## Original Article
# Effect of refined management in operating room nursing on surgical efficiency and nursing satisfaction during laparoscopic radical resection of colon cancer

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**Abstract:** Aim: To assess the effect of refined management in the operating room nursing on surgical efficiency and nursing satisfaction during laparoscopic radical resection of colon cancer. Methods: In this retrospective study, 100 patients with laparoscopic radical resection of colon cancer were enrolled into this study. There were 51 patients who received refined management (the observation group) and 49 patients who received routine nursing intervention (the control group). The effect of refined management in the operating room nursing was evaluated by comparing the surgical efficiency, quality of care ratings, pain scores, and the nursing satisfaction between the two groups. Results: The preoperative preparation time, surgical time, intraoperative bleeding volume, and time to first postoperative defecation in the observation group were all less than those in the control group after nursing intervention (all $P<0.05$). The observation group had higher scores than the control group in five categories: operating room environment and safety, drug and instrument management, hygiene and sterilization, nursing records, and nursing professionalism (all $P<0.05$). The numerical rating scale (NRS) pain scores of the patients in the observation group were lower than those of the control group at 12, 24, and 48 hours postoperatively (all $P<0.05$). The rate of satisfaction in the observation group was 96.1%. This was higher than the 91.8% in the control group ($P<0.05$). The multivariate regression analysis demonstrated that refined management intervention is an independent factor for patients' prognosis. Conclusion: The implementation of a refined management model in the operating room is effective in improving the quality of surgical care and surgical efficiency, and increasing patient satisfaction with nursing staff.

**Keywords:** Refined management, surgical efficiency, nursing satisfaction, laparoscopic radical resection, colon cancer, operating room nursing

## Introduction

Due to various bad living and dietary habits of human beings, long-term high-protein diet has been regarded as one of the main factors of intestinal diseases. Colorectal tumors are rising in China, as shown by the data. There are 600,000 cases of colorectal tumors are added every year in China [1]. Many colon cancer patients miss their best treatment time because of insidious symptoms such as dyspepsia and fecal occult blood [2]. The main treatments include surgical resection of malignant intestinal segments supplemented with long-term chemotherapy [3]. Laparoscopic radical surgery for colon cancer has a long operation time, coupled with the fact that the patients are mostly elderly. The operation may cause a great impact on the prognosis of the patients.

Laparoscopic radical surgery for colon cancer, as a minimally invasive operation, has less trauma and has gradually become the standard surgical practice [4]. It has been accepted because of its safety, feasibility, and good short and long-term outcomes [5]. Some studies have shown that the postoperative recovery of colon cancer patients undergoing laparoscopic radical surgery is different. It is necessary to explore better nursing models to improve the surgical efficiency and nursing satisfaction of colon cancer patients [6]. Conventional nursing interven-

tions center on the patient's disease. It has gradually not been able to meet the needs of clinical surgical care because of the lack of systematic, comprehensive. Detailed nursing content and the search for a more high-quality operating room nursing mode has become the main content of clinical nursing work [7]. In recent years, the concept of refined management has been gradually introduced from enterprise management to clinical nursing management. Compared with conventional nursing management, the refined management process are more detailed and comprehensive [8]. The refined management advocates patient-centered, comprehensive, and in-place nursing services to improve the physical and mental state of patients in the operating room [9].

Refined management is a new management mode [10]. Through the refinement of division of labor, the rational allocation of nursing positions, the development of standardized nursing process, the constraints on the nursing behavior according to the rules and regulations, and the sense of service throughout the entire operating room nursing process, it is able to achieve high-quality nursing care in the operating room and improve the efficiency of the operation [11-13]. The research on refined management nursing in China is at the initial stage of exploration. The research direction was focused on stroke and endoscopic sinus surgery [14, 15]. There was no evidence to show the effect of refined management in the operating room nursing on patients undergoing laparoscopic radical resection of colon cancer.

The aim of this study was to assess the effect of refined management in operating room nursing on surgical efficiency and nursing satisfaction during laparoscopic radical resection of colon cancer.

