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A Study on the Effect of Multimodal Nursing Intervention for Postoperative Pain in Gastrointestinal Surgery

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Abstract: *Objective*: To explore the clinical effect of multimodal nursing intervention on postoperative pain management in patients undergoing gastrointestinal surgery. *Methods*: A total of 120 patients who underwent gastrointestinal surgery in our hospital from January 2023 to January 2024 were selected as the research subjects. They were randomly divided into the intervention group and the control group, with 60 cases in each group. The control group received routine postoperative care, while the intervention group received multimodal pain care intervention. The postoperative pain scores, the rate of using analgesic drugs, postoperative recovery indicators, and nursing satisfaction were compared between the two groups. *Results*: At 24 hours, 48 hours, and 72 hours after surgery, the VAS pain scores of the intervention group were significantly lower than those of the control group ($p < 0.05$); the rate of using analgesic drugs in the intervention group (25.0%) was significantly lower than that in the control group (48.3%) ($p < 0.05$); the first defecation time, first ambulation time, and hospital stay of the intervention group were shorter than those of the control group ($p < 0.05$); the nursing satisfaction of the intervention group (96.7%) was significantly higher than that of the control group (80.0%) ($p < 0.05$). *Conclusion*: Multimodal pain care intervention can effectively relieve postoperative pain in patients undergoing gastrointestinal surgery, reduce the use of analgesic drugs, promote postoperative recovery, and improve nursing satisfaction.

Keywords: Gastrointestinal surgery; Postoperative pain; Multimodal care; Pain management; Rapid recovery

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1. Introduction

With the development of minimally invasive surgical techniques, gastrointestinal surgery has made significant progress. However, postoperative pain remains an important factor affecting patients' recovery. According to statistics, in 2023, the number of gastrointestinal surgery cases in China reached 2.8 million, and approximately 65% of the patients experienced moderate to severe pain after surgery [1].

Postoperative pain not only increases patients' suffering but also may lead to respiratory depression, delayed recovery of gastrointestinal function, and prolong hospital stay [2]. The traditional pain management model is mainly passive, which is difficult to meet the needs of modern rapid rehabilitation surgery. In recent years, the multi-modal analgesia concept has shown significant advantages in postoperative pain management. This concept emphasizes the synergistic effect of multiple approaches and methods to achieve better analgesic effects [3]. Studies have shown that multi-modal analgesia can effectively reduce the dosage of opioid drugs, lower the postoperative pain score, and promote early recovery of patients [4].

Based on the concept of rapid rehabilitation surgery (ERAS), the multi-modal analgesia plan has been widely applied to patients undergoing gastrointestinal surgery, and it has clear advantages in reducing postoperative pain, accelerating the recovery of gastrointestinal function, and shortening hospital stay [5].

This study, based on the ERAS concept, has constructed a multi-modal pain care plan including preoperative education, intraoperative cooperation, and postoperative intervention, aiming to provide better pain management services for patients undergoing gastrointestinal surgery and verify its clinical effect.

2. Materials and methods

2.1. Study subjects

A total of 120 patients who underwent surgical treatment in the Gastrointestinal Surgery Department of our hospital from January 2023 to January 2024 were selected as the study subjects.

2.1.1. Inclusion criteria

(1) Age ranging from 18 to 75 years
(2) Scheduled for gastrointestinal surgery
(3) ASA classification of grade I to II

2.1.2. Exclusion criteria

(1) Chronic pain history
(2) Long-term use of analgesic drugs
(3) Mental illness or cognitive impairment
(4) Severe dysfunction of heart, lung, liver, or kidney.

The patients were divided into the intervention group and the control group with 60 cases each using the random number table method. There was no statistically significant difference in baseline data between the two groups ($p > 0.05$), and they were comparable (**Table 1**).

Table 1. Comparison of baseline data between the two groups of patients

Project	Intervention group (n = 60)	Control group (n = 60)	t/χ^2	p
Age	52.3 ± 10.7	51.8 ± 11.2	0.251	0.802
Gender	32/28	34/26	0.136	0.712
BMI (kg/m²)	23.5 ± 3.1	23.8 ± 3.4	0.502	0.617
Type of surgery / (Open surgery / Laparoscopic surgery)	18/42	20/40	0.136	0.712
Time of operation (min)	142.5 ± 35.6	138.7 ± 32.8	0.603	0.548

2.2. Intervention methods

2.2.1. Control group

(1) Received routine postoperative care

Monitoring of vital signs after surgery, administration of analgesic drugs as needed, guidance on regular diet, and basic rehabilitation guidance

2.2.2. Intervention group

The multi-modal pain care intervention was implemented in the study design.

