

Effect of Case Management for Patients with Gestational Diabetes

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Abstract: *Objective:* To explore the effect of allocating case managers for gestational diabetes patients. *Methods:* 200 patients with gestational diabetes mellitus from December 2021 to December 2022 were included in this study, and the collection period. They were divided into groups according to the interventions received. Each patient in the observation group was managed by a case manager, while the control group were managed with conventional methods without the supervision of a case manager. There were 100 cases in each group, and the curative effects of the two groups were compared. *Results:* The fasting blood glucose and 2-hour postprandial blood glucose in the observation group were significantly lower than those of the control group ($P < 0.05$). The re-admission rate of patients due to poor blood sugar control in the observation group was lower than that in the control group ($P < 0.05$). The pregnancy outcome of the observation group was better than that of the control group ($P < 0.05$). *Conclusion:* Case management of gestational diabetes can not only control the blood glucose of pregnant women, but also improve pregnancy outcomes.

Keywords: Gestational diabetes mellitus; Case management; Blood glucose; Pregnancy outcome

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1. Introduction

The incidence of gestational diabetes mellitus (GDM) continues to increase, mainly referring to abnormal glucose metabolism (different degrees) that occurs only in pregnant women. Therefore, early management is very important to protect the health of mothers and babies. The American Diabetes Association (ADA) has updated the diagnosis of gestational diabetes and proposed that patients with gestational diabetes should be managed more strictly. In addition, the 2022 ADA guidelines recommended that the management of GDM should include pre-pregnancy management, optimal pregnancy blood glucose, GDM management, pre-pregnancy counseling, postpartum management, preeclampsia and aspirin, drug considerations, pregnancy management for Type 1 diabetes mellitus and Type 2 diabetes mellitus patients, etc. Compared with the previous content, except for GDM management, no other updates have been made [1]. However, in practice, there are several challenges in the management of gestational diabetes, such as how to determine the optimal blood sugar during pregnancy and how to prevent hypoglycemia, so case management is proposed. The purpose of this article is to explore the effect of gestational diabetes allocating case managers for GDM patients, as detailed below.

2. Materials/methods

2.1. General information

Patients with GDM are the main cases of this study (the admission period is from December 2021 to

December 2022), and they were divided into 2 groups, with 100 cases in each group. Inclusion criteria: (1) Diagnosed with GDM according to relevant clinical guidelines, (2) registered for an obstetric check-up card in this hospital, (3) planned to give birth in this hospital, (4) signed an informed consent for this study. Exclusion criteria: (1) pre-gestational diabetes; (2) multiple pregnancy; (3) severe complications during pregnancy.

The mean age of the observation group was 30.52 ± 2.77 (25–35) years old; there were 80 primiparas and 20 multiparas. The average age of the control group was 30.85 ± 2.45 (26–35) years old; there were 81 primiparas and 19 multiparas. There was no statistically significant difference in baseline data between the two groups ($P > 0.05$).

2.2. Methods

The control group adopted routine management: (1) The “five carriages” management model was used to control blood sugar within a reasonable range. Insulin was used to keep the blood sugar under control [2]. Patients were advised eat more meals in smaller portions, in which three snack times were added to the three meals in a day, and the carbohydrate intake for breakfast was controlled at 33% of the total carbohydrate intake for the day. The carbohydrate intake for lunch was controlled at 45% of the total carbohydrate intake for the day, and the carbohydrate intake of dinner was controlled at 22% of the total carbohydrate intake for the day. Patients were advised to choose foods with a low glycemic index to ensure that they have enough energy for the day. Common foods with a glycemic index below 55 include barley, corn, brown rice, whole wheat bread, oats, soybeans, red beans, mung beans, milk, sugar-free yogurt, lettuce, spinach, radishes, tomatoes, etc. Common foods with a glycemic index between 56–69 include millet, buckwheat noodles, red rice, sweet potatoes, potatoes, pumpkins, grapes, bananas, etc [3-5]. (2) Protein intake: The patients were advised to increase the amount of aquatic food and fish in their daily diet, and the proportion of the above foods in the daily intake of high-quality protein should be at least $>50\%$, and reduce the intake of red meat as much as possible. (3) Intake of vitamins and minerals: Patients were advised to increase the amount of foods rich in vitamins and minerals in their diet. Fresh fruits and vegetables, dairy products, poultry, and lean meat could be taken in moderation [6].

