

Observation on the Effect of Supportive Nursing Intervention in Patients Receiving Home Enteral Nutrition After Esophageal Cancer Surgery

Jinxiang Yu, Lu Chen

Department of Thoracic Surgery, Taizhou Second People's Hospital, Taizhou 225500, Jiangsu, China

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Abstract: *Objective:* To analyze the application effect of supportive nursing intervention in patients receiving home enteral nutrition after esophageal cancer surgery. *Methods:* A total of 102 esophageal cancer patients who underwent surgical treatment at Taizhou Second People's Hospital from March 2025 to April 2026 were selected and divided into a control group (conventional nursing intervention, 51 cases) and an observation group (supportive nursing intervention, 51 cases) based on different postoperative intervention plans. Both groups received interventions until 3 months after discharge. Nutritional status, cellular immune function, and the occurrence of adverse events were compared. *Results:* After the intervention, the nutritional status (Hb, ALB, PA, TRF) and cellular immune function (CD4⁺, CD4⁺/CD8⁺, CD8⁺) levels in both groups improved compared to those before the intervention, and the improvement in the observation group was significantly better than that in the control group. The total incidence of enteral nutrition-related adverse events in the observation group was 1.96%, which was significantly lower than that in the control group (13.73%) ($p < 0.05$ for all). *Conclusion:* Implementing supportive nursing intervention in patients receiving home enteral nutrition after esophageal cancer surgery can effectively improve their nutritional status, regulate cellular immune function, and reduce the risk of enteral nutrition-related adverse events such as abdominal pain, diarrhea, tube blockage, and reflux aspiration, demonstrating high clinical application value.

Keywords: Esophageal cancer; Home enteral nutrition; Supportive nursing; Nutritional status; Cellular immune function

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1. Introduction

In recent years, the incidence of esophageal cancer has shown an increasing trend year by year, ranking second in terms of mortality rate, and is more common in people over 40 years old^[1]. The typical symptom of this disease is progressive dysphagia. As the disease progresses, patients' food intake continues to decline, and they may even suffer from varying degrees of malnutrition, further weakening their immune function.

Surgery is the preferred radical treatment for early- and mid-stage esophageal cancer, and most patients require the placement of a nutritional tube for enteral nutrition support after surgery. After discharge, they still need long-term home feeding, and the quality of home care directly affects the process of nutritional absorption and postoperative recovery^[2]. Currently, conventional nursing mostly focuses on education during the hospitalization period, leading to a high incidence of home enteral nutrition-related adverse events, which is not conducive to the recovery of the body's nutritional and immune functions^[3]. Therefore, implementing scientific and feasible nursing interventions after esophageal cancer surgery is of great significance. Supportive nursing, as an important branch of continuous nursing, encompasses health guidance, practical training, psychological counseling, home follow-up, and complication prevention, breaking through the time and space limitations of in-hospital nursing and providing comprehensive, coherent, and personalized care support for home patients with tubes. Based on this, this study focuses on exploring the impact of supportive nursing intervention on the nutritional status, cellular immunity, and feeding-related adverse events of patients after esophageal cancer surgery, and the report is as follows.

2. Materials and methods

2.1. General information

A total of 102 patients with esophageal cancer admitted to Taizhou Second People's Hospital from March 2025 to April 2026 were included in the study. They were divided into a control group and an observation group based on the implementation of postoperative intervention plans, with 51 cases in each group. In the control group, there were 29 males and 22 females, aged 45 to 80 years, with an average age of (65.02 ± 8.70) years; the body mass index ranged from 19.12 to 26.08 kg/m², with an average of (23.05 ± 1.17) kg/m². In the observation group, there were 30 males and 21 females, aged 43 to 78 years, with an average age of (68.11 ± 8.99) years; the body mass index ranged from 19.06 to 26.15 kg/m², with an average of (23.11 ± 1.02) kg/m². Comparison of general information between the two groups showed no significant difference ($p > 0.05$), indicating comparability. This study was approved by the Medical Ethics Committee of Taizhou Second People's Hospital. Inclusion criteria: Meeting the disease diagnostic criteria in the "Diagnostic and Treatment Guidelines for Esophageal Cancer (2018 Edition)"; age ≥ 18 years; voluntarily participating and signing an informed consent form; stable vital signs^[4]. Exclusion criteria: Concomitant with other malignant tumors; severe heart, liver, or renal dysfunction; concomitant with other gastrointestinal diseases; concomitant with immune system diseases; concomitant with infectious diseases.

