Int J Clin Exp Med 2020;13(12):9495-9505
www.ijcem.com /ISSN:1940-5901/IJCEM0108825

Original Article

The impact of continuous nursing intervention on T2DM patients' prognoses and quality of life

Huan Wang*, Wanqiu Wang*, Ling Fan

*Department of Endocrinology, The First Affiliated Hospital of Shihezi University Medical College, Shihezi, China. *Equal contributors.*

Received February 7, 2020; Accepted August 22, 2020; Epub December 15, 2020; Published December 30, 2020

Abstract: Objective: The current study aimed to investigate the effect of out-of-hospital continuous care on the blood glucose levels and quality of life of patients with type 2 diabetes mellitus (T2DM). Methods: 412 patients with T2DM were enrolled in the study and divided into a control group (n = 100) and an intervention group (n = 312). The patients in the control group received routine nursing, and the participants in the intervention group received an out-of-hospital continuous nursing intervention in addition to the routine nursing. Results: After 12 weeks of continuous nursing intervention, the total scores on the Chinese version of the Care Transitions Measure (CTM) questionnaire increased, and the fasting blood glucose (FBG) levels decreased from 8.76 mmol/L (SD = 3.01) at the baseline to 6.29 mmol/L (SD = 2.12) (P<0.001). The FBG, 2-hour plasma glucose (2hPG), and glycated hemoglobin (HbA1c) in post-intervention levels decreased significantly in the intervention group compared to the control group. Age, the type of medical insurance, the monthly income of the individual, and the timely monitoring of blood glucose were the factors that affected the T2DM patients' quality of life after the intervention (P<0.05). Conclusion: Out-of-hospital continuous nursing intervention has a positive effect on glycemic control, disease awareness, and the improvement of quality of life.

Keywords: Continuous nursing intervention, CTM scores, influencing factors, quality of life

Introduction

With the changes of the disease spectrum and the improvement of people's living standards, the number of type 2 diabetes mellitus (T2DM) patients is increasing yearly. Late-stage diabetes can lead to other serious complications, which bring economic and social burdens and seriously influence patients' lives and health. Despite the regimens of oral medication and/or insulin for T2DM, successful glycemic control relies more on patient self-management and health education [1, 2]. However, unsuccessful glycemic control is still a challenging problem among individuals with T2DM [3]. Effective and consistent medical management reduces the glycemic level and the complications [4]. Continuous care services provide extended care for patients discharged from hospitals in China [5]. At the initial stage of the continuation care, the hospital bears significant responsibilities in the continuation of care, and the care's quality is closely related to the patient's outcome after the discharge and hospital experience [6]. Continuing care refers to the care outside the hospital, which makes up for the inadequacies of the hospital care, reflects the humanistic care of nursing services, and can increase the comprehensiveness of nursing.

The American scholar Coleman [7] developed the Care Transitions Measure (CTM) in 2002 to assess the quality of continuing care activities provided by hospital staff in preparing patients for discharge. The 15-item care transitions measure (CTM-15) has been endorsed by the NQF and included in the Consumer Assessment of Healthcare Providers and Systems (CAHPS) Hospital Survey in Mainland China [8]. The measure is based on a tested conceptual framework containing items relating to patients' critical understanding, the importance of preferences, management preparation and the existence of a written and understandable care plan. Studies have demonstrated that the CTM-15 is a valuable tool for health system performance evaluation by measuring the quality of care delivered across settings [6, 7]. Bakshi et al. [9] assessed both the English and Chinese versions of this instrument in 2012. Cao et al. [8] have evaluated

the validity and reliability of CTM-15 and its use in China.

Herein, this study will use a validated Chinese version of the CTM as a test tool to analyze the effect and influencing factors of continuing care intervention in diabetic patients in Shihezi. The effectiveness of continuous care interventions was assessed using the CTM score, blood glucose level, and the quality of life scale for patients with type 2 diabetes mellitus (DMQLS).

Materials and methods

Study subjects

At the beginning of the study, 420 patients with T2DM who were recruited from the Department of Endocrinology and Metabolism at The First Affiliated Hospital of Shihezi University School of Medicine from January to July 2019. Written informed consent was obtained from all participating patients before their enrollment in the study. The inclusion criteria were: patients diagnosed with T2DM for more than one year according to the World Health Organization criteria (Chinese Diabetes Society, 1998), patients who regularly visited the diabetes clinic for continuous treatment, patients 18-85 years old, and patients with a normal cognitive function. The exclusion criteria were: patients with serious diabetes complications, severe myocardium ischemia, and exercise contraindications, patients with neurological disorders, including cognition disorders, motor disorders, and language disorders, and patients with coagulopathy or other infectious diseases. The criteria led us to exclude 8 patients, and the remaining patients were randomly divided into the control group (n = 100) and the intervention group (n = 312). The patients in the control group received routine nursing, and the participants in the intervention group received an out-of-hospital continuous nursing intervention in addition to the routine nursing. This study was approved by the Institutional Ethics Committee of the First Affiliated Hospital of Shihezi University School of Medicine and was conducted in accordance with the ethical guidelines of the Declaration of Helsinki.

Genera data collection

The patients' general data, including their gender, ages, education levels, occupations, types of medical insurance, personal monthly incomes, lengths of illness, whether or not they have been hospitalized due to diabetes, whether they suffer from other chronic diseases, and whether they have received diabetes health education, etc. were recorded.

Routine nursing and continuous nursing intervention

The participants in the control group received routine nursing, which included regular exercise and diet control. The nursing intervention began with the out-of-hospital patients and lasted for 12 weeks. After 12 weeks, the effective follow-up of the control group was 93, and the follow-up success rate was 93%.

