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Factors Related to Self-Care Behaviors in Patients with Type 2 Diabetes Mellitus in Thai Nguyen Province, Vietnam

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ABSTRACT

Introduction: T2DM causes a heavy burden on individuals, patients' families and communities because it affects quality of life, requires a long-term and comprehensive health care. Self-care behavior is an important factor in reducing the disease impact and progression.

Objective: The study was conducted to investigate the status and factors related to self-care behaviors of self-care behavior of patients with type 2 diabetes mellitus.

Methods: A cross-sectional descriptive study was conducted on 408 patients diagnosed with type 2 diabetes mellitus at Thai Nguyen National Hospital through a questionnaire to assess self-care behaviors in people with diabetes mellitus (SDSCA).

Results: The highest percentage of patients who performed good self-care behaviors (from 5 to 7 days) was physical activity (88.0%) and the lowest was blood glucose level testing (2.7%); the rates of patients who followed the diet well, took care of their feet, and adhered to medication was 62.3%, 17.6%; and 13.0%, respectively. Number of people in the family were related to the diet (t* = -2.294, p = 0.022). Number of people in the family (t* = -1.984,; p = 0.048), education qualification (t* = -2.112, p = 0.035), and income (t* = -2.147, p = 0.032) were related to physical activities. Education qualification was related to blood glucose level testing (t* = -2.501, p = 0.013). Duration of diabetes mellitus was related to drug adherence (F** = 6.412, p = 0.002). Education qualification (t* = -2.340, p = 0.02), and income (t* = -3.356, p = 0.001) were related to foot care activities of people with diabetes mellitus. Self-care knowledge was related to self-care behavior in the areas of diet, physical activity, blood glucose level testing and foot care activities (p = 0.001, 0.00, 0.00, 0.008).

Conclusion: This study has proven that people with diabetes mellitus had low self-care behaviors in many areas. There were many factors related to self-care behaviors. Therefore, health workers need to personalize in counseling, health education, and provide knowledge about self-care activities of people with diabetes mellitus.

KEY WORDS: Diabetes mellitus, type 2 diabetes mellitus, self-care knowledge, self-care behavior.

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INTRODUCTION

According to International Diabetes Federation (IDF), in 2017 there were 425 million people with diabetes mellitus (DM) in the world, of which, it is about 90% had type 2 diabetes (T2DM). This number is forecasted to be 629 million in 2045[11]. Diabetes is a pandemic, killing more than 5 million people every year and every 6 seconds, one person dies from the disease. In Viet Nam, there are 3.53 million people diabetes mellitus, and at least 80 people die every day. The cost of treating diabetes and its

complications is estimated at USD 673 billion per year (12% of total worldwide spending). In Vietnam, the average cost of DM treatment is USD 162,700 per patient. Costs increase with disease severity and complications[11]

T2DM causes a heavy burden on individuals, patients' families and communities because it affects quality of life, requires a long-term and holistic health care. T2DM is a manageable disease, with good adherence to medication, diet, and physical activity[5]. Furthermore, 95% of T2DM self-care behaviors are mainly performed by patients and families. Self-care comes with many challenges and is difficult to maintain in the treatment of T2DM[20]. Self-care activities are still not properly focused in patients with T2DM. The rate of patients adhering to self-care activities in terms of diet, physical activity, medication adherence, blood sugar control, foot care is still quite low[2,16]. Self-care behavior of patients with diabetes is affected by many factors such as self-care knowledge, self-efficacy, family support[6,14].

The Vietnamese health sector has not had the synchronization and consistency in the management of diabetes patients from the central to local levels, as well as among medical examination and treatment facilities. This caused limitations in the treatment and ongoing and regular care for people with diabetes mellitus. Thai Nguyen is a mountainous province with many ethnic groups living; the prevalence of diabetes mellitus and some characteristics are not similar to the studied areas. The identification of self-care behaviors and related factors in patients with T2DM needs to be studied. Therefore, the study was conducted with the following objective: To survey the status of self-care behavior and related factors in patients with type 2 diabetes mellitus in Thai Nguyen province, Vietnam.

METHODOLOGY

Research time: It was from May 2021 to December 2021.

Research subjects: Patients with type 2 diabetes mellitus at the Outpatient Clinic of Thai Nguyen Central Hospital.

