To analyze the effects of continuous care on self-management ability, self-efficacy and quality of life in middle-aged and elderly patients with type 2 diabetes

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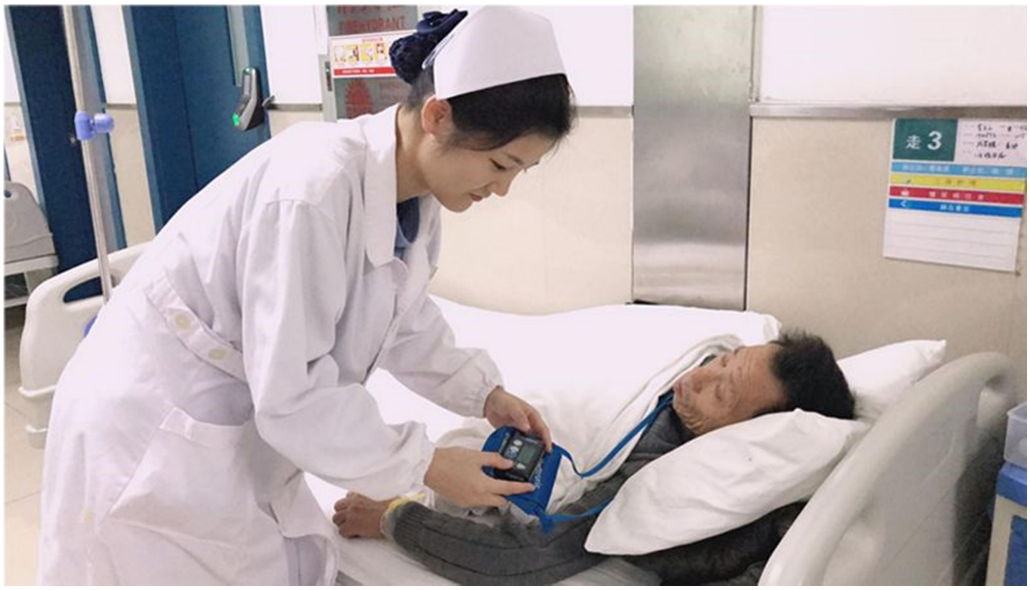
Introduction. The purpose of this study is to investigate the impact of continuous care on self-management ability, self-efficacy and quality of life in middle-aged and elderly patients with type 2 diabetes mellitus, and to further evaluate their effects in glycemic control and complication prevention.
Methods. Using a prospective cohort study design, 120 middle-aged and elderly type 2 diabetes patients were randomly divided into experimental group and control group, 60 each. The experimental group received six months of continuous care, including personalized health education, regular follow-up, and psychological support, and the control group received routine medical care. The study was mainly assessed by self-management performance scale, self-efficacy scale and quality of life scales, and monitored for glycemic control and complication rates.
Results. The experimental group had significantly higher scores in self-management ability, self-efficacy, and quality of life than the control group ($p < 0.05$). In addition, the experimental group performed better in glycemic control, and its complication rate was also significantly lower than that in the control group ($p < 0.05$).
Conclusion. The continuous care model has significantly improved the self-management ability, self-efficacy and quality of life of middle-aged and elderly type 2 diabetes patients, while showing positive effects in glycemic control and reducing complications. This suggests that continuous care is an effective strategy to improve disease management in middle-aged and elderly patients with type 2 diabetes.
Keywords. Type 2 diabetes mellitus; continuous care; self-management; self-efficacy; quality of life

