

Application of Nutrition Support Based on the IKAP Model in Perioperative Blood Glucose Management for Pancreatic Cancer Patients

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Abstract: Objective: To investigate the effect of information-knowledge-belief-behavior (IKAP) model of nutritional support on perioperative blood glucose management in patients with pancreatic cancer.

Method: From February 2023 to January 2025, a total of 84 patients underwent pancreatic cancer surgery at our hospital, with 42 patients in each group. One group received routine care (the control group), while the other group received nutritional support care based on the IKAP model (the observation group). The study observed the average blood glucose levels, postoperative complication rates, anxiety self-rating scale (HADS-A), depression self-rating scale (HADS-D), and nursing outcomes of both groups.

Results: The average blood glucose levels and the incidence of hyperglycemia and hypoglycemia in the IKAP intervention group were significantly lower than those in the control group ($P < 0.05$). Before the nursing intervention, there was no statistically significant difference in the HADS-A and HADS-D scores between the two groups ($P > 0.05$). However, after receiving IKAP care, patients' HADS-A and HADS-D scores were significantly lower than those in the conventional treatment group ($P < 0.05$). Compared to conventional care, patients in the IKAP care group showed higher dietary compliance and a lower incidence of postoperative complications ($P < 0.05$).

Conclusion: Nursing intervention based on IKAP model can effectively maintain the stability of blood glucose in perioperative patients with pancreatic cancer, improve the psychological status of patients, effectively improve the compliance of patients with diet, and reduce the occurrence of postoperative complications.

Introduction

Pancreatic cancer is a group of malignant tumors primarily originating from the epithelial cells of the pancreatic duct and acinar cells. It is characterized by its insidious onset and high mortality rate. In China, with changes in lifestyle and

dietary habits, as well as increased life stress, the incidence of pancreatic cancer has been on the rise. The 5-year overall survival rate is approximately 10%^[1], making it one of the cancers with the lowest survival rates^[2]. This condition has become a serious public health issue that poses a significant threat to public health.

Currently, surgical resection is the only effective method to extend the survival of pancreatic cancer patients^[3]. However, due to the extensive surgical resection, significant trauma, and multiple anastomoses, the incidence of postoperative complications is also high. The perioperative safety of pancreatic cancer patients is closely linked to their blood glucose levels. High blood glucose during the perioperative period can delay surgery, increase the risk of infection, bleeding, pancreatic fistula, and death^[4]. In pancreatic cancer patients, the incidence of abnormal glucose metabolism is as high as 85%, with 45%-67% having diabetes^[5]. Postoperative blood glucose abnormalities occur in 50.4% of cases, further complicating blood glucose management [6,7]. To address this, a series of comprehensive strategies have been implemented in clinical practice, including nutritional support, drug therapy, blood glucose monitoring, and diabetes education^[8]. Conventional methods of blood glucose control, such as single-drug therapy, are no longer the preferred strategy. Nutritional support, which forms the foundation of blood glucose control, should be integrated throughout the perioperative blood glucose management of pancreatic cancer patients^[9]. The core concept of MNT, proposed by the American Diabetes Association in 1994, aims to maintain blood glucose and lipid levels and reduce complications by quantitatively controlling the patient's nutrient intake. During the implementation of MNT, some patients lack a full understanding of the basis and process of the treatment plan, often leading to a lack of knowledge about blood glucose management and low compliance with the treatment plan, resulting in uncertain treatment outcomes^[10]. Secondly, the routine nursing in clinical practice in the past focuses on alleviating disease symptoms and pays less attention to patients' psychological state. Patients often suffer from anxiety, depression and other negative emotions due to fear of surgery and postoperative complications, which further affects blood glucose control.

The IKAP model is a relatively new nursing approach that enhances patients' understanding of their condition, improves treatment adherence, and alleviates negative emotions such as anxiety and depression by intervening in patients' information, knowledge, beliefs, and behaviors, thereby facilitating blood glucose control^[11]. This model has been applied to the nursing interventions for patients with hypertension^[12], coronary heart disease^[13], diabetes^[14], and gastric cancer^[15], achieving excellent results^[16]. Therefore, this study aims to explore the effectiveness of nutritional support using the IKAP model in perioperative blood glucose management for pancreatic cancer patients.