Criteria for selection: Patients with type 2 diabetes mellitus, aged 18 years or older, are being managed and treated as an outpatient clinic ward at the Thai Nguyen National Hospital.

Exclusion criteria: Patients are physically or mentally unable to perform self-care activities.

Research Methods

Study design: Cross-sectional description

Sample size: Sample size is 408 patients with T2DM. The sample size formula is applied to determine a ratio[17].

$$n = Z^2_{1-\alpha/2}\frac{p(1-p)}{d^2}$$

In which:

n = sample size

α = 0.05 (95% confidence level); $Z_{1-\alpha/2}$= 1.96

d = absolute error taken 0.05

p= 0.57[8]

Sampling method

The random sampling technique will be used in this study to obtain a representative sample from the total number of patients with type 2 diabetes mellitus. The desired number of participants in this study is 408 patients. Each day, participants were randomly selected according to this formula k = N/n (k is the jump, n is the sample size and N is the total number of outpatients with type 2 diabetes mellitus in the Outpatient Department). Therefore, the interval between selected patients is 4000/408 ~ 10 (k=10). That is to say, each day before data collection, the researcher will randomly select a number (R) from the list and then select the participants by jump k (R, R + k, R) + 2k, R + 3k, ..., R + (n-1) k).

Data collection and analysis

Data were collected using the Summary of Diabetes mellitus Self-Care Activities (SDSCA). This toolkit developed by Toobert and Glasgow involves 5 areas including diet (5 questions), physical activity (2 questions), checking blood glucose (2 questions), medication adherence (2 questions) and foot care (5 questions). The high reliability questionnaire in the current study with Cronbach's alpha is 0.81. Each question has 8 levels of choice about the frequency of performing self-care behaviors in a week from 0-7 days, corresponding to a score of 0-7 points. Average days of doing all the content are equal to the total number of days of doing the content divided by the total number of questions. People who performed self-care behaviors for 4 days or more were assessed as regularly performing and had good self-care activities, those who performed 4 days or less were assessed as having poor self-care activities[22].

Data processing

Statistical Description: It was used to describe self-care behaviors of patients with T2DM.

The relationship between the independent variables and self-care knowledge of patients with T2DM was determined using statistical tests: T-test (normal distribution): used to test the difference in values. Average between the two study groups. ANOVA test (normal distribution): for testing the difference between the mean values of 3 study groups.

Ethical considerations

This study was approved by the Research Ethics Committee of Thai Nguyen National Hospital (approval no. 234).

RESULTS

General information about research subjects

Females accounted for 63.5%. The female to male ratio is 1.74. The age group was mainly 65 and older (accounting for 63.5%); only 2.7% of subjects were 45 years of age or younger, with a mean age of 66.14 ± 8.32. More than 50% of the research subjects have completed high school education. Most of the research subjects are pensioners (75.7%); the marriage rate accounted for the majority

(89.0%). Study subjects living alone accounted for only 2.5%. Most of the patients with diabetes mellitus were ≤ 5 years (40.2%); the prevalence of the patients with diabetes mellitus was over 10 years (28.9%). Patients only take medicine, only injecting insulin and combining both oral drugs and insulin injection accounted for 72.8%, 14.0% and 13.2% respectively. The rate of diabetic complications of the study subjects was 32.1%.

The patient's BMI was at a good and acceptable level (14.7%); obesity rate was high in the study (46.8%); patients with good blood pressure control accounted for a low rate (9.8%), more than half of patients had poor blood pressure control (53.4%). Fasting blood sugar was poorly controlled at a high rate (55.1%), HbA1c was poorly controlled (36.5%), total cholesterol was controlled at a good and acceptable rate (72.5%), the rate of Triglyceride controlled at a good level accounted for a low rate (26.5%), good and acceptable HDL cholesterol controlled accounted for a high rate (92.7%), LDL cholesterol was controlled at a good and acceptable rate (82.9%).

