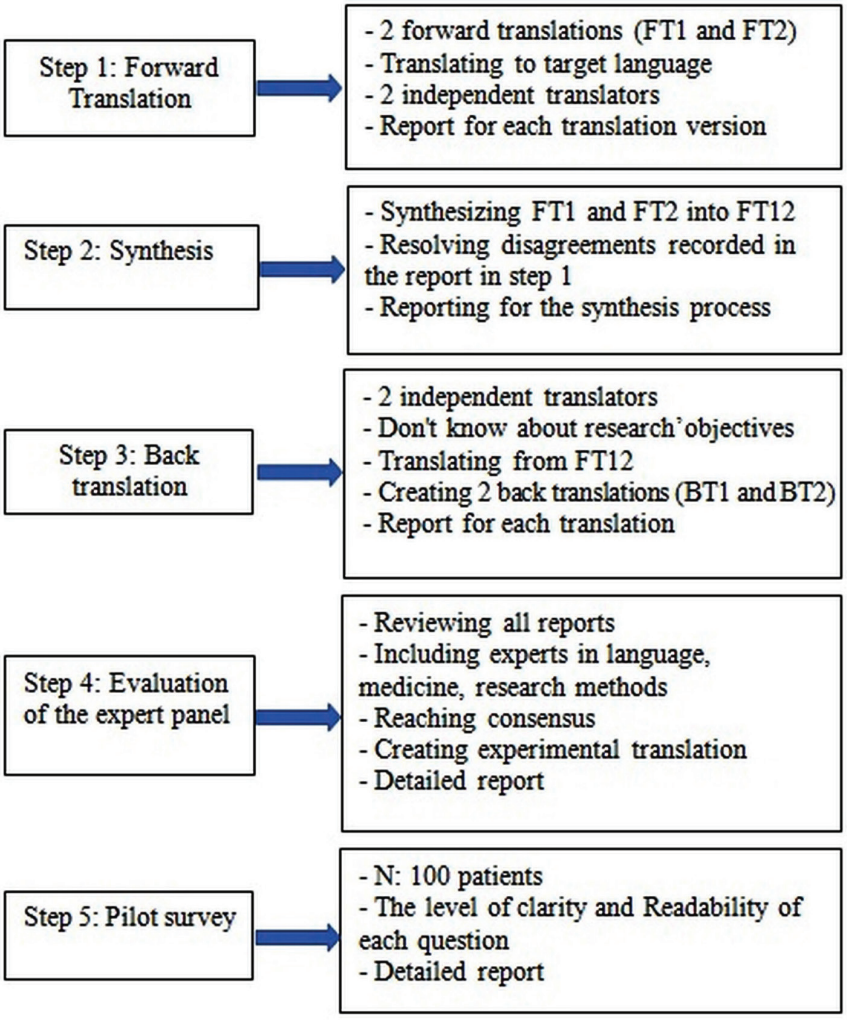

Figure 1 Five main steps of the translation process and adjustment of the questionnaire

DSCKQ-30 from English (source language) into Vietnamese was conducted by two Vietnamese translators, who are proficient in English (one translator in the medical field and with clear understanding about the aims of this study and one translator without medical expertise nor without knowing the aims of this study). Secondly, we conducted a meeting among researchers and two translators to reach a consensus on the forward-translated version of the DSCKQ-30. Thirdly, the instrument was blindly back-translated into English, by the other two translators who are proficient in English, but did not know the research aims nor the original questionnaire. Fourthly, we conducted an expert panel, including 8 people (4 medical doctors and 2 nurses, with expertise in the field of diabetes research and 2 experts in research methodology). Step 4 aimed to assess the face content validity and readability of the translated instrument.

Step 4 consisted of two stages:

-Stage 1: Evaluating the level of equivalence and giving comments on the adjustment of the questionnaire. Panelists independently assessed the equivalence of each question in the translated version compared to the original version in terms of semantic equivalence, idiomatic equivalence, experiential equivalence and conceptual equivalence.