**Materials and methods**

*General data*

In this retrospective study, the baseline and clinical data of 100 patients who had undergone laparoscopic radical resection of colon cancer from January 2021 to June 2023 were collected. Based on different nursing methods, the patients were assigned into two groups: an observation group including 51 patients who

received refined management and a control group encompassing 49 patients who received routine nursing intervention. The study was approved by the Ethics Committee of Yichun People's Hospital.

Inclusion criteria: ① Colon cancer patients undergoing laparoscopic radical resection; ② Patients with clear consciousness and communication ability; ③ Patients with an age of 18-80. Exclusion criteria: ① Patients with mental abnormalities; ② Patients with endocrine disorders, respiratory or circulatory diseases; ③ Patients with severe liver, kidney or organ dysfunction; ④ Patients with poor treatment compliance and failed to complete the relevant investigation of this study independently; ⑤ Patients with severe preoperative infections; ⑥ Patients with coagulation function or hematopoietic disorders; ⑦ Patients with incomplete clinical data.

*Nursing specifics*

The control group: The patients received routine nursing intervention, including close observation of the patient's physiological indicators, guidance on completing the routine surgical examination, assisting the surgeon to complete the operation, paying attention to the handover of shifts, and in-time notifying any accident to the attending physician.

The observation group: Based on the routine nursing intervention, refined management intervention was performed. (1) Training on fine management of operating room care: Organize the medical and nursing staff of the operating room to actively participate in professional management training, invite experts from tertiary hospitals to present lectures on advanced concepts of fine management in the operating room, and distribute study manuals to each staff for enhancing knowledge. (2) Emphasis on the assessment of the patient's psychological state, informing them of the advantages of surgical treatment and refined nursing care, and helping them to promptly resolve tension and anxiety, to be able to respond to the treatment in a more positive and optimistic state. (3) Fine management of the operating room environment: 30 min in advance of the operation, turn on the laminar flow purification system in the operating room, and use chlorine disinfectant to wipe and disinfect the items and instruments

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

| | Observation group (n=51) | Control group (n=49) | t/$\chi^2$ | P |
|---|---|---|---|---|
| Age (years) | 50.31±6.61 | 51.24±4.1 | 3.05 | 0.271 |
| Sex | | | 3.28 | 0.442 |
|     Male (n%) | 32 (62.3%) | 28 (57.1%) | | |
|     Female (n%) | 19 (37.7%) | 21 (42.9%) | | |
| Body mass index | 21.7±2.28 | 20.4±2.76 | 1.239 | 0.432 |
| Smoking | 31 (60.7%) | 30 (61.9%) | 1.97 | 0.691 |
| ASA classification | | | 9.95 | 0.062 |
|     I | 28 (54.1%) | 30 (61.2%) | | |
|     II | 23 (45.1%) | 19 (38.8%) | | |
| Anesthesia duration (min) | 260.2±11.12 | 261.4±11.76 | 2.225 | 0.219 |
| Infusion volume (ml) | 2355.52±111.88 | 2336.09±112.01 | 2.674 | 0.263 |
| Preoperative hemoglobin (g/L) | 97.7±7.7 | 100.1±7.9 | 1.982 | 0.198 |
| Pathological type | | | 1.876 | 0.219 |
|     Mass | 11 (21.6%) | 10 (20.4%) | | |
|     Ulcerative | 19 (37.7%) | 21 (42.9%) | | |
|     Invasive | 10 (19.6%) | 9 (18.4%) | | |
|     Mucinous carcinoma | 11 (21.6%) | 9 (18.4%) | | |

