Effect of Nursing Education Intervention on Standardized Insulin Injection in Patients with Type 2 Diabetes Mellitus

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Abstract

Objective: To explore the effect of nursing education intervention on standardized insulin injection in patients with type 2 diabetes mellitus. **Methods:** 100 cases of patients with type 2 diabetes mellitus in our hospital from January 2019 to January 2020 were selected retrospectively and divided into two groups according to the nursing methods: routine nursing intervention based nursing education intervention group (nursing education intervention group) and routine nursing intervention group (50 cases in each group). The insulin injection knowledge, insulin injection skills, insulin injection accuracy, blood glucose levels, local fat hyperplasia, hypoglycemia, nursing satisfactions of the two groups were statistically analyzed. **Results:** In the nursing education intervention group, the proportion of mastering the type and action time of insulin, mastering hypoglycemia symptoms and nursing methods, accurate insulin injection site, accurate rotation method of insulin injection site, accurate insulin storage method, and knowing the side effects of insulin were higher than those in the routine nursing intervention group ($P < 0.05$). In the nursing education intervention group, the patients washed their hands accurately, installed the insulin pen accurately and checked the sterilized bottled insulin, the insulin injection time was accurate, the injection needle was installed accurately and checked the insulin syringe, the skin was disinfected accurately, the insulin injection site was accurate, the residence time after using the insulin pen was accurate. The proportion of accurately handling disposable needles (syringes) was higher than that of routine nursing intervention group ($P < 0.05$). After nursing intervention, the accuracy of insulin injection in the nursing education intervention group was higher than that in the routine nursing intervention group ($P < 0.05$). After nursing intervention, the glycosylated hemoglobin, fasting blood glucose and postprandial blood glucose of the nursing education intervention group were lower than those of the routine nursing intervention group ($P < 0.05$). The incidence of local fat hyperplasia and hypoglycemia in the nursing education intervention group was lower than that in the routine nursing intervention group ($P < 0.05$). The nursing satisfaction of nursing education intervention group was higher than that of routine nursing intervention group ($P < 0.05$). **Conclusion:** Nursing education intervention can effectively regulate insulin injection in patients with type 2 diabetes.

Keywords

Type 2 diabetes mellitus, Standardized insulin injection, Routine nursing intervention, Nursing education intervention, Nursing satisfaction

Diabetes mellitus (DM) has become a global health problem, and insulin is the most physiological, effective and least adverse reaction treatment for diabetic patients. However, the results of the second global survey on injection technology recently completed show that the injection status of Chinese diabetic patients is not optimistic, and the phenomenon of nonstandard injection is common [1]. In patients who have used insulin, the blood glucose compliance rate is only 37%, which is an important reason for the poor mastery of injection technology [2]. To improve the self-management ability of patients in the process of insulin treatment, the author investigated the related problems of 100 hospitalized patients with type 2 diabetes, and gave nursing education intervention. The report is as follows.

1. Materials and methods

1.1 General information

100 cases of patients with type 2 diabetes in our hospital from January 2019 to January 2020 were selected retrospectively. According to the nursing methods, they were divided into two groups: nursing education intervention group (nursing education intervention group) and routine nursing intervention group. In the nursing education intervention group, 50 patients were aged from 36 to 66 years old, with an average of (46.28 ± 2) . There were 26 females (52.00%) and 24 males (48.00%). In terms of course distribution, 27 cases (54.00%) were in 1-4 years and 23 cases (46.00%) were in 5-8 years; In terms of complications, 7 cases (14.00%) had peripheral neuropathy and 2 cases (4.00%) had early nephropathy; In terms of educational level, there were 2 cases of illiteracy (4.00%), 6 cases of junior high school (12.00%), 26 cases of senior high school or technical secondary school (52.00%), and 16 cases of junior college or above (32.00%). In the routine nursing intervention group, 50 patients were aged from 37 to 67 years old, with an average of (47.25 ± 1) . There were 27 females (54.00%) and 23 males (46.00%). In terms of course distribution, 28 cases (56.00%) were in 1-4 years and 22 cases (44.00%) were in 5-8 years; In terms of complications, 6 cases (12.00%) had peripheral neuropathy and 3 cases (6.00%) had early nephropathy; In terms of educational level, 1 case (2.00%) was illiterate, 5 cases (10.00%) were junior high school, 27 cases (54.00%) were senior high school or technical secondary school, and 17 cases (34.00%) were junior college or above. There was no significant difference in general information between the two groups ($P > 0.05$).

