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Application of Quantitative Assessment Intervention Based on the Kano Model in Postoperative Nursing Care Following Laparoscopic Radical Surgery for Patients with Early-Stage Ovarian Cancer

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Abstract: *Objective*: To analyze the impact of nursing interventions based on quantitative assessment using the Kano model on the quality of rehabilitation in patients with early-stage ovarian cancer following laparoscopic radical surgery. *Methods*: A prospective clinical study was conducted involving 96 patients with newly diagnosed early-stage ovarian cancer who underwent laparoscopic radical surgery from December 2023 to December 2025. Patients were randomly assigned to groups using a random number table method before surgery. After surgery, the control group (n = 48) received routine quantitative assessment nursing interventions, while the observation group (n = 48) received nursing interventions based on quantitative assessment using the Kano model. Both groups received continuous nursing care until discharge. Differences between the groups were compared in terms of negative emotions, quality of life scores before and after postoperative intervention, postoperative recovery indicators, and nursing satisfaction evaluations on the day of discharge. *Results:* After intervention, the observation group had lower scores on the Self-Rating Anxiety Scale (SAS) and Self-Rating Depression Scale (SDS), as well as shorter recovery times for gastrointestinal function and food intake, and a shorter hospital stay compared to the control group. Additionally, the observation group had higher scores on the Quality-of-Life Instrument for Cancer Patients-Ovarian Cancer (QLICP-OV) than the control group, with statistically significant differences ($p < 0.05$). The overall satisfaction with nursing care in the observation group was also higher than that in the control group, with a statistically significant difference ($p < 0.05$). *Conclusion:* Implementing quantitative evaluation nursing interventions based on the Kano model for patients with early-stage ovarian cancer after laparoscopic radical surgery can, by addressing their postoperative basic health, disease awareness, and other intervention content needs to a comprehensive degree, actively promote postoperative recovery and improve their mental health and quality of life.

Keywords: Early-stage ovarian cancer; Laparoscopic radical surgery; Postoperative nursing; Kano model

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1. Introduction

Ovarian cancer, a common malignant tumor of the female reproductive system, has a high incidence rate among women aged 50 to 70. Clinical recommendations suggest that early-stage patients (TNM staging ≤ IIa) should undergo radical surgery as soon as possible to improve disease prognosis [1]. The quality of recovery, as a major factor influencing the postoperative safety of these patients, can be affected by multiple clinical factors that determine the actual postoperative recovery quality. It is necessary to formulate reasonable nursing plans and optimize the effects of nursing interventions by considering the actual needs of patients for different nursing services and the impact of nursing evaluations [2,3]. Therefore, to analyze the impact of nursing interventions based on quantitative evaluation using the Kano model on the recovery quality of patients with early-stage ovarian cancer after laparoscopic radical surgery, this study was conducted, with details as follows.

2. Materials and methods

2.1. Clinical data

A prospective clinical study was conducted on 96 patients with newly diagnosed early-stage ovarian cancer who were admitted to the hospital for laparoscopic radical surgery from December 2023 to December 2025. These patients were randomly divided into a control group (n = 48) and an observation group (n = 48) using a random number table method before surgery. In the control group, the patients ranged in age from 43 to 68 years (55.54 ± 5.61 years), with a disease duration of 5 to 15 months (10.24 ± 1.06 months). The pathological staging was as follows: 13 cases in stage I and 35 cases in stage IIa. In the observation group, the patients ranged in age from 45 to 65 years (55.21 ± 5.58 years), with a disease duration of 6 to 14 months (10.32 ± 1.02 months). The pathological staging was as follows: 16 cases in stage I and 32 cases in stage IIa. There were no statistically significant differences in age, the proportion of pathological staging, and disease duration between the two groups ($p > 0.05$).

2.1.1. Inclusion criteria

(1) Preoperative diagnosis met the diagnostic criteria for ovarian cancer, with TNM staging of stage I to IIa;
(2) Met the indications for laparoscopic radical surgery;
(3) Had an educational level of junior high school or above and were able to complete clinical questionnaire assessments and cooperate accordingly;
(4) Confirmed surgery, voluntarily joined the group, and signed the “Informed Consent Form”.

2.1.2. Exclusion criteria

(1) Accompanied by severe systemic diseases or cardiovascular and cerebrovascular diseases;
(2) Accompanied by a history of previous malignant tumors;
(3) Accompanied by a history of long-term analgesic medication;
(4) Estimated survival period of less than 6 months;
(5) Accompanied by severe psychological trauma within 6 months before surgery.

2.2. Methods

2.2.1. Control group

Conventional quantitative assessment nursing intervention:

(1) Risk quantification

Based on information such as patients' preoperative examinations and surgical conditions, as well as clinical risk assessment tools (e.g., pain assessment, negative emotion scoring, complication risk assessment, etc.), comprehensively evaluate the postoperative safety risk level of patients and develop clinical nursing content for patients at different risk levels.

