World Journal of
Clinical Cases

Contents

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World Journal of Clinical Cases

ORIGINAL ARTICLE

Randomized Controlled Trial

Impact of community public health care on treatment effect, health cognition, and self-management in patients with type 2 diabetes

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Abstract

BACKGROUND
At present, China has become the country with the largest number of individuals with diabetes mellitus (DM) in the world, with a total of approximately 140 million patients, the majority of whom have type 2 DM (T2DM). Based on conventional nursing methods, community home care has important clinical significance in controlling blood sugar and disease progression.

AIM
To explore the impact of community public health nursing on treatment effect, health cognition, and self-management in patients with T2DM.

METHODS
One hundred patients with T2DM were selected as the research subjects. The patients were divided into either a conventional nursing group or community nursing (CN) group using the random number table method. The conventional nursing group (50 cases) received routine care, while the CN group (50 cases) received community public health care in addition to routine care as that for the conventional nursing group. The rate of excellent and good blood glucose control, fasting blood glucose before and after care, 2-h postprandial blood glucose, health cognition, and self-management ability, and patient satisfaction were compared between the two groups.

RESULTS

The CN group had a higher rate of excellent blood sugar control than the conventional nursing group (88% *vs* 70%, $P < 0.05$). Before care, there was no significant difference in fasting blood glucose or 2-h postprandial blood glucose between the two groups of patients ($P > 0.05$). After nursing, fasting blood glucose and 2-h postprandial blood glucose were reduced to varying degrees in both groups, and both blood glucose levels in the CN group were lower than those of the conventional nursing group ($P < 0.05$). Compared with the scores before care, the cognitive level score for diabetes and self-management ability score improved after care in both groups. The cognitive level and self-management ability of patients in the CN group were higher than those of the conventional nursing group ($P < 0.05$). The overall satisfaction of the CN group was better than that of the conventional nursing group (98% *vs* 86%, $P < 0.05$).

CONCLUSION

Community public health care based on conventional care of T2DM can achieve better blood sugar control, and improve patients' health cognitive level and self-management ability.

Key Words: Community public health care; Type 2 diabetes; Blood sugar control; Self-management ability; Cognition level

Core Tip: This study investigated the impact of community public health nursing on treatment effect, health cognition, and self-management in patients with type 2 diabetes mellitus. The results demonstrate that community public health care based on conventional care can achieve better blood sugar control, and improve patients' health cognitive level and self-management ability.

INTRODUCTION

Diabetes mellitus (DM) is one of the fastest-growing global disease burdens in the 21st century. DM is primarily caused by a metabolic disorder resulting from either inadequate insulin secretion or impaired insulin biological effects. It has a high incidence rate among middle-aged and elderly individuals. The newly released 10th edition global DM map released by the International Diabetes Federation shows that in 2021, the world's 20-79-year-old adult DM patients have reached 536.6 million (estimated to yield a prevalence of 10.5%). It is speculated that by 2045, this number will increase to 783.2 million (12.2%)[1]. Over more than 30 years, the prevalence of DM in China has continued to rise, from 0.67% in 1980 to 10.9% in 2013, and in 2018, this number has increased to 12.4%[2,3]. At present, China has become the country with the largest number of DM patients in the world, with a total number of patients of as many as 140 million, of which type 2 DM (T2DM) patients predominate[4]. T2DM can produce many symptoms, and there will be many complications in the progression of the disease, which seriously endanger the quality of life and health of the patients[5]. Patients with T2DM are at high risk of microvascular and macrovascular complications.

For the treatment of T2DM, methods alone are not sufficient; reliable care is also essential to achieve better control of blood sugar levels. Clinical data show that due to the long course of diabetes, the disease changes are very complicated. In addition, since patients with type 2 diabetes are often old, do not have professional diabetes-related health knowledge, have weak self-management ability, the difficulty of controlling blood sugar is relatively large[6,7].

The prevention and treatment of T2DM require measures such as dietary therapy, exercise therapy, medication management, blood sugar monitoring, and comprehensive intervention. It requires long-term self-management of diabetic patients[8,9]. Self-management ability refers to the capacity to manage symptoms, treatment, physiology, psychological changes, and lifestyle adjustments in patients[10]. The latest diabetes prevention guide pointed out that the key to preventing acute complications of diabetes and reducing the risk of long-term complications is to strengthen self-management education in patients with diabetes[11].