2.2. Methods

The control group received conventional nursing intervention, as follows: After surgery, closely monitor vital signs, the patency of thoracic drainage tubes and nutritional tubes; guide the infusion rate and temperature of enteral nutrition solutions according to doctor's orders; inform patients of home nutrition feeding precautions; uniformly distribute printed health education brochures before discharge and verbally explain tube care, dietary contraindications, and key points for identifying uncomfortable symptoms; reserve a department consultation phone number after discharge for patients to call for advice when problems arise. The observation group received supportive nursing intervention, as follows:

2.2.1. Individualized health education

(1) Bedside practical teaching during hospitalization

The responsible nurse demonstrates the entire process of enteral nutrition pump/gravity infusion, tube flushing, sealing, fixation, and dressing change on a one-on-one basis, encouraging patients and their family members to independently complete the operations twice and providing on-site error correction until the operations are standardized; for elderly family members or those with poor memory, record standard operation short videos and send them to the family members' WeChat for retention.

(2) Explanation of nutrition plans

Formulate the total daily volume of nutrition solution, the infusion dose per time, and temperature control (38–40 °C) based on the patient's weight, preoperative nutritional indicators, and surgical anastomosis condition; clarify that the infusion duration for a single time should be no less than 2 hours and that rapid injection of nutrition solution is strictly prohibited; distinguish the dilution and dose reduction adjustment plans for nutrition solutions for patients with diarrhea, abdominal distension, and reflux to avoid uniform education.

(3) Specialized popularization of complications

Explain the causes of abdominal pain, diarrhea, tube blockage, and reflux aspiration through illustrations and guide home-based simple treatment methods, such as prohibiting violent injection for tube blockage and using 30 mL of warm water for repeated pulsatile flushing at a constant temperature; maintaining a semi-reclining position for 30–60 minutes after meals to prevent reflux.

2.2.2. Continuous follow-up

(1) Online WeChat follow-up

Open an online consultation window daily to promptly answer family members' feeding questions; send one short video on home nutrition care for esophageal cancer per week; collect patients' weight and food tolerance information online every month and dynamically adjust the nutrition infusion plan.

(2) Offline home visits

Conduct one home nursing visit at 1 month and 3 months after discharge, respectively, to check on-site tube fixation, the presence of exudate on dressings, and skin pressure injuries; assess the standardization of family members' operations on-site and correct wrong feeding habits; re-measure simple nutritional indicators on-site and record patients' uncomfortable symptoms.

(3) Telephone emergency follow-up

When sudden discomfort such as abdominal pain, vomiting, or tube blockage occurs, the nursing hotline provides real-time guidance on emergency treatment. If the symptoms cannot be relieved, the patient is immediately guided to return to the hospital for treatment.

2.2.3. Psychological support

Use an anxiety scale to assess emotional states and conduct one-on-one communication with patients with obvious negative emotions, explaining the role of home enteral nutrition in anastomosis healing and immune function recovery, listing well-recovered cases in the same ward to relieve psychological pressure. Actively affirm the care efforts of family members and answer their concerns; encourage family members to participate in nutrition care together to enhance care confidence.

2.2.4. Dynamic nutrition monitoring

(1) Guidance on indicator monitoring

Inform family members to weigh the patient's fasting weight at a fixed time every week and record the daily tolerance of nutrition solution; uniformly review nutritional status and immune indicators during follow-up and adjust the nutrition solution ratio and total daily calories according to indicator changes.

(2) Guidance on dietary transition

Within 1 month after surgery, mainly use enteral nutrition solutions. According to the recovery of the anastomosis, gradually guide the addition of liquid supplements such as rice soup and vegetable juice, record whether there is abdominal distension and diarrhea after addition, and gradually transition to a semi-liquid diet; prohibit spicy, overly hot, and coarse-fiber irritating foods.

