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Nursing Risks of Different Insulin Injection Methods for Treating Diabetes Mellitus

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Abstract

We aimed to evaluate effects of different insulin injection methods on treating diabetes mellitus and nursing risks, and to investigate the corresponding nursing measures. A total of 80 patients with type 2 diabetes mellitus hospitalized in the Endocrinological Inpatient Department of our hospital from January 2018 to December 2019 were enrolled as the research subjects, and they were evenly divided into two groups using a random number table. Multiple subcutaneous insulin injection therapy was carried out in control group, while continuous intravenous insulin pump-infusion therapy was conducted in observation group. During treatment, specialized nursing intervention was performed in both groups, and the overall response rate, blood glucose indexes, time to reach target glucose level, insulin dose, dynamic blood glucose indexes, unhealthy emotion scores and quality-of-life score were compared between the two groups. The overall response rate in observation group was higher than that in control group (95.00% *vs.* 80.00%, P<0.05). Compared with those before intervention, the levels of fasting blood glucose and 2 h postprandial blood glucose declined in the two groups after intervention (P<0.05), whereas observation group had lower levels of fasting blood glucose and 2 h postprandial blood glucose than control group after intervention (P<0.05). In comparison with those in control group, the time to reach target blood glucose level was shortened (P<0.05), the insulin dose was decreased (P<0.05), and the proportion of time in hypoglycemia, blood glucose fluctuation coefficient, and incidence rate of hypoglycemia declined (P<0.05) in observation group. After intervention, the self-rating anxiety scale (SAS) and depression self-rating scale (SDS) scores in the two groups were lower than those before intervention, and the SAS and SDS scores in observation group were lower than those in control group after intervention (P<0.05). Moreover, the quality-of-life score in the two groups after intervention was higher than that before intervention, and observation group had a higher quality-of-life score than control group (P<0.05). Continuous intravenous insulin pump-infusion therapy is more efficacious in treating type 2 diabetes mellitus than multiple subcutaneous insulin injection therapy. In combination with specialized nursing measures, it can effectively control blood glucose, reduce blood glucose fluctuations and hypoglycemia risk and relieve the unhealthy emotion of patients, thereby helping improve their quality of life.

Keywords: type 2 diabetes mellitus, insulin, injection, nursing

Introduction

Type 2 diabetes mellitus is not only a clinically common disease characterized by hyperglycemia, but also a chronic metabolic disease frequently occurring in the mid-aged and elderly [1-3]. Currently, efficacious methods have not yet been found for the treatment of diabetes mellitus in clinical practice, and the major treatment approaches include hypoglycemic drug therapy. Insulin, a common hypoglycemic drug for the clinical treatment of diabetes mellitus, can lower the blood glucose level of patients [4]. Insulin is administered to patients with type 2 diabetes mellitus mainly by subcutaneous injection or continuous pump-infusion, but its administration modes remain controversial clinically. In the present study, 80 patients with type 2 diabetes mellitus hospitalized in the Endocrinological Inpatient Department of our hospital from January 2018 to December 2019 were

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enrolled for randomized controlled research and underwent multiple subcutaneous insulin injection therapy or continuous intravenous insulin pump-infusion therapy combined with specialized nursing measures, so as to explore the efficacy of different insulin injection methods in patients with type 2 diabetes mellitus and the nursing essentials.

MATERIALS AND METHODS

Baseline clinical data

A total of 80 patients were enrolled as a study subject, and allocated to the control group (n=40) and observation group (n=40), using a random number chart, for Type 2 Diabetes mellitus hospitalized in the Endocrinological Department of our hospital, for the duration January 2018 through December 2019. The test category comprised 21 males and nineteen females, 50 to 75 years old and measuring (63,09 ± 10,51) and ranged over 6 months-10 years of age for an overall (4,79 ±2,31) years of age. Observation category comprised 22 individuals, 18 females between the ages of 51 and 76, with a total of (63.71±10.42) years, and with a total of (5.02±2.67) years, with a disease period of 7 months to 11 years... The discrepancies between the two classes is statistically important in terms of age, sex and illness lifetime (P>0.05), which are equivalent. This research has been carried out with permission of the Medical Ethics Committee and informed consent has been granted to the patients and their family members.

Requirements of inclusion: 1) patients certainly confirmed with type 2 diabetes, relying on the diagnosis criteria in the China Type 2 Recommendations (2013 edition); 2) over 50 years; 3) patients with an unambiguous state of mind; Type 2 diabetes mellitus diagnostic criteria.