**Table 2.** Comparison of nursing satisfaction between the two groups

| Group | Number of cases | Basically satisfied | Satisfied | Very satisfied | Satisfaction rate |
|---|---|---|---|---|---|
| Observation group | 51 | 2 (3.9%) | 30 (58.8%) | 19 (37.3%) | 49 (96.1%) |
| Control group | 49 | 4 (8.2%) | 28 (57.1%) | 17 (34.7%) | 45 (91.8%) |
| t | - | 6.42 | 2.93 | 3.39 | 5.17 |
| P | - | 0.041 | 0.74 | 0.33 | 0.02 |

in the operation room. After the operation, thoroughly clean the debris on the floor of the operating room and the dirty liquid. After the morning meeting every day, the head nurse checks the cleanliness in the operating room. Weekly cleaning of the operating room and monthly bacterial colony testing of the surfaces and air in the operating room are required. (4) Fine management of items in the operating room: Items in the operating room should be classified in detail and labeled properly on the surface. After the operation, the items should be sent to the sterilization and supply center in time for sterilization and disinfection. The instruments and equipment should be regularly inspected and maintained to ensure their adequate function. (5) Fine management of nursing process in the operating room: establishing the responsibility system in the operating room, clearly delineating the scope of responsibilities of each nursing link and each nursing staff, standardizing the perioperative nursing process from preoperative visit and preparation, intraoperative cooperation to postoperative follow up, emphasizing the implementation of fine management to each surgery-related aspect to reduce the incidence of errors, developing a nursing risk warning management system, refining the grading of the possible intraoperative risks of patients, standardizing the rescue procedures and standards for critically ill patients, and strengthening the awareness of detail management of nursing staff. (6) Reducing the risk of medical infection in the operating room: emphasizing hand hygiene is the focus. The operating room should be equipped with sensor-type hand-washing faucets, stocked with sufficient hand sanitizer and dry paper towels next to the sink for the convenience of healthcare workers to allow post seven-step hand-washing, and prepared with finger-washing signs and occupational exposure treatment on the top of the sink. (7) After the operation, patients' pain were evaluated, and diverse actions were conducted to alleviate the pain. For mild pain, the patients should be
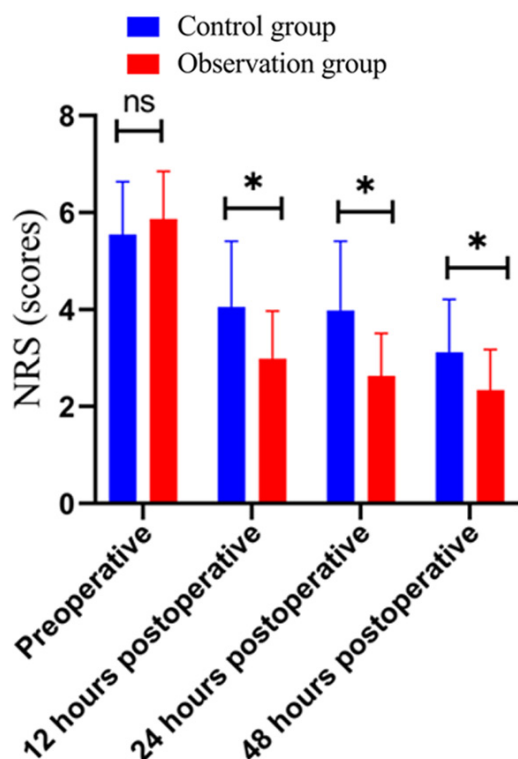
**Figure 1.** Compare NRS scores between two groups. *$P<0.05$ as compare with control group. $^{ns}P>0.05$ as compare with control group.

instructed to divert their attention through reading and listening to music. For strong pain, they should be provided with analgesic drugs under the guidance of the physician to alleviate the pain. It is necessary to pay attention to the fine management of the postoperative inpatient environment, provide patients with a quiet and comfortable inpatient environment, adjust the temperature and humidity to a reasonable range, and ventilate and disinfect the hospital at regular intervals.

*Outcome measurement*

The primary observation indices were surgical efficiency and nursing satisfaction. The surgical efficiency included preoperative preparation time, surgery time, intraoperative bleeding volume, time to first postoperative defecation, and postoperative pain score. The evaluation of nursing satisfaction in the operating room was carried out using a self-made questionnaire designed according to the tertiary hospital satisfaction evaluation criteria developed by the Ministry of Health [16], with a total score of 50. A score of 50 points indicated very satisfied,

45-49 points represented satisfied, 35-44 points implied fair, and <35 points indicated unsatisfied. Nursing care satisfaction (%) = (number of very satisfied cases + number of satisfied cases)/total number of cases × 100%. The Numerical Rating Scale (NRS) [17] was used as an assessment tool to evaluate the pain level of the patients. The pain level was expressed as a number from 0 to 10, with a lower score indicating a milder pain degree.