2.2.3. Preoperative intervention

(1) Pain knowledge education

Use multimedia to explain the mechanism of postoperative pain, assessment methods, and coping strategies

(2) Psychological counseling

Assess the patient's anxiety level and conduct targeted psychological intervention

(3) Breathing training

Guide abdominal breathing and effective coughing methods

2.2.4. Intraoperative intervention

(1) Position management

Use gel pads to protect the pressured areas

(2) Temperature maintenance

Use heated blankets to maintain normal body temperature

(3) Intervention

Cooperate with the anesthesiologist to implement multi-modal analgesia.

2.2.5. Postoperative intervention

(1) Pain assessment

Use the VAS scoring method to assess pain severity every 4 hours and dynamically adjust intervention measures.

2.2.6. Non-pharmacological intervention

(1) Cold/hot compress

Cold compress around the incision within 24 hours after surgery, and change to hot compress after 48 hours

(2) Position adjustment

Assist the patient to take a comfortable position to reduce incision tension

(3) Music therapy

Select soothing music according to the patient's preference, 2 times a day, 30 minutes each time

(4) Relaxation training

Guide progressive muscle relaxation techniques

2.2.7. Pharmacological intervention

(1) Implement a stepped analgesic plan

Mild pain (VAS 1–3 points) uses non-steroidal anti-inflammatory drugs; moderate pain (VAS 4–6 points) adds weak opioids; severe pain (VAS 7–10 points) uses strong opioids

(2) Time interval

Combine timed administration with on-demand administration

(3) Contraindication

Preventive use of antiemetic drugs to reduce side effects of opioids.

2.2.8. Early activity

Start Moving around on the bed 6 hours after surgery, assist with getting out of bed 24 hours after surgery, then formulate individualized activity plans and gradually increase activity volume.

2.2.9. Nutritional support

Start drinking small amounts of water 6 hours after surgery; gradually transition to a diet based on gastrointestinal function recovery, then supplement with protein and vitamins to promote wound healing.

2.3. Observation indicators

2.3.1. Pain severity

Use the VAS scoring method (0–10 points) to record the pain scores at rest and during activity at 24 h, 48 h, and 72 h after surgery.

2.3.2. Use of analgesic drugs

Record the usage rate of analgesic drugs within 72 hours after surgery and calculate the equivalent dose of morphine.

2.3.3. Postoperative recovery indicators

The time of first exhaust, the time of first getting out of bed for activity, and the length of hospital stay.

2.3.4. Nursing satisfaction

Use a self-made Likert 5-level scoring questionnaire, including dimensions such as pain control, nursing attitude, and health education.

A total score of ≥ 90 is considered very satisfactory, 75–89 is satisfactory, and < 75 is unsatisfactory.

2.4. Statistical methods

Data analysis was conducted using SPSS 22.0 software.

Measurement data were expressed as mean ± standard deviation ($\bar{x} \pm s$), and inter-group comparisons were performed using *t*-tests; count data were expressed as the number of cases (percentage), and inter-group comparisons were performed using χ^2 tests. $p < 0.05$ was considered statistically significant.

3. Result

3.1. Comparison of pain scores between the two groups

At each time point after the operation, the VAS scores of the intervention group during rest and activity were significantly lower than those of the control group ($p < 0.05$). The details are shown in **Table 2**.