Materials and Methods

This study is a quasi-experimental study that uses the formula for sample size calculation in two-sample mean comparison: $N1 = N2 = 2[(t\alpha/2 + t\beta)S/\delta]^2$. The table shows that $t_{0.05/2}=1.96, t_{0.1}=1.28$. Based on relevant literature^[17], the mean difference δ was set at 3.39, and the standard deviation S was 4.56. After calculation, $N1 = N2 = 38$. Considering a 10% dropout rate, the final required sample size is 84 participants, with 42 in each group (control and observation). Convenience sampling was used to select patients who underwent pancreatic cancer surgery at our hospital from February 2023 to January 2025. A total of 84 patients were recruited and divided into two groups based on their admission time: 42 in the observation group (receiving IKAP mode nutritional support care) and 42 in the control group. The study compared the effects of IKAP care with conventional care. All patients were fully informed about the study, provided consent forms, and signed them. The study protocol was approved by the hospital's ethics committee and adhered to the clinical research ethical guidelines outlined in the Declaration of Helsinki.

Inclusion criteria: (1) Patients undergoing pancreatic cancer surgery at this hospital; (2) Age > 18 years, gender not limited; (3) Have undergone blood glucose level assessment; (4) Blood glucose management is performed during both perioperative periods; (5) NRS2002 score ≥ 3 ; (6) Have participated in this study and signed an informed consent form.

Exclusion criteria: (1) patients were given glucocorticoid therapy; (2) insulinoma or coexisting other malignant tumors; (3) history of previous pancreatic resection or pancreatectomy; (4) patients who received preoperative adjuvant radiotherapy and chemotherapy; (5) patients with normal postoperative blood glucose assessment.

Intervention Method:

The control group received routine dietary guidance and underwent face-to-face interventions with patients upon admission. 1) Diabetes Health Education: Face-to-face sessions were conducted to understand the types, causes, mechanisms, treatments, complications, and the importance of dietary intervention in diabetes. Patients were informed that controlling blood sugar levels can maintain perioperative safety and reduce postoperative complications. 2) Formulating Dietary Intervention Plans for Patients: ① Based on intervention guidelines, a personalized nursing intervention plan was developed by professionally trained nurses. The plan was printed and distributed to the interveners to ensure they understood the entire intervention process. ② Following the European Association for the Study of Obesity (EASO) 'Clinical Nutrition in Surgery' guidelines, it is recommended that carbohydrates make up 50% to 65% of total intake. Daily calories should be divided into three meals—morning, noon, and evening—equally, with smaller, more frequent meals. This approach helps distribute daily calories over 5 to 6 meals. High-cholesterol and fried foods should be limited. Foods rich

in dietary fiber, such as brown rice, whole wheat bread, oatmeal, fruits, vegetables, and legumes, should be consumed more often. The diet should be light, with a salt intake of 6 g/day, especially for hypertensive patients who need to control their salt intake. 3) Psychological Care: During the completion of questionnaires, nurses engaged in conversations with patients to identify any psychological issues and provided timely psychological support. 4) Regular Follow-ups: Monthly telephone follow-ups were conducted, each lasting 15 to 20 minutes.

The observation group implemented the IKAP model of nutritional support care. This included: 1) forming an intervention team comprising one nursing mentor, one endocrinologist, one nutritionist, one hepatobiliary surgeon, one head nurse of the hepatobiliary surgery department, two hepatobiliary surgery nurses, and one graduate student, totaling eight members. The research team established the overall framework of the plan, defined the intervention content, and organized data collection and statistical analysis. The nursing mentor was responsible for personnel allocation and reviewing the intervention plan. The endocrinologist and hepatobiliary surgeon provided guidance on research questions and reviewed the intervention plan. The nutritionist guided and adjusted nutritional support issues. The head nurse of the hepatobiliary surgery department organized, coordinated, and monitored the implementation details. The hepatobiliary surgery nurses assisted the graduate student in specific interventions. The graduate student was responsible for data collection and entry. All intervention personnel received unified training before the intervention to ensure quality control of the entire nursing intervention plan.