Criteria of exclusion: 1) individuals with prior documented allergie histories; 2) people with cognition problems or psychiatric illnesses; 3) those with cancer, coronary artery disease, stroke or other chronic illness; 4) others of mid-term follow-up or drop-out. This research includes: Criteria of exclusion;

Treatment methods

The test group administered several therapies for subcutaneous insulin injection in the following manner. Novolin N was administered subcutaneously 3 times a day at 30 minutes prior to dinner. The original dosage was 3 ml / time, and a dosage was then changed once every three days depending on rapid blood glucose. Therapy lasted four weeks.

Continuous intravenous pump-infusion therapy has been performed in the study community. The first move was to fill Novolin N in an insulin pump and a punching needle was placed into the patient's lateral hip and subcutaneously integrated. The original regular dosage was 0.5 U / kg, followed by the one changed once every three days according to the patient's fasting blood glucose level. The rehabilitation also required four weeks.

Nursing methods

The advanced clinical care in both categories was taken during recovery with the following nursing strategies focused on patient unique symptoms and insulin therapy characteristics. 1) Clinical education following diagnosis is associated with the implementation of hospital laws and rules, medical treatment, preventive services and other details for patients accepted by the primary nurse so that patients have a clear knowledge of the hospital setting. In addition, instructional guides on type 2 information relevant to diabetes mellitus have been given to patients and patients were first advised to call the nurse when they were requested. Further, information on type 2 diabetes mellitus, such as triggers, treatment protocols and aims of the care at any level, stressed the value of insulin therapy and described the safeguards of the attending physician during insulin therapy ... 2) Clinical treatment included engaging respectfully with patients due to their cultural background and their age and listening closely to their patient's concerns. At presentation, the participants were examined and summarizing the psychiatric state and sources of negative emotions. Then, patients were targetedly illuminated and comforted so that their mind could be changed. In comparison, patients' unreasonable convictions have been established and patients questioned if the unfounded convictions had any empirical foundation. The unfounded convictions is withdrawn and logical convictions restored. Moreover, diabetic patients with strong blood glucose regulation have been urged to exchange experiences in blood glucose testing and to interact with one another, in order to enhance patients' trust in insulin therapy. 3) Diet nursing requires measurement of the normal amounts of calories and nutrients, the value of nutritional restrictions and the description of dietary requirements in conjunction with the illness, care and treatment of patients. Furthermore, there have been exclusively restricted consumption of sodium chloride, sugar and fat, no alcohol, and no sticky, spicy and thrilling food. Normal feeding was preserved meanwhile, since both unhealthy and diet intake had become

detrimental to blood glucose regulation. 4) Patients were advised to regularly workout after hospitalization for fitness nursing. The exercise volume and length of the patient depend on their particular conditions and in the event of dizziness, fatigue and tightness of patient's exercise must be stopped instantly. Upon release, patients had recommendations for routines depending on their own interest, and square dancing, tai chi, biking and fast marching exercises may be picked. Patients were recommended to perform mildly, based on their ability, and to not perform empty stomach. 5) Environmental nursing dealing with the ward's light sensitivity to a soft setting for the reasons of preventing intense sunshine. In addition, at 22-25% and at 50-60%, temperature and humidity are monitored in the hospital. The sound in the ward was also monitored, that implies that the nursing procedures were performed softly and the speech sound was held down in particular during the night, in order to avoid disturbing the rest of the patients.

Observation indices

The overall response rate, blood glucose indexes, time to reach target glucose level, insulin dose, dynamic blood glucose indexes, and unhealthy emotion and quality-of-life scores were compared between the two groups.

Evaluation criteria for therapeutic effects[5]: 1) Markedly effective: fasting blood glucose and 2 h postprandial blood glucose were reduced to the normal level, or the fasting blood glucose declined by 40%; 2) effective: fasting blood glucose was reduced by 20%, but not to the normal level; 3) noneffective: fasting blood glucose was lowered by less than 20%. Overall response rate = (number of markedly effective cases + number of effective cases) / total number of cases × 100%.

The blood glucose indexes included fasting blood glucose and 2 h postprandial blood glucose. Fasting blood glucose <7.0 mmol/L indicated reaching target glucose level.

A continuous glucose monitoring system was employed to continuously supervise such dynamic blood glucose indexes of patients as the proportion of time in hypoglycemia, blood glucose fluctuation coefficient and incidence rate of hypoglycemia throughout the day.

