Research article

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A Three-Month Continuous Care Intervention for Prediabetes Management at Polyclinic Pham Ngoc Thach University of Medicine

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Abstract

Background: Prediabetes is a condition where blood glucose levels are higher than normal but not yet high enough to be diagnosed as diabetes. It is associated with an increased risk of progressing to type 2 diabetes and other metabolism disorders. This study aimed to evaluate the impact of a continuous care intervention on changes in fasting blood glucose, HbA1c levels, body weight, and patient satisfaction among prediabetic patients at Polyclinic Pham Ngoc Thach University of Medicine.

Methods: A total of 37 adults diagnosed with prediabetes were enrolled in this study. Participants received continuous care from a family medicine physician, which included tailored nutritional counseling and structured physical activity guidance. Data on fasting glucose, HbA1c, body weight, and patient satisfaction were collected at baseline and after the three-month intervention period.

Results: Of the 37 participants initially recruited, 28 completed the intervention. The study observed a decrease in average fasting blood glucose from 5.49 ± 0.65 mg/dL to 5.39 ± 0.65 mg/dL and in HbA1c from 5.91 ± 0.33 to 5.79 ± 0.43, though these changes were not statistically significant. There was a significant reduction in body weight (0.81 ± 0.6 kg; p = 0.022). Patient satisfaction was high, with an average score of 26.85 ± 4.25 out of 32.

Conclusions: Although the change in the fasting blood glucose and HbA1c were not significant, this study suggests that continuous care models can be effective in improving lifestyle adherence and managing weight, which are crucial for preventing the progression of prediabetes to diabetes. The study supports the need for further research into longer-term to enhance the effectiveness of prediabetes management programs.

Keywords: Prediabetes, Outpatients, Vietnam, Diabetes Prevention, Continuous Care

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1. INTRODUCTION

Prediabetes is an intermediary metabolic condition characterized by blood glucose levels that are higher than normal but not yet high enough to qualify as diabetes. It is a critical risk factor for the development of type 2 diabetes and cardiovascular diseases [1]. The global burden of prediabetes is increasing everywhere, including in Vietnam, leading to higher rates of diabetes and related complications. [2]. Therefore, managing this condition effectively is pivotal in reducing the healthcare burden and associated medical costs.

Chronic diseases, such as prediabetes, require ongoing management strategies that are best addressed through continuous care principles. Continuous care, a fundamental concept of family medicine, involves comprehensive, coordinated, and integrated care that is accessible and patient-centered. It emphasizes the longitudinal aspect of care, where the patient-physician relationship is maintained over time and is not limited to episodic visits. This model facilitates early detection of conditions, routine monitoring, and timely interventions, which are essential for effective management of chronic conditions [3].

Family medicine's approach to health care, focusing on continuous and preventive care, is particularly suited to the management of prediabetes. This approach encompasses more than just medical treatment; it integrates lifestyle modifications, patient education, and support systems into the care plan. By addressing the various aspects of health, including physical, emotional, and social factors, family medicine can play a crucial role in managing prediabetes effectively. Regular follow-ups and personalized care plans help in modifying risk factors early, thereby potentially reversing prediabetes and preventing the onset of diabetes [4].