Self-care behavior of patients with T2DM

Outcomes of self-care behaviors in patients with T2DM

Table 1: Frequency of self-care behaviors in patients with T2DM

Self-care behaviors under SDSCA		Frequency	%	Mean ± SD
Diet	1-4 days/week	154	37.7	21.33 ± 5.60
	5-7 days/week	254	62.3	
Physical activity	1-4 days/week	49	12.0	11.6 ± 2.84
	5-7 days/week	359	88.0	
Medication adherence	1-4 days/week	355	87.0	7.86 ± 2.35
	5-7 days/week	53	13.0	
Foot care	1-4 days/week	336	82.4	13.76 ± 6.45
	5-7 days/week	72	17.6	
Checking blood glucose	1-4 days/week	397	97.3	1.49 ± 2.66
	5-7 days/week	11	2.7	

The highest percentage of patients who performed good self-care behavior (from 5 to 7 days) was physical activity (88.0%) and the lowest was blood glucose testing (2.7%), rates of patients who followed the diet well, took care of their feet, and adhered to medication were 62.3%, 17.6%, and 13.0% respectively.

Table 2: Frequency of Self-care behaviors in T2DM patients in each specific area

Self-care behaviors (SDSCA) (n = 408)	Implementation frequency				Mean±SD
	14 days		5-7 days		
	n	%	n	%	
Diets					
Following the diet	103	5.2	305	74.8	5.41 ± 1.86
Adhering to the meal/drink plan for the past month	91	2.3	317	77.7	5.49 ± 1.73
Eating five or more servings of fruits and vegetables	107	5.2	301	73.8	5.36 ± 1.64
Eating foods rich in fat	389	3	19	4.7	1.31 ± 1.47
Distribute the amount of carbohydrates evenly	260	3.7	148	36.3	3.77 ± 1.61
Physical activity					
Exercising at least 30 minutes of physical activity	49	12.0	359	88.0	5.94 ± 1.46
Exercising specialized physical activities	78	19.1	330	80.9	5.67 ± 1.69
Checking blood glucose					
Testing blood glucose level at home	393	96.3	15	3.7	0.77 ± 1.44
Checking your blood glucose levels at the recommended frequency	398	97.5	10	2.5	0.73 ± 1.33
Medication adherence					
Taking oral medications as directed	299	3.3	109	26.7	1.88 ± 3.08
Injecting insulin as indicated	58	4.2	350	85.8	5.99 ± 2.42
Foot care					

Checking patient's feet	304	4.5	104	25.5	2.36 ± 2.75
Checking the inside of a patient's shoes	238	3.3	170	41.7	3.44 ± 2.80
Performing foot wash	23	6	385	94.4	6.55 ± 1.19
Doing a foot bath	403	3.8	5	1.2	0.71 ± 1.11
Performing dry cleaning between toes	404	9.0	4	1.0	0.72 ± 1.13

Most of the patients in the study followed a diet (74.8%), adhered to the meal/drink plan (77.7%), and did not eat high-fat foods (95.3%). However, patients performed the distribution of carbohydrates evenly accounted for only 36.3%. People with diabetes mellitus were physically active, performed at least 30 minutes of physical exercise (88.0%), and performed specialized exercises (80.9%). The rate of regular blood glucose testing was very low, over 96.3% of patients did not check their blood glucose levels at home. The rate of patients with good adherence to medication in the group taking orally medicines was still low (26.7%), but the insulin injection group had a high rate (85.8%). The patient did not perform better foot care activities, dry between the toes (99.0%), soak the feet (98.8%), check the feet (74.5%); it was only the foot washing activity performed well (94.4%).

Factors related to self-care behaviors in patients with T2DM

Table 3: Examine factors related to self-care behaviors n T2DM patients.