Based on conventional nursing methods, community home care has important clinical significance in controlling blood sugar and disease progression. Community care, as a web position in the public service network system, plays a basic role in public health services[12]. Community nursing is a new mode of nursing discipline integrating modern nursing, prevention medicine, management, and related humanities and social sciences. It is centered on promoting the health of the community population, with family as the unit, society as the scope, and nursing procedures as working methods to carry out the physical and mental health of individuals, families, and people. It organically combines nursing, prevention, treatment, health care, rehabilitation, and health education, and integrates physical care with group care[13]. Being able to discover, treat early, and prevent diseases at an early stage can reduce the waste of medical resources caused by minor

illnesses progressing into major ones. This approach can also lessen the economic burden on residents and ensure that they have access to continuous and convenient health services[14].

Therefore, this study aimed to explore the treatment effect, cognition, and self-management changes of T2DM patients after community public health care, in order to establish the foundation for the optimization of community health management in the future.

MATERIALS AND METHODS

Patients
One hundred patients with T2DM who were admitted to Caotang Community Health Service Center from October 2022 to December 2023 were selected as the research subjects, and they were divided into either a conventional nursing group or a community nursing (CN) group using the random digital table method, with 50 cases in each group 50. This study was approved by the medical ethics committee.

Inclusion and exclusion criteria
The inclusion criteria were: (1) Following the "Standards of medical care for type 2 diabetes in China 2019"[15] related diagnostic standards; (2) Age ≥ 18 years old; (3) The mental state and cognitive function were normal; and (4) Knowing the content of this research. The exclusion criteria were: (1) Craniocerebral trauma; (2) Those with damage or dysfunction of other organs and systems; (3) Those with tumor diseases; and (4) Those who lacked clinical data due to various reasons.

Nursing method
Based on the patient's condition, the two groups were given the same medicinal hypoglycemic solution in accordance with the "Guidelines for the Prevention and Treatment of Diabetes"[15].

Conventional nursing group: The conventional nursing group was given conventional care. It is essential to develop scientific and rational nursing methods tailored to the patient's specific situation. These methods aim to instruct patients on the correct use of medication and diet as per the doctor's recommendations, and help patients establish healthy lifestyle habits and effectively manage their blood sugar levels.

CN group: In addition to conventional care as that in the conventional nursing group, the CN group was given community public health care: (1) Health education: Health education aims to promote the relevant knowledge of T2DM in the community, help patients fully understand their diseases, actively and patiently answer patients' questions, and help patients solve doubts. According to the patient's questions, the corresponding care methods are recommended according to his/her conditions. Regular telephone follow-up or family follow-up of patients is performed to understand and judge the patient's current blood glucose level. The patients are instructed to watch some related videos of diabetic care, and community nursing staff answer questions about patients and their families in the face of community care. In addition, relevant experts can be hired to go to the corresponding lectures regularly, introduce basic diabetes treatment and nursing methods, and encourage patients to ask questions and give corresponding answers; (2) Diet care: Community nursing staff collect patients' basic information, such as weight, height, and other essential details. They also engage in proactive communication with patients and their families to comprehend their daily eating habits to guide them to eat sensibly, manage their food intake, and collaborate with patients and their families to create a diet plan. The diet plan can be personalized based on the patient's condition and the family's economic circumstances to ensure its feasibility. Nursing staff instruct patients to maintain a light diet whenever possible and encourage them to consume more whole grains and vegetables. Nursing staff explain in detail to patients the importance of dietary control in main-taining good health and ensure that patients understand the necessity of a balanced diet. Nursing staff instruct the patient to eat regularly and in appropriate quantities, advise him/her to strictly follow the diet plan, and guide the patient's family to monitor the patient's diet sensibly. They also suggest patients to consume high-protein, high-fiber, and vitamin-rich foods, and not to eat high-sugar and high-cholesterol foods. Drinking should be lighter, and spicy tobacco and alcohol should be avoided[16]; (3) Exercise care: Community nurses guided patients to exercise reasonably and design appropriate exercise plans based on the patient's physique and condition. When designing an exercise plan, nursing staff can first understand the patient's preferences and try to include the patient's favorite exercise methods, such as Tai Chi, dancing, jogging, and walking. Nursing staff design the exercise intensity based on the patient's pulse rate and instruct the patient to maintain each exercise time within 0.5 to 1 h. Nursing staff explain the benefits of moderate exercise to the patient, instruct him/her to carry a disease card and a card with contact information and home address when engaging in outdoor exercise, and ask the patient to prepare sugary foods and eat in time when symptoms of hypoglycemia occur; (4) Psychological care: Community nursing staff actively communicate with patients to understand their mental state and understand the reasons for their negative emotions. If the patient questions the efficacy of the treatment plan, nursing staff should promptly explain the purpose of the treatment plan and the main functions of the drug to the patient to eliminate any doubts that the patient may have. If the patient is worried about the unstable condition of the disease and experiences fear, the nursing staff will promptly comfort the patient and actively encourage him/her to build confidence in maintaining his/her health. Nursing staff explain to the patient the potential impact of negative emotions, inform the patient about the crucial role of maintaining a positive and stable psychological state, and encourage the patient to relax as much as possible. Medical staff actively communicate with patients' families, inform them to communicate more with