2) Develop an intervention plan by searching domestic and international databases, The English search terms include: IKAP/KAP/knowledge-attitude-practice, pancreaticcancer/pancreaticr/pancreatectomy,perioperative/preoperative/postoperative, hyperglycemia management, nutritional supplement/nutritional management/nutritional care. A preliminary draft of the intervention plan was developed through a literature review. After discussions within the research team, the final framework and specific content of the nursing intervention were determined at an expert meeting, as shown in Table 1.

Table 1. Nutritional support perioperative blood glucose management intervention protocol of IKAP model

Intervention methods	Intervention time	intervention study
gather information (I)	Admission, intervention 1 week, intervention 3 weeks	1) Primary disease assessment: Through preliminary scale surveys and comprehensive patient evaluations, the patient's blood glucose status, nutritional status, and eating habits are assessed. 2) Nutritional risk screening: For hospitalized patients, the Nutritional Risk Screening 2002 (NRS2002) is used to screen for nutritional risks ^[18] . Patients scoring 3 or higher are given a nutritional support plan ^[19] . 3) For patients with a history of diabetes or random blood glucose >7.8mmol/L and no HbA1c test in the past three months, an HbA1c test is required upon admission ^[21] . If random blood glucose >7.8mmol/L and HbA1c ≥6.5%, diabetes can be diagnosed ^[20] . 4) Assess the type, duration, treatment method, complications, history of hyperglycemia, history of hypoglycemia, and knowledge and behavior regarding blood glucose management in diabetic patients. 5) During the collection of basic patient information and questionnaire data, pay attention to assessing the patient's psychological state, identify any issues, and provide a basis for subsequent health education. 6) Based on the questionnaire completion, current blood glucose levels, nutritional status, and psychological state, develop appropriate nursing interventions for the patient
impart knowledge (K)	Two times a week	The 'WeChat + face-to-face' method is used for knowledge education, with one face-to-face session before admission and another before surgery. 1) Disease-related knowledge: Explain the causes of pancreatic cancer, treatment methods, preoperative examination contents and precautions, and blood glucose management (including monitoring, complications, diet, medication, exercise, and the impact of poor blood glucose control). 2) Nutritional support: Develop an individualized dietary guidance plan: ① Refer to the International Society of Surgical Oncology's 'Nutritional Support and Treatment in Pancreatic Surgery,' calculate the daily target energy requirement based on body weight at 25~30kCal·kg ⁻¹ ·d ⁻¹ , with carbohydrates making up 30%~55% of total intake, proteins 15~20%, and fats 25%~35%. Calculate the amounts of these three nutrients in each meal, and select foods rich in these macronutrients: low GI foods (grains, tubers, vegetables, fruits, meats, eggs, sugars, and fats, converted according to food exchange portions). ⑤ Inform about vitamin and mineral intake, which should follow the standard perioperative intake for pancreatic cancer without special control. ⑥ Advise transitioning to enteral nutrition as soon as possible, and diabetic patients can use diabetes-appropriate enteral nutrition formulations ^[25] . During the period of parenteral nutrition, the intake can be temporarily reduced to 20~25kCal/kg ^[26] ; Energy distribution: 45%~60% from carbohydrates, 25%~35% from fats, and 15%~20% from proteins ^[27]
Strengthening of convictions (A)	Once a week for 3 times	1) Considering the patient's psychological state, analyze the reasons for their low level of belief. Inform them about the importance of nutritional support in blood sugar management and its impact on postoperative complications. Share successful case studies to help patients build confidence and courage in treating their condition, and shift their negative attitude towards illness. 2) Encourage patients to keep a mood diary and share their treatment experiences in WeChat groups to enhance peer and healthcare provider support. 3) Psychological intervention: Nurses with a psychological counseling certificate or who have undergone psychological training can provide psychological counseling and symptom support to patients. They can also conduct music listening, acupoint massage, and other psychological interventions to alleviate or eliminate negative emotions, boost confidence, and encourage active participation in the nursing plan
Driving forces (P)	Face-to-face + WeChat: answer patients' questions once a week in face-to-face or wechat group; telephone/ WeChat follow-up: once a month, 15~20min each time; face-to-face follow-up during patient review	1) Distribute the electronic version of the 'Low-GI Food Handbook' to guide patients in reading. 2) Dietary Record: Guide patients to record their daily food intake (types and quantities), using a WeChat mini-program for dietary tracking, with nurses checking if the daily target is met. 4) Blood Glucose Monitoring: ① Use the hospital's existing blood glucose monitoring devices to record blood glucose levels (including fasting and 2-hour postprandial glucose). ② Utilize the e-monitoring system developed by the hospital's IT department to collect information on meal times, frequency, and food details, providing accurate data support for personalized nutritional support decisions. 4) Intervention Period: Both groups will undergo an intervention period of 3 weeks