1.2 Inclusion and exclusion criteria

Inclusive criteria: (1) all patients met the criteria for diagnosis and classification of diabetes mellitus of who in 1999 and had been injected with insulin before hospitalization for 6 months to 15 years (2) No language and visual impairment, can fill in the questionnaire, can complete insulin injection [3].

1.3 Methods

1.3.1 Routine nursing intervention group

A standardized diabetes care group was established, with the head nurse as the team leader and 5 endocrine nurses as the team members. First of all, the group carried out a series of training and learning of insulin standardized injection related knowledge according to the 2011 edition of "China diabetes drug injection technology guide", and then carried out a questionnaire survey on the patients who are currently using insulin, and found the problems in the process of insulin use.

1.3.2 Nursing education intervention group

1.3.2.1 Storage of insulin pen and refill

The unopened insulin pen refill should be kept away from light and refrigerated. It is best to store it in the refrigerator at 2-8°C. Do not freeze or close to the ice lattice. Frozen insulin should not be used because insulin is a small molecular protein. The activity of insulin will be destroyed at 0°C and decreased when the temperature is higher than 30°C; The insulin refills that have been used should be stored in the environment of $< 28^{\circ}\text{C}$ as far as

possible, and should be kept away from light and heat. The opening date should be indicated. Generally, they can be stored for 4 weeks at room temperature.

1.3.2.2 Before body injection, exhaust and check the dose and injection time

The premixed preparation should be fully mixed. Tell the patient that not exhausting is easy to cause insufficient dose, guide the patient to correct exhaust method, that is, turn the knob clockwise to 1-2 units, erect the pen upward, flick the refill of the pen several times with fingers, make the air gather on the head, and push down the injection key until 1 drop of insulin appears on the tip of the needle.

1.3.2.3 The injection site of insulin

5 cm away from the umbilicus, the absorption is the fastest here, followed by one third of the lateral side of the bilateral upper arms, and one third of the lateral side of the bilateral thighs. However, do not inject insulin here during exercise, and the absorption of the buttocks is the slowest, so it is generally not used. Those who were injected twice a day were given abdominal injection before breakfast and hip injection before dinner; For those who inject 4 times a day, abdominal injection should be conducted before breakfast and dinner, upper arm injection should be conducted before lunch, and buttock injection should be conducted before going to bed. Continuous injection at the same injection site should be conducted at an interval of about 1 finger width, while avoiding induration, fat atrophy and other parts.

1.3.2.4 Needle entry angle and skin pinching

Investigation found that some patients blindly pinched skin during injection, ignoring the importance of needle entry angle. Whether the injection pinches the skin or not depends on the length of the injection needle and the thickness of subcutaneous fat, so as to ensure that the insulin is injected into the subcutaneous fat layer and give full play to the ideal blood glucose control effect. If the injection is too deep or the muscles are pinched together, insulin will be injected into the muscle layer, which will accelerate the absorption of insulin and cause hypoglycemia; If the needle is too short or too shallow. Injection into the dermis can lead to leakage of islet cord fluid, resulting in insufficient injection dose, poor blood glucose control, and rich capillary and nerve endings in the dermis, causing injection pain and increasing bleeding. The right way to pinch the skin is to pinch the dermis with the thumb, index finger and middle finger and then use 45°. Injection; Fat people do not need to pinch skin to 90°, the depth of needle is 2/3 of Novotel needle. If ultra-fine and short BD needle is used, there is no need to pinch the skin, but it must be 90°. Put the needle into the skin. In general, female patients do not need to pinch their thighs, while male patients need to pinch their thighs and buttocks.