The patients in intervention group were cared for as follows: First, the investigator received a Chinese version of CTM on the patient's day of discharge. The questionnaires were administered after we explained the study to the respondents and obtained their informed consent. The respondents filled out the questionnaire by themselves. If the patient had a visual impairment or other limitation, the questionnaire could not be completed by the investigator. The investigator had to fill in the questionnaire according to the patient's answers. But the investigator did not input any subjective views on the questionnaire, and the questionnaire was collected on the spot. A total of 312 valid questionnaires were returned. At the same time, each patient's HbA1c and FBG levels were measured.

Second, the patients entered the continuation care stage after their discharges. We established a continuous care intervention team, including three nurses and one attending physician. The nursing staff had certain nursing skills and a high psychological literacy. The attending doctor was responsible for regular diabetes rehabilitation lectures and so on. The continuing care training for the patients included telephone follow-up, the issuance of health education manuals, the establishment of a QQ group and a WeChat diabetes exchange group, and related lectures.

Third, each subject was followed up by telephone, clinic, or community visits 12 weeks later. The follow-up included determining their CTM scores, and their recent (7 d-10 d) FBG

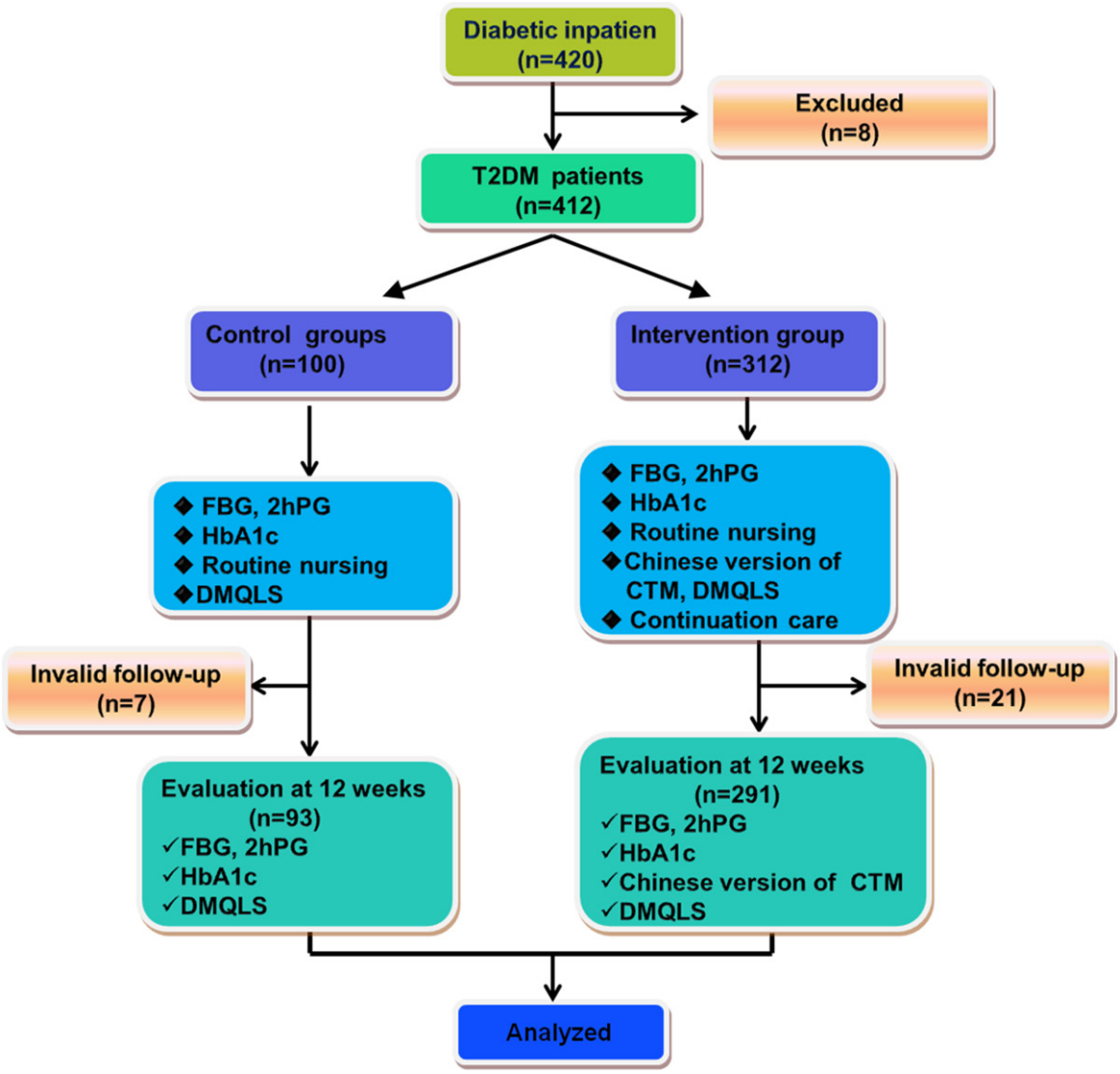

Figure 1. Flow diagram of the data collection. CTM, Care Transitions Measure; HbA1c, glycated hemoglobin; DMQLS, quality of life scale for patients with type 2 diabetes mellitus. FBG, fasting blood glucose; 2hPG, 2-hour plasma glucose.

and HbA1c levels were also recorded. The effective follow-up was 291 patients, so the follow-up success rate was 93.27%. A flow diagram of the data collection process is shown in **Figure 1**.