-Stage 2: Adjusting questions that did not achieve the equivalent score and re-evaluating the questionnaire after adjustment. The questions not reaching the absolute equivalent score (8/8), for four aforementioned criteria, were collected and sent to the panel for equivalence adjustment. The questions, after adjustment, were assessed by the panelists for the 2nd equivalence assessment; according to the four criteria and rating scale as in stage 1. The result achieved was the translated version used for the pilot survey (pilot version).

Step 5: Pilot survey

The aim of this step was to assess the clarity and readability of each question, and form a final Vietnamese version of the questionnaire. One hundred (100) patients with T2DM[4], visiting Thai Nguyen National Hospital, were interviewed face-to-face with the pilot version of the questionnaire; from June 1, 2021 to June 15, 2021. The wording of each question in the pilot version was evaluated by T2DM patients on a scale of 0 to 10; wherein, 0 was very difficult to understand and 10 was very clear and easy to understand. Then, the questions with an average score of ≤9 were sent to the panel for revision. The product of this step was the final Vietnamese version of the DSCKQ-30 that was ready for examination of its reliability and validity in phase 2 of this study.

Phase two: examining the reliability and validity of the DSCKQ-30 questionnaire

-Research design: a test-retest design was conducted to examine the reliability and validity of the questionnaire.

-Subjects: Patients with T2DM visited the clinic at the Thai Nguyen National Hospital.

-Sample size: According to Kline (2013)[15], the sample size for test-retest reliability and to measure internal consistency reliability should be at least 279 participants.

-Time: From July 1, 2021 to July 30, 2021

-Evaluative criteria for the DSCKQ-30 questionnaire

Reliability

Two types of reliability were measured, including internal consistency and stability. Internal consistency was examined based on Cronbach's alpha coefficient; with a Cronbach's alpha of 0.5 or above being consistently considered[16,17]. Stability (Test-retest) was examined based on the Kappa coefficient to assess the stability of patients'

responses between the first and second points in time. Patients who visited the clinic on July 1, 2021, were interviewed twice: July 1st and July 15th (after two weeks). The same interviewing process was applied to the other patients.

Validity

Content validity and construct validity were examined to measure the validity of the questionnaire. Content validity was evaluated by 8 experts while constructing validity was performed based on the ability to differentiate of the self-care knowledge score between groups. These were divided by using patients' characteristics, including age, gender, education, comorbidity and disease duration. In each pair analysis, the Chi-square test was used and controlled for educational level.

Results

Translation and adjustment of the questionnaire

Translation: In the forward translation step, no difficulties were recorded in the translation process. In terms of the back translation, translator 1 used some singular verbs, while translator 2 used some plural verbs; which were the inputs for the expert panel.

Evaluation of expert panel

-Stage 1: There were 25 out of 30 questions evaluated by the expert panel, with absolute equivalent scores in 4 criteria. The remaining questions (1, 8, 11, 12, 16) did not achieve the maximum equivalent score; the lowest score was question 11 (0.78 points on average). Some questions required adjustment of tenses and the use of singular or plural verbs. Some questions required adjustment of content; including: "daily brushing and flossing", which was revised as "daily brushing and using toothpicks"; "drinking more than 14 standard drinks of alcohol (about 5 bottles of Nigerian beer), for women or 21 standard drinks of alcohol (about 7 bottles of Nigerian beer) for men"; which was revised as: "drinking more than 560 ml of alcohol (30%) for women, or 840 ml of alcohol (30%) for men. Low dose aspirin (Vasoprin®, Emprin®)", was revised as: "Aspirin (Vasoprin®, Emprin®) dose of 75mg per time, per day".

-Stage 2: After adjustment of words, phrases and some content relevant to Vietnamese culture, the average score of the expert panel was 1.00 for 4 criteria of semantic, idiomatic, experiential and conceptual equivalence. The result of this stage was a Vietnamese version of the questionnaire, which was used in the pilot study.