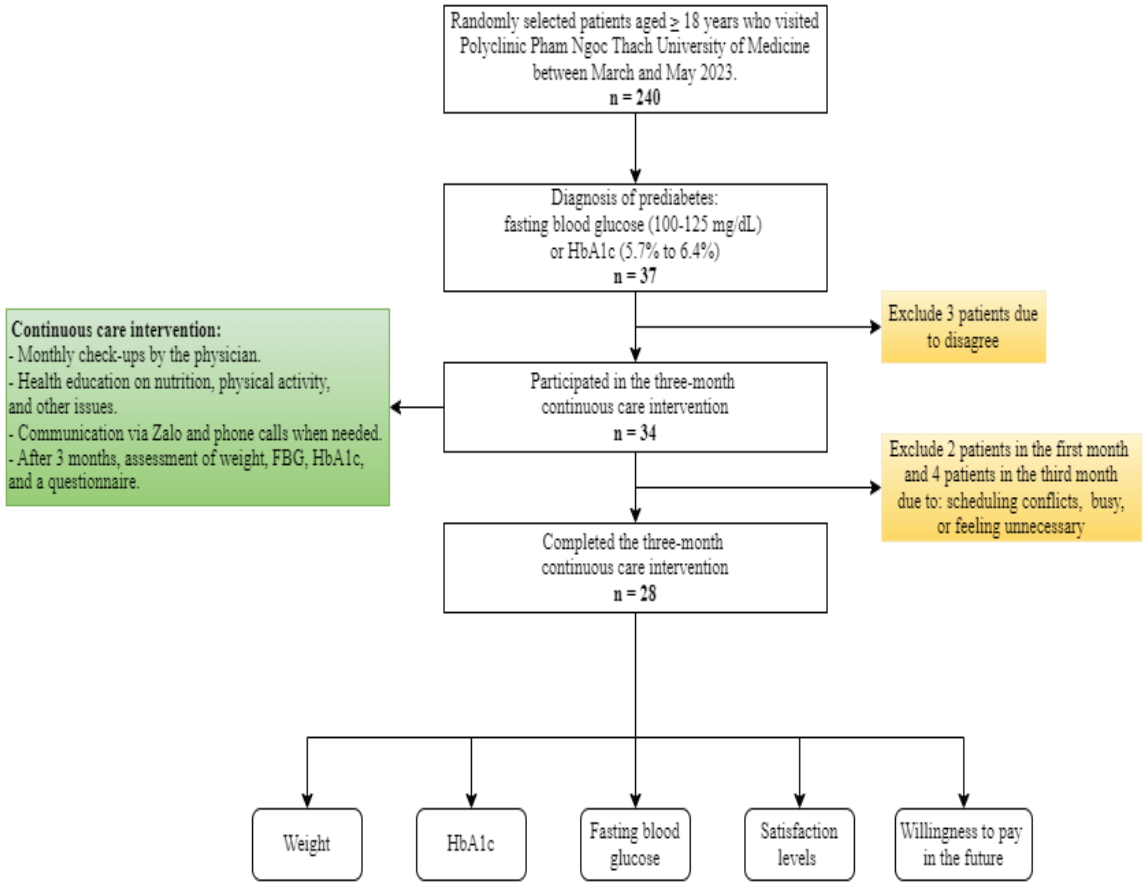
Given the rising prevalence of prediabetes and the effective framework provided by family medicine principles, this study aims to evaluate the impact of a continuous care model on prediabetic patients at Polyclinic Pham Ngoc Thach University of Medicine. The specific goals are to assess changes in fasting blood glucose, HbA1c, body weight, and to evaluate patient satisfaction with the continuous care intervention over a three-month period.

2. MATERIALS AND METHODS

This is an intervention study conducted on a group of subjects with pre- and post-intervention comparisons. In this intervention, all 37 participants with prediabetes, diagnosed from the 240 patients who visited Polyclinic Pham Ngoc Thach University of Medicine between March 2023 and May 2023, were enrolled for a three-month period. During this time, they received continuous care from a family medicine physician to modify lifestyle factors associated with the progression to type 2 diabetes.

Eligible participants were adults aged 18 years or older with a diagnosis of prediabetes based on fasting blood glucose (100-125 mg/dL) or HbA1c tests (5.7% to 6.4%). Exclusion criteria included individuals who declined to participate in the continuous care intervention for various reasons, those who could not understand Vietnamese, those with hearing impairments that affected their ability to comprehend study details, and those previously diagnosed with diabetes or currently being treated with insulin or other glucose-lowering medications. This setup aimed to ensure that participants could fully engage with and benefit from the intervention while maintaining clear communication throughout the study process.

Figure 1: Study flowchart



The intervention included a personalized approach to managing prediabetes, with individually tailored nutritional counseling and customized physical activity guidance for each patient. Participants received dietary advice focused on reducing their intake of calories and fats, while increasing their consumption of foods with a low glycemic index, whole grains, fruits, and vegetables to stabilize blood sugar levels. Additionally, they were encouraged to engage in moderate-intensity exercises such as brisk walking, with a goal of achieving at least 150 minutes of activity per week, corresponding to an approximate energy expenditure of 700 kcal. This dual approach aimed to improve metabolic health and prevent the progression of prediabetes to diabetes.

