

# Application of Quantitative Evaluation System Based on Sensitive Indicators of Accelerated Rehabilitation Nursing in Patients with Pancreaticoduodenal Surgery

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## Abstract

**Objective:** To explore the application effect of a quantitative evaluation system based on accelerated rehabilitation (ERAS) nursing-sensitive indicators in patients with pancreaticoduodenal surgery. **Methods:** 60 patients with pancreaticoduodenal surgery in our hospital from January 2021 to October 2023 were selected as the research objects by using the prospective research method. The random number table method was divided into two groups: the reference group (n = 30, taking routine nursing) and the research group (n = 30, the reference group plus the quantitative evaluation system nursing based on eras nursing sensitive indicators). The intervention duration of the two groups was 14 days. The rehabilitation, nutritional status [nutritional risk screening 2002 (NRS 2002), nutritional index (PNI)], simplified Comfort Scale (GCQ) score, gastrointestinal quality of life (GIQLI) score, and postoperative complication rate were compared between the two groups. **Results:** The exhaust time, intestinal function recovery time, hospitalization time, and hospitalization expenses of the study group were lower than those of the reference group ( $p < 0.05$ ). After the intervention, the NRS score of the two groups was lower than that before the intervention, and the PNI was higher than that before the intervention ( $p < 0.05$ ). After the intervention, the NRS score of the study group was lower than that of the reference group, and the PNI was higher than that of the reference group ( $p < 0.05$ ). The GCQ and GIQLI scores of the two groups after the intervention were higher than those before the intervention ( $p < 0.05$ ). The GCQ and GIQLI scores of the study group after the intervention were higher than those of the reference group ( $p < 0.05$ ). The total incidence of postoperative complications in the study group was 3.33% lower than 26.67% in the reference group ( $p < 0.05$ ). **Conclusion:** The quantitative evaluation system based on eras

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nursing sensitivity index has a significant effect on the intervention of pancreaticoduodenal surgery, which can promote the postoperative rehabilitation of patients, improve the nutritional health status, comfort, and quality of life, and reduce the incidence of postoperative complications.

### Keywords

Pancreaticoduodenum, Accelerated Rehabilitation Nursing, Sensitive Index, Quantitative Evaluation, Nursing Effect

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## 1. Introduction

Pancreaticoduodenal surgery is a common surgical procedure in hepatobiliary and pancreatic surgery, which is mainly applicable to chronic pancreatitis, pancreatic head lesions, duodenal neoplastic lesions, etc. [1] [2] Studies have shown that pancreaticoduodenal surgery can reduce pain and control the progression of the disease by removing the lesion site of the pancreas and duodenum [3] [4]. However, in the actual diagnosis and treatment, the anatomical location of the pancreas and duodenum is complex, the operation is difficult, the surgical invasion operation easily causes damage to the surrounding normal tissues and organs, and the postoperative complications are many, and the incidence is high, which will have a certain impact on the diagnosis and treatment outcome. Therefore, it is of great significance to cooperate with scientific and appropriate nursing intervention measures to reduce the incidence of complications and promote the recovery of the disease. Enhanced recovery after surgery (ERAS) nursing refers to the use of perioperative interventions with evidence-based medical evidence to reduce the incidence of complications, shorten hospital stays, promote rehabilitation, reduce inflammation and stress reaction, and help patients achieve more significant postoperative recovery [5]. At present, the screening criteria for the prognosis of pancreaticoduodenal surgery are not unified, and the evaluation system and process are not perfect. The establishment of a sensitive index quantitative evaluation system based on the eras concept is conducive to the early rehabilitation of patients and the reduction of hospitalization costs [6]. Nursing-sensitive indicators refer to crucial quantitative metrics that reflect various aspects of nursing work, including quality, efficiency, and safety. These indicators serve as standards for quantitatively assessing and monitoring the quality of nursing management, nursing services, organizational promotion, and other procedures that impact patient health outcomes. They constitute significant tools for evaluating the quality of nursing care and nursing activities and also serve as vital means for managing nursing quality. Upon review, no research has been found on the application of a quantitative evaluation system based on ERAS nursing-sensitive indicators in pancreaticoduodenectomy. In view of this, this study plans to conduct a controlled study on 60 patients with pancreaticoduodenal surgery admitted from January 2022 to October 2023, aiming to explore the intervention effect of the

quantitative evaluation system based on eras nursing sensitive indicators.