Measurements

The blood glucose level measurements included FBG, 2hPG, and HbA1c. The Chinese version of the CTM questionnaire adds two items to the CTM-15, for a total of 17 items and 4 dimensions. The scale uses the Likert 4 rating, ranging from "strongly disagree" to "strongly agree", from 1 to 4 points. Finally, the average score of the entries in terms of percentages is used as a scale score, with a higher score indicating better care transition. Conversion formula: scale score = (item average score - 1) ×100/3. The content validity index (CVI) of each entry in the Chinese version of the scale is 0.80~1.00, and the average is 0.99. The total score and the Cronbath's α coefficients of each factor are between 0.83 and 0.85, and they have good polymerization validity and structural validity. The quality of life in the patients with T2DM was assessed using DMQLS and included disease, psychological, physical, and social scores. Higher scores indicate a lower quality of life.

Table 1. General clinical data (mean ± SD)

Characteristic	Control group	Intervention group	χ^2/t	*P* value
Gender (n, %)				
Male	46 (46.0)	154 (49.4)	0.342	0.559
Female	54 (54.0)	158 (50.6)		
Age (years)	57.2±6.3	56.6±7.1	0.755	0.451
Course of disease (years)	9.3±10.1	9.5±9.3	0.183	0.855
BMI (kg/m^2)	25.6±3.7	25.8±3.1	0.535	0.593

Statistical analysis

We establish a database using Epidata 3.1, and we implemented double data entry and consistency checks. After the data entry, SPSS 17.0 software (SPSS Inc., Chicago, IL, USA) was used for the data analysis. Cronbach' α was used to assess the internal consistency reliability. Quantitative values are expressed as the mean ± standard deviation (SD). A univariate analysis was performed using t tests and analyses of variance. The comparisons of the proportions between two groups were done using chi-square tests. We created a forest map based on the statistical indicators and the statistical analysis method, a graph drawn from the result of a numerical operation. The SPSS-logistic regression analysis obtained odds ratio (OR) values and 95% confidence intervals (CI). An OR value greater than 1 indicated that the factor is a risk factor; an OR value less than 1 indicated that the factor is a protective factor. An item-total score correlation was calculated using a Spearman correlation analysis. Our correlation matrix analysis was generated using the R language. $P<0.05$ was considered statistically significant.

Results

Baseline clinical

No significant differences in terms of gender, age, body mass index (BMI), or course of disease were noted between the groups ($P>0.05$, **Table 1**).

The Chinese version of the CTM evaluation before and after intervention

The observation population (n = 312) had a CTM score of 65.10±19.50 at pre-intervention, and Cronbath's α coefficient of the CTM was 0.871. After the intervention and eliminating the patients lost to follow-up, we found that there was a clear increasing trend in each dimension, with a total score of 69.0±18.6 points (n = 291), and the Cronbath's α coefficient of CTM was 0.880. The score of the dimensions of the scale from high to low includes critical understanding, the importance of preferences, management preparation, and the written plan. The increase in the total CTM scores, the dimensions of the written plan, the importance of the preferences, and the management preparation were significantly different before and after the intervention, respectively (**Figure 2A**). The specific differences of the 17 items in the 4 dimensions before and after the intervention are displayed in **Table 2**. Although the Chinese version of the CTM items has a slight change from the original version, Cao et al. [8] show that the Chinese version of the CTM assessment scale has good reliability and validity. In addition, it is essential and important to note that the CTM-15 is scored as a unidimensional structure, so the domain-level structure does not have a direct impact on the scoring [6]. Briefly, the total CTM score was statistically significant compared with the score before the intervention, and the content is adequately valid.

The FBG and 2hPG levels before and after the nursing

After 12 weeks of continuous nursing intervention, the FBG level in the intervention group decreased from 8.76±3.01 mmol/L at baseline to 6.29±2.12 ($P<0.05$), while the FBG level before and after the routine nursing in the control group was 9.01±3.18 mmol/L and 8.04±2.57 mmol/L, respectively (**Figure 2B**). And the 2hPG level in intervention group decreased from 11.07±3.12 mmol/L at baseline to 8.39±3.62 ($P<0.05$), while the FBG level before and after the routine nursing in the control group was 10.96±3.25 mmol/L and 9.57±2.81 mmol/L, respectively (**Figure 2C**). An intra-group comparison suggested that the FBG and 2hPG levels after the nursing were significantly lower than they were before the nursing in both groups, and the differences were statistically significant. It can be clearly seen from **Figure 2B** and **2C** that a decrease in the FBG and 2hPG levels after the nursing