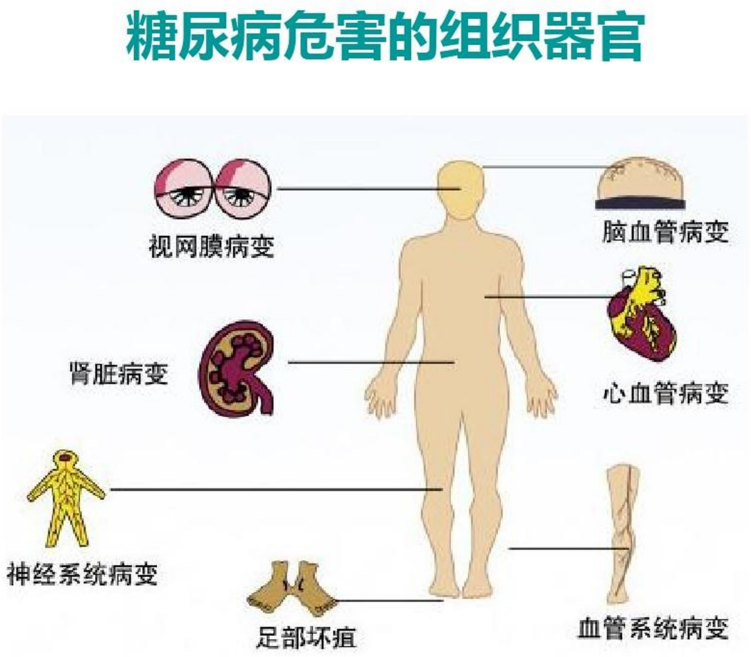
INTRODUCTION

As a chronic metabolic disease, type 2 diabetes poses a major public health challenge for public health worldwide, especially in the middle-aged and elderly population. As the aging population increases, type 2 diabetes and its complications place a huge burden on patients' quality of life and the global health system. The management of this disease requires not only effective glycemic control but also a comprehensive consideration of the patients' lifestyle, psychological status and social support. In this context, it becomes particularly important to explore and implement effective disease management strategies, especially for middle-aged and elderly patient populations.

As a comprehensive nursing method, the continuous care model has received increasing attention in recent years. This model aims to improve the overall health status of patients by providing continuous medical monitoring, individualized treatment planning, and psychosocial support. Although existing studies have shown a positive impact of continuous care on improving some health indicators in patients with type 2 diabetes, its specific effects on self-management ability, self-efficacy and quality of life in middle-aged and elderly patients still need to be further explored.



In view of this, this study aims to deeply analyze the effects of continuous care in middle-aged and older patients with type 2 diabetes. We specifically focused on how continuous care affects patients 'self-management ability and self-efficacy and its role in improving patients' quality of life. Through an in-depth analysis of these aspects, this study aims to provide valuable insights to clinicians and public health policy makers on how to improve the care of patients with type 2 diabetes. Meanwhile, this study also explored the potential benefits of continuous care in glycemic control and reducing complications, in order to provide direction for future clinical practice and research.



1. MATERIALS AND METHODS

1.1 Study method

Subjects and Groups: 120 middle-aged and elderly patients, diagnosed with type 2 diabetes from January 2021 to January 2022, were selected for this study. Inclusion criteria were: being aged over 50 years old, meeting the diagnostic criteria for type 2 diabetes, having a disease duration of more than 1 year, and being able to take care of themselves in daily life. Exclusion criteria included: patients with severe cardiovascular and cerebrovascular disease, mental illness or other serious complications, and patients who were unable to cooperate with the study requirements. According to the random number table method, 120 patients were randomly divided into experimental and control groups, 60 each.

1.2 Research tool

The Self-management Power Scale: This is a scale specifically designed for people with diabetes to assess their ability to manage the disease in their daily life. It contains several items covering the patient's understanding of basic diabetes, dietary control, physical activity, medication management, blood glucose monitoring and ability to manage abnormal blood glucose. Each item has a quantitative scoring criterion, and patients choose the corresponding option according to their actual situation. The higher the score is, the stronger their self-management ability is Self-efficacy Scale: This is a tool to assess the patient's confidence and ability to control the disease. The questions in the scale were designed around the patients' confidence in managing their diabetes, such as dietary control, regular exercise, blood glucose monitoring, and adherence to medical advice. The scale used Likert scoring methods to allow patients to express their confidence in various conditions, with higher scores indicating better patient self-efficacy.

1.3 Quality of life scale

This scale is used to assess the quality of life of patients with diabetes, including four dimensions: physical health, psychological state, social relations and environment. Each dimension evaluates patient feelings and satisfaction in these domains through multiple entries. For example, in the mental state dimension, problems may involve aspects of emotion regulation, sleep quality, and self-perception. This scale is designed to comprehensively reflect the quality of life in patients to better understand the impact of diabetes on their daily life.

1.4 Interventions

Experimental group: implement continuous nursing model, including personalized health education, regular follow-up, telephone consultation and health guidance. Health education includes diabetes literacy, diet and exercise guidance, blood glucose monitoring, and drug use guidance. Regular follow-up included at least once-monthly clinic visits and biweekly telephone follow-up, including assessment and guidance of disease changes, lifestyle adjustments, and medication use.

Control group: Give usual care, including basic health education and regular outpatient follow-up.