Characteristics	**Diet**	**Physical activity**	**Checking blood glucose**	**Medication adherence**	**Foot care**
Gender	t* = 1.016 *p* = 0.310	t* = 1.323 *p*= 0.187	t* = 0.184 *p* = 0.854	t* = 0.329 *p* = 0.742	t* = -0,310 *p* = 0.757
Age	F**= 1.948 *p* = 0.144	F**= 1.848 *p* = 0.159	F**= 0.634 *p* = 0.531	F**= 0.634 *p* = 0.531	F **= 0.686 *p* = 0.504
Educational Qualification	t* = 0.511 *p* = 0.610	**t* = -2,112 *p* = 0.035**	**t* = -2.501 *p* = 0.013**	t* = -1.047 *p* = 0.296	**t* = -2.340 *p* = 0.02**
Job	F** = 2.388 *p* =0.093	F** = 1.438 *p* =0.239	F** = 2.354 *p* =0.096	F** = 0.680 *p* =0.507	F** = 0.147 *p* = 0.863
Marital status	F** = 0.955 *p* = 0.368	F** = 0.934 *p* = 0.394	F** = 1.047 *p* = 0.352	F** = 1.517 *p* = 0.221	F** = 0798 *p* = 0.451
Number of people in the family	**t* = -2.294 *p* = 0.022**	**t* = -1.984 *p* = 0.048**	t* = -1.212 *p* = 0.266	t* = -0.624 *p* = 0.533	t* = -0.434 *p* = 0.665
Duration of diabetes mellitus	F** = 0.968 *p* = 0.381	F** = 0.981 *p* = 0.376	F** = 1.362 *p* = 0.257	**F** = 6.412 *p* = 0.002**	F** = 2.491 *p*= 0.084
Income	t* = -0.084 *p* = 0.933	**t* = -2.147 *p* = 0.032**	t* = -1.44 *p* = 0.151	t* = -1.057 *p* = 0.291	**t* = -3.356 *p* = 0.001**
Health Insurance	t* = 1.351 *p* = 0.178	t* = 0.803 *p* = 0.432	t* = -0.269 *p* = 0.788	t* = -1.591 *p* = 0.112	t* = 0.058 *p* = 0.954
Co-morbidities	t* = 0.485 *p* = 0.628	t* = 0.531 *p* = 0.596	t* = -0.993 *p* = 0.321	t* = -1.642 *p* = 0.107	t* = -1.161 *p* = 0.872
Complications	t*= 0.939 *p* = 0.348	t*= -1.615 *p* = 0.107	t*= 1.884 *p* = 0.06	t*= 1.08 *p* = 0.281	t*= 1.610 *p* = 0.108

** Normal distribution, T-test*

** Normal distribution, Anova test*

Number of people in the family were related to the diet (t* =-2.294, *p* = 0.022). Number of people in the family (t* = -1.984, *p* = 0.048), education qualification (t* = -2.112, *p* = 0.035), and income (t* = -2,147, *p* = 0.032) were related to physical activities. Education qualification was related to blood glucose testing (t* =-2.501, *p* = 0.013). Duration of diabetes mellitus was related to drug adherence (F** = 6.412, *p* = 0.002). Education qualification (t* =-2.340, *p* = 0.02), and income (t* = -3,356, *p* = 0.001) were related to foot care activities of people with diabetes mellitus.

Table 4: Test self-care knowledge related to self-care behaviors in patients with T2DM

Self-care knowledge / Self-care activities	Good knowledge (Mean ± SD)	Poor knowledge (Mean ± SD)	p
Diet	22.22 ± 5.34	20.33 ± 5.74	**0.001**
Physical activity	12.10 ± 2.66	11.05 ± 2.94	**0.00**
Checking blood sugar	1.97 ± 3.10	0.94 ± 1.91	**0.00**
Medication adherence	8.04 ± 2.48	7.65 ± 2.18	0.091
Foot care	14.56 ± 6.54	12.85 ± 6.24	**0.008**

Self-care knowledge was related to self-care behaviors in the areas of diet, physical activity, blood glucose testing and foot care (p = 0.001, 0.00, 0.00, 0.008).

DISCUSSION

Situation of self-care behaviors in patients with T2DM

Diet: The results of the study showed that patients with diabetes mellitus regularly followed a diet (74.8%), adhered to a meal/drink plan (77.7%) and ate five or more servings of fruit and vegetables (73.8%) from 5-7 days. However, 95.3% of the patients ate foods rich in fat and 63.7% of them did not even distribute carbohydrates during the week. According to a study of Mi Nguyen (2017), patients followed an average diet of 4.2 days/week, only 4.7% of patients met all dietary requirements during the whole week; 37.8% of patients did not ensure compliance with a healthy diet for people with diabetes mellitus. The percentage of patients who ate enough vegetables for at least one day or more was quite high (74.7%). However, 59.1% of patients did not regularly eat enough vegetables/fruits during the day[16]. According to Vivian, 54.7% of people followed a healthy diet, 50.7% of people ate enough or more than 5 servings of vegetables/fruits, and 40.0% of patients abstained from foods rich in fat[22]. In patients with diabetes mellitus, the most common problem when implementing dietary self-care behaviors was failure to distribute amounts of carbohydrates evenly and to eat less high-fat foods as recommended.