2.2.5. Refined home tube care

(1) Guidance on tube fixation

Guide the use of medical breathable dressings and elastic tapes to properly fix the stoma tube/nasogastric tube, replace the fixed dressing daily, and observe for redness, swelling, or pressure sores on the nasal/abdominal skin; reserve enough tube length when turning over or moving to prevent pulling and dislodgement.

(2) Tube maintenance specifications

Use 20–30 mL of warm water for pulsatile flushing before and after each infusion and seal the tube after infusion; clean the nutrition infusion equipment daily and replace the infusion tube weekly. Immediately replace contaminated or damaged tubes; keep nursing supplies such as warm water for flushing, sterile gauze, and dressings at home.

2.2.6. Preventive intervention for adverse events

Prepare the nutrition solution for immediate use and do not leave it at room temperature for more than 4 hours to avoid bacterial growth and diarrhea; use the refrigerated prepared solution within 24 hours and discard it 4 hours after warming; gradually increase the infusion rate from slow to fast for tolerance; raise the head of the bed after each feeding and stop nutrition solution infusion 2 hours before bedtime at night to reduce the risk of nighttime reflux; instruct family members to observe the patient's defecation and abdominal signs daily, slow down the infusion rate when mild abdominal pain occurs, and seek medical attention promptly if the discomfort persists.

Note: Both groups received interventions until 3 months after discharge.

2.3. Observation indicators

(1) Indicator 1

Nutritional status. Fasting venous blood samples of 3 mL were collected from patients before discharge and 3 months after discharge. These samples were analyzed using an automatic biochemical analyzer to measure hemoglobin (Hb), albumin (ALB), prealbumin (PA), and transferrin (TRF).

(2) Indicator 2

Cellular immune function. Fasting venous blood samples of 3 mL were collected from patients before discharge and 3 months after discharge. The levels of T lymphocyte subsets CD4⁺ and CD8⁺ were measured using the enzyme-linked immunosorbent assay (ELISA), and the CD4⁺/CD8⁺ ratio was calculated.

(3) Indicator 3

Incidence of adverse events. Assessed 3 months after discharge, including abdominal pain, diarrhea, tube blockage, and reflux/aspiration. A lower total incidence rate indicates a better postoperative outcome for patients.

2.4. Statistical methods

Data were analyzed using SPSS 27.0 statistical software. Count data were expressed as [number of cases (%)] and tested using the chi-square (χ^2) test. Measurement data were expressed as ($\bar{x} \pm s$) and tested using the *t*-test. A *p*-value of less than 0.05 was considered statistically significant.

3. Results

3.1. Nutritional status

After the intervention, the observation group showed superior improvement in nutritional status ($p < 0.05$). See **Table 1**.

Table 1. Comparison of nutritional status between the two groups ($\bar{x} \pm s$)

Group	Hb (g/L)		ALB (g/L)		PA (mg/L)		TRF (g/L)	
	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Observation group (n = 51)	99.67 $\pm$ 7.82	133.62 $\pm$ 10.80	32.82 $\pm$ 3.45	45.97 $\pm$ 3.69	284.22 $\pm$ 19.97	332.50 $\pm$ 25.67	1.62 $\pm$ 0.41	2.99 $\pm$ 0.46
Control group (n = 51)	98.50 $\pm$ 7.51	118.06 $\pm$ 9.93	32.16 $\pm$ 4.22	38.15 $\pm$ 3.85	283.05 $\pm$ 20.18	302.19 $\pm$ 28.98	1.65 $\pm$ 0.37	2.32 $\pm$ 0.70
<i>t</i>	0.771	7.574	0.865	10.472	0.294	5.591	0.388	5.712
<i>p</i>	0.443	< 0.001	0.389	< 0.001	0.769	< 0.001	0.699	< 0.001

3.2. Cellular immune function

After the intervention, the observation group demonstrated superior improvement in cellular immune function ($p < 0.05$). See **Table 2**.