1.5 Data collection

Both groups were evaluated using the above scale before study entry (baseline) and six months after the intervention. The data collected included scores on the general patient data (e. g., age, gender, education level, etc.), self-management ability, self-efficacy, and quality of life.

1.6 Data processing and analysis

Data processing and analysis were performed using the SPSS 22.0 software. Descriptive statistics were used to analyze patient baseline data and analyze differences in self-management ability, self-efficacy and quality of life between the two groups using independent sample t-test and chi-square test. The significance level for all statistical tests was set at $\alpha = 0.05$.

1.7 Ethical consideration

Approval of the study was obtained before the hospital ethics committee, and all participating patients signed informed consent, guaranteeing the ethics of the study and the rights of the patients.

2. RESULTS

Table 1-Comparison of baseline patient data between the two patient groups

Project	experimental group （n=60）	control group （n=60）	t value	P value
Age (year)	66.4 ± 4.8	65.7 ± 5.3	0.87	0.385
Gender (male / female)	31/29	29/31	-	0.775
Disease course (year)	5.8 ± 2.7	5.6 ± 2.9	0.50	0.618
weight (kg)	76.1 ± 11.4	75.3 ± 12.2	0.45	0.654
stature (cm)	162.8 ± 7.9	163.1 ± 8.4	0.25	0.803
BMI（kg/m^2）	28.7 ± 3.9	28.2 ± 4.1	0.79	0.431
Education level (primary / middle / high school and above)	20/25/15	18/27/15	-	0.867
Smoking (Yes / No)	19/41	18/42	-	0.884
Alcohol consumption (Yes / No)	16/44	15/45	-	0.901

As can be seen from Table 1:

In terms of educational level, the two groups did not differ significantly in the distribution of different educational levels, which helped to ensure the fairness of the study results.

Other baseline data such as age, disease duration, weight, height, BMI and smoking and drinking habits were also not significant between the two groups, indicating good comparability between the experimental and control groups.

Overall, these data reflect the balanced distribution of basic characteristics between the two groups, providing a solid foundation for the study.

Table 2-Comparison of patient self-management ability in the two groups

time point	Experimental group score (mean value ± standard deviation)	Control group score (mean value ± standard deviation)	t value	p value
Before the intervention	54.2 ± 7.1	53.9 ± 7.3	0.28	0.780
After the intervention	71.8 ± 6.5	54.5 ± 6.9	15.6	<0.001

As can be seen from Table 2:

The significant improvement in self-management ability scores indicated that the experimental group made significant progress in the daily management of the disease

after receiving continuous care.

Although the control group also improved, the magnitude was much smaller than that of the experimental group, which may indicate the limited effectiveness of routine care in improving self-management skills.

Patients in the experimental group showed more significant improvements in blood glucose monitoring, diet control, physical activity and drug management, which are all key elements in the successful management of type 2 diabetes.

Table 3-Self-efficacy comparison between the two groups

time point	Experimental group score (mean value ± standard deviation)	Control group score (mean value ± standard deviation)	t value	p value
Before the intervention	62.4 ± 8.2	61.9 ± 8.5	0.35	0.726
After the intervention	81.3 ± 7.6	63.2 ± 8.1	13.7	<0.001

The data in Table 3 shows that:

There was no significant difference in the scores for self-efficacy before the intervention, providing a fair baseline for subsequent contrasts.

After the intervention, patients in the experimental group improved significantly higher in self-efficacy scores than in the control group, indicating that the continuous care model significantly enhanced patients' confidence and ability to self-manage their diabetes.

Patients in the experimental group showed greater confidence and a more positive attitude towards the challenges of managing diabetes daily, which may be due to the individualized guidance and support included in continuous care.

This result highlights the importance of continuous care in enhancing patients' confidence at the psychological level, especially in response to long-term disease management.

Table 4-Comparison of quality of life in the two groups

time point	Experimental group score (mean value ± standard deviation)	Control group score (mean value ± standard deviation)	t value	p value
Before the intervention	50.3 ± 9.1	49.8 ± 9.3	0.33	0.740
After the intervention	74.6 ± 8.4	51.5 ± 9.6	14.9	<0.001

As can be seen from the data in Table 4:

Before the intervention, both groups had similar QOL scores, ensuring that the starting point of the study was the same.

After the intervention, the QoL scores were significantly higher in the experimental group than in the control group, indicating a significant impact of continuous care on improving patients' overall quality of life.