Observation indicators:

- (1) Compare the average blood glucose levels on day 1, day 3, day 5, and day 7 post-surgery;
- (2) Compare the incidence of hyperglycemia and hypoglycemia after sur-

gery;

(3) Use the Hospital Anxiety and Depression Scale (HADS), including the HADS-A for self-assessment of anxiety and the HADS-D for self-assessment of depression, to compare the levels of anxiety and depression before and after the intervention. Higher scores indicate more severe negative emotions.

(4) Dietary Compliance: This study evaluates the daily total calorie intake and the ratio of the three macronutrients (carbohydrates, proteins, and fats) in the conventional group based on 24-hour dietary records before and after the intervention. For the intervention group, the study calculates whether the intake of the dietary plan meets the standards. The evaluation of dietary compliance is based on the number of days each patient adheres to the dietary management regimen per week (for example, if a patient can follow the diet for 3 days in a week, the score is “3”) [28].

(5) Postoperative complications include abdominal infection, pulmonary infection, pancreatic fistula and bleeding.

Statistical analysis

using SPSS 26.0 software. For data that followed a normal distribution, the mean $\pm$ standard deviation ($\pm s$) was used to represent quantitative data, and t-tests were employed for inter-group comparisons. For categorical data, the number of cases (percentage) was used, and χ^2 tests were used for inter-group comparisons. For non-normal distributed data, non-parametric tests were used, with median (interquartile range) representing the central tendency. Mann-Whitney U-tests were used for inter-group comparisons, and Wilcoxon rank-sum tests for intra-group comparisons. $P < 0.05$ was considered statistically significant.

Results:

General Information of Patients.

The control group had an average age of 62.5 ± 8.7 years (ranging from 45 to 78 years), with 18 males (42.86%) and 24 females (57.14%). Among the patients, 22 had a history of hypertension, diabetes, or coronary heart disease (52.38%), and 20 had other comorbidities (47.62%). Their Body Mass Index (BMI) was $23.4 \pm 3.5 \text{ kg/m}^2$. In contrast, the observation group had an average age of 60.3 ± 9.2 years (ranging from 43 to 76 years), with 20 males (47.62%) and 22 females (52.38%). The observation group also had a history of hypertension, diabetes, or coronary heart disease in 18 cases (42.86%), and 24 had other comorbidities (57.14%). Their BMI was $24.1 \pm 3.8 \text{ kg/m}^2$. The characteristics of the two groups were similar ($P > 0.05$) (**Table 1**).