Table 2. Comparison of cellular immune function between the two groups ($\bar{x} \pm s$)

Group	CD4 ⁺ pre-intervention	CD4 ⁺ post-intervention	CD8 ⁺ pre-intervention	CD8 ⁺ post-intervention	CD4 ⁺ /CD8 ⁺ pre-intervention	CD4 ⁺ /CD8 ⁺ post-intervention
Observation group (n = 51)	45.92 $\pm$ 4.66	40.52 $\pm$ 4.06	31.22 $\pm$ 5.31	19.67 $\pm$ 2.06	1.42 $\pm$ 0.21	2.08 $\pm$ 0.22
Control group (n = 51)	45.75 $\pm$ 4.17	37.20 $\pm$ 3.98	30.50 $\pm$ 6.08	21.83 $\pm$ 1.87	1.45 $\pm$ 0.16	1.79 $\pm$ 0.18
<i>t</i>	0.194	4.170	0.637	5.544	0.812	7.286
<i>p</i>	0.847	< 0.001	0.526	< 0.001	0.419	< 0.001

3.3. Incidence of adverse events

After the intervention, the observation group had a lower total incidence rate of adverse events ($p < 0.05$). See **Table 3**.

Table 3. Comparison of the incidence of adverse events between the two groups [number of cases (%)]

Group	Abdominal pain	Diarrhea	Tube blockage	Reflux/aspiration	Total incidence
Observation group (n = 51)	1 (1.96)	0	0	0	1 (1.96)
Control group (n = 51)	3 (5.88)	2 (3.92)	1 (1.96)	1 (1.96)	7 (13.73)
χ^2					4.883
p					0.027

4. Discussion

Esophageal cancer is a commonly encountered malignant tumor in the clinical digestive system, with a higher prevalence in males than in females^[5,6]. Surgical treatment can completely remove the lesion, but it disrupts the continuity of the esophagus and digestive tract, temporarily impairing the postoperative feeding pathway. Consequently, patients are unable to eat normally by mouth in the short term and must rely on home enteral nutrition to supply the body's energy needs^[7]. Supportive nursing intervention is a novel comprehensive nursing approach that emphasizes the combination of in-hospital practical teaching with post-discharge continuous follow-up^[8]. Specifically, for patients undergoing long-term home enteral nutrition after esophageal cancer surgery, this model can continuously correct improper feeding practices by family members, dynamically adjust the infusion plan of nutritional solutions based on the patient's nutritional and immune indicators, promptly alleviate anxiety and negative emotions caused by long-term tube placement, effectively reduce the risk of adverse events related to home feeding, and facilitate rapid improvement in nutritional status and restoration of immune function.

The results of this study indicate that the observation group demonstrated superior improvements in nutritional status and cellular immune function after intervention, and also had a lower overall incidence of adverse events ($p < 0.05$). The reasons for this are as follows: conventional nursing can only provide basic in-hospital monitoring and one-time oral education, which is prone to inducing complications such as diarrhea, tube blockage, and reflux. Additionally, the long-term fixed nutritional solution supply model is difficult to match the postoperative recovery needs of the patient's body, and persistent malnutrition can inhibit the proliferation and differentiation of T lymphocytes, leading to severe imbalance in immune function cells. In contrast, the application of supportive nursing in the observation group integrates multiple measures such as practical training, multi-channel continuous follow-up, and dynamic nutritional adjustments, reducing various enteral nutrition-related adverse events from the source, as well as minimizing additional bodily consumption caused by complications, thereby promoting nutritional absorption and cellular immune function recovery in both directions.

5. Conclusion

In summary, implementing supportive nursing intervention for patients receiving home enteral nutrition after esophageal cancer surgery can significantly improve their nutritional levels, enhance cellular immune function, and reduce adverse events related to home feeding, demonstrating a definite effect of nursing intervention. However, this study has certain limitations: it only selected samples from a single center,

resulting in a single source of samples; the follow-up period was only set at 3 months post-surgery, lacking long-term tracking of patients' nutritional, immune, and quality of life outcomes. Subsequent studies can conduct multi-center, large-sample controlled trials, extend the follow-up observation period, and incorporate multiple indicators such as patients' quality of life and psychological scores to further refine the home enteral nutrition supportive nursing intervention system, thereby providing more precise clinical reference evidence for the development of standardized continuity of care plans after esophageal cancer surgery.

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Disclosure statement

The authors declare no conflict of interest.

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