

Article

Tumor rehabilitation and psychosocial support in GI cancer patients

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Abstract: Background: The disease progression of advanced gastrointestinal tumors is rapid, and traditional treatments often focus on tumor control while easily ignoring psychological needs and nutritional imbalances. Previous studies have shown that nutritional intervention and psychological support have potential value in improving the quality of life of patients in advanced stages, but there is still a lack of systematic evidence-based research in primary hospitals with relatively limited resources. **Objective:** To investigate, in hospitalized patients aged 18–80 years with stage IIIb/IV advanced gastrointestinal tumors (expected survival ≥ 3 months), using a randomized exploratory design, the difference between a control group receiving routine care and nutritional support and an intervention group receiving routine care plus standardized nutritional support, structured rehabilitation exercises, and patient-centered psychosocial care, on the primary outcome of EORTC QLQ-C30 global health status (items 29 and 30, 0–100 scale), and on secondary outcomes including psychological status (assessed by SAS and SDS), nutritional indicators, and cancer-related fatigue (assessed by RPFS-CV), with Bonferroni correction applied for multiple testing. **Methods:** A prospective randomized controlled design was used in this study, and a total of 100 patients with advanced gastrointestinal tumors who met the inclusion and exclusion criteria were enrolled. They were randomly divided into an intervention group and a control group, with 50 patients in each group. The intervention group received humanistic care in addition to routine care and nutritional support. After 2 months, changes in EORTC QLQ-C30, SAS, SDS, nutritional indicators, and cancer-related fatigue were compared between the two groups. Independent sample *t*-test, paired *t*-test, multiple regression, and Logistic regression were used to analyze the primary and secondary outcome measures, and the χ^2 test was used to evaluate adverse events. A two-sided test with $P < 0.05$ was considered statistically significant. **Results:** After 2 months of intervention, the EORTC QLQ-C30 functional dimensions in the intervention group were significantly higher than those in the control group (all $P < 0.05$), and the scores for fatigue, nausea and vomiting, and pain were significantly reduced (all $P < 0.05$), with a significant difference observed before and after the intervention in the intervention group (all $P < 0.001$). Multiple linear regression showed that the intervention had an independent positive effect on the overall health status score ($P = 0.002$), with an increase of 4.75 points in the intervention group compared to the control group after adjusting for covariates. The SAS and SDS in the intervention group improved significantly compared to the control group (both $P < 0.05$). Among the nutritional indicators of the intervention group, serum albumin and NRS 2002 scores were significantly higher than those of the control group ($P = 0.009, 0.002$), and the RPFS-CV total fatigue score was also significantly reduced (all $P < 0.05$). There was no statistically significant difference in adverse events between the groups (all $P > 0.05$). **Conclusion:** Humanistic care combined with nutritional support can safely and effectively improve the quality of life, psychological state, and certain nutritional indicators of patients with advanced gastrointestinal tumors in primary hospitals. It is worthy of further promotion and the conduct of longer-term, multi-center studies.

Keywords: advanced gastrointestinal tumors; humanistic care; nutritional support; quality of

life

1. Introduction

Late-stage gastrointestinal tumors have a high incidence and mortality rate worldwide, with rapid disease progression and significant challenges in comprehensive treatment. Although surgery, radiotherapy, chemotherapy, and targeted therapy can achieve certain results in the early and middle stages, many researchers have noted that solely focusing on tumor control cannot fully meet the growing rehabilitation needs of patients [1,2]. Recent research has gradually paid attention to the auxiliary value of nutritional support and psychological intervention for gastrointestinal tumors, but most of it has been concentrated in tertiary hospitals with more advanced technology and equipment. In primary medical environments, most patients, due to the lack of systematic nursing and long-term follow-up mechanisms, often face multiple challenges such as psychological pressure, nutritional imbalance, and poor treatment compliance, which may further accelerate disease progression or affect the maintenance of therapeutic efficacy [3,4]. The term “grassroots hospitals” refers to county-level and below community health institutions that serve as the first point of contact for most rural and suburban patients. These facilities typically have limited infrastructure, fewer specialized staff, and rely heavily on general practitioners, leading to challenges in equipment availability, staff workload, and continuity of care. We chose this term to underscore the unique operational constraints and patient-management gaps in these settings compared to higher-tier centers. Within existing research frameworks, the usual focus is on palliative treatment or single nutritional interventions for patients with late-stage tumors, overlooking the importance of comprehensive mind-body care, especially in primary hospitals with limited clinical resources [5]. When patients’ psychological needs are not adequately addressed, their willingness to ingest nutrients is low and follow-up is intermittent, making treatment progress more prone to disruption [6]. However, there is currently a lack of relevant high-quality evidence-based data, and no comprehensive intervention model has yet been formed that can be widely applied, making it difficult for primary healthcare units to promptly identify and address both the nutritional and psychological burdens of patients with late-stage gastrointestinal tumors, and rendering them unable to systematically evaluate the impact of humanistic care strategies on this special patient population [7]. In response to these issues, this study carried out a prospective randomized controlled study to explore the effect of humanistic care combined with tumor rehabilitation nutritional support on the quality of life of patients with late-stage gastrointestinal tumors in a primary hospital setting. The study used the EORTC QLQ-C30 scale as the main observation indicator, while also evaluating psychological status, nutritional indicators, and cancer-related fatigue, with the aim of comprehensively reflecting the intervention’s effects and safety. If the expected results can confirm the feasibility of this model in improving quality of life and psychological status, it will provide new ideas for clinical practice in primary medical institutions and lay a foundation for subsequent multicenter research.

