

# Holistic self-management behavior among urban patients with type 2 diabetes

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## ABSTRACT

This study aimed to measure the self-care practices of type 2 diabetes mellitus (T2DM) patients managed in an urban hospital in Hanoi, Vietnam. An observational cross-sectional study was performed. The adherence of self-care practices was measured by using the Condition-specific Recommendations and Adherence scale. Among 165 T2DM patients, nobody adhered to all self-care practices. The average number of adhered behavioral recommendations was 6.0 (SD=1.6). Gender, education and overweight/obesity were associated with self-care practice adherence. Repeated educational sessions should be provided to patients, especially male patients, and those with low education levels, overweight/obese, to improve their self-care ability.

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## 1. INTRODUCTION

Diabetes mellitus (DM) or type 2 diabetes (T2DM) is a global threat and is increasingly prevalent in both developed and developing countries [1]. The prevalence of adults with T2DM raised from 4.7% (1980) to 8.3% (2019) [2]. Also, it is estimated that 460 million people are confirmedly diagnosed with diabetes type 2 in 2019 [2], and this number will increase to approximately 630 million in 2045 [3]. Notably, about 212 million people are unaware of their disease, which may place them at risk of diabetic complications until they understand their conditions and receive appropriate treatment [2]. Since type 2 diabetes requires life-long treatment, having optimal self-care practices is vital for protecting patients from diabetic complications as well as enhancing the treatment outcomes. In diabetic treatment, good self-care practices include medication adherence, regular blood glucose monitoring, and healthy lifestyles (e.g. no smoking or alcohol drinking, healthy diet, and being physically active) [4]. Maintaining these behaviors is associated with glycemic control [5]–[7], reducing the risk of diabetic complications (e.g. cerebrovascular, retinopathy, or nephropathy diseases) [6], [8], diminishing healthcare utilization [9] and enhancing patients' quality of life [10].

Nonetheless, poor self-care practices are common among T2DM patients worldwide. Studies in Ethiopia showed that the prevalence of patients not adhering to self-care practices ranged from 45.5% to 83.5% [11]–[14]. In urban slum areas of India, 77.9% of patients frequently performed blood sugar testing, while only 12.3% complied with diabetic diets [15]. Another study in rural India found that 50.5% of T2DM patients had poor self-care practices [16]. Other studies in different countries also had similar results, for example, Palestine (48%) [17], Iran (63.6%) [18] and Kenya (59%) [19]. Various factors have been determined, which can be related to poor self-care practices, including older age, male, low education, higher

duration of diabetes, or weak social support [11]–[19]. Since the rate of poor self-care practices and associated factors are varied across settings, more evidence should be warranted for more understanding the pattern of self-care management among T2DM patients.

In Vietnam, although the prevalence of T2DM is remarkably increasing over time, studies about self-care practices in this population have not been fully thoroughly investigated. Only one prior study was performed in elderly people with T2DM, which showed that most patients adhered to seek medical services for blood lipid testing, stop smoking, change diet and do regular exercise [20]. However, this study was conducted on the elderly population in a hospital at the central level of the health system, which might limit the generalizability of study findings to other groups such as middle-aged adults or younger people. This study aimed to measure the self-care practices of general adults with T2DM in an urban hospital in Hanoi, Vietnam, and examine factors related to poor self-care practices. Evidence from this study would contribute to developing an individualized intervention in the hospital to improve the self-care practices of T2DM patients.

## 2. RESEARCH METHOD

### 2.1. Design and data collection

This is a secondary analysis of a cross-sectional survey in October 2019 at an outpatient department of an urban hospital in Hanoi, Vietnam. This department managed approximately 2,000 diabetic patients who monthly visited the department for regular examination and taking medications. Patients aged 18 years or, having T2DM which was confirmedly diagnosed as per the guideline of the Ministry of Health [21], and managed at the hospital were invited to participate in the study. People with cognitive impairment, being inpatients, or refusing to participate in the study were not included. Sample size was calculated with following parameters: expected population proportion=0.51 [16],  $\alpha=0.05$ , relative precision  $\epsilon=0.15$ , resulting in the essential sample size of 165 T2DM patients. Physicians in the department helped the research team to screen and introduce the study to eligible patients.

Undergraduate medical students were employed for data collection. They were intensively trained about the study protocol, interview, and communication skills. During the data collection period, they met patients when patients completed their examination procedures and waited for drug dispense. They invited patients to a private counseling room to ensure their confidentiality, informed briefly about study purposes and asked them to give their written informed consent. After conveniently inviting 200 patients, we reached the required sample size (response rate 82.5%). The reasons for refusal included: having busy work, not wanting to disclose private information and not feeling comfortable. The protocol of this study was approved by the institutional review board of the hospital.