Case managers were allocated to the patients in the observation group. (1) Case screening: Case managers cooperates with outpatient doctors, and patients were referred from outpatient clinics to GDM case managers. (2) Overall specialist assessment: (i) The degree of pregnant women’s understanding of GDM; (ii) the eating habits of the patients were understood through a 24-hour dietary review survey, and the patients were tested for three major nutrients; (iii) suitable types and intensity of exercises were determined for each patient depending on their physical condition; (iv) pre-pregnancy weight status and weekly weight gain during pregnancy; (v) the sleep quality, work, and rest time of the patients were evaluated; (vi) the perceptions and responses of the patients towards gestational diabetes were understood, and assess their self-confidence in self-management of blood sugar. (3) One-day outpatient for gestational diabetes: the whole procedure was carried out by a case manager who guided the patients to register at the counter at 7:20 a.m., and the patient’s fasting blood sugar and blood pressure were measured, and the doctors listened to the fetus; at 7:30 a.m., the patients were instructed to bring their own breakfast and finish eating in about 20 minutes; at 8 a.m., they were required to carry out aerobic exercise or take a walk for about 30 minutes; the patients were educated with relevant knowledge and blood sugar monitoring methods; the case manager measured the patient’s blood sugar 2 hours after breakfast at 9:30 a.m.; additional meals were provided at 10 o’clock, and the patients’ blood sugar were monitored 30 minutes before lunch at 12 o’clock [6]; at 12:30 p.m., lunch was provided according to the patients’ needs after consultation with the nutrition department, and the meals were delivered to the patients by the cafeteria; the lunch time was 20 minutes; at 2:30, 2 hours after lunch, lectures were given by an obstetrician and an extra meal was provided

[7]; at 4 o'clock, the blood glucose of the patients were analyzed by the obstetrician to determine whether the patient needed to be hospitalized; at 4:30, question-and-answer session was held at 4:30 p.m.; then, the blood sugar 30 minutes before dinner and 2 hours after dinner was monitored at home, and the results were sent to the case manager through WeChat. (4) Tracking and management: After the pregnant women were discharged, they had to monitor their blood sugar every week, and they were guided on blood sugar management, and hierarchical management was carried out for A1 and A2 pregnant women; the blood sugar of A1 pregnant women was monitored closely, and the questions that arise during the management process were addressed [8]; for A2 pregnant women, it was necessary to pay attention to insulin injection and observe the condition of the patient after insulin use and whether hypoglycemia occurred. (5) Contact and coordinate to obtain services: when the blood sugar of a patient was poor, the reasons for it was analyzed; if the blood sugar could not be regulated, the patient would need to return to the hospital for treatment, and the doctor in charge was consulted to explore the next step of diagnosis and treatment plan for the patient; the blood sugar of the patient was also analyzed by doctors of multiple disciplines; It is also necessary to strengthen the diagnosis and treatment of pregnant women [9]; the case had to be closed within a week, and the results of glucose tolerance tests were analyzed; if there are any abnormalities, they were referred to the endocrinology department for further diagnosis and treatment [10]. (vii) Evaluation of the effectiveness of case management: the pregnancy outcomes of pregnant women were recorded, and insulin use, weight gain during pregnancy, and incidences of poor blood sugar control were analyzed. Pregnant women who are not diagnosed with diabetes in the first prenatal examination should be screened for GDM at 24 to 28 weeks of pregnancy, whereas pregnant women with diabetes should undergo an oral glucose tolerance test to screen for diabetes at 6 to 12 weeks postpartum [11].

2.3. Observation indicators

The indicators of the two groups were compared: (1) fasting blood glucose, 2-hour postprandial blood glucose; (2) re-hospitalization rate of poor blood glucose control; (3) pregnancy outcomes.

2.4. Statistical processing

SPSS 25.0 was used for statistics and analysis of the data of this study. When the result of P -value < 0.05 , it means that this study has statistical significance.

3. Results

3.1. Blood sugar levels

The fasting blood glucose and 2-hour postprandial blood glucose of the observation group were significantly lower than those of the control group ($P < 0.05$), as shown in **Table 1**.

Table 1. Comparison of blood glucose levels (mmol/L)

Group	Number of cases (n)	Fasting blood sugar	2-hour postprandial blood sugar
Observation group	100	4.97 ± 0.43	5.96 ± 0.56
Control group	100	5.32 ± 0.32	6.59 ± 1.72
t -value	-	12.237	3.195
P -value	-	0.000	0.000

3.2. Re-admission rates due to poor blood sugar control

The re-admission rate of patients with poor blood sugar control in the observation group was lower than that of the control group ($P < 0.05$), as shown in **Table 2**.