1.3.2.5 Replacement of insulin needle

Chen Lingzhi and other studies have shown that the insulin injection needle needs to be used once. Although there is no bacterial growth in the short-term reuse, the needle tip is prone to burr, which easily leads to tissue damage at the puncture point. When nursing intervention insulin injection needle to avoid the problem of repeated use, according to the evidence-based basis combined with the specific economic situation of patients. For patients who cannot use needles once a day, instruct them to change needles once a day. Avoid subcutaneous induration, redness, swelling, infection and fat atrophy caused by repeated use of insulin needle, and increase the economic burden of patients. Tell the patient not to wipe the needle with ethanol. There is a layer of silicon on the surface of the insulin pen needle, which has a protective function. It can reduce the friction with the skin, relieve the pain during injection and damage to adipose tissue. After wiping with ethanol, this function can be destroyed.

1.3.2.6 To master the correct method of pulling out the needle

Zhang Shenxiu et al. showed that the best time for insulin needle under IOU to stay subcutaneously is Los; 11-20u is 15s; 21-30u is 20s, and the needle is pulled out in sections.

1.4 Observation indexes

The patients were followed up for 1 month. 1) The knowledge of insulin injection was mastered; 2) Mastery of insulin injection skills; 3) The accuracy of insulin injection; 4) Blood glucose level. Including glycosylated hemoglobin, fasting blood glucose, 2 h postprandial blood glucose; 5) The occurrence of local fat hyperplasia and hypoglycemia; 6) Nursing satisfaction. Self made questionnaire, the total score of 0-100, 0-69, 70-79, 80-89, 90-100, respectively, rated as dissatisfied, general, relatively satisfied, very satisfied.

1.5 Statistical analysis

SPSS20.0 statistical software was used for analysis, the measurement data were expressed with (%), the comparison was performed with t test, the repeated measurement data was analyzed with ANOVA, the count data were expressed with rate (%), the comparison was performed with chi square test, $P < 0.05$ was considered as statistically significant.

2. Results

2.1 Comparison of insulin injection knowledge between the two groups

In the nursing education intervention group, the proportion of mastering the type and action time of insulin, mastering hypoglycemia symptoms and nursing methods, accurate insulin injection site, accurate rotation method of insulin injection site, accurate insulin storage method, and knowing the side effects of insulin were higher than those in the routine nursing intervention group ($P < 0.05$) (see Table 1-1, Table 1-2).

Table 1-1. Comparison of mastery of insulin injection knowledge between the two groups [cases (%)]

Groups	n	Master the type and action time of insulin	Master hypoglycemia symptoms and treatment methods	Accurate injection site of insulin
Nursing education intervention group	50	45 (90.00)	47 (94.00)	46 (92.00)
Routine nursing intervention group	50	27 (54.00)	33 (66.00)	37 (74.00)
χ^2		14.070	11.070	12.590
P		<0.05	<0.05	<0.05

Table 1-2. Comparison of mastery of insulin injection knowledge between the two groups [cases (%)]

Groups	n	Accurate method of insulin injection site rotation	The method of insulin storage is accurate	Know the side effects of insulin
Nursing education intervention group	50	44 (88.00)	45 (45.00)	48 (96.00)
Routine nursing intervention group	50	4 (8.00)	35 (70.00)	28 (56.00)
χ^2		16.750	10.640	15.510
P		<0.05	<0.05	<0.05

2.2 Comparison of insulin injection skills between the two groups

In the nursing education intervention group, the patients washed their hands accurately, installed the insulin pen accurately and checked the sterilized bottled insulin, the insulin injection time was accurate, the injection needle was installed accurately and checked the insulin syringe, the skin was disinfected accurately, the insulin injection site was accurate, the residence time after using the insulin pen was accurate. The proportion of accurately handling disposable needles (syringes) was higher than that of routine nursing intervention group ($P < 0.05$) (see Table 2-1, Table 2-2).