*Statistical analysis*

The data were processed by SPSS 23.0 statistical software, and GraphPad Prism software (v5, GraphPad Software, Inc.) was used for figure rendering. The counted data were expressed as [n (%)], and comparisons were made by $\chi^2$. Measured data were expressed as (X±s), and t-test was used for comparison. For NRS scores, repeated measurement analysis was conducted for measurements of 3 time points. Kaplan-Meier method was applied to draw the survival curve, and Log rank test was used to assess differences in survival. Patients were divided into two groups with good prognosis and poor prognosis to analyze independent risk factors affecting prognosis. If the 3-year survival rate is between 30% and 50%, the prognosis is good. If the 3-year survival rate is not between 30% and 50%, the prognosis is poor. Univariate logistic regression model was used to analyze the factors affecting prognosis in patients with laparoscopic radical resection of colon cancer. The variables with significant results in univariate analysis were included in multivariate logistic regression analysis. Cox proportional hazards regression model was used for multivariate analysis. Multivariate analysis included refined management intervention, preoperative hemoglobin, pathological type, preoperative preparation time, surgical time, and time of first postoperative defecation. Survival status showed continuous variables, including classified variables. Multivariate analysis adjusted body mass index and age. *P* value <0.05 was considered as significance.

**Results**

*Clinical data*

The enrolled patients in this study consisted of 60 male and 40 female. There were no significant differences in gender, age, body mass

**Table 3.** Comparison of surgical efficiency between the two groups

| Index | Time points | Observation group (n=51) | Control group (n=49) | t | P |
|---|---|---|---|---|---|
| Preoperative preparation time (min) | Before treatment | 31.38±6.22 | 31.44±5.25 | 1.673 | 0.348 |
| | After treatment | 22.97±5.54 | 30.81±5.21 | 9.263 | 0.004 |
| | t | 10.218 | 3.216 | - | - |
| | P | 0.001 | 0.058 | - | - |
| Surgical time (min) | Before treatment | 249.8±23.5 | 246.7±23.4 | 1.873 | 0.315 |
| | After treatment | 175.9±23.9 | 232.4±24.1 | 12.943 | 0.002 |
| | t | 14.128 | 3.416 | - | - |
| | P | 0.001 | 0.062 | - | - |
| Intraoperative bleeding (ml) | Before treatment | 44.7±14.5 | 43.1±16.4 | 0.785 | 0.332 |
| | After treatment | 30.8±15.3 | 42.6±14.3 | 11.194 | 0.001 |
| | t | 14.628 | 4.116 | - | - |
| | P | 0.001 | 0.076 | - | - |
| Time to first postoperative defecation (hours) | Before treatment | 44.7±14.5 | 44.1±16.4 | 0.685 | 0.432 |
| | After treatment | 38.8±15.3 | 42.6±14.3 | 7.194 | 0.021 |
| | t | 8.628 | 1.116 | - | - |
| | P | 0.011 | 0.073 | - | - |