The unhealthy emotion was assessed [6] using the self-rating anxiety scale (SAS) and self-rating depression scale (SDS). The score of the two scales is 0-100 points. The scores are positively proportional to the degree of anxiety and depression.

The World Health Organization Quality of Life Scale-Brief (WHOQOL-BREF) was adopted to evaluate the quality of life [7]. The scale consists of 4 dimensions, namely physiology, psychology, environment and social relations. The score of each dimension ranges from 0 to 100 points and positively proportional to the quality of life.

Statistical analysis

Both results have been evaluated systematically by program SPSS 26.0. The visual knowledge (n) was t-tested and the quantitative evidence) (is t-test. Statistically relevant P<0.05 was found.

RESULTS

Overall response rate

The overall response rate in observation group was higher than that in control group (95.00% vs. 80.00%, P<0.05) (Table 1).

Blood glucose indices

The blood glucose and postprandial blood glucose levels reduced by 2 h in both groups following intervention in contrast with those before treatments (P<0.05), while retrospective groups had lower blood glucose fasting and 2 h postprandial glucose levels than post experiment control groups (P<0.05) (Table2).

Time to reach target glucose level and insulin dose

Compared with those in control group, the time to reach target blood glucose level was shortened (P<0.05) and the insulin dose was decreased (P<0.05) in observation group (Table 3).

Dynamic blood glucose indices

Compared with those in control group, the proportion of time in hypoglycemia, blood glucose fluctuation coefficient and incidence rate of hypoglycemia declined (P<0.05) in observation group (Table 4).

Unhealthy emotion scores

After intervention, the SAS and SDS scores in the two groups were lower than those before intervention, and the scores in observation group were lower than those in control group after intervention (P<0.05) (Table 5).

Quality-of-life score

The quality-of-life score in the two groups after intervention was higher than that before intervention, and observation group had a higher quality-of-life score than control group (P<0.05) (Table 6).

DISCUSSION

Tier 2 mellitus diabetes, a serious condition in the hospital, is a long-term recurrent disorder ... Its key therapeutic improvement is the aberrant blood glucose rise. At the outset, patients often experience symptoms such as dehydration, polyuria and exhaustion, which are highly detrimental to patients' physical and mental health [8,9]. In middle-aged and elderly patients type 2 Diabetes mellitus is more popular. The prevalence rates of Type 2 Diabetes mellitus are on the upward trajectory have becoming a public health issue that impacts the wellbeing of large numbers in recent years.

Clinically, the pathogenesis of type 2 diabetes mellitus remains unclear, and there is still a lack of means to cure it. Its treatment goal is mainly to control blood glucose, and insulin is a commonly used hypoglycemic drug for it. Injecting insulin into patients can supplement patients with insulin, regulate the glucose metabolism and control the blood glucose level [10,11]. In the past, insulin has been used to treat patients with type 2 diabetes mellitus mainly through multiple subcutaneous injections. Subcutaneous injection can supplement patients with adequate insulin, but since insulin is mostly administered through subcutaneous injection, the single injection dose of insulin is often high for patients, and it can easily lead to large blood glucose fluctuations, bringing the risk of hypoglycemia [12]. In recent years, when treating type 2 diabetes mellitus with insulin, insulin pump has been gradually adopted for continuous infusion, and it can continuously supplement insulin for patients, while preventing excessive fluctuations of blood glucose caused by excessive single dose of insulin, thereby avoiding affecting the effect of blood glucose control. In the process of continuous insulin infusion, the patients' bodies can gradually adapt to the supplementation of exogenous insulin and absorb insulin steadily and slowly, and islet cells are constantly stimulated for their self-repair and improvement [13].

Patients with type 2 diabetes mellitus through insulin treatment are vulnerable to harmful emoses because of their loss of knowledge of disease and insulin therapy, plus their condition status that affects their quality of life [14,15]. In insulin therapy in type 2 diabetes mellitus it is also important to carry out nursing procedures. In this research all patients obtained expert clinical services, including intake treatment, psychiatric nursing, nursing, nursing, and so on ... In particular, admission health education will decrease patients' unfamiliarity and improve their confidence in the hospital setting. Psychological rehabilitation may allow patients to change their psychiatric condition, overcome their psychological issues and boost their motivation in collaboration with healthcare professionals. Dietary treatment will help patients change improper eating patterns and decrease their nutritional risk. Workout wellness will encourage you to pursue workout, which can improve your body and help you regulate your body weight. Ambient treatment will enhance the environmental quality of patients, make them more relaxed and help them calm their mind and body.