Table 2-1. Comparison of mastery of insulin injection skills between the two groups [cases (%)]

Groups	n	Wash your hands accurately	Install the insulin pen accurately and check the sterilized insulin bottle	The time of insulin injection is accurate	Accurately install the injection needle and check the insulin syringe
Nursing education intervention group	50	49 (98.00)	48 (96.00)	50 (100.00)	48 (96.00)
Routine nursing intervention group	50	34 (68.00)	38 (76.00)	42 (84.00)	38 (76.00)
χ^2		12.020	13.360	9.490	14.680
P		<0.05	<0.05	<0.05	<0.05

Table 2-2. Comparison of mastery of insulin injection skills between the two groups [cases (%)]

Groups	n	Disinfect skin accurately	Accurate injection site of insulin	The residence time after insulin pen injection was accurate	Accurate handling of disposable needles (syringes)
Nursing education intervention group	50	47 (94.00)	47 (94.00)	49 (98.00)	42 (84.00)
Routine nursing intervention group	50	24 (48.00)	36 (72.00)	37 (74.00)	9 (18.00)
χ^2		15.990	11.390	12.550	16.010
<i>P</i>		<0.05	<0.05	<0.05	<0.05

2.3 Comparison of the accuracy of insulin injection before and after nursing intervention between the two groups

The accuracy of insulin injection in two groups after nursing intervention was higher than that before nursing intervention ($P < 0.05$); After nursing intervention, the accuracy of insulin injection in the nursing education intervention group was higher than that in the routine nursing intervention group ($P < 0.05$) (see Table 3).

Table 3. Comparison of the accuracy of insulin injection between the two groups before and after nursing intervention [cases (%)]

Groups	n	Before nursing intervention	After nursing intervention	χ^2	<i>P</i>
Nursing education intervention group	50	19 (38.00)	48 (96.00)	14.450	<0.05
Routine nursing intervention group	50	18 (36.00)	27 (54.00)	13.340	<0.05
χ^2		0.210	13.280		
<i>P</i>		>0.05	<0.05		

2.4 Comparison of blood glucose level between two groups before and after nursing intervention

The glycosylated hemoglobin, fasting blood glucose and 2 h postprandial blood glucose of the two groups after nursing intervention were lower than those before nursing intervention ($P < 0.05$); After nursing intervention, the glycosylated hemoglobin, fasting blood glucose and postprandial blood glucose of the nursing education intervention group were lower than those of the routine nursing intervention group ($P < 0.05$) (see Table 4).

Table 4. Comparison of blood glucose levels between the two groups before and after nursing intervention ($\bar{x} \pm s$)

Groups	n	Time	Glycosylated hemoglobin (%)	Fasting blood glucose (mmol/L)	2 h postprandial blood glucose (mmol/L)
Nursing education intervention group	50	Before nursing intervention	9.30±1.32	9.16±1.42	11.40±2.08
		After nursing intervention	6.56±1.68	6.82±1.71	9.01±1.44
Routine nursing intervention group	50	Before nursing intervention	9.25±1.23	9.13±1.40	11.30±1.11
		After nursing intervention	7.32±1.73	7.52±1.88	10.30±1.94

2.5 The incidence of local fat hyperplasia and hypoglycemia in the two groups was compared

The incidence of local fat hyperplasia and hypoglycemia in the nursing education intervention group was lower than that in the routine nursing intervention group ($P < 0.05$) (see Table 5).

