

Effects of Bundle Nursing Combined with Peppermint Oil in the Construction of Vomiting-Free Wards on the Quality of Life of Patients with Gastrointestinal Malignancies Receiving Chemotherapy

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Abstract: *Objective:* To explore the effects of bundle nursing combined with peppermint oil under the construction of vomiting-free wards on improving the quality of life of patients with gastrointestinal malignancies receiving chemotherapy. *Methods:* A total of 82 patients with gastrointestinal malignancies receiving chemotherapy before and after surgery, admitted to our department from January 2024 to January 2025, were selected and randomly divided into a control group and an observation group, with 41 cases in each group. The control group received routine nursing, while the observation group was given bundle nursing intervention on the basis of routine nursing. The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30 (QLQ-C30) was adopted to evaluate the quality of life of patients in both groups, and the intervention effects of the two groups were compared. *Results:* After the intervention, the scores of all functional domains of QLQ-C30 in the intervention group were higher than those in the control group ($p < 0.05$). *Conclusion:* Bundle nursing combined with peppermint oil for patients with gastrointestinal malignancies undergoing perioperative chemotherapy can relieve negative emotions and improve their quality of life, which is worthy of clinical promotion.

Keywords: Vomiting-free ward; Bundle nursing intervention; Perioperative chemotherapy for malignant tumors; Peppermint oil; Quality of life

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1. Introduction

According to the 2022 global cancer database statistics, gastric cancer ranks fifth in global incidence, with approximately 969,000 new cases every year, among which 75.7% occur in Asia. In China, gastric cancer

ranks fifth and third, respectively, in the incidence and mortality of all malignant tumors. The number of new colorectal cancer cases exceeded 1.9 million in 2022, ranking third in incidence and second in mortality^[1]. At present, surgical resection is the primary treatment for gastric and colorectal cancers^[2]. With the development of adjuvant chemotherapy, the therapeutic efficacy of gastrointestinal cancers has been improved^[3]. Neoadjuvant chemotherapy can reduce tumor lesions and lower the risks of recurrence and metastasis. Nevertheless, chemotherapeutic drugs damage normal body cells and trigger adverse reactions in multiple systems, including the digestive and hematopoietic systems, as well as discomforts such as sleep disturbance and poor appetite, which reduce treatment compliance and impair therapeutic effects and quality of life^[4,5]. Chemotherapy-induced nausea and vomiting (CINV) refer to nausea (a state characterized by retching and urge to vomit) and vomiting (reflex expulsion of gastric contents through the mouth), which are among the most distressing adverse reactions of malignant tumor chemotherapy^[6]. Although antiemetic drugs are recommended by clinical guidelines for the prevention and control of CINV, the standardized implementation rate of antiemetic treatment remains low due to drug costs, limited drug access, and insufficient disease awareness among patients^[7]. Without timely intervention, 60% to 80% of patients will develop dehydration and electrolyte disorders, which lead to reduced therapeutic efficacy and increased medical burdens^[8]. Therefore, the management of CINV has become an urgent clinical problem. Bundle care refers to evidence-based combined nursing measures formulated for specific patients and nursing problems to improve nursing quality and optimize patient prognosis^[9]. In 2016, the Chinese Society of Clinical Oncology (CSCO) launched the standardized CINV management program and promoted the construction of vomiting-free wards. By establishing joint doctor-patient management teams and carrying out risk screening, symptom assessment, standardized antiemetic medication, dietary and psychological intervention, such wards alleviate chemotherapy-induced vomiting and enhance patients' treatment compliance, therapeutic effects, and quality of life. To effectively control CINV, non-pharmacological aromatherapy has attracted widespread attention. Peppermint oil, the most commonly used aromatic essential oil, is extracted from mint via steam distillation with menthol as its main ingredient^[10]. Multiple studies have verified the anti-emetic effect of peppermint oil. Liu Mingming et al. proved that smearing peppermint oil on the alae nasi can significantly reduce the incidence of postoperative nausea and vomiting in female patients^[11]. Zorba and Ozdemir found that massage combined with inhalation of peppermint aromatic preparations can greatly relieve CINV^[12]. Efe Ertürk and Tascı confirmed that dripping one drop of peppermint oil between the upper lip and nose three times a day for five days during chemotherapy can alleviate nausea, vomiting, and retching^[13].