## 2. Data and Methods

### 2.1. General Information

Sixty patients with pancreaticoduodenal surgery admitted to our hospital from January 2022 to October 2023 were selected as the research objects. Inclusion criteria: ① refer to the expert consensus on laparoscopic pancreatoduodenectomy [7] and meet the surgical indications; ② Age  $\geq 18$  and  $< 80$  years old; ③ Complete case data and clear awareness; ④ The patient and family members signed the informed consent. Exclusion criteria: ① Patients with tumor received anti-tumor treatment before operation; ② There are surgical contraindications such as diffuse pancreatic lesions and intolerance to pneumoperitoneum; ③ During the onset of psychosis, or there are language and consciousness disorders; ④ Complicated with distant metastasis of malignant tumor or other serious organic diseases; ⑤ Have a history of pancreatic or duodenal disease surgery; ⑥ Complicated with infectious diseases; ⑦ Patients were complicated with immune diseases, or had a history of immunosuppressant and steroid use within 3 months before enrollment. The patients were randomly divided into two groups: the reference group (n = 30) and the study group (n = 30). There was no significant difference in case data between groups ( $p > 0.05$ ) (see Table 1). The study was approved by the hospital ethics committee, ethics number KY202448.

**Table 1.** Comparison of case data between the two groups.

Group		Study Group (n = 30)	Reference Group (n = 30)	$\chi^2/t$	P
Gender [n (%)]	Male	18 (60.00)	21 (70.00)	0.659	0.417
	Female	12 (40.00)	9 (30.00)		
Average Age (Years)		53.16 $\pm$ 3.48	54.01 $\pm$ 4.17	0.857	0.395
Body Mass Index (kg/m <sup>2</sup> )		23.16 $\pm$ 2.12	23.31 $\pm$ 2.06	0.278	0.782
Type of Disease [n (%)]	Chronic Pancreatitis	6 (20.00)	4 (13.33)	0.480	0.488
	Carcinoma of Head of Pancreas	5 (16.67)	6 (20.00)	0.111	0.739
	Duodenal Carcinoma	11 (36.67)	13 (43.33)	0.278	0.598
	Carcinoma of the Lower Bile Duct	4 (13.33)	5 (16.67)	0.001	1.000
Complication [n (%)]	Ampullary Carcinoma	4 (13.33)	2 (6.67)	0.185	0.667
	Diabetes	4 (13.33)	6 (20.00)	0.480	0.488
Degree of Education [n (%)]	Hypertension	10 (33.33)	12 (40.00)	0.287	0.592
	Middle School and Below	11 (36.67)	14 (46.67)	0.617	0.432
	Vocational Education	14 (46.67)	13 (43.33)	0.067	0.795
	Undergraduate	5 (16.67)	3 (10.00)	0.144	0.704

### 2.2. Method

#### 2.2.1. Reference Group

Routine nursing care includes: 1) Instructing patients before surgery to complete

preparatory tasks, such as preoperative examinations and intestinal cleansing, to assess their surgical tolerance and risks. 2) Postoperative care involves administering a diet and necessary medications, including antibiotics to prevent infection and pain relievers to alleviate discomfort. Simultaneously, monitoring for drug side effects and patient reactions is essential. Within the first 24 hours after surgery, priority is given to enteral and parenteral nutritional support. Daily caloric needs are calculated based on the patient's weight, and the infusion of nutrients is strictly controlled. Following anal exhaust, patients are initially fed liquid food, which can gradually transition to semi-liquid and then regular food as tolerance increases. Throughout this process, close attention is paid to the patients' nutritional status and tolerance. 3) Based on the patients' pain level and tolerance, analgesic treatment is administered according to medical advice. Traditional methods involve oral administration or injection of analgesics, but strict control of drug dosage and administration frequency is necessary to prevent addiction and side effects. 4) Management of pulmonary complications: Patients are encouraged to practice deep breathing, coughing, and expectoration post-surgery to prevent pulmonary infections, atelectasis, and other complications.