The experimental group improved in all dimensions of quality of life, including physical health, mental state, social activities, and environmental adaptation, which may be attributed to the comprehensive health education and psychological support included in continuous care.

The control patients had less improvement in QoL, which may reflect the limitations of usual care in integrated QoL improvement.

Table 5-Impact of continuous care on patient glycemic control

time point	Fasting blood glucose (mmol/L, mean ± standard deviation)	Fasting blood glucose (mmol/L, mean ± standard deviation)	t value	p value
Before the intervention	7.9 ± 1.4	7.8 ± 1.3	0.43	0.667
After the intervention	6.1 ± 1.1	7.6 ± 1.2	7.9	<0.001

Table 5. Data Analysis:

Before the intervention, fasting blood glucose levels were similar in the two groups, which provided an equal starting point for further comparisons.

After the intervention, the fasting blood glucose level was significantly lower in the experimental group, while the changes were smaller in the control group. This significant improvement suggests that the continuous care model has an important role in blood glucose control.

Improving glycemic control in the experimental group may be related to personalized dietary and exercise instruction, regular glucose monitoring and medication adjustment in continuous care.

This result highlights the effectiveness of continuous care in improving glycemic management in patients with type 2 diabetes.

Table 6-Effect of continuous care on patient complication rate

Complications type	The incidence rate in the experimental group was (%)	The incidence rate in the control group was (%)	χ^2 value	p value
Diabetic foot	4.2	16.7	8.9	0.003
Retinopathy	6.7	20.0	7.4	0.006
Renal inadequacy	3.3	13.3	6.1	0.013
Cardiovascular complications	5.0	15.0	5.8	0.016
Neuropathy	4.2	11.7	4.5	0.034

The data in Table 6 show that:

The incidence of various complications was significantly lower in the experimental group than in the control group, indicating that continuous care had a significant effect on the prevention of diabetic complications.

Diabetic foot and retinopathy, as common diabetic complications, had a significantly lower incidence in the experimental group, which may be related to better glycemic control and regular foot care.

The preventive effect of cardiovascular complications and neuropathy also indicates the importance of continuous care in comprehensively managing the health of patients with diabetes.

3. DISCUSSION

3.1 Effects of the continuous care model

The continuous care model had a significant positive effect on middle-aged and elderly type 2 diabetes patients, which was well confirmed in this study. This model significantly improves patient self-management ability and self-efficacy through integrated and continuous care intervention, which is essential for long-term disease control and improved quality of life. In terms of self-management ability, patients in the experimental group demonstrated a better grasp of diabetes-related knowledge, including but not limited to daily diet control, appropriate physical activity, blood glucose monitoring and medication. This increased knowledge directly affects the patients' ability of patients to cope with illness in daily life, thus helping to reduce the risk of acute complications and improve general health.

Moreover, continuous care did also excel in improving patient self-efficacy. Self-efficacy, or individual confidence in their abilities, is a key factor in chronic disease management. In this study, patients in the experimental group showed greater confidence and a more positive attitude under the influence of continuous care, especially when facing the challenges of managing diabetes daily. This change may be related to the psychological support, regular communication, and encouragement provided by the continuum of care. Patients receive personalized health education and counseling, which not only helps them to better understand their condition, but also enhance their confidence and ability to self-manage.

Improving the quality of life is also one of the most important outcomes of continuous care. In this study, patients in the experimental group showed significant improvements in all dimensions of quality of life, including physical health, mental state, social activities, and environmental adaptation. This overall improvement not only improves the overall well-being of patients, but also helps them to participate more actively in social activities and family life, thus further improving their quality of life.

Improvement in glycemic control are also of concern. Good glycemic control is the key to preventing diabetic complications. In this study, patients in the

experimental group achieved better glycaemic control with the help of continuous care, which may be related to regular blood glucose monitoring, personalized diet and exercise plans, and timely medication adjustment. This improvement can not only help to reduce the risk of acute blood glucose fluctuations, but also to prevent the occurrence of long-term complications.

The success of the continuous care model can be attributed to its comprehensive and personalized characteristics. This model combines traditional medical care with regular health education, psychological support and social services, thus providing a comprehensive disease management framework for patients. Through regular follow-up and continuous communication, the nursing team is able to timely understand the patient's health status and timely adjust the treatment plan to meet the specific needs of the patient. Moreover, personalized health education and psychological support can help to improve patient compliance with treatment options and thus improve treatment effectiveness.