**Table 4.** Comparison of quality of care ratings between the two groups

| | Time points | Observation group (n=51) | Control group (n=49) | t | P |
|---|---|---|---|---|---|
| Operating room environment and safety (points) | Before intervention | 10.51±5.92 | 10.51±6.16 | 1.992 | 0.189 |
| | After intervention | 18.22±5.37 | 11.06±5.33 | 8.235 | 0.008 |
| | t | 14.318 | 3.216 | - | - |
| | P | 0.001 | 0.057 | - | - |
| Drug and device management (points) | Before intervention | 10.12±2.95 | 11.53±2.22 | 1.639 | 0.427 |
| | After intervention | 18.12±5.24 | 12.54±2.05 | 9.424 | 0.003 |
| | t | 13.128 | 2.416 | - | - |
| | P | 0.001 | 0.077 | - | - |
| Sanitization (points) | Before intervention | 9.23±3.22 | 9.45±3.24 | 2.940 | 0.616 |
| | After intervention | 15.47±5.21 | 10.45±3.24 | 10.349 | 0.002 |
| | t | 8.618 | 7.216 | - | - |
| | P | 0.002 | 0.060 | - | - |
| Nursing records (points) | Before intervention | 11.01±4.32 | 11.54±3.27 | 3.538 | 0.180 |
| | After intervention | 19.08±3.27 | 12.28±3.69 | 10.444 | 0.001 |
| | t | 9.91 | 1.15 | - | - |
| | P | 0.001 | 0.072 | - | - |
| Nursing professionalism (points) | Before intervention | 13.87±5.89 | 12.18±5.21 | 3.636 | 0.220 |
| | After intervention | 18.21±5.30 | 13.21±4.64 | 8.567 | 0.007 |
| | t | 10.9 | 3.78 | - | - |
| | P | 0.003 | 0.065 | - | - |
| Totals (points) | Before intervention | 68.58±4.55 | 65.36±5.52 | 3.377 | 0.750 |
| | After intervention | 88.28±5.57 | 66.22±4.06 | 9.458 | 0.002 |
| | t | 9.892 | 3.135 | - | - |
| | P | 0.009 | 0.052 | - | - |
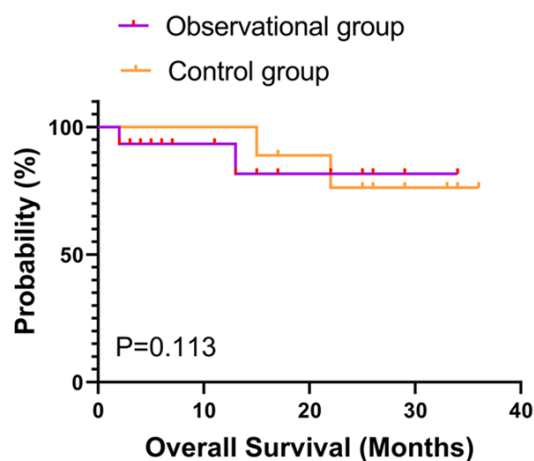
**Figure 2.** The Kaplan Meier survival curve.

index, smoking status, ASA classification, anesthesia duration, infusion volume, pathological type, or preoperative hemoglobin between two groups (all P>0.05) (**Table 1**).

*Nursing satisfaction*

The rate of satisfaction in the observation group was 96.1%. This was significantly higher than 91.8% in the control group (P<0.05) (**Table 2**).

*NRS scores*

The NRS pain scores of the patients in the observation group were lower than those of the control group at 12, 24, and 48 hours postoperatively. The differences between the two groups were significant (all P<0. 05) (**Figure 1**).

*Surgical efficiency*

As shown in the **Table 3**, preoperative preparation time, surgical time, intraoperative bleeding volume, and time to first postoperative defecation in the observation group were statistically less than those in the control group after nursing intervention (all P<0.05).

*Quality of care ratings*

After the nursing intervention, the observation group had significantly higher scores than the control group in five categories: operating room environment and safety, drug and instrument management, hygiene and sterilization, nursing records, and nursing professionalism (all P<0.05) (**Table 4**).

*The overall survival rate*

The Kaplan-Meier survival curve showed that the survival rate between the two groups had no significant differences (P>0.05) (**Figure 2**).

*Univariate analysis of factors affecting patients' prognosis*

We found that refined management intervention, preoperative hemoglobin, pathological type (Invasive), preoperative preparation time, surgical time, and time to first postoperative defecation had a significant correlation with patients' prognosis (all P<0.05) (**Table 5**).

*Multivariate analysis of factors affecting patients' prognosis*

As shown in the **Table 6**, multiple regression analysis demonstrated that patients' prognosis had a significant relation with refined management intervention.