(2) Nursing implementation

After the assessment, assign nursing staff to patients based on the assessment results, i.e., one nurse for every two patients with low risk, one nurse for each patient with medium risk, and one head nurse and one nurse for each patient with high risk. During the postoperative rehabilitation period, nurses will perform psychological interventions, dietary guidance, functional exercises, and other nursing tasks, as well as provide medication guidance in accordance with medical advice.

2.2.2. Observation group

Quantitative assessment nursing intervention based on the Kano Model:

(1) Kano model quantitative assessment

A research team composed of specialist head nurses, nurses, doctors, and psychologists will be established. Based on the Kano model theory and recent literature research findings, a comprehensive Kano model assessment scale will be developed to quantitatively evaluate the nursing needs of patients based on their age, underlying conditions, pathological stage, emotional health scores (including SAS and SDS scores), and postoperative 24-hour vaginal bleeding volume. After the assessment, the degree of demand for related nursing content will be classified based on the scores of each evaluation item, including five levels: like, expected, indifferent, tolerable, and dislike. Based on the degree of demand, the satisfaction coefficient (SI) of related service items will be calculated. If the SI is positive and the larger the value, the stronger the impact of the related nursing service items on improving nursing satisfaction. After completing the aforementioned questionnaire assessment, a comprehensive nursing plan should be formulated in detail, which requires relevant nursing to be carried out on the basis of routine quantitative assessment and nursing intervention for patients.

(2) Nursing implementation

① Health Education: Utilize personalized methods such as pictures and videos to educate patients on disease knowledge, surgical treatment, and other related content. Use the publicity board in the ward area to create and display promotional materials on disease and surgical management, enhancing the accessibility of health knowledge for patients. ② Nutritional Intervention: During the postoperative recovery period, a comprehensive assessment of the patient's postoperative nutritional health status and nutrient requirements should be conducted by a nutritionist. Individualized nutritional rehabilitation guidance should then be provided to ensure the healthy recovery of gastrointestinal function and postoperative nutritional health. ③ Treatment Guidance: Provide detailed treatment education and safety management cooperation to patients regarding their postoperative treatment plans. ④ Psychological Intervention: Based on postoperative health education, nurses are required to communicate with patients on a "one-on-one" basis daily, provide psychological counseling and intervention based on the patient's psychological changes, and adjust nursing intervention content as needed based on an understanding of the patient's changing needs. ⑤ Rehabilitation Guidance: Develop feasible intervention plans tailored to the postoperative exercise rehabilitation needs of

ovarian cancer patients, guiding them in traumatic exercises within 6 hours post-surgery, getting out of bed within 12 hours post-surgery, and engaging in other postoperative exercise rehabilitation activities.

2.3. Observation indicators

(1) Negative emotions

The Self-Rating Anxiety Scale (SAS) and Self-Rating Depression Scale (SDS) were employed to evaluate patients' anxiety and depression before and after intervention. Both scales are 20-item versions with a total score range of 20 to 80. A SAS score ≥ 50 indicates the presence of anxiety, while an SDS score ≥ 53 suggests the presence of depression. Higher scores indicate more severe anxiety or depression [4].

(2) Quality of life score

The Quality-of-Life Instrument for Cancer Patients-Ovarian Cancer (QLICP-OV) was used to assess patients' quality of life before and after intervention. It encompasses four domains: physical function, psychological function, social function, and common symptoms and side effects, with a total of 42 items. A Likert 5-point scoring method was used for assignment, and the raw scores obtained were converted into standardized scores using the range normalization method. The total score ranges from 0 to 100, with higher scores indicating a higher level of quality of life [5].

(3) Postoperative recovery indicators

The mean values of the first anal exhaust, defecation time, first feeding time, and discharge time during hospitalization after surgery were calculated for each group.

(4) Nursing satisfaction evaluation

The Newcastle Nursing Service Satisfaction Scale (NSNS) was used to evaluate nursing satisfaction on the day of discharge, with a total score ranging from 19 to 95. Satisfaction levels were classified based on the scoring results, including very satisfied (95 points), satisfied (76–94 points), average (57–75 points), and dissatisfied (19–56 points). The overall satisfaction rate was calculated as (number of very satisfied cases + number of satisfied cases) / n × 100%.

2.4. Statistical methods

Data were statistically analyzed using SPSS 25.0 software. For normally distributed measurement data, descriptions were presented in the form of ($\overline{x} \pm s$). Independent sample *t*-tests were conducted for comparisons between groups, and paired sample *t*-tests were used for comparisons within groups. For count data, descriptions were given as n (%). For data on composition ratios, chi-square tests were performed, and for ordinal data, rank-sum tests were applied. A *p*-value less than 0.05 indicated a statistically significant difference.