### 2.2.2. Research Group

The quantitative evaluation system based on ERAS nursing-sensitive indicators was added to the reference group. Care is as follows.

#### 1) Establish a nursing team

The head nurse is responsible for setting up a nursing team, including 6 nurses in the accelerated rehabilitation standard ward of the Chen Xiaoping Foundation, 1 nutritionist, and 2 specialists. The head nurse regularly organized members to start training and assessments related to ERAS and nursing-sensitive indicators. The team members jointly reviewed the literature, consulted experts, sorted out data and expert opinions, and discussed and formulated the perioperative nursing plan for pancreaticoduodenum.

#### 2) Establish a quantitative evaluation system of nursing-sensitive indicators

Delphi method and semi-structured interview were used to establish a quantitative evaluation system of nursing-sensitive indicators based on eras concept, including 6 dimensions of preoperative intervention, nutritional risk [nutritional risk screening 2002 (NRS 2002), prognostic nutritional index (PNI)], complications, intraoperative nursing, postoperative nursing, and patient satisfaction. Eleven clinical nursing experts with bachelor's degrees or above were interviewed by Delphi expert correspondence, and the nursing-sensitive indicators were clarified after two rounds of correspondence (see **Table 2** for details, using the Likert 5-level scoring method).

#### 3) ERAS care

Eras nursing was implemented based on sensitive indicators of nursing. 1) Preoperative nursing: The ERAS concept emphasizes reducing unnecessary preoperative preparations, such as shortening the duration of fasting and water deprivation, and avoiding excessive intestinal preparation, to minimize the stress response and

discomfort experienced by patients. ① After admission, the patient was informed to give up smoking and alcohol, and the patient was instructed to carry out cough and abdominal breathing training. The patient was given 800 ml of 12.5% carbohydrate drink 10h before the operation and  $\leq 400$  ml 2H before the operation. ② Introduce the information of medical staff and ward environment to patients and explain the operation process, mechanism, postoperative complications, and precautions. Cooperate with standardized patients to take perioperative nursing videos of pancreaticoduodenal surgery and carry out health education combined with videos. If patients have excessive tension, fear, and other negative emotions before surgery, they can give appropriate explanations of successful medical records or invite patients with successful treatment to share the online experience through the WeChat group. ③ The nutritional risk was assessed according to the patient's weight, dietary preferences, recent dietary intake, and specific condition on admission, and the postoperative nutritional interventions were dynamically adjusted according to the risk assessment results. According to the principle of a five-step treatment mode before the operation, nursing interventions such as normal three meals + bepril, normal three meals + bepril + yogurt, enteral and parenteral nutrition support were given to patients with eating intention, poor appetite and no eating intention, extremely poor appetite and eating amount  $\leq 1/3$  before illness. 2) In postoperative care, ERAS advocates early feeding to facilitate the recovery of intestinal function and minimize complications. It emphasizes multimodal analgesia and preemptive analgesia to alleviate the impact of postoperative pain on patients. Although routine nursing also encompasses the management of pulmonary complications, the ERAS concept places greater emphasis on early mobility and deep breathing exercises to prevent the occurrence of pulmonary complications. ① Strengthen the monitoring of vital signs, observe and record the patient's heart rate, blood pressure, respiratory rate, and blood oxygen saturation every 30 min. Patients were encouraged to get out of bed early in the second to third postoperative days, 15 - 20 min/time, once a day, with mild sweating as the degree. ② Nutritional intervention should be given according to the risk of nutrition screening. If NRS 2002  $\geq 3$  points or PNI  $< 48.4$ , postoperative enteral and parenteral nutrition support should be strengthened, the nutritional risk should be evaluated again every 1D, and the postoperative diet plan should be adjusted according to the evaluation results. ③ The risk of postoperative complications was evaluated according to nursing-sensitive indicators, and the graded prevention nursing of complications was given in combination with the evaluation results. Closely observe the bleeding of the postoperative incision, abdominal signs, and drainage of patients. If the bleeding is  $\geq 100$  ml, inform the doctor in time and give timely treatment. Observe and record the fixation and drainage of the drainage tube, including the nature, color, and drainage volume of the drainage fluid. If severe abdominal pain occurs, give acid suppression and somatostatin treatment according to the doctor's advice; Encourage patients to move early; According to the results of nutritional risk assessment, strengthen nutritional support,