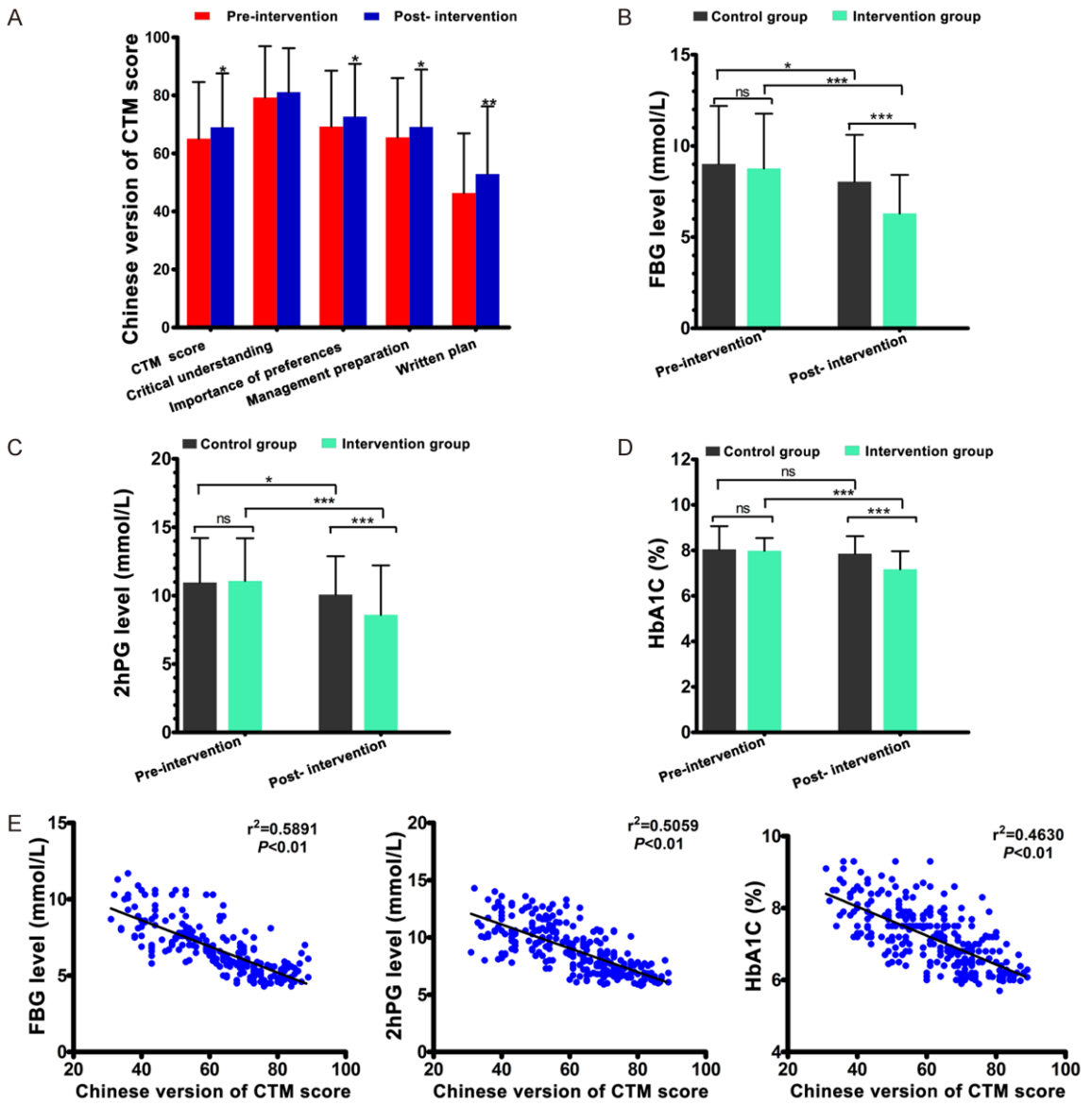

Figure 2. A. A comparison of the Chinese version CTM scores before and after the intervention in the intervention group. B-D. Comparison of the FBG, 2HPG, and HbA1c levels in the intervention and control groups before and after the nursing intervention, respectively. E. Correlation analysis between the FBG, 2hPG and HbA1C levels and the CTM scores after the continuing nursing intervention in the intervention group. *t* test, ***P<0.001, **P<0.01, *P<0.05. ns: no significant difference.

in intervention group were more significant (P<0.001). A comparison between the control and intervention groups showed that the differences in the FBG and 2hPG levels at baseline were not statistically significant. However, after 12 weeks, the FBG and 2hPG levels in the intervention group were significantly lower than they were in the control group (P<0.001, P<0.05). Taken together, the results suggest that continuous nursing intervention will exert a greater impact on the decrease in FBG and 2hPG levels in T2DM patients (**Table 3**).

The HbA1c levels before and after the nursing

No significant changes in the HbA1c levels were noted before and after the routine nursing in the control group. However, a significant difference in the HbA1c levels before and after the intervention was noted in the intervention group (P<0.001) (**Figure 2D**). The difference in the HbA1c levels at baseline was not statistically significant between the two groups. After 12 weeks, the HbA1c level was significantly lower in the intervention group than it was in

Table 2. The CTM scores before and after the nursing intervention in the intervention group

	Pre-intervention ($\bar{x}$ ± s) n = 312	Post-intervention ($\bar{x}$ ± s) n = 291
Factor 1: Critical understanding		
14. Understand how to take medications[1]	86.66±14.76	90.51±15.17**
13. Understand medications' purpose[1]	86.00±15.73	89.33±15.82**
11. Confident could do what needed[1]	83.33±18.03	85.67±17.72
10. Confident I knew what to do[1]	81.33±17.56	81.92±15.63
9. Good understanding of things I was responsible for[1]	78.53±17.60	78.57±16.87
16. Understand what makes better or worse[3]	78.33±16.28	78.66±17.30
8. Understand disease condition[(add)]	75.15±20.16	76.00±21.33
4. Had information needed for self-care[3]	64.66±20.03	68.12±18.97*
Factor 2: Importance of preferences		
2. Preferences deciding health care needs[2]	74.66±17.02	76.92±18.76
1. Agreed health goals and means[2]	71.68±19.35	75.33±18.93*
3. Preferences deciding where needs met[2]	65.66±19.30	68.67±20.31
5. Understand how to manage health[3]	65.00±21.26	69.89±20.62**
Factor 3: Management preparation		
17. Understand how to cope with discomfort[(add)]	73.00±18.52	76.12±17.7*
6. Understand signs and symptoms[3]	71.66±18.71	75.33±19.50*
15. Understand medications' side effects[1]	52.07±24.36	55.92±22.77*
Factor 4: Existence of a written and understandable care plan (Written plan)		
7. Had written care plan[4]	47.27±20.73	50.13±24.30
12. Had written list of appointments and tests[4]	45.33±20.51	55.67±25.71**
Total	65.10±19.50	69.0±18.6*

[1,2,3,4]Factor for the original English version of the CTM [7]. *P<0.05, **P<0.01.

the control group (P<0.001). This suggests that continuous nursing intervention has a better positive effect on improving the HbA1c levels in T2DM patients.