Data collection for the study was conducted through a series of structured procedures designed to monitor the effects of the interventions on prediabetes management. At the initial visit, baseline measurements for fasting glucose levels, HbA1c, and body weight were recorded to establish starting points for each participant. A family medicine physician would perform patient's follow-up, which were conducted either in person, at the participants' homes, or via video calls, allowing the research team to assess adherence to the intervention and make any necessary adjustments to the plan. Follow-up visits were scheduled monthly, supplemented by on-demand consultations with the physician via Zalo or phone calls when necessary. Concurrently, the patient and physician maintained communication

through Zalo to ensure treatment adherence and strengthen the doctor-patient relationship. When we find that patients are not adhering to the regimen, we will reassess and make modifications for them. At the end of the three-month intervention period, a single final evaluation was conducted, during which the same health metrics were remeasured to assess the intervention's outcomes. Additionally, physicians directly interviewed patients using the Client Satisfaction Questionnaire-8 (CSQ-8) and assessed their ability to afford the service in the future. Participants were surveyed once at the conclusion of the intervention to evaluate their satisfaction, offering valuable insights into the effectiveness and acceptability of the treatment strategies employed.

Survey responses and clinical data were first entered into an Excel database and subsequently analyzed using Stata version 14.2. The analysis included descriptive statistics and paired t-tests to compare pre-intervention and post-intervention outcomes, with a significance threshold set at $p < 0.05$.

The study protocol was approved by the Pham Ngoc Thach University of Medicine Institutional Review Board (Approval No. 800/TĐHYKPNT-HĐĐĐ) on December 28, 2022.

3. RESULTS

The intervention study initiated with 37 prediabetes participants eligible for the study, of which 34 agreed to participate in the intervention phase. Over the course of the study, 6 participants withdrew for various reasons, leaving 28 participants who completed the three-month intervention (Figure 1).

Table 1: Fasting blood glucose, HbA1c, and weight before and after intervention (n=28)

Indicator	Before Intervention (Mean ± SD)	After Intervention (Mean ± SD)	p-value
Fasting Blood Glucose (mmol/L)	5.49 ± 0.65	5.39 ± 0.65	0.472
HbA1c (%)	5.91 ± 0.33	5.79 ± 0.43	0.073
Weight (kg)	62.7 ± 14.02	61.89 ± 13.42	0.022

At the end of the intervention, the average fasting blood glucose level decreased from 5.49 ± 0.65 mg/dL to 5.39 ± 0.65 mg/dL. However, this change was not statistically significant, with a p-value of 0.472. Similarly, the average HbA1c levels saw a reduction from 5.91 ± 0.33 to 5.79 ± 0.43, but this difference also lacked statistical significance ($p = 0.073$). In terms of body weight, participants experienced a significant reduction, with an average weight loss of 0.81 ± 0.6 kg, which was statistically significant ($p = 0.022$). The average percentage change in weight before and after the intervention is approximately 1.29%.

Table 2: Satisfaction levels of participants with the continuous care intervention services (n=28)

Characteristic	Mean ± SD	Min - Max
Quality of prediabetes care consultation services	3.32 ± 0.61	2 – 4
Access to appropriate services	3.14 ± 0.59	2 – 4
Meeting personal needs	2.8 ± 0.59	2 – 4
Willingness to recommend consultation services to others	3.39 ± 0.56	2 – 4
Satisfaction with the frequency of consultation and support	3.71 ± 0.53	2 – 4
Satisfaction with consultation solving personal health issues	3.39 ± 0.49	3 – 4
Overall service satisfaction	3.78 ± 0.41	3 – 4
Returning to the doctor/consultant when needed	3.32 ± 0.47	3 – 4
Average satisfaction score with the intervention	26.85 ± 4.25	19 – 32
Willingness to pay for services in the future:	Frequency	Percentage (%)
Yes	22	78.6
No	6	21.4
Average payment willingness for services (VND/month)	118.181 ± 60.838	50.000 - 200.000

Satisfaction levels of participants with the continuous care intervention services were assessed using the Client Satisfaction Questionnaire-8 (CSQ-8). Satisfaction with the intervention was high among the clinic visitors, with an overall average score of 26.85 ± 4.25 out of a possible 32 points. Satisfaction scores were consistently high across various aspects of the intervention, with the highest average score being 3.78 ± 0.41 for general satisfaction with the services received. Regarding the frequency of the consultations, the average satisfaction score was 3.71 ± 0.53.

In addition, patients were asked about their willingness and the amount they would be willing to pay for similar services in the future. Of the respondents, 78.6% agreed to pay for continuous care services, with an average willingness-to-pay amounting to 118,181 ± 60,838 VND per month, ranging from 50,000 VND to a maximum of 200,000 VND.