Pilot study

There were 100 patients participating in the pilot study to assess the clarity and readability of the DSCKQ-30 questionnaire. The ratio of men and women was equal, with the average age being 62.25±8.67. The proportion of patients with comorbidity, disease duration of 5-10 years, and high school education accounted for 71.2%, 66.4%, and 52.8%, respectively. Scores for assessing the clarity and readability of the questionnaire are presented in Table 1.

Table 1 Patients's scores for level of clarity and readability of each question

Question	Score (Mean±S.D.)	Question	Score (Mean±S.D.)
1	10.00±0.00	16	10.00±0.00
2	10.00±0.00	17	10.00±0.00
3	10.00±0.00	18	10.00±0.00
4	10.00±0.00	19	10.00±0.00
5	10.00±0.00	20	10.00±0.00
6	10.00±0.00	21	10.00±0.00
7	10.00±0.00	22	10.00±0.00
8	10.00±0.00	23	10.00±0.00
9	10.00±0.00	24	10.00±0.00
10	10.00±0.00	25	10.00±0.00
11	10.00±0.00	26	10.00±0.00
12	10.00±0.00	27	10.00±0.00
13	10.00±0.00	28	10.00±0.00
14	10.00±0.00	29	10.00±0.00
15	10.00±0.00	30	10.00±0.00
Average score of 30 questions		10.00±0.00	

S.D.=standard deviation

The score for clarity and readability of 30 questions of the Vietnamese DSCKQ-30 was 10.00±0.00, which meant all items of the questionnaire had clarity and understanding. During the pilot survey, no patient difficulties were recorded as to words and expressions; therefore, the completed Vietnamese version of the DSCKQ-30 questionnaire was achieved.

Validity

-Content validity: the results of evaluating the equivalence of the Vietnamese version of the DSCKQ-30 questionnaire were compared to its English version. The Vietnamese version of the DSCKQ-30 questionnaire was evaluated by 8 experts, with an average score of 1.00 for all 4 criteria in terms of semantics, idiomatic, experience and conceptual equivalence.

-Construct validity of the questionnaire was examined by analyzing the relationships between self-care knowledge (Vietnamese version of the DSCKQ-30 questionnaire) and a number of factors belonging to the patient's characteristics; such as, gender, age, disease duration, education level and comorbidities.

Table 2 presents the results of correlations between self-care knowledge scores and patients' characteristics. Specifically, there was a significant relationship between age, comorbidity, disease duration, education level and self-care knowledge scores (p-value=0.016; 0.001; 0.022; 0.000). On the other hand, the results showed that the questionnaire was able to distinguish groups based on patients' characteristics. Self-care knowledge scores of the group with comorbidity was higher than that of the group without comorbidities. Self-care knowledge scores of the group with disease duration of 5-10 years was higher than that of the other two groups. The self-care knowledge scores of the group with high school education or higher was higher than that of the group with secondary school or lower.

Table 2 The relationship between the self-care knowledge scores and patients' characteristics

Characteristics	Number	%	Mean	p-value*
Gender				
Male	132	47.4	26.54±5.87	0.429
Female	147	52.6	27.60±3.45	
Age (years)				
<65	44	52.4	28.84±2.16	0.016
≥65	133	47.6	26.09±5.11	
Comorbidities				
Yes	153	54.9	29.50±0.67	0.001
No	126	45.1	24.82±6.28	
Disease duration (years)				
<5	93	33.0	26.83±6.49	0.022
5-10	91	32.6	29.33±0.89	
>10	95	34.4	25.61±3.91	
Education				
≤Secondary school	139	49.8	24.62±5.70	0.000
≥High school	140	50.2	29.46±0.90	

*Chi-square test, with controlling for education

Time to complete the questionnaire

The average time for patients to complete the questionnaire was calculated based on the time taken to answer the first interview from 279 patients. The results showed that the patient spent an average of 9.52±1.82 minutes to complete the questionnaire (the fastest was 5 minutes and the slowest was 15 minutes).