Correlation analysis

In addition, we performed a correlation analysis between the CTM scores and the FBG, 2hPG and HbA1c levels in the intervention group after the continuous nursing intervention. We found that the FBG, 2hPG, and HbA1c levels were negatively correlated with the CTM scores after the intervention, respectively (**Figure 2E**). Taken together, the T2DM patients with high CTM scores can get better glycemic control after continuous nursing intervention.

Analysis of the influencing factors on the CTM scores after the intervention

We conducted a univariate analysis of the CTM scores after the intervention in the T2DM patients, and the results are shown in **Table 3**. We found that the CTM scores may not be affected by gender, medical insurance, or complications of diabetes. However, age, educational level, personal monthly income, the timely monitoring of blood glucose levels, and diabetes hospitalization history can influence the CTM score after the intervention and are statistically significant. In addition, a linear correlation analysis between age, personal monthly income, and CTM score after the intervention showed that age was negatively correlated with CTM score (r^2 = 0.5062), but personal monthly income was positively correlated with CTM score (r^2 = 0.5570), as shown in **Figure 3A** and **3B**.

A multivariate analysis of the CTM scores after the intervention

For further research, taking the CTM scores after the intervention in the T2DM patients as the dependent variable, the statistically significant variables in the univariate analysis were subjected to a multiple stepwise linear regression analysis. Age, personal monthly income,

Table 3. A univariate analysis of the CTM scores after the intervention in intervention group

Variable		n	Chinese version of CTM score	*P* value
Gender	male	163	69.83±15.550	0.3991
	female	128	68.25±16.211	
Age (year old)	<40	30	71.79±8.199	0.0270*
	40~60	122	68.22±7.419	
	>60	139	66.95±10.291	
Educational level	Primary school or under	28	61.18±15.992	<0.01**
	Junior high school	47	66.19±16.785	
	Senior high school	136	73.32±12.837	
	College or university and above	80	75.28±9.918	
Personal monthly income (yuan)	<2000	22	61.71±17.373	<0.01**
	2000~3999	96	66.10±13.416	
	4000~5500	107	71.39±11.523	
	>5500	66	76.69±16.196	
Medical insurance	Employee medical insurance	204	67.92±10.236	0.8282
	New rural cooperative medical insurance	46	68.61±11.541	
	Resident medical insurance	30	68.40±11.606	
	Self-paying	11	70.79±8.4055	
Monitor blood glucose on time	No	75	63.34±15.948	<0.01**
	Yes	216	74.65±10.424	
Diabetes hospitalization history	No	88	61.85±10.330	<0.01**
	Yes	203	76.06±11.369	
Complications of diabetes	No	212	68.56±6.597	0.2998
	Yes	79	69.45±6.229	

*P<0.05, **P<0.01.

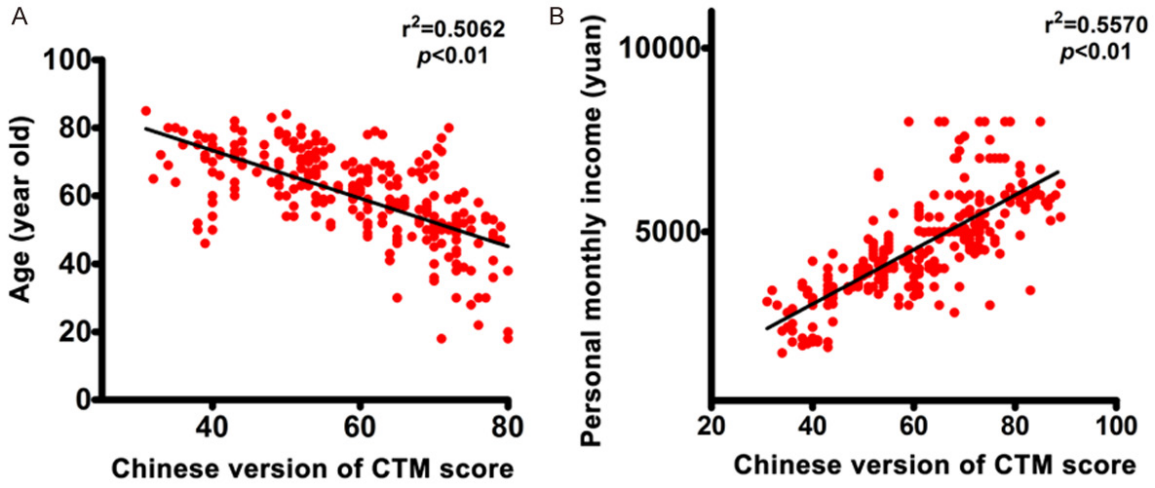

Figure 3. Linear correlation analysis of age (A), personal monthly income (B), and the post-intervention CTM scores (n = 291).

type of health insurance, and the timely monitoring of blood glucose levels all worked together to influence the CTM scores after the intervention (**Table 4**).