Table 1. General information of patients

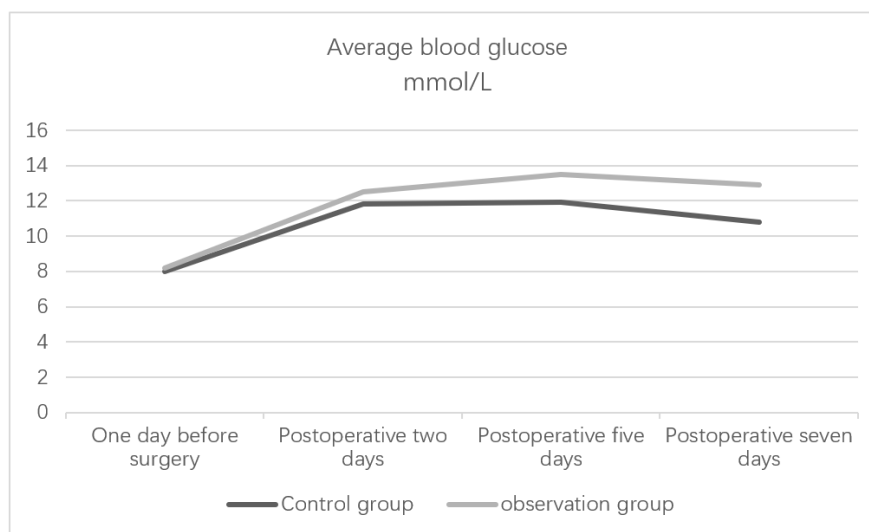
group	Age	gender		history of past illness		BMI(kg/m ²)
		male	female	Hypertension/diabetes/coronary heart disease	rest	
control group n=42	62.5±8.7	18(42.86%)	24(57.14%)	22(52.38%)	20(47.62%)	23.4±3.5
observation group n=42	60.3±9.2	20(47.62%)	22(52.38%)	18(42.86%)	24(57.14%)	24.1±3.8
t/x ²	1.134	0.190		0.762		0.892
P value	0.260	0.663		0.383		0.375

The average blood glucose levels during the perioperative on the day of pancreatic resection as day 1, and compared with the average blood glucose levels on day 1 before surgery, day 2 after surgery, day 5 after surgery, and day 7 after surgery. The analysis showed that there was no significant difference in the average blood glucose levels between the two groups on day 1 before surgery and day 2 after surgery ($P>0.05$). However, after receiving IKAP care, the patients had lower average blood glucose levels on days 5 and 7 after surgery compared to the control group ($P<0.05$), as shown in **Table 2** and **Figure 1**.

Table 2. Average blood glucose levels during perioperative period ($\pm s$, mmol/L)

Average blood glucose (mmol/L)	control group (n=42)	observation group (n=42)	t	P 值
One day before surgery	8.2±1.1	8.0±1.3	0.752	0.454
Postoperative two days	12.5±2.3	11.8±2.1	1.462	0.148
Postoperative five days	13.5±1.4	11.9±1.7	4.773	<0.001
Postoperative seven days	12.9±1.9	10.8±2.2	4.892	<0.001

Figure 1 Average estimated blood glucose



Hyperglycemia and hypoglycemia occurred after surgery

Monitor the postoperative blood glucose levels of two groups of patients. If the blood glucose level exceeds 22.2mmol/L, it is recorded as one instance of hyperglycemia. If the blood glucose level rises again after stabilizing, it is recorded as a second instance of hyperglycemia. If the blood glucose level falls below 3.9

mmol/L, it is recorded as one instance of hypoglycemia. Compare the incidence of hyperglycemia and hypoglycemia between the two groups. The proportion of hyperglycemia in the intervention group is lower than that in the control group ($P < 0.05$), while there is no significant difference in the proportion of hypoglycemia ($P > 0.05$). (Table 3)

Table 3. Postoperative hyperglycemia and hypoglycemia [n(%)]

blood sugar	times	control group (n=42)	observation group (n=42)	X ²	P value
Hyperglycaemia	0.00	18(42.86%)	28(66.67%)	4.941	0.05
	≥1.00	24(57.14%)	14(33.33%)		
glucopenia	0.00	39(92.86%)	38(90.48%)	0.157	0.692
	≥1.00	3(7.14%)	4(9.52%)		

Anxiety (HADS-A) and depression (HADS-D) scores

Before the intervention, there was no significant statistical difference in the HADS-A and HADS-D scores ($P > 0.05$). However, after three weeks of the intervention, both the HADS-A and HADS-D scores in the group receiving IKAP nursing care decreased. This suggests that the IKAP nursing model, which includes psychological support, helps improve postoperative recovery and addresses patients' mental health issues beyond routine care (Table 4)