and appropriately give gastric mucosal protection and gastric acid-suppressive drug treatment; Strengthen aseptic operation, closely observe the patient's postoperative temperature and abdominal signs, and take emergency treatment if there are signs of infection. ④ The patients can be discharged after the drainage tube is removed, they can get out of bed, they can eat semi-liquid food, and their body temperature is normal. They will be given discharge guidance and extended care. The patients will be given life and diet guidance by phone or WeChat during their homestay.

The duration of nursing intervention in both groups was 14 days.

**Table 2.** Sensitive indicators of care based on eras.

	Sensitive Indicators	Importance ( $\bar{x} \pm s$ , Score)	Coefficient of Variation	Weight
Preoperative Intervention	Preoperative visit management	4.61 ± 0.17	0.047	0.082
	Eras health education	4.68 ± 0.23	0.049	0.063
	Respiratory function training	4.76 ± 0.19	0.040	0.051
	Unconventional bowel preparation	4.77 ± 0.23	0.048	0.057
	Fasting time management	4.62 ± 0.18	0.054	0.058
	Prophylactic use of antibiotics	4.66 ± 0.22	0.057	0.069
	Psychological nursing	4.78 ± 0.12	0.069	0.072
	Nursing risk assessment	4.82 ± 0.17	0.074	0.084
	Evaluation of deep vein thrombosis	4.74 ± 0.24	0.062	0.075
	Preoperative anemia, diabetes, hypertension control	4.71 ± 0.19	0.061	0.071
	Preoperative oral carbohydrate preoperative skin preparation	4.63 ± 0.22 4.67 ± 0.18	0.057 0.059	0.062 0.065
Nutritional Risk	NRS 2002	4.62 ± 0.31	0.067	0.086
	PNI	4.64 ± 0.29	0.063	0.080
Complication	Postoperative bleeding	4.75 ± 0.22	0.046	0.059
	Anastomotic fistula	4.68 ± 0.23	0.049	0.063
	Associated infections	4.66 ± 0.29	0.062	0.079
	Total complication rate	4.61 ± 0.28	0.061	0.078
Intraoperative	Anesthetic depth detection	4.78 ± 0.16	0.033	0.042
	Prophylactic use of antibiotics	4.91 ± 0.15	0.031	0.040
	Hypothermia prevention	4.73 ± 0.27	0.057	0.073
	The pipeline is not normally left	4.72 ± 0.24	0.051	0.065
	Intraoperative circulatory system monitoring	4.69 ± 0.19	0.048	0.058
	Intraoperative respiratory system monitoring	4.71 ± 0.22	0.053	0.064
Precise fluid therapy	4.68 ± 0.15	0.059	0.066	

**Continued**

	Prevention of deep vein thrombosis	4.73 ± 0.29	0.063	0.075
	Intraoperative pressure ulcer	4.69 ± 0.15	0.049	0.054
	Incision infiltration anesthesia	4.76 ± 0.25	0.065	0.077
	First exhaust	4.63 ± 0.17	0.058	0.069
	First oral intake	4.52 ± 0.11	0.044	0.054
	Postoperative nutritional support	4.66 ± 0.24	0.057	0.062
	Pain management	4.69 ± 0.13	0.059	0.068
	Pipeline removal time	4.74 ± 0.28	0.068	0.075
Postoperative	Prevention of postoperative nausea and vomiting	4.71 ± 0.17	0.063	0.076
	Respiratory function training	4.69 ± 0.24	0.066	0.082
	Get out of bed for the first time	4.73 ± 0.28	0.071	0.085
	Early ambulation execution	4.75 ± 0.26	0.073	0.086
	Perioperative blood transfusion	4.32 ± 0.15	0.047	0.058
Patient Satisfaction	Be in hospital	4.83 ± 0.22	0.046	0.059
	Leave hospital	4.81 ± 0.17	0.035	0.045

**2.3. Observation Index**

1) Rehabilitation: the exhaust time, intestinal function recovery time, hospitalization time, and hospitalization expenses of the two groups were compared.