3. Results

3.1. Comparison of negative emotions and quality of life scores

Before the intervention, there was no statistically significant difference in negative emotions and quality of life scores between the two groups ($p > 0.05$). After the intervention, the SAS and SDS scores of patients in both groups decreased compared to those before the intervention, while the QLICP-OV score increased compared to that before the intervention. Moreover, the changes in the above scores in the observation group were more significant than those in the control group, with statistically significant differences ($p < 0.05$). See **Table 1**.

Table 1. Comparison of negative emotions and quality of life scores ($\overline{x} \pm s$)

Group	SAS (Score)		SDS (Score)		QLICP-OV (Score)	
	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Control (n = 48)	57.68 ± 4.31	38.95 ± 4.21*	61.47 ± 5.12	42.58 ± 4.35*	62.36 ± 5.74	74.31 ± 5.52*
Observation (n = 48)	58.02 ± 4.25	33.16 ± 3.97*	61.45 ± 5.23	35.65 ± 4.08*	62.42 ± 5.58	80.26 ± 4.97*
t-value	0.389	6.159	0.019	8.050	0.052	5.549
p-value	0.698	< 0.001	0.985	< 0.001	0.959	< 0.001

Note: *A *p*-value less than 0.05 indicates a statistically significant difference compared to the same group.

3.2. Comparison of postoperative recovery indicators

The time to first anal exhaust, first defecation, first intake of food, and the length of hospital stay in the observation group were all shorter than those in the control group, with statistically significant differences ($p < 0.05$). See **Table 2**.

Table 2. Comparison of postoperative recovery indicators ($\overline{x} \pm s$)

Group	Time to first flatus (d)	Time to first defecation (d)	Time to first oral intake (d)	Hospital stays (d)
Control (n = 48)	2.32 ± 0.48	2.97 ± 0.78	2.54 ± 0.55	11.12 ± 2.15
Observation (n = 48)	1.45 ± 0.52	2.09 ± 0.65	1.67 ± 0.48	9.15 ± 1.85
t-value	8.517	6.005	8.257	4.812
p-value	< 0.001	< 0.001	< 0.001	< 0.001

3.3. Comparison of nursing satisfaction evaluation

The overall satisfaction rate and the proportions of "very satisfied" and "satisfied" in the observation group were higher than those in the control group, with statistically significant differences ($p < 0.05$). See **Table 3**.

Table 3. Comparison of nursing satisfaction evaluation (n, %)

Group	Very satisfied	Satisfied	Fair	Dissatisfied	Total satisfaction
Control group (n = 48)	14 (29.17)	26 (54.17)	6 (12.50)	2 (4.17)	40 (83.33)
Observation group (n = 48)	20 (41.67)	27 (56.25)	1 (2.08)	0	47 (97.92)
χ^2 (Chi-square)		1.978			6.008
p-value		0.048			0.014

4. Discussion

The Kano model, widely applied in corporate management in recent years, has a definitive effect on optimizing customers' actual service experiences. This model may also be applicable to the healthcare service industry. Related studies have indicated that the implementation of nursing under the guidance of the Kano model, after analyzing patients' actual intervention needs and classifying them into categories such as expected, attractive, and

essential needs, can delve deeper into patients' potential needs from the perspectives of the degree and nature of these needs. This, in turn, enhances nursing content and intervention outcomes, with proven clinical effectiveness [6].

Based on the above background, after formulating and applying a quantitative evaluation nursing intervention based on the Kano model, it was found that the SAS and SDS scores, postoperative gastrointestinal function, time to resume eating, and length of hospital stay in the observation group were all lower than those in the control group, while the QLICP-OV score was higher in the observation group, with statistically significant differences ($p < 0.05$). Analysis shows that, based on the quantitative assessment of the Kano model, on the foundation of conventional risk quantitative assessment, after analyzing the actual demand levels of different nursing intervention measures involved in the factors influencing the quality of postoperative rehabilitation in patients, as well as their impact on the evaluation of nursing services, the nursing implementation content and details for patients with different risk levels can be further refined. This, in turn, can actively promote the recovery of patients' postoperative gastrointestinal function by improving measures such as health education, psychological intervention, and nutritional intervention, thereby assisting in enhancing the overall quality and efficiency of rehabilitation, and positively improving patients' postoperative emotional health and quality of life [7].

Furthermore, this study indicates that the overall satisfaction rate, as well as the proportions of "very satisfied" and "satisfied" in the observation group, are higher than those in the control group, with statistically significant differences ($p < 0.05$). The aforementioned conclusions align with the application objectives of the Kano model. After clarifying the impact of different nursing intervention effects on patients' nursing evaluations, by strengthening the intensity of relevant interventions, the satisfaction level of patients' actual nursing service evaluations can be actively optimized.

5. Conclusion

In summary, implementing quantitative assessment nursing interventions based on the Kano model after laparoscopic radical surgery for early-stage ovarian cancer patients can actively promote postoperative rehabilitation and improve their mental health and quality of life, based on the demand levels of intervention content such as basic postoperative health and disease awareness.

Disclosure statement

The authors declare no conflict of interest.

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