### 2.2. Variables

The condition-specific recommendations and Adherence scale were used to measure the self-care practices in T2DM patients [22]. We asked patients to report their frequency in performing eleven behaviors comprising: i) take prescribed medication daily; ii) follow a diabetic diet; iii) follow a low-fat or weight-loss diet; iv) exercise regularly; v) stop/cut down on smoking; vi) cut down on alcohol; vii) cut down stress; viii) check feet regularly; xi) check blood sugar; x) carry supplies needed for self-care, and (11) carry something with sugar in it [22]. Each behavior had six options: 0=None of the time; 1=A little of the time; 2=Some of the time; 3=A good bit of the time; 4=Most of the time; and 5=All of the time. For “take prescribed medication daily” behaviors, optimal adherence was achieved when patients reported they did it “all of the time”, while patients optimally adhered to other behaviors as they reported “all of the time” or “most of the time”. The total number of adhered behavioral recommendations ranged from 0 to 11 [22].

Patients were interviewed to report their education, marital status, and living area. We measured anthropometrics such as weight, height, and body mass index after patients completed the interview. Other information including age, gender, number of comorbidities, and medications used were extracted from the medical records.

### 2.3. Statistical analysis

Stata software version 14.0 was utilized for data analysis. Mean, standard deviation, frequency, and percentage were performed. Chi-squared and Mann-Whitney tests were performed to detect the differences between males and females. Multivariate generalized linear regression was employed to identify associated factors with the number of adhered behavioral recommendations. Variance Inflation Factor was conducted and the results showed that there was no collinearity among variables. A  $p\text{-value}<0.05$  was used to detect statistical significance.

### 3. RESULTS AND DISCUSSION

This study was conducted to assess the compliance with recommendations in the self-care of T2DM patients in urban areas of Vietnam. The study results provide evidence that helps clinicians design appropriate interventions to enhance the patient's self-care ability and improve treatment outcomes. Of 165 patients with T2DM, the majority of them were females (52.1%). The mean age was 61.8 (SD=7.4) years, and the mean duration of diabetes was 7.3 (SD=5.1) years. Most patients (86.7%) had partners and lived in urban areas (86.1%). There were 57.0% of patients that were overweight or obese. Sociodemographic, behavioral and clinical characteristics as shown in Table 1.

Table 1. Sociodemographic, behavioral and clinical characteristics

Characteristics	Male		Female		Total		p-value
	n	%	n	%	n	%	
Total	79	47.9	86	52.1	165	100.0	
Education							
Under high school	26	32.9	54	62.8	80	48.5	<0.001
High school	14	17.7	13	15.1	27	16.4	
Above high school	39	49.4	19	22.1	58	35.2	
Marital status							
Single	4	5.1	18	20.9	22	13.3	0.003
With partner	75	94.9	68	79.1	143	86.7	
Occupation							
Self-employed	33	42.9	45	52.9	78	48.2	0.183
Retired	38	49.4	30	35.3	68	42.0	
Others	6	7.8	10	11.8	16	9.9	
Living location							
Urban	75	94.9	67	77.9	142	86.1	0.002
Rural	4	5.1	19	22.1	23	13.9	
Diabetic medication							
Oral anti-diabetics	65	85.5	78	91.8	143	88.8	0.455
Insulin-injected	3	4.0	2	2.4	5	3.1	
Both	8	10.5	5	5.9	13	8.1	
Overweight and Obesity							
No	28	35.4	43	50.0	71	43.0	0.059
Yes	51	64.6	43	50.0	94	57.0	
	Mean	SD	Mean	SD	Mean	SD	p
Age	60.2	7.3	63.4	7.2	61.8	7.4	0.015
Duration of diabetes (years)	7.0	5.0	7.5	5.3	7.3	5.1	0.616
Number of medications used	2.0	1.4	1.7	1.5	1.9	1.4	0.166
Number of comorbidities	2.1	1.3	2.3	1.4	2.2	1.4	0.444
Body mass index (kg/m <sup>2</sup> )	23.9	2.7	22.8	3.0	23.3	2.9	0.013

Table 2 indicates that adhering to taking prescribed medication had the highest proportion (91.5%), followed by "Stop/cut down on smoking" (84.9%), while the lowest percentage of adherence was for the "Carry something with sugar in it" practice (13.4%), following by "Check blood sugar" (18.9%) and "Check feet regularly" (19.5%). Overall, the mean number of adhered behavioral recommendations was 6.0 (SD=1.6). None of the T2DM patients adhered to all self-care practices. Female patients had a significantly higher number of adhered behavioral recommendations than their male counterparts ( $p<0.05$ ). Study findings showed that out of the eleven recommendations for self-care, none of the patients complied with all recommendations. In our study, patients made at most nine behavioral recommendations. This may be explained by recommendations such as "Carry something with sugar in it" or "Carry supplies needed for self-care," which were rarely mentioned during patient consultations with a physician when they had regular physical examinations. On the other hand, the results show that the majority of patients adhered to prescription medication, stop or cut down on smoking and alcohol consumption, as well as followed a diabetic diet, and regularly do physical activities. This is similar to some studies in the world that showed that medication adherence was the behavior with the highest rate of patient compliance [15], [23]–[25]. Despite this, the research results show that less than one-fifth of patients adhered to some recommendations which were necessary for controlling blood sugar and diabetes complications such as "Check feet regularly" or "Check blood sugar". These insufficient practices might reduce patients' capacity to control their blood sugar levels promptly or to take actions that help prevent diabetes complications.