4. DISCUSSION

In this study, we evaluated the effectiveness of a 3-month intervention program aimed at managing prediabetes through continuous care at Polyclinic Pham Ngoc Thach University of Medicine. Our initial total number of participants was 37 individuals, with 28 completing the intervention. Throughout the study, participants received continuous care, including clinical assessments, health education, and dietary and physical activity consultations once a month.

The study demonstrated a reduction in fasting blood glucose from an average of 5.49 to 5.39 and a drop in HbA1c levels from 5.91 to 5.79. While these results suggest an improvement in glycemic control, they were not statistically significant, with p-values of 0.472 and 0.073, respectively. A study in South India shows that after five years, participants with prediabetes who received intensive counseling on physical activity and diet had a significant reduction in glucose and HbA1c levels compared to those who received standard care. Additionally, the standard care group

experienced a significant increase in weight, BMI, and waist circumference [5]. Another study conducted in Da Qing, China, showed a 45% reduction in diabetes risk among the intervention group (HR: 0.55, 95% CI: 0.40-0.76; p = 0.001). The differences may be due to the shorter duration compared to the long-term lifestyle changes promoted in the Da Qing study, which demonstrated significant benefits in preventing diabetes complications [6]. Notably, the intervention in this study did result in a statistically significant weight reduction, with an average loss of 0.81 kg. This weight loss was lower than expected, possibly due to study limitations, such as the inability to provide standardized meals for patients, the lack of tools to measure activity levels and dietary intake, and the absence of pharmacological intervention. Especially during the three-month continuous care period, no participants progressed to diabetes. The study highlights the importance of early interventions for prediabetes, focusing on nutrition, physical activity, and continuous monitoring, which can slow the progression to diabetes and lead to improvements in weight management.

Despite the high retention rate and overall satisfaction (average satisfaction score of 26.85 out of 32), the attrition rate of 17.6% highlights challenges in maintaining engagement in non-intensive intervention settings. Reasons for dropout such as work commitments and a lack of perceived necessity for the intervention, suggesting that enhancing the perceived value and convenience of such programs could improve adherence rates.

Although it is a new healthcare model, the majority of patients are willing to pay for this service. Since no similar model has yet been approved by the Vietnamese Ministry of Health, more time and testing are needed to evaluate its effectiveness. However, this presents a great opportunity for patients to access personalized medical services and for physicians to gain additional experience.

While the study's impact on glucose levels was not statistically significant, the reduction in weight and high satisfaction levels indicate that such interventions can still offer substantial health benefits. Furthermore, these findings provide a foundation for scaling up similar interventions, enhancing public health strategies for managing chronic conditions more effectively, and improving the general awareness and understanding of prediabetes as a critical health issue.

The strength of this study is that it offers a continuous care model and provides guidance on healthy diet and exercise habits for patients. Despite being a new model, patient satisfaction and willingness to pay for the service in the future were relatively high. However, a limitation of the study is the short duration of the intervention and the small sample size. Due to budget constraints, limited resources, and the short timeframe of the master's program, the intervention was restricted to three months, resulting in only modest improvements in patients' conditions. The three-month intervention period was chosen to align with the standard intervals for monitoring and evaluating blood glucose control via HbA1c, ensuring consistency with clinical guidelines. Moreover, because of the small sample size, we were unable to include an additional control group, which made it challenging to objectively evaluate the effectiveness of the intervention. Additionally, these interventions relied on patients' voluntary adherence, monitored remotely by physicians. Although we made

efforts to maintain contact through Zalo, phone calls, and in-person visits to provide consultations and adjust individualized treatment plans, we could not ensure uniform adherence among all patients. Finally, since this model is patient-centered, each patients had different needs and challenges. As a result, we were unable to precisely calculate the average time spent per patient to assess the model's feasibility. However, these experiences provide important insights for refining and enhancing the model's implementation moving forward.

Future studies should consider expanding the duration and intensity of interventions and possibly including more comprehensive educational components to enhance participant engagement and outcomes.

5. CONCLUSION

This three-month intervention for prediabetes by continuous care at Polyclinic Pham Ngoc Thach University of Medicine showed significant weight reduction and high patient satisfaction, although it did not significantly alter glucose and HbA1c levels. The results highlight the benefits of continuous care in improving lifestyle adherence and managing weight, key in preventing diabetes progression. These findings advocate for longer-term and possibly more intensive interventions in future studies.

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