patients, and guide them to help and support patients to keep patients happy; (5) Life management: Nursing staff strengthen the management of patients to help them develop good health habits. Under the premise of the patients' own supervision and family members' urging, nursing staff help them correct their current bad lifestyle and strictly quit smoking and alcohol. In terms of exercise, nursing staff can encourage patients to participate in various types of sports activities and exercise in combination with the individual conditions of patients and their preferences. It is necessary to avoid strenuous exercise and to gradually increase the amount of exercise and operation intensity[17]; (6) Disease monitoring: Community nursing staff regularly visit patients to check their blood sugar levels, and record the time and results of blood sugar tests in detail in their health records. Diabetes experts consult patients' health files in a timely manner and promptly modify and supplement nursing intervention measures based on the patient's condition. The nursing staff instructs patients to strictly follow the doctor's instructions for self-management and informs them of the crucial role that good self-management plays in maintaining good health. Nursing staff instruct patients to contact medical staff directly if there are any abnormalities; and (7) Medication guidance: Community nurses explain the actual effects of various drugs to patients in detail, inform patients of possible adverse effects of taking the drugs, and guide patients on how to use drugs correctly. The nursing staff instructs patients not to change the medication time and dosage at will. They also inform patients of the adverse consequences if they do not follow the doctor's instructions. If the patient requires long-term insulin injections, the nursing staff should educate the patient on proper insulin storage methods, instruct both the patients and their family on the correct use of insulin injection tools, and advise the patient on selecting injection sites appropriately.

Observation indicators

The rate of excellent/good blood sugar control, fasting blood sugar before and after care, 2-h postprandial blood sugar, diabetes cognition, and self-management ability were compared between the two groups of patients.

Blood sugar control can be categorized as: (1) Excellent: The patient's glycated blood sugar protein was < 6.5%; (2) Good: The patient's glycated blood sugar protein was controlled at 6.5%-8%; and (3) Poor: The patient's glycosylated glycemic protein was > 8%. The rate of excellent/good blood sugar control was calculated as the percentage of patients achieving excellent or good blood sugar control[18].

The T2DM health knowledge scale self-made by our center was used for evaluation. This scale has been tested for validity and reliability, with Cronbach's α = 0.921. It includes a total of 23 items, with each item scoring 0 (incorrect) or 1 (correct), yielding a total score of 23 points. The higher the score, the better the patient's health knowledge.

Use the Self-Management Ability Scale for T2DM Patients to evaluate patients' self-management ability[19]. The scale includes 11 items in total, including 3 dimensions: Information, motivation, and behavioral skill. Each item adopts a 1 to 5-level scoring method. The higher the score, the stronger the patient's self-management ability.

The statistics of nursing satisfaction are based on the center's self-made questionnaire.

Statistical analysis

The data in this study were analyzed and processed with SPSS 21.0 statistical software. Measurement data, expressed as the mean ± SD, were compared using the t-test. Count data, expressed as rates (%), were compared using the χ^2 test. P-values < 0.05 were considered statistically significant.

RESULTS

Comparison of clinical data

We selected 100 patients with T2DM admitted to our community health service center from October 2022 to December 2023. The two groups of patients were comparable in gender, course of disease, body mass index, and age (P > 0.05) (Table 1).

Comparison of excellent/good blood glucose control rates

In order to observe the effect of nursing on blood sugar control, we compared the overall blood sugar control of the two groups. The results showed that the CN group had a higher rate of excellent blood sugar control than the conventional nursing group (88% *vs* 70%, P < 0.05) (Table 2).