Physical activity: Research results showed that 88.0% of patients exercised at least 30 minutes a day, and 80.9% of patients performed specialized exercises daily. However, 12.0% still performed at least 30 minutes of physical activity and 19.1% performed specialized exercises for 1-4 days. Research results of Mi Nguyen (2017) showed that rates of people who performed at least 30 minutes of physical activity for 5 days or more and regularly performed specialized exercises accounted for 72.5% and 30.8% respectively. Some patients think that they did not have time to practice or that the energy consumption in chores and housework was enough to compensate for specific exercises[16]. In Vivian's study in 2014 the rate of performing specific exercises for 5 days or more was only 10.7%[22]. In our study, the rate of patients who performed specialized exercises was higher, they had diabetes mellitus over 5 years, accounting for two-thirds, mainly retired, so they had time for physical activities; They had good self-care knowledge about physical activity, high self-confidence, so patients understood the benefits of exercise and were motivated to perform, especially specific exercises for patients with diabetes mellitus.

Blood glucose test: Research results showed that the patient's blood glucose test at home was very low 3.7 days; the rate of patients checking their blood glucose levels as recommended was lower than 2.5%. A study in Gujarat showed that 16% of people performed self-control of blood glucose levels[18]. A study in India (2015) and a study in East Ethiopia gave quite positive results when rates of people self-controlled blood glucose levels at home was 54.0% and 57.7% respectively[4,15]. The main reason given by the patients was due to difficult economic conditions, no money to buy blood glucose meters and test strips (49.1%) and stable blood glucose without testing (47.5%)[10]. Their blood glucose levels will have checked every month at the outpatient clinic, so they all think it was not necessary to control their own blood glucose levels at home.

Medication adherence: According to the research results, the percentage of patients who adhered to drug treatment is high with prescribed oral medication (82.3%), insulin injection as indicated (98.4%). In Gujarat, 82% of patients followed their medication schedule, and 68% assured that they had never missed a dose in the past week[18]. In Kakumani's study, more than 70% of patients stopped treatment midway; the most common reasons for non-compliance was lack of motivation (61.4%), difficulty remembering taking medicine daily due to work or forgetting, lack of money (50%) and living far from the doctor (43%)[12]. In this study, the proportion of patients had a higher education qualification, most of them lived with relatives, had a long illness, so the patients were conscious and reminded by their family members about their adherence to drug treatment; An important reason was that patients had knowledge of drug adherence (mean score of 2.65 ± 0.86), so it will promote the patient's drug adherence behavior.

Foot care: Patients in the study performed foot self-care behaviors mainly from 1-4 days a week (82.4%); in which the high rate is to soak foot (98.8%) and dry between toes (99.0%). The percentage of patients who performed good

foot care was mainly foot washing (94.4%); however, some foot care behaviors such as checking the inside of shoes, checking the feet, soaking the feet and drying between the toes are still low and accounted for 41.7%, 25.5%, 1.2%, and 1.0% respectively. This result was similar to the study in Brazil, most of the patients did not have the desired behaviors related to foot care[22]; foot self-care behaviors of patients with diabetes mellitus is low 33.9%[16]. The foot care behavior to prevent complications in patients with diabetes mellitus was not well performed, which can be explained by the lack of knowledge about foot care that has not motivated their behavior; The communication, education, and giving typical examples of foot complications are not good, so patients are subjective in preventing complications.

The results of the assessment of each area in the patients' self-care behavior showed that patients performed good self-care activities in two areas of diet (62.3%), physical activity (88.0%). However, there were still many fields that T2DM patients did not perform well in self-care activities such as blood sugar control (97.3%), medication adherence (87.0%) and foot care (82.4). The result of this study was different from some studies, D'Souza et al assessed that the self-care activities of patients with diabetes mellitus are not good (20.6%)[7]; the study of Tharek et al conducted to study on 340 T2DM patients in Malay showed that 3.76% of these patients performed self-care behaviors[21]. The study of Mi Nguyen (2017) on 513 T2DM patients in Thua Thien Hue showed that the rate of good implementation of self-care behaviors of people with diabetes mellitus accounted for 32.4%[16]. The difference in results on self-care behavior assessment can be explained by the difference in sample size, assessment methods, and subjects in the studies with different education qualifications, regions and duration of diabetes mellitus. These factors have also been shown by many studies to influence self-care behaviors in patients with diabetes mellitus.