Table 2. Comparison of VAS scores between the two groups after the operation ($\bar{x} \pm s$, points)

Time	Resting pain score				Activity pain score			
	Intervention group	Control group	*t*	*p*	Intervention group	Control group	*t*	*p*
24 h	3.2 ± 1.1	5.8 ± 1.3	11.72	< 0.001	4.5 ± 1.2	7.2 ± 1.4	10.56	< 0.001
48 h	2.6 ± 0.9	4.3 ± 1.1	9.43	< 0.001	3.8 ± 1.0	6.1 ± 1.2	8.92	< 0.001
72 h	1.8 ± 0.7	3.2 ± 0.9	9.25	< 0.001	2.9 ± 0.8	4.7 ± 1.0	7.84	< 0.001

3.2. Comparison of analgesic drug usage between the two groups

The usage rate of analgesic drugs within 72 hours after surgery in the intervention group (25.0%) was significantly lower than that in the control group (48.3%) ($\chi^2 = 6.78$, $p = 0.009$). The equivalent dose of morphine in the intervention group was (12.5 ± 4.2) mg, which was significantly lower than that in the control group (18.6 ± 5.8) mg ($t = 6.52$, $p < 0.001$).

3.3. Comparison of postoperative recovery indicators between the two groups

The time for the first defecation, the time for the first ambulation, and the hospital stay of the intervention group were significantly shorter than those of the control group ($p < 0.05$) (**Table 3**).

Table 3. Comparison of postoperative recovery indicators between the two groups ($\bar{x} \pm s$)

Index	Intervention group	Control group	*t*	*p*
First exhaust time (h)	24.5 ± 6.8	36.2 ± 8.9	8.24	< 0.001
The time of first getting out of bed (h)	28.3 ± 7.5	42.6 ± 9.8	9.12	< 0.001
Hospital stays (d)	7.2 ± 1.8	9.8 ± 2.5	6.87	< 0.001

3.4. Comparison of nursing satisfaction between the two groups

The nursing satisfaction rate of the intervention group (96.7%) was significantly higher than that of the control group (80.0%) ($\chi^2 = 8.45$, $p = 0.004$).

4. Discussion

The results of this study indicate that the implementation of multimodal pain care intervention can significantly improve the postoperative recovery process of patients undergoing gastrointestinal surgery. The pain scores of patients who received this intervention were significantly lower at all time points after surgery. This analgesic effect may be attributed to the synergistic effect of both pharmacological and non-pharmacological intervention measures [6]. Through the combination of non-pharmacological methods such as cold and hot compresses, music therapy, and a stepwise pharmacological analgesic regimen, pain sensitivity and central sensitization were

effectively reduced. This multimodal intervention approach not only provides more comprehensive pain control but also enhances patients' understanding and participation in pain management through psychological counseling and health education [7]. In terms of the use of analgesic drugs, the intervention scheme significantly reduced the usage rate of opioid drugs and the equivalent dose of morphine. This finding is of great significance because reducing the use of opioid drugs can effectively lower the risk of related side effects such as nausea, vomiting, and intestinal paralysis, thereby further promoting patient recovery.

Multimodal analgesia reduces dependence on opioid drugs through non-pharmacological means [8]. It is worth noting that the intervention scheme also significantly improved postoperative recovery indicators. The time to first defecation, the time to get out of bed, and the length of hospital stay were significantly shortened, which reflects the comprehensive benefits of multimodal nursing intervention in promoting postoperative recovery.

Early activity and nutritional support, as the core content of the ERAS concept, provide strong support for shortening the hospital stay by reducing postoperative complications and promoting gastrointestinal function recovery. In particular, early ambulation not only helps promote blood circulation, reduce deep vein thrombosis, but also significantly promotes gastrointestinal function recovery, thereby accelerating the postoperative recovery process [9].

The significant improvement in nursing satisfaction reflects the advantages of multimodal nursing intervention in providing personalized and comprehensive pain management. By combining psychological counseling, health education, and pain control, this approach enhances patients' trust and satisfaction. This patient-centered management model not only focuses on the physiological aspect of pain but also takes into account the influence of psychological and social factors on the pain experience, thus providing more comprehensive nursing services [10].

5. Conclusion

Multimodal pain care intervention can effectively alleviate postoperative pain in patients undergoing gastrointestinal surgery, reduce the use of analgesic drugs, promote postoperative recovery, and improve nursing satisfaction. This plan is based on the ERAS concept and integrates multiple measures before, during, and after the surgery. Through the combination of drug and non-drug interventions, it achieves the optimization and individualization of pain management. Its clinical application and promotion can help improve patients' surgical experience, accelerate the recovery process, and reduce medical resource consumption, and has significant clinical value and practical significance.

Disclosure statement

The authors declare no conflict of interest.

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