The average rate of response in this analysis was higher in the observation group (95.00 percent) than in the control group (80.00 percent). During the treatment, both fast serum glucose and blood glucose were lower in the study community than in the control group over two hours. In addition, it was shortened time to achieve blood glucose levels and decreased in observation groups the dose of insulin suggesting that a permanent infusion of insulin can increase the impact of blood glucose regulation in type 2 patients and reduce the amount of insulin they take. The hypoglycemia, blood glucose fluctuation levels, and hypoglycemia occurrence were fewer duration in the study community than in the control group and this indicates that constant infusion of insulin injections was better for patients with type 2 diabetes than many subcutaneous injections. After the operation, the SAS and SDS ratings in the observation Group were weaker than that in the control group, although the standard of life in the observation group was better than those in the control group, primarily because during insulin therapy advanced nursing interventions were introduced. Comprehensive treatment operations may allow patients to minimize the burden of caring, and constant insulin infusion may boost the impact of blood glucose regulation, and can mitigate the psychologic and quality of life effects of patients.

In brief, constant intravenous insulin infusion-pump treatment is more successful in the course of managing type 2 diabetes mellitus than intermittent subcutaneous insulin injection therapy. In short. Combined to advanced clinical techniques, blood pressure can be easily regulated, blood pressure levels and hypoglycemia can be minimized, and patients' unstable feelings may be assisted through enhanced existence.

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Table1. **Overall response rate [case (%)]**

Group	Case No.	Markedly effective	Effective	Ineffective	Overall response rate
Control	40	14 (35.00%)	18 (45.00%)	8 (20.00%)	32 (80.00%)
Observation	40	18 (45.00%)	20 (50.00%)	2 (5.00%)	38 (95.00%)
χ^2					4.114
P					0.043

Table 2. **Blood glucose indices ($\bar{x} \pm s$, mmol/L)**

Group	Fasting blood sugar		2 h postprandial blood glucose	
	Before intervention	After intervention	Before intervention	After intervention
Control (n=40)	9.12±1.54	7.58±1.19	12.74±2.08	10.69±1.65
Observation (n=40)	9.08±1.52	6.45±1.03	12.67±2.10	9.16±1.27
t	0.117	4.541	0.150	4.647
P	0.907	0.000	0.881	0.000

Table 3. **Time to reach target glucose level and insulin dose ($\bar{x} \pm s$)**

Group	Time to reach target glucose level (d)	Insulin dose (U)
Control (n=40)	5.69±1.68	54.37±12.85
Observation (n=40)	4.03±1.25	41.26±10.59
t	5.014	4.979
P	0.000	0.000

Table 4. **Dynamic blood glucose indices**

Group	Case No.	Proportion of time in hypoglycemia (%)	Fluctuation coefficient	Incidence rate of hypoglycemia
Control	40	3.49±0.97	1.86±0.47	4 (10.00%)
Observation	40	2.50±0.81	1.39±0.44	0 (0)
t/χ^2		4.955	4.617	4.211
P		0.000	0.000	0.040

Table 5. **Unhealthy emotion scores ($\bar{x} \pm s$, point)**

Group	SAS score		SDS score	
	Before intervention	After intervention	Before intervention	After intervention
Control (n=40)	54.57±6.91	47.23±5.47	55.28±6.74	48.37±5.86
Observation (n=40)	54.38±6.95	41.68±4.83	55.09±6.80	42.50±5.19
t	0.123	4.810	0.126	4.743
P	0.903	0.000	0.900	0.000

Table 6. **Quality-of-life score ($\bar{x} \pm s$, point)**

Group	Physiology		Psychology		Environment		Social relationship	
	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Control (n=40)	74.56±5.09	82.09±6.13	75.38±5.20	83.12±6.07	74.27±4.81	81.35±6.29	75.09±5.18	82.14±5.93
Observation (n=40	74.68±5.04	88.45±6.37	75.52±5.13	89.36±6.28	74.38±4.75	88.46±6.83	75.30±5.04	88.57±6.29
t	0.106	4.500	0.121	4.519	0.103	4.843	0.184	4.704
P	0.916	0.000	0.904	0.000	0.918	0.000	0.855	0.000