2) Nutritional status: the nutritional health status was evaluated by NRs score and PNI before and 14 days after the intervention. NRS includes three dimensions of disease severity, impaired nutritional status, and age, which are 1 - 3 points, 0 - 3 points, and 0 - 1 points, respectively, with a total of 1 - 7 points. The higher the score, the higher the risk of malnutrition; Pni = albumin (g/l) + 5 × total number of peripheral blood lymphocytes (× 10<sup>9</sup>/l).

3) General comfort questionnaire (GCQ) and gastrointestinal quality of life index (GIQLI) scores: before and 14 days after the intervention, GCQ and GIQLI were used to assess comfort and quality of life. GCQ contains 28 items, 1 - 4 points/item, with a total of 28 - 112 points. The higher the score, the better the comfort; GIQLI contains 36 items, 0 - 4 points/item, a total of 0 - 144 points. The higher the score, the better the quality of life.

4) Postoperative complication rate: the number of patients with abdominal infection, anastomotic leakage, postoperative bleeding, and stress ulcer in the two groups were compared.

**2.4. Statistical Methods**

SPSS 22.0 software was used for statistical analysis of the data. The measurement data in line with the normal distribution were expressed by  $\bar{x} \pm s$ , and the independent sample test was used for comparison between groups. The data that did

not conform to the normal distribution were expressed by the median (interquartile range), and the comparison between groups was performed by a nonparametric test. Count data are expressed in n%, and the  $\chi^2$  test is used for comparison between groups.  $P < 0.05$  means that the data difference is statistically significant.

### 3. Results

#### 3.1. Comparison of Rehabilitation between the Two Groups

The exhaust time, intestinal function recovery time, hospitalization time, and hospitalization expenses of the study group were lower than those of the reference group ( $p < 0.05$ ) (see **Table 3**).

**Table 3.** Comparison of rehabilitation between the two groups ( $\bar{x} \pm s$ )

Group	Number of Cases	Exhaust Time (d)	Recovery Time of Intestinal Function (d)	Hospital Stay (d)	Hospitalization Expenses (Ten Thousand Yuan)
Study Group	30	2.32 ± 0.74	2.83 ± 0.46	11.26 ± 2.14	5.31 ± 1.01
Reference Group	30	3.01 ± 0.82	3.89 ± 0.62	15.31 ± 2.82	6.58 ± 1.19
t	-	3.422	7.520	6.266	4.457
P	-	0.001	0.001	0.001	0.001

#### 3.2. Comparison of Nutritional Status between Two Groups

There was no statistically significant difference in NRS scores and PNI between the two groups before intervention ( $P > 0.05$ ); The NRS scores of the two intervention groups were lower than before intervention, and the PNI was higher than before intervention ( $P < 0.05$ ); After intervention, the NRS score of the research group was lower than that of the reference group, and the PNI was higher than that of the reference group ( $P < 0.05$ ) (see **Table 4**).

**Table 4.** Comparison of nutritional status between two groups ( $\bar{x} \pm s$ ).

Group	Number of Cases	NRS Rating (Points)		PNI	
		Before Intervention	After Intervention	Before Intervention	After Intervention
Study Group	30	4.23 ± 1.02	1.88 ± 0.46 <sup>①</sup>	42.13 ± 3.17	51.16 ± 3.07 <sup>①</sup>
Reference Group	30	4.31 ± 1.05	2.18 ± 0.51 <sup>①</sup>	42.81 ± 3.62	49.01 ± 2.81 <sup>①</sup>
t	-	0.299	2.393	0.774	2.830
P	-	0.766	0.020	0.442	0.006

Note: Compared with before intervention in the same group, <sup>①</sup> $P < 0.05$ .

#### 3.3. Comparison of GCQ and GIQLI Scores between Two Groups

The comparison of GCQ and GIQLI scores between the two groups before intervention showed no statistically significant difference ( $P > 0.05$ ). The GCQ and GIQLI scores of the two groups after intervention were higher than before

intervention ( $P < 0.05$ ). After the intervention, the GCQ and GIQLI scores of the research group were higher than those of the reference group ( $P < 0.05$ ) (see **Table 5**).