Table 3 shows the results of the multivariate regression model. Being females (Coef.=0.82; 95%CI=0.28-1.36), and having above high school education (Coef.=0.72; 95%CI=0.14-1.31) were positively associated with the number of adhered behavioral recommendations. Meanwhile, patients with overweight or obesity had a significantly lower number of adhered behavioral recommendations (Coef. =-0.55; 95%CI=-

1.05 – -0.04) compared to those not having overweight or obese. Our results indicated that highly educated people had a higher number of compliance behaviors than people with low education. This can be explained by people with higher levels of education having higher health literacy and self-efficacy than those with lower levels of education, so they are more aware and more compliant with the recommended behaviors [12], [26], [27]. Moreover, females were found to comply more with the recommended behaviors than males. Previous studies showed similar results when showing that females followed the recommendations as well as more beneficial to their social support, while males were more likely to seek alternative treatment options [28].

Table 2. Adherence to self-care practices among T2DM patients

Characteristics	Male		Female		Total		p-value
	n	%	n	%	n	%	
Take prescribed medication	73	93.6	77	89.5	150	91.5	0.353
Follow a diabetic diet	53	68.0	65	75.6	118	72.0	0.277
Follow a low-fat or weight-loss diet	36	46.8	54	62.8	90	55.2	0.040
Exercise regularly	59	75.6	56	65.1	115	70.1	0.141
Stop/cut down on smoking	58	73.4	82	95.4	140	84.9	<0.001
Cut down on alcohol	49	62.0	81	94.2	130	78.8	<0.001
Cut down on stress	48	62.3	54	62.8	102	62.6	0.952
Check feet regularly	14	18.0	18	20.9	32	19.5	0.630
Check blood sugar	15	19.2	16	18.6	31	18.9	0.919
Carry something with sugar in it	7	9.0	15	17.4	22	13.4	0.112
Carry supplies needed for self-care	25	32.1	29	33.7	54	32.9	0.820
	Mean	SD	Mean	SD	Mean	SD	p
Number of adhered behavioral recommendations	5.6	1.7	6.4	1.5	6.0	1.6	0.006

Table 3. Associated factors with a number of adhered behavioral recommendations

	Coef.	SE	z	p-value	95% CI	
Age (per year)	0.03	0.02	1.52	0.13	-0.01	0.06
Gender (Female compared to Male <sup>a</sup> )	0.82	0.27	2.98	<0.001	0.28	1.36
Living location (Rural compared to Urban <sup>a</sup> )	0.18	0.37	0.47	0.64	-0.56	0.91
Education (compared to under High school <sup>a</sup> )						
High school	-0.35	0.37	-0.94	0.35	-1.08	0.38
Above high school	0.72	0.30	2.44	0.02	0.14	1.31
Marital status (Having partner compared to Single <sup>a</sup> )	0.30	0.39	0.77	0.45	-0.47	1.06
Diabetic medication (compared to Oral anti-diabetics <sup>a</sup> )						
Insulin-injected	0.13	0.74	0.17	0.86	-1.33	1.58
Both	0.86	0.47	1.85	0.07	-0.06	1.78
Duration of diabetes (per year)	0.02	0.03	0.83	0.41	-0.03	0.07
Number of comorbidities (per disease)	0.60	0.47	1.29	0.20	-0.32	1.53
Number of medications used (per drug)	0.02	0.09	0.18	0.86	-0.15	0.19
Overweight and obesity (Yes compared to No <sup>a</sup> )	-0.55	0.26	-2.14	0.03	-1.05	-0.04

<sup>a</sup> Reference groups

Our study shows critical clinical implications to increase self-management among patients with type 2 diabetes. First, our findings showed that none of the patients complied with all recommended behaviors, which might be contributed by the lack of diabetic consultancy among physicians. Thus, physicians should provide counseling more comprehensively and repeatedly to ensure the high compliance of patients. This is critical in the time of COVID-19 and posts COVID-19 given the matter that patients with T2DM are among the most vulnerable population for COVID-19 [29]. A multidisciplinary approach should be taken to improve the self-management capacities and resilience of patients during the pandemic [30]. Second, several groups, such as males and patients with low education, might not be well self-managed. Additional counseling sessions should be provided for them to increase their self-management capacity. Finally, weight control interventions should be designed and performed, which might also facilitate them to comply with self-management recommendations.

Results of this study should be interpreted with following limitations. First, using a cross-sectional study could constrain our capacity to have causal conclusions about associations found in the study. Longitudinal cohorts should be performed to understand more the mechanisms of these relationships. Second, our study was conducted in a hospital and used a convenient sampling method for recruiting patients; thus, it should be cautious when using study findings in other settings. Finally, we collected self-reported information via interviews, which might result in recall bias.

#### 4. CONCLUSION

To conclude, our findings indicated that patients with type 2 diabetes in our survey had a low-to-moderate level of compliance with recommended self-care practices. Repeated educational sessions should be provided, especially for patients who were males, had low education levels, and were overweight/obese to improve their self-care ability.




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