Test-retest study

Patient characteristics

A test-retest study was conducted on a sample of 279 patients, at the Thai Nguyen National Hospital. Among 279 patients, females accounted for 52.6%; mean age was 65.20±8.73; patients with comorbidities accounted for 54.9%; disease duration of 5 years or more was 67%; and the proportion of patients having graduated from high school or higher was 50.2% (Table 3).

Table 3 Patients' characteristics

Characteristics	Number of patients	%
Gender		
Male	132	47.4
Female	147	52.6
Age		
Mean±S.D.	65.20±8.73	
Comorbidities		
Yes	153	54.9
No	126	45.1
Disease duration (years)		
<5	93	33.0
5-10	91	32.6
>10	95	34.4
Education		
≤Secondary school	139	49.8
≥High school	140	50.2

S.D.=standard deviation

Table 4 Cronbach's alpha value of the DSCKQ-30 questionnaire

Question	Corrected Item-Total Correlation	Cronbach's alpha coefficient if if the question is removed	Question	Corrected Item-Total Correlation	Cronbach's Alpha coefficient if if the question is removed
1	0.643	0.893	16	0.347	0.908
2	0.333	0.903	17	0.4011	0.897
3	0.323	0.903	18	0.533	0.895
4	0.532	0.895	19	0.547	0.895
5	0.548	0.894	20	0.595	0.894
6	0.454	0.896	21	0.595	0.894
7	0.463	0.896	22	0.521	0.897
8	0.532	0.895	23	0.517	0.896
9	0.533	0.894	24	0.359	0.898
10	0.300	0.901	25	0.716	0.894
11	0.586	0.893	26	0.435	0.896
12	0.499	0.897	27	0.380	0.898
13	0.370	0.898	28	0.370	0.898
14	0.619	0.892	29	0.371	0.898
15	0.521	0.897	30	0.593	0.893

Cronbach's Alpha coefficient of the entire questionnaire: 0.899

Table 5 Kappa coefficients of the DSCKQ-30 questionnaire

Question	Kappa coefficient	p-value	Question	Kappa coefficient	p-value
1	0.834	<0.001	16	0.878	<0.001
2	0.868	<0.001	17	0.790	<0.001
3	0.840	<0.001	18	0.878	<0.001
4	0.868	<0.001	19	0.728	<0.001
5	0.822	<0.001	20	0.898	<0.001
6	0.865	<0.001	21	0.878	<0.001
7	1,000	<0.001	22	1,000	<0.001
8	0.898	<0.001	23	0.847	<0.001
9	0.884	<0.001	24	0.912	<0.001
1	0.920	<0.001	25	1,000	<0.001
11	0.880	<0.001	26	0.898	<0.001
12	0.790	<0.001	27	0.929	<0.001
13	0.811	<0.001	28	0.929	<0.001
14	0.880	<0.001	29	0.790	<0.001
15	0.658	<0.001	30	0.951	<0.001

Consistency

Cronbach's alpha coefficients for all 30 questions on the questionnaire showed an average coefficient of 0.899. Corrected Items – Total Correlation in all questions was greater than 0.300 (Table 4).

Stability

The stability of the questionnaire, based on the repetition between the first and second responses of 279 patients was examined: Table 5 shows the Kappa coefficient for each question. All questions regarding the Vietnamese version of the DSCKQ-30 questionnaire had a Kappa coefficient of 0.700 or greater, except question 15, with a Kappa coefficient of 0.658 (acceptable).