Factors related to self-care behaviors in patients with T2DM

There were many factors involved in self-care behaviors in patients with T2DM. In our study, we found the number of family members related to diet, and physical activity. Most families in Vietnam cook the same food for all family members, which makes it difficult for people with T2DM to stick to their diets. Traditionally Vietnamese housewives or people who have free time will prepare meals for everyone in the family and eat/drink together, so people with diabetes mellitus can hardly make decisions for themselves and can separate family members to follow a pathological diet thoroughly.

Education level and income were related to physical activity, educational qualification was related to blood glucose testing behavior. The resources were major barriers to exercise program adherence[3]. Patients with high incomes will have more opportunities to access equipment and specialized exercise programs tailored to their condition than other patients. Duration of diabetes mellitus was related to medication adherence. The most common reasons for non-compliance was lack of motivation (61.4%), difficulty remembering to take daily medication due to work or forgetting, lack of money (50%) and living far from the doctor (43%)[12]. However, in this study, the longer duration of diabetes mellitus was, the higher compliance rate was, which could be explained that the people with the long-term diabetes mellitus had more opportunities to access information and they gradually had a sense on the importance of drug use that would be one of the three factors to control blood glucose and prevent from complications. Patients who did not take medication regularly will show monthly blood glucose level and HbA1c test results at the outpatient clinic. The care team for patients with diabetes mellitus has counseling and measures to help patients adhere to the drug, so the percentage of patients who practice correctly and regularly was higher.

Education level and income were related to foot care activities of people with diabetes mellitus. Patients with an educational background had an understanding of foot care behaviors that would influence how they take care of their feet on a daily basis. When people with T2DM had a good education, they had many ways to learn how to take the right and best foot care, such as diabetes mellitus counseling, seminars on diabetes mellitus to be able to promote appropriate foot care activities for patients[13]; combined with patients having good income can choose equipment for foot care or they intend to pay more to practice foot hygiene, foot examination and foot exercise. Health care providers will help people with diabetes mellitus prevent and combat foot complications. Moreover, understanding will create good conditions for the patients to deal with their illness situations.

Self-care knowledge were related to self-care behaviors in the fields of diet, physical activity, blood glucose testing, and foot care. Self-care knowledge has the potential to inform patients about specific actions during diabetes mellitus care. Therefore, the better self-care knowledge of patients had their illness was, the more likely they were to understand their illness and perform good self-care activities such as diet, physical activity and blood glucose testing, and other behaviors. This finding was consistent with previous results. The research of Doanh (2016) studied on 198 T2DM patients showed that results of knowledge of treatment adherence were related to nutritional compliance, physical activity, and home blood glucose testing[9]. Y units Sari's study in 2018 on "Foot self-care behavior and its predictors in people with diabetes mellitus in Indonesia" on 546 T2DM patients at 22 primary care centers showed that foot care knowledge was related to foot care behavior[19]. In Indonesia on 81 people with diabetes mellitus at Bojonegoro Medical Center, East Java, in 2018, Sulistyo also showed similar results to my study[1].

CONCLUSION

This study has proven that DM patients' adherence to self-care behaviors was not high in the fields of medication adherence, foot care, and home blood glucose testing, which would affect the control of diabetes mellitus level, prevention of complications and quality of life of patients. Family size and self-care knowledge were related to diet. Family size, education level, income, self-care knowledge was related to physical activity. Education level and self-care knowledge were related to blood glucose testing. Duration of diabetes mellitus was related to medication adherence. Education level, income, and self-care knowledge was related to foot care activities of people with diabetes mellitus. Health workers need to personalize in counseling, health education, provide knowledge about self-care activities of people with diabetes mellitus.

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CONFLICT OF INTEREST

There is no conflict of interest.

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