Comparison of blood sugar levels

We measured the patient's fasting blood glucose and 2-h postprandial blood glucose levels (Table 3). The results showed that before care, there was no significant difference in fasting blood glucose or 2-h postprandial blood glucose between the two groups of patients (P > 0.05). After nursing, fasting blood glucose and 2-h postprandial blood glucose were reduced to varying degrees in both groups, and both blood glucose levels in the CN group were lower than those of the conventional nursing group (P < 0.05). This suggests that the effect of community nursing is better than that of conventional nursing.

Comparison of diabetes cognition and self-management ability

We assessed diabetes cognition and self-management ability in both groups before and after care (Table 4). The results showed that before care, there was little difference in diabetes cognition and self-management ability scores between the two groups of patients (P > 0.05). After care, compared with before care, the diabetes cognitive level and self-management

Table 1 Comparison of general clinical data of patients, mean ± SD

Index	Conventional nursing group (*n* = 50)	CN group (*n* = 50)	*t*/*χ*²	*P* value
Average age	64.78 ± 7.76	63.76 ± 8.01	0.647	0.519
Gender (male/female)	30/20	27/23	0.367	0.545
Course of disease	6.80 ± 3.29	6.79 ± 3.41	0.015	0.988
BMI	27.15 ± 1.31	26.82 ± 1.23	1.299	0.197

CN: Community nursing; BMI: Body mass index.

Table 2 Comparison of excellent/good blood glucose control rates, *n* (%)

Index	Conventional nursing group (*n* = 50)	CN group (*n* = 50)	*t*/*χ*²	*P* value
Excellent	19 (38.00)	23 (46.00)		
Good	16 (32.00)	21 (42.00)		
Poor	15 (30.00)	6 (12.00)		
Excellent/good rate	35 (70.00)	44 (88.00)	4.882	0.027

CN: Community nursing.

Table 3 Comparison of blood sugar levels between the two groups of patients before and after care, mean ± SD

Group	*n*	FBG		Postprandial 2-h blood glucose	
		Before care	After care	Before care	After care
Conventional nursing group	50	9.67 ± 2.15	7.41 ± 2.02	14.08 ± 1.58	10.65 ± 1.78
CN group	50	9.71 ± 2.12	6.52 ± 1.72	14.12 ± 1.65	8.43 ± 1.61
t/*χ*²		-0.094	2.372	-0.124	6.540
P value		0.926	0.020	0.902	< 0.001

FBG: Fasting blood glucose; CN: Community nursing.

Table 4 Comparison of diabetes cognition and self-management ability, mean ± SD

Group	*n*	Diabetes cognition		Self-management skills	
		Before care	After care	Before care	After care
Conventional nursing group	50	12.82 ± 2.11	15.34 ± 2.68	30.46 ± 3.07	35.98 ± 4.16
CN group	50	12.54 ± 2.11	19.66 ± 2.40	31.38 ± 3.17	41.60 ± 3.91
t/*χ*²		0.664	-8.491	-1.474	-6.961
P value		0.509	< 0.001	0.144	< 0.001

CN: Community nursing.

ability scores improved in both groups. Moreover, the cognitive level and self-management ability of patients in the CN group were higher than those of the conventional nursing group ($P < 0.05$).

Nursing satisfaction comparison

After the study was completed, to understand the patients' actual feelings about community nursing in this study, a nursing questionnaire was distributed to the two groups of patients (Table 5). According to the specific information of the questionnaire, the results showed that the overall satisfaction of the CN group was better than that of the conventional nursing group (98% *vs* 86%; $P < 0.05$).

Table 5 Nursing satisfaction comparison, *n* (%)

Group	n	Very satisfied	Relatively satisfied	Generally satisfied	Not satisfied	Overall satisfaction rate
Conventional nursing group	50	31 (62)	8 (16)	4 (8)	7 (14)	43 (86)
CN group	50	40 (80)	7 (14)	2 (4)	1 (2)	49 (98)
t/χ^2						4.891
P value						0.027

CN: Community nursing.

DISCUSSION

With the development of society and the improvement of quality of life, people's dietary structure and daily life behaviors have changed. The incidence of endocrine diseases such as T2DM has shown an increasing trend year by year, which has also had a greater impact on patient's quality of life. However, the progression of the disease can be controlled through drug treatment. Because T2DM mostly occurs in middle-aged and elderly people, they often have little knowledge about DM. Moreover, patients with T2DM have poor self-management ability, long disease course, and complex disease changes, and routine care can no longer meet their needs for blood sugar control[20,21]. Therefore, providing more active and effective care for such patients has important clinical significance.