Logistic regression analysis

The CTM scores after the intervention were divided into high and low groups, CTM>61.0

Table 4. A multiple stepwise linear regression for the factors in the intervention group

	β	SE	β'	t	*P* value
Constant	48.349	2.248	-	21.505	<0.01
Personal monthly income	1.364	0.344	0.193	3.964	<0.01
Medical insurance	-1.151	0.373	-0.149	-3.082	0.002
Age (years old)	-1.451	0.489	-0.148	-2.969	0.003
Monitor blood glucose on time	1.352	0.644	0.104	2.098	0.036

The argument assignment: Age, <40 years = 1, 40~60 = 2, >60 = 3; personal monthly income, <2000 yuan = 1, 2000~3999 yuan = 2, 4000~5500 yuan = 3, >5500 yuan = 4; Types of medical insurance, employee medical insurance = 1, new rural cooperative medical insurance = 2, resident medical insurance = 3, self-paying = 4; monitor blood glucose, no = 0, yes = 1.

(median) = 0, CTM≤61.0 = 1, and a logistic regression analysis was performed. The SPSS analysis displayed that age is a risk factor for low CTM scores (OR = 1.485), and personal monthly income is a protective factor for low CTM scores (OR = 0.552) (**Figure 4A**). Next, the correlation analysis between the two factors is shown in a matrix diagram (**Figure 4B**).

Comparison of the quality of life in the two groups of T2DM patients

The dimensions of disease, psychology, physiology, and society scores in the intervention group were not statistically different from the scores in the control group at the pre-intervention. The dimensions of disease, psychology, physiology, and society scores were significantly lower than they were before the nursing in the intervention group at post-intervention. The differences were statistically significant ($P<0.01$) (**Table 5**). However, no significant differences were noted for the disease, psychology, physiology, and society dimensions scores between the control group before and after the nursing. In addition, the dimensions of disease, psychology, and physiology scores in the intervention group were statistically lower than they were in the control group after the nursing ($P<0.05$). It is worth noting that the reason why the changes in the social dimension scores in the two groups after the intervention were not significant may be that the 12 weeks' study period was short. Taken together, after the continuous nursing intervention, the patients' quality of life in the intervention group was significantly improved compared to the control group.

Discussion

In recent years, more and more scholars have begun to study continuation nursing, and the hospital has assumed important responsibilities as the initial stage of continuation nursing [10-13]. Out-of-hospital continuing nursing is an extension of clinical care. It extends medical care to the outside of the hospital, enabling patients to receive timely and correct guidance on disease-related knowledge after discharge to improve their self-management and compliance behavior. Herein, the current results found that an increase in the Chinese version of the CTM scores through short-term continuous nursing intervention, particularly the importance of preferences and written plan factors. After the intervention, the FBG, 2hPG, and HbA1c levels were significantly reduced, and the disease awareness and the Chinese version CTM scores were increased in the intervention group. The quality of life was also greatly improved compared to the control group. This also indicates that individualized continuous care can effectively control T2DM patients' glycemic levels and improve their quality of life.

In our research, the Chinese version CTM scores in the patients with T2DM in pre-intervention was 65.10±19.50, and the post-intervention score was 69.0±18.60. This is slightly lower than the scores reported in the literature [14, 15]. The difference may be attributed to the dissimilar healthcare policies in China and other countries. In China, many scholars have made positive attempts at the continuous care of chronic diseases, but they are all in their infancy and exploration. And for continuous care, there is no support for health insurance policies. Continuing care in our hospital and surrounding areas are still in its infancy. The nursing staff is not sufficiently proficient in continuous diabetes care, which may also be one of the reasons for the low CTM scores in our study. With regard to the reliability analysis, we found that the Cronbach's α values of the CTM were 0.871 and 0.88, which are in parallel with the results of previous studies [6, 9, 16, 17]. This also suggests that studying is reliable.

Currently, blood glucose levels are the most direct indicator of glycemic control in patients with T2DM. And changes in the FBG, 2hPG, and HbA1c levels are important indicators of diabetic diagnosis and prognosis [18, 19]. In