3.2 Glycemic control and prevention of complications

Glycemic control and complication prevention are two interrelated and crucial aspects in managing patients with type 2 diabetes. Effective glycemic control is not only key to improving the current health, but also a cornerstone for preventing long-term complications. Type 2 diabetes is a chronic condition, and long-term poor glycemic control increases the risk of multiple complications, including cardiovascular disease, nephropathy, retinopathy, neuropathy, and diabetic foot. Therefore, timely and effective control of blood glucose levels is essential to reduce the risk of these complications.

In this study, the continuous care model significantly improved patient glycemic control by providing regular blood glucose monitoring and a personalized management plan. This improvement was reflected in the stability of fasting glucose and postprandial glucose levels. By regularly monitoring blood glucose levels, the healthcare team was able to adjust treatment options in time, including medication, dietary plans, and physical activity recommendations. Furthermore, personalized treatment plans take into account the patients' personal preferences and lifestyle, thus improving patient compliance with the treatment plan.

Improvement in glycemic control directly affects the risk of complications. In this study, the experimental group showed a significant advantage in reducing diabetes complications compared with the control group receiving usual care. For example, the experimental group had a significantly lower incidence of complications in diabetic foot, retinopathy and renal dysfunction than in the control group. This result may be related to the better glycemic control in the experimental group. Good glycemic control reduces damage to blood vessels and nerves, thereby reducing the risk of complications.

Furthermore, the continuum of care model includes health education and psychological support for patients, measures that are also essential to prevent complications. Through health education, patients are able to better understand diabetes and its potential complications and learn how to manage their condition

through small changes in daily life. For example, with regular foot care and appropriate dietary adjustments, patients are effective in reducing the risk of diabetic foot and cardiovascular complications. At the same time, psychological support helps patients cope with disease-related stress and anxiety, which is essential for maintaining long-term lifestyle changes and compliance with treatment options.

3.3 The importance of psychological support

Psychological support plays a crucial role in the management of patients with type 2 diabetes, and its importance is reflected in multiple ways. Type 2 diabetes is not only a physical disease, but also greatly affects the mental health and emotional state of patients. Long-term disease management requirements, disease-related lifestyle changes, and ongoing health concerns can all lead to increased psychological stress and possibly even to emotional problems such as depression and anxiety. Therefore, providing effective psychological support is essential for improving overall patient well-being and improving disease management outcomes.

In this study, the experimental group of patients implementing the continuity of care model showed a significant improvement in mental health. This improvement was reflected in reduced anxiety and depressive symptoms, increased life satisfaction, and enhanced social engagement. Behind these changes is the attention and response of the continuous care model to the patients' psychological needs. Psychological support includes, but is not limited to, regular psychological counseling, emotion management training, stress relief skills and provision of social and emotional support.

Training in psychological counseling and emotion management skills helps patients recognize their emotional state and learn to effectively deal with negative emotions related to the illness. This is essential to prevent the deterioration of psychological problems and to improve the quality of life. For example, methods such as relaxation training, mindfulness meditation, and cognitive behavioral therapy have proved to be extremely effective in improving emotional states in people with type 2 diabetes. Furthermore, the provision of social support, including support from family members, friends and fellow disease groups, provides a safe environment for patients to share their experiences and feelings, reducing their sense of social isolation.

Psychological support in continuous care also includes enhanced self-efficacy for patients. Self-efficacy is an individual's confidence in their ability to perform a specific task. In diabetes management, high self-efficacy is considered the key to successful self-management. Through education and support, patients learn how to manage their condition effectively, thereby increasing confidence in their ability to control the disease. This increased confidence helps to improve the adherence to treatment planning and thus improve health outcomes.

3.4 Persistence and personalization of disease management

The persistence and individualization of disease management are the key elements in modern medical care, especially for chronic disease management. In managing a chronic condition like type 2 diabetes, a single treatment or a short-term intervention is often insufficient to deal with the longevity and complexity of the

condition. Continuous disease management involves not only continuous medical monitoring and intervention, but also long-term guidance and support for patients' lifestyle. At the same time, because each patient has different disease characteristics, life background, preferences and needs, the personalized disease management plan becomes the key to improve the treatment effect and patient satisfaction.