Discussion

The Vietnamese-translated DSCKQ-30 questionnaire has proven its validity and good reliability within the Vietnamese-speaking community. The content of the DSCKQ-30 measured a wide range of self-care knowledge of patients with diabetes mellitus. The language of the DSCKQ-30 questionnaire was also appropriate for people with poor reading skills, which made it easy for the elderly to understand. The procedure was also simple, as it took each patient approximately 10 to 15 minutes to complete. Strict adherence to the forward and back translation process, using independent bilingual translators, found only slight differences in language usage between source and target languages. Additionally, there were only minimal changes in grammar and culture, which did not change the meaning of items in the Vietnamese version compared to the English version. The content validity of the DSCKQ-30 questionnaire was also demonstrated, as the translators were health professionals (medical doctors and nurses), which led to content validity. Members of the other expert panel, people with varying experience, also found that the content was easily understood and increased the respondents' ability to both understand and complete the tool. Patients also appreciated the use of sentences in terms of clarity and understanding of the DSCKQ-30 questionnaire. People with different experiences also found that the content could be easily understood and increased the respondents' ability to understand and complete the

tool. Furthermore, patients also appreciated the use of sentences and words in terms of clarity and readability of the DSCKQ-30 questionnaire.

This study had a large enough sample size to conduct consistency and stability assessments. The consistency of the DSCKQ-30 questionnaire has proven to be reliable (Cronbach's alpha of 0.899), similar to the original version of the DSCKQ-30 questionnaire, developed by Adibe et al. in 2011, and the research of Zerihun Sahile in 2020[18]. Reliability of the DSCKQ-30 questionnaire herein obtained the same results after two times of testing (Kappa >0.700): in other words, the tool was stable over a period of time[19]. Two important principles were also adhered to; firstly, the measurement items were not changed over time; and secondly, the interval between the two tests was long enough in that the "remembering" of the respondents in the first test did not affect their response in the second test[20].

Content validity was assessed by the expert panel, with an average score of 1.00, for all 4 criteria being equivalent in terms of semantics, idioms, experiences and concepts. The expert panel consisted of 8 experts in language, scientific research and experts in the field of diabetes mellitus, so the evaluation of the content validity of the DSCKQ-30 questionnaire through two phases ensured accuracy with the four criteria. In addition, the results of this study show that the questionnaire was able to differentiate between two or more groups, which should be different if the tool is valid. There was a significant relationship between disease duration and self-care knowledge (p-value=0.022), with controlling for education. In other words, the self-care knowledge scores of the group with a disease duration of 5-10 years were higher than that of the other two groups. This might be associated with the insidious nature of diabetes. Respondents with a shorter duration of diabetes might not see the need to self-care until their symptoms have manifested, unlike patients who have been living with the disease for many years, and whose symptoms had manifested. This latter group of patients is more likely to self care, so as to relieve themselves of debilities and discomforts associated with diabetes. There was also a significant relationship between comorbidity and self-care knowledge (p-value=0.001). The group with comorbidities had higher self-care knowledge than that of the group without comorbidities.

Strengths and limitations

The Vietnamese version of the DSCKQ-30 questionnaire has proven its validity and reliability in the Vietnamese-speaking community. The language of the DSCKQ-30 questionnaire is also suitable for people with poor reading ability. This makes it easy for the elderly to understand and answer correctly when participating in surveys. It is also simple and takes little time.

On the other hand, this study also has some limitations; in that, the survey sample size could skew the stability of the questionnaire.

Conclusion

The Vietnamese version of the DSCKQ-30 questionnaire is valid, reliable and feasible. Additionally, the DSCKQ-30 questionnaire measures a wide range of self-care knowledge for patients with DM.

This tool can assist in targeting public health efforts to reduce complications and improve quality of life for those with T2DM. The results obtained from using this tool may guide health professionals to educate DM patients.

Moreover, the DSCKQ-30 questionnaire can be used in future studies in Vietnamese-speaking people with diabetes mellitus; either in Vietnam or abroad.

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Conflict of interest

There are no conflicts of interest.

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