Table 4. HADS-A scores and HADS-D scores ($\bar{x} \pm s$ Points)

group	HADS-A scores		HADS-D scores	
	Before intervention	Intervention for 3 weeks	Before intervention	Intervention for 3 weeks
control group (n=42)	10.6±2.8	10.4±2.6	10.8±3.6	10.5±3.4
observation group (n=42)	10.2±2.1	7.3±1.9	9.4±3.5	6.8±2.8
t	0.721	6.842	1.856	6.215
P value	0.473	<0.001	0.067	<0.001

Dietary compliance

Compared with the control group, patients in the observation group showed higher dietary compliance ($P < 0.05$), indicating that the implementation of IKAP care improved patients' dietary compliance.

Table 5. Analysis of dietary compliance

time	control group (n=42)	observation group (n=42)	U/Z value	P value	Effect size
Intervention for one week	3[2,4]	4[3,5]	689.5	0.062	$\delta=0.20$
Intervention for two weeks	4[3,5]	6[5,7]	397.0	<0.001*	$\delta=0.58$
Z	2.41	4.83			
P	0.016*	P<0.001*			

note: * $P < 0.05$; Effect size $\delta > 0.33$ was a clinically important difference

Postoperative complications

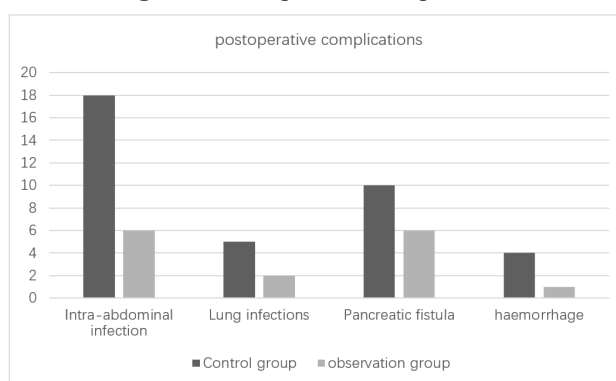
The incidence of postoperative complications in patients receiving IKAP intervention was lower than that in patients receiving conventional treatment, but the difference was not statistically significant ($P > 0.05$). This suggests that IKAP treatment may promote a good recovery process by reducing postoperative com-

plications (Table 6 and Figure 2).

Table 6. Postoperative complications [n (%)]

complication	Control group(n=42)	observation group(n=42)	X2	P value
Intra-abdominal infection	18(42.86%)	6(14.29%)	8.400	0.004*
Lung infections	5(11.90%)	2(4.76%)	1.400	0.237
Pancreatic fistula	10(23.81%)	6(14.29%)	1.286	0.257
haemorrhage	4(9.52%)	1(2.38%)	1.905	0.168
Total complications	28(66.67%)	14(33.33%)	9.333	0.002*

Figure 2. Postoperative complications



Discuss

In this study, the nursing intervention based on the IKAP model of nutritional support was implemented in patients with pancreatic cancer, which had a positive effect on improving blood glucose. The IKAP model of nursing intervention meets the specific needs of different patients through individualized guidance and support of low GI diet, and comprehensively evaluates the effectiveness of blood glucose management in patients. By collecting and analyzing patients' clinical outcome data, IKAP nursing can identify the problems and essentialities of blood glucose management in a timely manner, help patients reverse negative attitudes, establish a positive health mindset for patients, influence patients' behavior through beliefs, and enhance patients' confidence in postoperative recovery by improving patients' awareness of the disease, enhancing their belief in overcoming the disease, and enhancing their confidence in postoperative recovery [29-30]. Compared with conventional nursing, IKAP nursing reduces HADS-A score and HADS-D score, improves patients' dietary compliance, facilitates blood sugar control, reduces the incidence of postoperative complications, and effectively improves the surgical treatment effect of patients. To develop the belief that patients value health, and to help patients adopt healthy behaviors to achieve the goal of blood sugar control. This process is based on cognition or knowledge, with positive health beliefs as the driving force for behavior and healthy behaviors as the end ^[31]. By discussing and implementing the diagnosis and treatment care plan, the nurse changed the patient's beliefs and behaviors, and effectively improved

the patient's lifestyle and eating habits through symptomatic care.