Community public health nursing is a reliable nursing strategy for patients with long-term T2DM to control disease progression and prevent various complications while recuperating in the community. During the implementation period, nursing knowledge and public health are safely integrated. During the implementation period, community health service centers are used to serve patients in the community, thereby providing patients with personalized disease care and fundamentally improving the health and safety of patients[22,23]. Nursing staff will actively understand the patient's basic information, such as weight, height, and living habits, and design a reasonable diet and exercise plan based on the patient's economic conditions, so that the patient can maintain a reasonable diet and exercise state, thereby improving the patient's quality of life.

Based on previous clinical data, it can be seen that effective community nursing has the following advantages: (1) It can provide patients with continuous medical care, enable patients to still receive complete care after discharge, and increase the sense of security of patients and their families in a familiar environment; (2) It can significantly reduce the re-hospitalization rate and medical consultation rate of patients during their stay in the community; (3) It fundamentally improves patients' quality of life and encourages patients to learn and master more self-care methods; (4) It reduces the distance that patients and their families have to travel to and from the hospital, and the financial burden on patients during home treatment; (5) It significantly shortens the length of stay for patients, and also increases the turnover rate of hospital beds to a certain extent; and (6) It has a great promotional effect on the development of the community nursing profession and also expands the professional field[24-26].

In this study, our center analyzed the impact of community nursing on diabetes cognition and self-management of T2DM patients. The results showed that the excellent/good blood glucose control rate in the CN group was higher than that of the conventional nursing group (*P* < 0.05). After nursing, the fasting blood sugar and 2-h postprandial blood sugar of the CN group were lower than those of the conventional group (*P* < 0.05), confirming that the application of community nursing significantly improved the patients' blood sugar control. At the same time, the results of this study showed that after nursing, the diabetes cognitive level and self-management ability scores of both groups improved, and the improvement was more significant in the CN group than the conventional nursing group (*P* < 0.05). After receiving appropriate care, the patients' level of health cognition has increased, and their self-management ability has significantly improved. This confirms the benefits of community nursing and aligns with previous clinical studies[27,28]. The reason is that the application of community nursing combines the onset characteristics, clinical symptoms, and nursing needs of patients with T2DM to provide targeted nursing strategies. It not only improves the overall nursing service level but also better meets the patients' nursing needs, thereby improving their medical compliance behavior and ultimately achieving the purpose of effectively controlling the patients' blood sugar level[29,30]. In addition, community nursing increases communication with patients through health education and builds a relatively harmonious nurse-patient relationship. It also significantly improves patients' understanding of the disease, enhances their medical compliance, and boosts their self-management ability[31].

In this study, the patient satisfaction rate before and after care was also compared. The satisfaction rate of patients in the CN group with nursing services was 98% (49/50), which was higher than that of the conventional nursing group (86%, 43/50). This suggests that community care improves patient satisfaction, resulting in higher patient compliance and psychological adaptation, and is worthy of promotion.

This study has some limitations. The sample size of this study was too small and it was a single-center study. In the future, relevant research can be conducted by combining collections from multiple centers. In this study, most of the patients with diabetes were elderly, but as patients with chronic diseases are now becoming younger and younger, we also need to explore the effect of care on relatively young people.

CONCLUSION

In summary, incorporating community care into the routine treatment of patients with T2DM can lead to improved blood sugar control, enhance patients' understanding of their health, and boost their self-management skills, ultimately facilitating patient recovery. In subsequent studies, the sample size can be further expanded, observation indicators increased, and follow-up time extended to assess the application advantages of community nursing more scientifically and effectively.

FOOTNOTES

Author contributions: Shi H, Liu C, and Luo HY designed the research study; Shi H and Liu C performed the research; Luo HY and Liu C contributed new reagents and analytic tools; Shi H, Liu C, and Luo HY analyzed the data and wrote the manuscript. All authors have read and approved the final manuscript.

Institutional review board statement: The study was reviewed and approved by the Caotang Community Health Service Center Institutional Review Board.

Informed consent statement: All study participants, or their legal guardians, provided informed written consent prior to study enrollment.

Conflict-of-interest statement: The authors deny any conflict of interest for this article.

Data sharing statement: No other data is available.

CONSORT 2010 statement: The authors have read the CONSORT 2010 statement, and the manuscript was prepared and revised according to the CONSORT 2010 statement.

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Country of origin: China

ORCID number: Hong-Yan Luo 0009-0008-0336-4922.

S-Editor: Liu H
L-Editor: Wang TQ
P-Editor: Zhao YQ

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