2. Materials and methods

2.1. General data

A total of 82 patients with gastrointestinal malignancies receiving perioperative chemotherapy admitted to our department from January 2024 to January 2025 were selected as research subjects and randomly divided into two groups with 41 cases each. Control group: 25 males and 16 females, aged 38 to 82 years, with a mean age of (63.11 ± 5.06) years; TNM staging: 11 stage II cases, 22 stage III cases, and 8 stage IV cases. Observation group: 25 males and 16 females, aged 36 to 79 years with a mean age of (63.29 ± 6.10) years; TNM staging: 9 stage II cases, 24 stage III cases, and 8 stage IV cases. There was no statistically significant difference in general data between the two groups ($p > 0.05$). This study was approved by the hospital ethics committee, and all patients participated voluntarily and signed informed consent forms.

2.2. Inclusion and exclusion criteria

2.2.1. Inclusion criteria

- (1) Voluntary participation in the study;
- (2) Gastrointestinal malignancies confirmed by imaging and pathological examinations;
- (3) Receiving chemotherapy with an expected survival time of no less than 6 months;
- (4) Signed informed consent.

2.2.2. Exclusion criteria

- (1) Cognitive or language dysfunction;
- (2) Poor treatment compliance;
- (3) Peppermint oil allergy;
- (4) Dropout during the research.

2.3. Intervention methods

2.3.1. Construction of vomiting-free wards

- (1) Management mode of vomiting-free wards

In accordance with standards including the SOP for the Construction and Management of CINV Standardized Treatment Demonstration Vomiting-Free Wards issued by the Committee of Cancer Rehabilitation and Palliative Care of the Chinese Anti-Cancer Association and the Evaluation Form for Standardized Vomiting-Free Demonstration Wards of Yunnan Province, a CINV management team led by the department director and head nurse was established, consisting of specialist physicians, oncology nurses, and clinical pharmacists. Standard operating procedures (SOP) for vomiting-free wards were formulated, with clear job responsibilities and regular training and assessment implemented.

- (2) CINV management process for inpatients in vomiting-free demonstration wards

① Admission assessment. All newly admitted chemotherapy patients underwent CINV risk assessment via dedicated files covering individual and chemotherapy-related factors. Individual factors included tumor staging, CINV risk factors (age, gender, motion sickness, history of gestational vomiting, anxiety and fear), and previous vomiting episodes during chemotherapy. Chemotherapy-related factors were classified into four emetogenic levels (high, moderate, low and minimal) in line with NCCN Guidelines. Patients with at least two of the following high-risk factors (female, age over 85 years, history of motion sickness, previous chemotherapy-induced vomiting, expectation of severe adverse reactions, anxiety) were identified as high-risk populations. CINV risks were stratified based on emetogenic regimens and personal risk factors: high risk: high emetogenic regimen or moderate emetogenic regimen with at least two high-risk factors; moderate risk: moderate emetogenic regimen or low emetogenic regimen with at least two high-risk factors; mild/minimal risk: low or minimal emetogenic regimens. ② Individualized preventive antiemetic regimens prioritizing prevention. In accordance with NCCN Guidelines and the 2019 Chinese Expert Consensus on the Prevention and Treatment of Chemotherapy-Induced Nausea and Vomiting, antiemetic therapy should be administered prior to anti-tumor treatment. Individualized antiemetic plans were developed: patients receiving high or moderate emetogenic regimens remained at risk of vomiting for 2 to 3 days after chemotherapy and required full-course antiemetic protection. High-risk patients received triple antiemetic therapy, moderate-risk patients' dual antiemetic therapy, and mild/minimal-risk patients single-agent intervention or routine omission of antiemetics. Antiemetics were not routinely given to patients without