**Table 5.** Comparison of GCQ and GIQLI scores between two groups ( $\bar{x} \pm s$ , points).

Group	Number of Cases	GCQ Score		GIQLI Score	
		Before Intervention	After Intervention	Before Intervention	After Intervention
Reference Group	30	73.59 $\pm$ 3.47	95.26 $\pm$ 5.01 <sup>①</sup>	89.49 $\pm$ 6.14	115.24 $\pm$ 7.13 <sup>①</sup>
Study Group	30	74.08 $\pm$ 4.02	91.93 $\pm$ 4.86 <sup>①</sup>	90.21 $\pm$ 6.55	109.97 $\pm$ 6.92 <sup>①</sup>
t	-	0.505	3.054	0.439	2.905
P	-	0.615	0.003	0.662	0.005

Note: Compared with before intervention in the same group, <sup>①</sup> $P < 0.05$ .

### 3.4. Comparison of Postoperative Complication Rates between Two Groups

The total incidence of postoperative abdominal infection, anastomotic leakage, postoperative bleeding, and stress ulcers were compared, with the study group having a rate of 3.33% lower than the reference group having a rate of 26.67% ( $P < 0.05$ ) (see **Table 6**).

**Table 6.** Comparison of postoperative complication rates between two groups [n (%)].

Group	Number of Cases	Abdominal Infection	Anastomotic Fistula	Postoperative Bleeding	Stress Ulcer	Total Incidence Rate
Reference Group	30	0 (0)	0 (0)	0 (0)	1 (3.33)	1 (3.33)
Study Group	30	1 (3.33)	1 (3.33)	3 (10.00)	3 (10.00)	8 (26.67)
$\chi^2$	-	0.001	0.001	1.404	0.268	4.706
P	-	1.000	1.000	0.236	0.605	0.030

## 4. Discussions

Pancreaticoduodenal surgery, as a type of abdominal surgery addressing various pathologies, carries potential risk factors, including surgical complexity and technical challenges, individual patient differences, and postoperative management. With the promotion and application of minimally invasive surgical techniques such as laparoscopy, it has the advantages of minimal trauma and fast prognosis. However, there are research reports [8] that compared with open surgery, laparoscopic pancreaticoduodenectomy has no significant decrease in the overall incidence of postoperative complications (open surgery 100.00% compared to laparoscopy 100.00%). Research has shown [9] that the total incidence of severe complications after pancreaticoduodenectomy in elderly patients is 56.14%. The risk of postoperative complications following pancreaticoduodenal surgery is generally high. However, by implementing strategies such

as enhancing surgical techniques, conducting individualized preoperative evaluation and optimization, bolstering postoperative management and rehabilitation, establishing a multidisciplinary collaborative team, and maintaining continuous monitoring and improvement, we can effectively reduce the incidence of complications and enhance the diagnosis and treatment outcomes for patients.