Table 2. Comparison of the re-admission rate due to poor blood glucose control between the two groups (n, %)

Group	Number of cases (n)	Readmission rate for poor glycemic control
Observation group	100	1 (1.00)
Control group	100	15 (15.00)
χ^2	-	13.315
P	-	0.000

3.3. Pregnancy outcomes

The pregnancy outcomes of the observation group were better than that of the control group ($P < 0.05$), as shown in **Table 3**.

Table 3. Comparison of pregnancy outcomes between the two groups (n, %)

Group	Number of cases (n)	Postpartum hemorrhage	Fetal macrosomia	Neonatal hypoglycemia	Neonatal asphyxia
Observation group	100	1 (0.00)	1 (0.00)	0 (0.00)	1 (0.00)
Control group	100	10 (10.00)	9 (9.00)	1 (1.00)	2 (2.00)
χ^2	-		16.503		
P	-		0.000		

4. Discussion

The results of the study show that compared with the traditional nursing model, case management of GDM patients has many benefits, and it can significantly reduce the insulin usage of pregnant women. The results of this study are consistent with two other studies [12]. The cases are managed based on the patient's needs and disease characteristics through reasonable allocation of tasks, coordination, and effective communication [13]. Nowadays, China is gradually developing this management model and applying it in the management of diabetes [14]. Multidisciplinary cooperation was applied in this study, and out-of-hospital tracking management was performed, and personalized and full-range services were provided for pregnant women. At the same time, individualized blood sugar management plans were carried out based on the condition of the pregnant women, and family members were encouraged to participate in blood sugar management. Guidance and supervision [15]. Studies have shown that the blood sugar of pregnant women can be controlled through the multidisciplinary cooperation mediated by case managers, thereby significantly improving the effect of diagnosis and treatment [16].

The results of this study showed that compared to the traditional management mode, the implementation of case management can significantly reduce the rate of poor blood sugar control in pregnant women, thereby reducing the economic burden and psychological pressure of pregnant women [17]. According to the study, the key to GDM management is to improve their unhealthy lifestyle, especially in the first trimester or second trimester. If the blood sugar of the patient is still not within the acceptable range even after intervention, drug therapy can be given. At present, insulin is the main hypoglycemic drug in clinical practice; glibenclamide and metformin can both pass through the placental barrier, so it is not recommended as the first line medicine. For non-insulin injection hypoglycemic drugs and other oral drugs, due to the lack of long-term safety data, it is not recommended as a treatment for GDM. In the 2022 ADA guidelines, recommendations on telemedicine visits have been added. Compared to standard offline medical

care, telemedicine visits can improve pregnancy outcomes ^[18]. The incidence of complications in the observation group was significantly lower than that in the control group, which shows that complications can be effectively prevented through case management during pregnancy. This is because through case management, the patients are educated on their conditions and targeted diet plans are formulated for them to keep their weights within the normal range. In addition, it is possible to detect changes in blood sugar in time strengthening the monitoring of blood sugar of patients. Mothers should be given a diet plan and exercise program to control their blood sugar, so as to effectively improve the pregnancy outcomes. The results of this study showed even with the implementation of individual case management, the patients in the observation group still experienced postpartum hemorrhage, macrosomia, and neonatal asphyxia. The analysis of the reasons may be related to the lack of individual guidance. The other places failed to communicate with our hospital in time, and the mothers with macrosomia and neonatal asphyxia were all obese mothers, which also reflected that the case management still needs to be further strengthened ^[19]. On the other hand, it may be closely related to the number of samples in this study. In the future, the sample size can be increased, and the long-term nursing effect of case management can be studied through multi-center studies ^[20]. Through case management, pregnant women can grasp the factors that need to be managed in GDM. At the same time, their understanding of relevant knowledge will also be strengthened, which will significantly reduce the rate of re-admission due to poor blood sugar control and improve blood sugar control during pregnancy ^[21]. With the implementation of the two-child policy, the number of pregnant women with GDM is increasing, and the demand for high-quality GDM management is also increasing. Therefore, case management can provide patients with continuous and full medical care ^[22].

5. Conclusion

In conclusion, the allocation of case managers for GDM can not only control the blood sugar of pregnant women, but also prevent adverse conditions, which makes it worthy of promotion and exploration.

Disclosure statement

The authors declare no conflict of interest.

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