nausea and vomiting; antiemetic regimens would be upgraded if vomiting occurred during subsequent chemotherapy cycles. When patients returned for the next cycle of chemotherapy, nurses fed back their vomiting control status to physicians, who reassessed and decided whether to maintain or adjust the original regimen. ③ CINV assessment forms were placed at bedside, and CINV warning signs hung at the head of each bed. CINV Patient Care Manuals were distributed to all patients. Nausea and vomiting symptoms were assessed and recorded one day before chemotherapy, on the day of chemotherapy, and 24 hours and 3 days after chemotherapy. Continuous assessment was carried out from the 4th day until symptoms disappeared. Nurses conducted telephone follow-up within one week after discharge for asymptomatic patients, and reported patients with Grade II nausea and vomiting to physicians for standardized treatment. Physicians reviewed the Patient Care Manual during ward rounds and graded vomiting symptoms in accordance with CTCAE 4.0, recording assessments and issuing symptomatic medical orders in medical records. ④ Training and assessment for medical and nursing staff. Training plans: Medical and nursing staff received at least one training session every quarter covering the pathogenesis of CINV, classification and pharmacology of common antiemetics, guideline updates and adverse reaction management. Teaching forms included lectures, nursing rounds, case discussions, intra-hospital and regional exchanges, and online learning. ⑤ Health education on CINV for patients. Science popularization posters were posted and educational videos played in wards. One-on-one counseling was provided for first-time chemotherapy patients, and health education was delivered once per cycle for recurrent patients. Multidisciplinary science outreach was jointly organized by nutrition and pharmacy departments, covering vomiting prevention, home self-care, dietary management, and standard manual filling. ⑥ Establishment of complete data entry and follow-up platforms. An electronic CINV database was built to store clinical research data of all patients. Patients were followed up via telephone, WeChat, and electronic questionnaires to monitor medication compliance, rehospitalization, sleep, diet, and recovery from vomiting symptoms.

2.3.2. Implementation of bundle nursing combined with nasal peppermint oil application

(1) Evidence-based team formation and training

A bundle nursing guidance group was established under evidence-based nursing principles, led by the head nurse. All team members held college diplomas and nurse titles or above with more than five years of oncology chemotherapy nursing experience. The group formulated standardized nursing operating specifications and provided theoretical and operational training for nurses with more than one year of employment.

(2) Bundle nursing interventions

The group reviewed relevant literature and formulated bundle nursing protocols based on routine nursing and actual patient conditions: ① Empowerment and emotional intervention: Staged one-on-one health education was delivered. Mild negative emotions were relieved through anti-cancer case sharing, music therapy, and peer communication. Patients with severe negative emotions received combined intervention with psychological physicians to enhance treatment compliance via emotional support. ② Dietary intervention: The incidence of anorexia among chemotherapy patients reached 94.6%. Patients were instructed to follow a light, digestible diet with small, frequent meals and slow chewing. Foods high in 5-hydroxytryptamine, such as bananas and persimmons, were avoided. Food intake was reduced 1 to 2 hours before chemotherapy, and excessive water intake was forbidden within one hour after meals to prevent

nausea. ③ Peppermint oil anti-emetic nursing: Patients were guided to smear peppermint oil on both sides of the nasal alae with cotton swabs, rotating gently inside each nostril. Smearing was scheduled at 09:00, 15:00, and 21:00 every day from the day of chemotherapy to 5 days after treatment. Patients were assisted to set alarms, and nurses reminded patients by telephone if alarm setup was unavailable. ④ Self-management during treatment intervals: Follow-up registration books and patient WeChat groups were created, with dedicated staff conducting regular follow-ups to monitor adverse reactions after discharge. ⑤ Oral care: Contaminants were cleaned, and mouth rinsing was performed immediately after vomiting to eliminate odors and relieve nausea. ⑥ Exercise guidance: A “Walking Team” WeChat group was established. On Day 1 of Week 1, nurses delivered theoretical teaching via exercise videos and guidebooks. On Day 2, exercise movements were explained and demonstrated to correct improper postures, and personal exercise calendars were distributed to record daily exercise status and duration; wearable sports watches were recommended for eligible patients. Starting from Day 3, patients walked 30 minutes per day, 3 to 5 times weekly for 12 consecutive weeks, with check-ins in the WeChat group after each session. After discharge, family members supervised exercise with at least three weekly check-ins, and nurses conducted telephone follow-ups every two weeks. ⑦ Sleep intervention: Regular schedules were required. Hot foot soaks and warm milk before bedtime were recommended, while caffeinated drinks were prohibited. Daytime naps were shortened. Hypnotic drugs were prescribed by physicians for severe insomnia.

All bundle nursing strategies were individualized as needed and dynamically adjusted in accordance with the latest clinical guidelines.