ERAS aims to shorten hospitalization time, reduce the incidence of complications, and promote patient recovery. By optimizing and improving intervention measures and refining nursing plans, ERAS helps pancreatic and duodenal surgery patients achieve more significant recovery effects, improve clinical intervention quality, and enhance patients' medical experience [10] [11]. Nursing sensitive indicators can provide a quantitative reference for predicting nursing outcomes and play an important role in clinical nursing guidance, helping to reduce the impact of sensitive issues on patient condition and prognosis and accelerate recovery speed. To improve the intervention effect on patients undergoing pancreaticoduodenectomy, this study used a quantitative evaluation system based on ERAS nursing-sensitive indicators for clinical nursing. The results showed that the study group had lower exhaust time, intestinal function recovery time, hospitalization time, and hospitalization costs than the reference group ( $P < 0.05$ ). Wang Zhixuan *et al.* [12] found that the postoperative hospitalization time, intestinal recovery time, and hospitalization costs of patients undergoing pancreaticoduodenectomy in the ERSA group were lower than those in the control group, which is consistent with the conclusion of this study. The reason for this is that after admission, guiding patients to carry out a cough and abdominal breathing training can help them maintain a smooth airway and good respiratory status during the perioperative period, which has a positive impact on reducing the risk of pulmonary complications and maintaining good vital signs and is beneficial for prognosis [13]. Collaborate with standardized patients in advance to shoot nursing videos, improve patients' health awareness, and provide timely psychological guidance for those who are overly nervous and fearful, which is conducive to improving patient compliance, ensuring clinical diagnosis and nursing effectiveness, and shortening postoperative recovery time. Simultaneously conducting nutritional and complication risk assessments based on sensitive indicators, adjusting perioperative nutritional support plans, and encouraging patients to get out of bed early can not only promote gastrointestinal motility and improve rehabilitation outcomes, but also reduce the impact of sensitive issues such as surgical stress, malnutrition, and complications on prognosis, further shortening hospitalization time and reducing medical costs. The results of this study showed that the NRS score of the intervention group was lower than that of the reference group, and the PNI, GCQ, and GIQLI scores were higher than those of the reference group ( $P < 0.05$ ), indicating that the quantitative evaluation system based on ERAS nursing-sensitive indicators can improve the nutritional health status, comfort, and quality of life of patients. Research has shown [14] [15] that patients undergoing pancreaticoduodenectomy often suffer from varying degrees of malnutrition, which can affect prognosis. PNI and NRS

can reflect the nutritional status and provide a quantitative reference for perioperative nutritional interventions. Based on nutritional risk indicators, preoperative and postoperative nutritional assessments and personalized nutritional interventions can ensure the daily nutritional intake of different patients [16] [17]. At the same time, dynamically adjusting the nutritional intervention plan based on the evaluation results of indicators at each stage not only prevents gastrointestinal mucosal atrophy, improves nutritional health status and immunity, but also promotes postoperative recovery of patients, which has a positive effect on reducing pain, improving comfort and quality of life [18]. Secondly, this study found that the total incidence of complications in the study group was 3.33% lower than that in the reference group, which was 26.67% ( $P < 0.05$ ). Similar to the research findings of Liu Juan [19], Lin Xiaoli [20], and others, it indicates that a quantitative evaluation system based on ERAS nursing-sensitive indicators can reduce the incidence of postoperative complications in nursing. The reason behind this is that by forming nursing teams, it is easier to provide patients with more comprehensive and scientific nursing services. Using the Delphi method and semi-structured interviews, a quantitative evaluation system for nursing-sensitive indicators was established based on the ERAS concept, and targeted intervention measures were developed based on the sensitive indicators. Conduct risk assessment based on sensitive indicators and propose improvement suggestions. Through preoperative guidance, health education, psychological intervention, and nutritional intervention, patients can undergo surgery in a good physical and mental health state, which is of great significance in reducing surgical stress and promoting postoperative recovery. After surgery, combined with sensitive indicators, it strengthens the monitoring of vital signs, encourages patients to get out of bed early, provides personalized nutritional interventions, prevents complications, and provides extended care after discharge. On the one hand, it can provide personalized nursing interventions for different patients, optimize and integrate medical resources, and improve nursing quality and efficiency. On the other hand, targeted ERAS nursing can accelerate recovery, further reduce the incidence of postoperative complications, facilitate the formation of a virtuous cycle, and alleviate the impact of sensitive indicators on the patient's condition.

## 5. Conclusion

The quantitative evaluation system established based on ERAS-sensitive nursing indicators demonstrates a significant intervention effect in pancreaticoduodenal surgery. This system can facilitate postoperative rehabilitation in patients and enhance their nutritional health status, comfort, and quality of life while reducing the incidence of postoperative complications. The limitations of this study include a relatively small sample size and limited observation time for indicators. When implementing ERAS-based nursing interventions in various hospital settings, it is crucial to consider the actual conditions of the hospital environment, establish an effective multidisciplinary collaboration mechanism, strengthen the training and

education of medical staff, and continuously optimize and improve the specific measures within the ERAS pathway. Therefore, in future research, it is necessary to appropriately expand the scope of the study to provide more references for the promotion and application of these intervention measures.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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