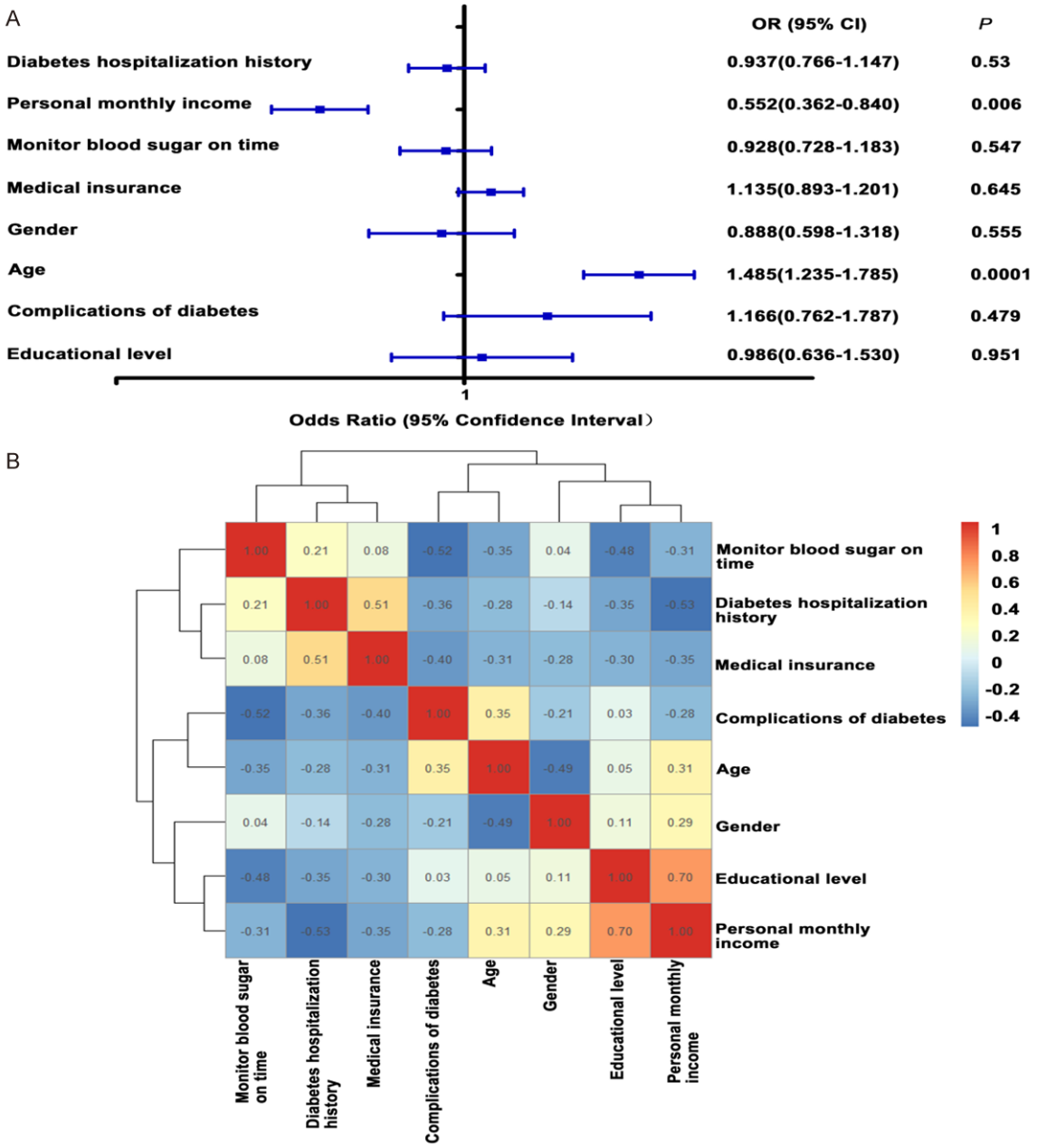

Figure 4. A. A low score CTM independent impact factors forest map. B. A correlation matrix analysis between the two factors in research.

the current study, continuous nursing intervention exhibited advantages over routine nursing in the reduction of HbA1c, FBG, and 2hPG levels. These results are similar to those previously reported [3, 20, 21], which indicates that targeted nursing intervention can help in glycemic control.

In addition, the FBG, 2hPG and HbA1c levels were negatively correlated with the CTM scores after the intervention. This indicates that T2DM participants with high CTM scores can achieve better glycemic control. Our analysis of the influencing factors of the Chinese version CTM scores after the continuous nursing intervention in T2DM patients showed that the level of personal monthly income was positively correlated with CTM scores and age was negatively correlated with CTM scores after the intervention in T2DM patients. Simultaneously, age is a risk factor for low CTM scores (OR = 1.485), and personal monthly income is a protective

Table 5. A comparison of the DMQLS scores pre/post-intervention in the two groups of patients

	Group	Disease	Psychological	Physiological	Social
Pre-intervention (×1)	Intervention	52.31±6.78	50.97±8.12	50.66±6.22	49.17±8.36
	Control	52.18±7.23	51.19±8.35	49.81±7.58	48.32±8.02
	P-value	0.870	0.815	0.261	0.372
Post-intervention (×2)	Intervention	45.73±8.01	43.57±8.27	45.67±8.56	46.57±8.09
	Control	50.33±7.82	48.96±7.81	48.12±7.74	47.21±7.67
	P-value	<0.001**	<0.001**	0.013*	0.495
P-value = ×2 vs ×1#	Intervention	<0.001**	0.004**	<0.001**	<0.001**
	Control	0.086	0.055	0.123	0.322

*$P<0.05$; **$P<0.01$. #*P*-value = ×2 vs ×1: refers to the comparison of the intervention group/control groups before and after the intervention.

factor for low CTM scores (OR = 0.552) according to our logistic regression analysis. The treatment of diabetes is a long-term process that requires lifelong medication. Those with high incomes have better medical security, can face diseases with a healthier and more positive attitude, and have an enhanced self-confidence in overcoming diseases. With the increase of age, due to the decline in physical function, cognition, memory, and understanding of mobility (including the lack of WeChat QQ operation), it is difficult for patients to master disease knowledge and practice healthy behavior. Therefore, this also reminds medical staff to choose quiet places for health guidance for elderly patients, and to use the teach-back method for one-on-one health education. If conditions permit, the patient and family can communicate with each other to improve the effectiveness of the health guidance. In addition, through the correlation matrix, we found that there was a positive correlation between educational level and personal monthly income, and diabetes hospitalization history and medical insurance, respectively. One's diabetes hospitalization history and personal monthly income, and the timely monitoring of blood glucose and the complications of diabetes have significant negative correlations, respectively.

Frankly, the relatively short research period and the relatively simple assessment of the quality of life are the disadvantages of this experiment. Therefore, long-term and more detailed intervention studies including patient rehabilitation evaluation and the impact of complications will also be of great value in the future. In summary, our study found that out-of-hospital continuous nursing intervention helps control patients' glycemic levels more effectively and improves their quality of life.