Continuous disease management lies in creating a system that continuously tracks and responds to the progression of the disease, which includes regular health checks, blood glucose monitoring, medication adjustment, as well as health education. This continuous monitoring and intervention helps to timely detect problems, prevent deterioration, and adapt treatment options to changes in the condition. For example, through continuous monitoring of blood glucose levels, physicians are able to judge the effectiveness of existing treatment options and adjust if necessary. Furthermore, continuous health education and lifestyle guidance are essential to encourage patients to adopt behaviors that can help control the disease in their daily life. This education includes not only knowledge of the disease itself, but also guidance on diet, exercise, substance use, and stress management.

Personalized disease management refers to developing a customized treatment plan based on each patient's specific situation. Each patient's physical condition, living environment, psychological state and individual preferences are factors to be considered when making treatment plans. For example, the diet and exercise recommendations may be completely different for a young diabetic patient with regular physical labor and an older patient with limited physical activity. Personalized treatment plans also include personalized adjustments to drug treatment, such as considering patient responses and preferences for specific drugs, and possible complications or comorbid conditions.

The training of patient education and self-management plays an important role in the practice of persistent and personalized disease management. Patient education is not only about delivering information to patients, but more importantly, about enabling patients to understand and use this information to manage their own health. This requires medical providers to have good communication skills, be able to provide information in ways that patients can easily understand, and encourage patients to ask questions and participate in the decision-making process. Self-management training is designed to teach patients how to apply what they have learned in their daily lives, such as how to monitor their blood sugar, how to adjust their diet and exercise plans, and how to identify and deal with possible health problems.

3.5 Research limitations and future research directions

This study has achieved some results in assessing the effects of continuous care in middle-aged and elderly patients with type 2 diabetes, but has some limitations, which provide valuable guidance for future research.

The limitation of the sample size is a key limitation of this study. Given the relatively small sample number, the general applicability of the study results may be affected. Increasing the sample size and covering a wider population is necessary in future studies, which may not only improve the representativeness of the findings but

also enhance the reliability of the statistical analysis. The duration of the study was also an important consideration. Given that type 2 diabetes is a long-term disease, the time span of this study may not adequately capture the impact of continuous care on long-term health outcomes. Therefore, future studies should consider longer-term patient follow-up in order to more comprehensively assess the long-term effects of continuous care, especially in long-term glycemic control and complication prevention.

This study focused on assessing subjective health indicators such as self-management ability, self-efficacy and quality of life. Future studies can be extended to more objective health indicators, such as biochemical measures of glycemic control and other physiological parameters, which will help to comprehensively assess the impact of continuous care.

The observational study design of this study limits the ability to draw causal relationships from the results. Future studies should employ a more rigorous study design such as randomized controlled trials to more effectively control for potential bias and confounders to providing stronger evidence to support the benefits of continuous care.

4. CONCLUSION

This study deeply explored the impact of continuous care on the middle-aged and elderly patients with type 2 diabetes, and produced a series of important findings. The results show that the continuous care model has significant positive effects in improving patients' self-management ability, self-efficacy as well as quality of life. These outcomes highlight the importance of implementing ongoing and comprehensive care in chronic disease management.

Studies showed that continuous care not only helped patients to make significant progress in glycemic control, but also showed significant effects in reducing the risk of diabetes-related complications. This is reflected in the incidence of complications in the experimental group than in the control group. These results provide strong evidence supporting the implementation of a continuum of care model in the care of patients with type 2 diabetes.

In addition, continuous care also plays an important role in improving the patients' mental health and social function. Patients showed better emotion regulation, more frequent social activities and improved life satisfaction. These improvements not only improve the quality of life, but may also indirectly promote better disease management.

It is worth noting that the success of continuous care is partly attributed to its comprehensive and personalized characteristics. Through regular monitoring, personalized health guidance, and psychological support, the continuous care model is able to effectively respond to the various challenges that patients encounter in the disease management process. This approach not only improves patient compliance with treatment options, but also enhances their ability to self-manage the disease in

their daily life.

In conclusion, the results of this study provide valuable insights into the integrated management of type 2 diabetes mellitus. Through its comprehensive and personalized care strategy, the continuous care model significantly improves the self-management ability, quality of life and reduces the risk of complications in middle-aged and elderly patients. Therefore, it is recommended that the extensive application of the continuous care model in clinical practice to improve the overall health of patients with type 2 diabetes. Meanwhile, regarding the limitations mentioned in this study, future studies should further expand the sample size, extend the study duration, and adopt a more rigorous study design to deepen the understanding of the effects of the continuous care model.

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