Table 5. Comparison of blood glucose level, local fat hyperplasia and hypoglycemia between the two groups [cases (%)]

Groups	n	Local lipogenesis	Hypoglycemia
Nursing education intervention group	50	8 (16.00)	6 (12.00)
Routine nursing intervention group	50	11 (22.00)	10 (20.00)
χ^2		11.140	11.340
<i>P</i>		<0.05	<0.05

2.6 Comparison of nursing satisfaction between the two groups

The nursing satisfaction of nursing education intervention group was higher than that of routine nursing intervention group ($P < 0.05$) (see Table 6).

Table 6. Comparison of nursing satisfaction between the two groups

Groups	n	Very satisfied	Quite satisfied	Commonly	Dissatisfied	Satisfaction
Nursing education intervention group	50	22 (44.00)	25 (50.00)	2 (4.00)	1 (2.00)	47 (94.00)
Routine nursing intervention group	50	17 (34.00)	20 (40.00)	9 (18.00)	4 (8.00)	37 (74.00)
χ^2						12.830
P						<0.05

3. Discussion

Health education is an educational activity with goal, plan, organization, system and evaluation. To encourage people to consciously adopt healthy behaviors in order to maintain and promote human health, especially for the elderly patients with low cultural quality, due to their lack of awareness of their own diseases and self-care awareness, they did not change their bad behaviors. This study found that the changes of patients' mastery of insulin injection technology before and after the intervention were statistically significant. Through the intervention, the patients' insulin injection technology was significantly improved, and the wrong behaviors could be timely guided. More patients can get the trust and cooperation [4]. It can be seen that the planned and targeted nursing education intervention has improved the patients' awareness of active participation and the ability to correctly use insulin pen injection therapy. The application of theoretical explanation and practical interactive operation training can correct the patients' knowledge mistakes and injection errors, not only improve the patients' understanding of islet cord and the compliance of insulin injection treatment, but also make the effective rate of correct use of insulin pen reach 100% [5].

At present, more and more attention has been paid to the standard injection of insulin in China, and November 7 of each year has been designated as the "standard injection day for diabetes", which aims to attract more people's attention to the standard injection of insulin. To further improve the injection technology of diabetic patients in our country, we need the majority of medical staff to teach patients carefully and patiently in the future daily work, so that patients can really master the correct insulin knowledge and injection skills, so as to control blood sugar well, reduce and delay the occurrence and development of complications, and improve the quality of life of diabetic patients [6]. The results showed that in the nursing education intervention group, the proportion of patients mastering the type and action time of insulin, mastering hypoglycemia symptoms and nursing methods, accurate insulin injection site, accurate rotation method of insulin injection site, accurate insulin storage method, and knowing the side effects of insulin were higher than those in the routine nursing intervention group ($P < 0.05$). In the nursing education intervention group, the patients washed their hands accurately, installed the insulin pen accurately and checked the sterilized bottled insulin, the insulin injection time was accurate, the injection needle was installed accurately and checked the insulin syringe, the skin was disinfected accurately, the insulin injection site was accurate, the residence time after using the insulin pen was accurate. The proportion of accurately handling disposable needles (syringes) was higher than that of routine nursing intervention group ($P < 0.05$). After nursing intervention, the accuracy of insulin injection in the nursing education intervention group was higher than that in the routine nursing intervention group ($P < 0.05$). After nursing intervention, the glycosylated hemoglobin, fasting blood glucose and postprandial blood glucose of the nursing education intervention group were lower than those of the routine nursing intervention group ($P < 0.05$). The incidence of local fat hyperplasia and hypoglycemia in the nursing education intervention group was lower than that in the routine nursing intervention group ($P < 0.05$). The nursing satisfaction of nursing education intervention group was higher than that of routine nursing intervention group ($P < 0.05$), which fully confirmed the effectiveness and necessity of nursing education intervention.

In conclusion, nursing education intervention can effectively regulate insulin injection in patients with type 2 diabetes, which is worthy of clinical promotion.

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