This study found that, compared with conventional care, the IKAP nursing model integrates four dimensions: Information, Knowledge, Attitude, and Practice. It has shown significant advantages in the perioperative management of pancreatic cancer patients. 1) In terms of blood glucose control: the perioperative blood glucose control of the IKAP group was significantly better than that of the conventional group, which was due to the formulation of personalized nutrition support programs, dynamic adjustment of dietary plans, and the establishment of a "monitoring-feedback-adjustment" closed-loop management system, which effectively reduced the incidence of hyperglycemic events. Due to the prominent problem of postoperative glycemic disorders, the postoperative hypoglycemia level of patients was set below 3.9 mmol/L and the level of hyperglycemia was located above 22.2 mmol/L according to the evidence from the literature review^[32]. Comparing the ratio of the number of patients with high and low blood sugar and the average blood glucose level of the two groups, it was found that the proportion of the number of patients with hyperglycemia and the average blood glucose level of the IKAP model nutritional support intervention group were lower than those of the control group, which was an effective application of the nutritional support management program in the process of blood glucose management based on the IKAP model. 2) Improvement of psychological state: After 3 weeks of intervention, the IKAP group showed a double improvement in HADS score, indicating that this nursing model is very important in the psychological support of patients during the perioperative period, and postoperative music therapy and acupuncture help to alleviate patients' bad mood, enhance treatment beliefs, reduce anxiety and depression levels, and thus have a positive impact on the overall recovery. 3) Diet management: The IKAP model achieves the best results of diet management through visual diet education tools, personalized recipe design and supervision mechanism for family participation. 4) Reduction of postoperative complications: Surgical prognosis improvement Complication analysis showed that the rate of intra-abdominal infection was reduced, and the risk of total complications was reduced, which was related to IKAP "predictive care" strategy: the development of a preoperative risk assessment system, perioperative nutritional support management and early dietary management were conducive to glycemic control and reduced the risk of complications. 5) Increased dietary adherence: The higher dietary adherence observed in the IKAP care group can be attributed to the emphasis on patient education and active participation in care. Provide detailed dietary guidance, knowledge training, and psychological support to improve patients' dietary adherence. The innovation of this study lies in the construction of a set of glycemic management intervention programs based on nutritional support based on the theoretical framework of the IKAP model, which provides a new basis for clinical glycemic management intervention.

This study provides IKAP mode care for perioperative blood glucose management in patients with sub-pancreatic cancer, which has certain guiding sig-

nificance, but due to many constraints, there are still some shortcomings in this study: (1) Only 84 patients were included in this study, which failed to fully reflect the treatment effect. (2) Because this study is a quasi-experimental study, it is easy to produce selection bias and has certain limitations because it is grouped according to the chronological order of surgery, and (3) this study only lists two groups for efficacy analysis, and the short observation period and lack of long-term follow-up are also shortcomings, so clinical studies with larger sample sizes are needed in the future to provide more clinical evidence for this method.

Conclusion

Patients with perioperative pancreatic cancer often have anxiety and depression caused by disease factors, and postoperative blood glucose disorders are more prominent, which increases the occurrence of complications, resulting in an increase in negative emotions and affecting postoperative rehabilitation. Based on the IKAP model of nutritional support nursing, through the formulation of a low GI dietary intervention program, the collection and understanding of patients' comprehensive information, psychological counseling for patients, the alleviation of patients' negative emotions, and the establishment of patients' belief in overcoming the disease, IKAP nursing can effectively maintain patients' blood sugar stability, reduce patients' anxiety, depression and other adverse emotions and postoperative complications, effectively improve patients' dietary compliance, and facilitate blood sugar control. It provides some nursing enlightenment for future clinical care and provides evidence-based basis for future research, but in view of the limitations of this study, clinicians need to consider it carefully.

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