**Discussion**

Refined management model is applied in medical management, through the establishment of management objectives, the refinement of medical management content and processes, and the improvement of the perfect management system. This would enhance the level of medical care and the quality and efficiency of medical services [18]. In this study, it was found that the application of refined management in the management of the operating room can effectively improve the quality of nursing care in the operating room. It can significantly improve the efficiency of surgery. The rate of satisfaction was significantly higher in the observation group (96.1% VS 91.8%).

The refined management model improved the quality of nursing care and efficiency of surgery. The reason may be that it could make the management content and work regulations more refined. Medical and nursing staff would pay more attention to the connection of each link strictly in accordance with the norms of the operation to improve the quality of care. Through the optimization of various nursing processes, the time of pick-up and drop-off in the operating room and the preparation time could be significantly shortened, improving the work efficiency. This would ensure the patient can be more quickly accepted to the treatment,

**Table 5.** The relation between various factors and patients' prognosis

| Indexes | rho | P |
|---|---|---|
| Age | -0.092 | 0.555 |
| BMI (kg/m$^2$) | -0.181 | 0.792 |
| Gender | 0.145 | 0.612 |
| ASA classification (I) | -0.244 | 0.844 |
| ASA classification (II) | -0.567 | 0.687 |
| Anesthesia duration (min) | -0.338 | 0.412 |
| Infusion volume (ml) | -0.476 | 0.287 |
| Refined management intervention | 0.941 | <0.001 |
| Preoperative hemoglobin (g/L) | 0.176 | 0.011 |
| Pathological type (Mass) | -0.345 | 0.245 |
| Pathological type (Ulcerative) | -0.042 | 0.876 |
| Pathological type (Invasive) | -0.429 | 0.006 |
| Pathological type (Mucinous carcinoma) | -0.174 | 0.106 |
| Preoperative preparation time | 0.664 | <0.001 |
| Surgical time | -0.328 | 0.009 |
| Intraoperative bleeding | -0.875 | 0.758 |
| Time of first postoperative defecation | 0.385 | 0.002 |
| Operating room environment and safety | 0.274 | 0.107 |
| Drug and device management | -0.698 | 0.219 |
| Sanitization | -0.339 | 0.145 |
| Nursing records | -0.987 | 0.078 |
| Nursing professionalism | -0.498 | 0.057 |

Note: The Pearson correlation analysis was used for normal distribution data and Spearman correlation analysis was used for non-normal distribution data. Rho: Rank correlation coefficient.

**Table 6.** Multivariate regression analysis

| Dependent variables | Independent variables | B | SE | β | P value |
|---|---|---|---|---|---|
| Prognosis | Refined management intervention | 0.588 | 0.094 | 0.594 | 0.007 |

Note: B: nonstandard regression coefficient; SE: standard error; b: standardized regression coefficient; β: multiple correlation coefficient adjusted for the degrees of freedom.

and to a certain extent, can enhance the effectiveness of clinical treatment [19-22].

Refined management is the enhancement of services, environment and division of labor based on traditional management to rationalize resource management, reduce costs and improve quality. Fine management in the operating room can promote the smooth implementation of surgery, improve surgical safety, reduce the risk of infection, and improve the quality of care and enhance patient satisfaction [23-26]. This will improve the effectiveness of clinical treatment. Refined management can improve the comprehensive quality of medical staff in the operating room, develop good working habits, and refine their professional abilities

[27-30]. It was found in this study that under the refined management, the comprehensive quality of medical staff improved from (13.87±5.89) to (18.21±5.30), and satisfaction rate was improved. Refined management maximizes the use of time improves work efficiency, and enhances patient satisfaction.

This study also had some shortcomings. Retrospective study has selective bias, and the results of the study were easily affected by regions. There was a lack of long-term follow-up for patients after laparoscopic radical resection of colon cancer. It is suggested that the selection of samples should follow the diversification principle and the postoperative nursing service time should be prolonged.

In summary, the refined management can significantly improve the surgical efficiency and quality of nursing, alleviate their pain, improve nursing satisfaction, and reduce nursing adverse events. This is worthy of application and promotion.

## Disclosure of conflict of interest

None.

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