Acknowledgements

This work was supported by the Nursing Fund Project of the First Affiliated Hospital of Shihezi University School of Medicine (HL201701).

Disclosure of conflict of interest

None.

Address correspondence to: Ling Fan, Department of Endocrinology, The First Affiliated Hospital of Shihezi University Medical College, Shihezi, China. E-mail: fanlingshzdx@aliyun.com

References

[1] Co MA, Tan LS, Tai ES, Griva K, Amir M, Chong KJ, Lee YS, Lee J, Khoo EY and Wee HL. Factors associated with psychological distress, behavioral impact and health-related quality of life among patients with type 2 diabetes mellitus. J Diabetes Complications 2015; 29: 378-383.

[2] Poolsup N, Suksomboon N and Rattanasookchit S. Meta-analysis of the benefits of self-monitoring of blood glucose on glycemic control in type 2 diabetes patients: an update. Diabetes Technol Ther 2009; 11: 775-784.

[3] Lyu WB, Gao Y, Cheng KY, Wu R and Zhou WQ. Effect of self-acupoint massage on blood glucose level and quality of life in older adults with type 2 diabetes mellitus: a randomized controlled trial. J Gerontol Nurs 2019; 45: 43-48.

[4] Buse JB, Wexler DJ, Tsapas A, Rossing P, Mingrone G, Mathieu C, D'Alessio DA and Davies MJ. 2019 update to: management of hyperglycemia in type 2 diabetes, 2018. A consensus report by the American diabetes association (ADA) and the European association for the

study of diabetes (EASD). Diabetes Care 2020; 43: 487-493.
[5] Cui Y, Gong D, Yang B, Chen H, Tu MH, Zhang C, Li H, Liang N, Jiang L and Chang P. Making the CARE comprehensive geriatric assessment as the core of a total mobile long term care support system in China. Stud Health Technol Inform 2018; 247: 770-774.
[6] Coleman EA, Mahoney E and Parry C. Assessing the quality of preparation for posthospital care from the patient's perspective: the care transitions measure. Med Care 2005; 43: 246-255.
[7] Coleman EA, Smith JD, Frank JC, Eilertsen TB, Thiare JN and Kramer AM. Development and testing of a measure designed to assess the quality of care transitions. Int J Integr Care 2002; 2: e02.
[8] Cao X, Chen L, Diao Y, Tian L, Liu W and Jiang X. Validity and reliability of the Chinese version of the care transition measure. PLoS One 2015; 10: e0127403.
[9] Bakshi AB, Wee SL, Tay C, Wong LM, Leong IY, Merchant RA and Luo N. Validation of the care transition measure in multi-ethnic South-East Asia in Singapore. BMC Health Serv Res 2012; 12: 256.
[10] Boockvar K, Fishman E, Kyriacou CK, Monias A, Gavi S and Cortes T. Adverse events due to discontinuations in drug use and dose changes in patients transferred between acute and long-term care facilities. Arch Intern Med 2004; 164: 545-550.
[11] Kripalani S, LeFevre F, Phillips CO, Williams MV, Basaviah P and Baker DW. Deficits in communication and information transfer between hospital-based and primary care physicians: implications for patient safety and continuity of care. JAMA 2007; 297: 831-841.
[12] McLeod J, Stolee P, Walker J and Heckman G. Measuring care transition quality for older patients with musculoskeletal disorders. Musculoskeletal Care 2014; 12: 13-21.
[13] Moore C, Wisnivesky J, Williams S and McGinn T. Medical errors related to discontinuity of care from an inpatient to an outpatient setting. J Gen Intern Med 2003; 18: 646-651.
[14] Brumm S, Theisen K and Falciglia M. Diabetes transition care from an inpatient to outpatient setting in a veteran population: quality improvement pilot study. Diabetes Educ 2016; 42: 346-353.
[15] Hwang JI, Chung JH and Kim HK. Psychometric properties of transitional care instruments and their relationships with health literacy: brief prepared and care transitions measure. Int J Qual Health Care 2019; 31: 774-780.
[16] Bei-Lei L, Yong-Xia M, Fa-Yang M, Zhen-Xiang Z, Qin C, Ming-Ming S and Yuan-Yuan F. Current status and nurses' perceptions of the electronic tabular nursing records in Henan, China. J Nurs Manag 2019; 27: 616-624.
[17] Shadmi E, Zisberg A and Coleman EA. Translation and validation of the care transition measure into Hebrew and Arabic. Int J Qual Health Care 2009; 21: 97-102.
[18] Gu Y, Xu X, Wang Z, Xu Y, Liu X, Cao L, Wang X, Li Z and Feng B. Chromium-containing traditional Chinese medicine, tianmai xiaoke tablet, for newly diagnosed type 2 diabetes mellitus: a meta-analysis and systematic review of randomized clinical trials. Evid Based Complement Alternat Med 2018; 2018: 3708637.
[19] Lean M, McCombie L and McSorely J. Trends in type 2 diabetes. BMJ 2019; 366: l5407.
[20] Chen SM, Lin HS, Atherton JJ, MacIsaac RJ and Wu CJ. Effect of a mindfulness programme for long-term care residents with type 2 diabetes: a cluster randomised controlled trial measuring outcomes of glycaemic control, relocation stress and depression. Int J Older People Nurs 2020; e12312.
[21] Cheng L, Sit JWH, Choi KC, Chair SY, Li X, Wu Y, Long J and Yang H. The effects of an empowerment-based self-management intervention on empowerment level, psychological distress, and quality of life in patients with poorly controlled type 2 diabetes: a randomized controlled trial. Int J Nurs Stud 2019; 103407.