2.4. Evaluation indicators

The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30 (QLQ-C30) was adopted to assess the quality of life of tumor patients. The scale contained 30 items, covering 5 functional domains, 6 single-item measurements, and one global health and quality of life domain. Items of the global health domain were scored on a 7-point scale, while other items adopted a 4-point scoring system.

2.5. Statistical analysis

SPSS 22.0 statistical software was used for data analysis. Measurement data conforming to a normal distribution were expressed as $\bar{x} \pm s$ and compared via a paired *t*-test. Skewed measurement data were presented as M (Q1, Q3) and analyzed with non-parametric tests. Chi-square test or non-parametric tests were applied for nominal and ordinal data. *p* < 0.05 indicated a statistically significant difference.

3. Results

There was no significant difference in QLQ-C30 scores between the two groups before treatment (*p* > 0.05), while statistically significant differences were observed after treatment (*p* < 0.05). See **Table 1** and **2**.

Table 1. Comparison of QLQ-C30 functional domain scores (cognitive function, physical function, and role function) between two groups before and after treatment ($\bar{x} \pm s$, Points)

Group	Case No.	Time	Cognitive function	Physical function	Role function
Control Group	41	Pre-treatment	50.16 $\pm$ 19.23	43.69 $\pm$ 18.18	44.83 $\pm$ 12.25
		Post-treatment	58.91 $\pm$ 14.92	58.71 $\pm$ 19.12	55.23 $\pm$ 18.23
Observation Group	41	Pre-treatment	42.75 $\pm$ 16.11	44.12 $\pm$ 16.82	42.22 $\pm$ 14.61
		Post-treatment	80.02 $\pm$ 12.13	80.23 $\pm$ 12.36	79.98 $\pm$ 12.91

Table 2. Comparison of QLQ-C30 Functional domain scores (emotional function, social function and global health status) between two groups before and after treatment ($\bar{x} \pm s$, Points)

Group	Case No.	Time	Emotional function	Social function	Global health status
Control Group	41	Pre-treatment	46.28 $\pm$ 19.12	45.89 $\pm$ 23.13	48.15 $\pm$ 18.22
		Post-treatment	54.23 $\pm$ 18.13	55.15 $\pm$ 16.72	56.32 $\pm$ 15.41
Observation Group	41	Pre-treatment	39.35 $\pm$ 16.43	42.12 $\pm$ 12.68	47.83 $\pm$ 14.56
		Post-treatment	75.25 $\pm$ 17.57	82.13 $\pm$ 12.21	78.45 $\pm$ 13.28

Note: ^a $p < 0.05$ compared with pre-treatment within the same group; ^b $p < 0.05$ compared with control group post-treatment.

4. Discussion

Malignant tumors seriously threaten human lives ^[14]. Chemotherapy can effectively improve survival rates and prolong patients' survival time, yet chemotherapeutic drugs easily damage gastrointestinal mucosa and trigger gastrointestinal adverse reactions dominated by nausea and vomiting ^[15,16]. Existing studies have verified that peppermint oil aromatherapy relieves chemotherapy-induced nausea and vomiting in breast cancer patients, and combined with muscle relaxation can alleviate anxiety and depression to achieve physical and mental relaxation ^[17,18]. At present, few studies have explored the combined application of peppermint oil and bundle nursing, which provides a new direction for the prevention and control of chemotherapy adverse reactions. The results of this study showed that the incidence and severity scores of acute and delayed CINV in the control group were higher than those in the observation group, proving that bundle nursing combined with peppermint oil under the vomiting-free ward model can significantly reduce the incidence and severity of chemotherapy-induced nausea and vomiting. Chemotherapy easily causes anxiety and depression, which aggravate adverse reactions and form a vicious cycle. Aromatherapy relaxes the body, relieves stress, regulates endocrine and immune functions, reduces the severity of chemotherapy-induced nausea and vomiting, and mitigates chemotherapy damage ^[19,20]. It also soothes emotions and enhances psychological resilience to improve patients' mental state ^[21,22]. Alleviation of nausea and vomiting further optimizes patients' mood and quality of life. In conclusion, bundle nursing combined with peppermint oil intervention in vomiting-free wards can improve CINV symptoms, psychological status, and quality of life of chemotherapy patients, offering new ideas for clinical oncology nursing. Nevertheless, this research has limitations, including a small sample size and a short follow-up period, which requires further in-depth research.

Disclosure statement

The authors declare no conflict of interest.

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