2. Research methods

2.1. Study design

Research on nutritional intervention and humanistic care for patients with advanced tumors has mostly been conducted in tertiary hospitals, lacking evidence-based studies tailored to primary hospital settings. Patients in primary hospitals often exhibit poor follow-up compliance, high patient mobility, and relatively limited medical resources, making long-term follow-up difficult to implement. This study was conducted by designing a prospective, randomized controlled trial for exploration. The study began in January 2024 and ended in January 2025. Prior to enrollment, study staff met with each participant in person to explain the specific interventions for the control and intervention groups, including potential benefits and limitations, ensuring full understanding before obtaining written informed consent. Patients who met the inclusion criteria were assigned to intervention or control groups using a computer-generated random sequence produced by SPSS version 26.0. A 2-month intervention observation period was selected based on the characteristics of patients in primary hospitals, the feasibility of the intervention measures, and the practical consideration that changes in patients' quality of life can be reflected in the short term. The results of this study will provide new evidence and practical methods for nursing and nutritional intervention models for tumor patients in primary hospitals. The study protocol was reviewed and approved by the Medical Ethics Committee of our hospital (approval number XXXX).

2.2. Study subjects

Inclusion criteria: (1) Diagnosed with advanced gastrointestinal tumors, with pathological histological or cytological findings confirming stage IIIB or IV; (2) Expected survival of no less than 3 months, with no acute life-threatening organ failure; (3) Aged between 18 and 80 years, able to understand and cooperate in completing the intervention measures and evaluations in this study; (4) Nutritional intake route is oral or via an external gastrointestinal tube, with no complete gastrointestinal obstruction; (5) The subject or their immediate family members sign the informed consent form, voluntarily participate in the study, and agree to follow-up; (6) All participants were inpatients with progressive disease, receiving standard anticancer therapies (chemotherapy and/or targeted therapy), and did not undergo radiotherapy during the intervention period.

Exclusion criteria: (1) Presence of severe mental disorders or cognitive impairment, making it impossible to understand or cooperate with the intervention and evaluation; (2) Presence of other life-threatening severe comorbidities, including heart failure, liver failure, renal failure, or uncontrolled severe infection; (3) Simultaneous participation in other interventional clinical trials whose intervention measures conflict with this study; (4) Previous or current systematic receipt of comprehensive psychological intervention and individualized nutritional support, which could make it impossible to distinguish the intervention effects of this study.

2.2.1. Sample size estimation and random grouping

This study selected the global health status score of the EORTC QLQ-C30 scale as the primary outcome indicator. Based on previous literature and preliminary experiment results, the PASS (Power Analysis and Sample Size) software was used for calculation. When $\alpha = 0.05$ (two-sided) and the test power $(1 - \beta) = 0.80$, the required sample size for each group was Z cases. Based on prior studies in advanced gastrointestinal tumor populations, the standard deviation of the EORTC QLQ-C30 global health status score was assumed to be 12.5 points. We powered the study to detect a between-group difference of 8 points, which is considered clinically meaningful on the 0–100 scale. Allowing for a 10% dropout rate, the calculated minimum was 45 patients per group, and we rounded up to 50 per group for safety. Finally, it was determined that 50 cases would be included in each group, for a total sample size of 100 cases. A computer-generated random sequence was used for grouping. One hundred eligible patients were randomly assigned to the intervention group and the control group at a 1:1 ratio, with 50 cases in each group. Due to the nature of humanistic care and routine nursing interventions, neither the study participants nor the nursing staff implementing the interventions could be blinded. To reduce assessment bias, a “blinded assessor” partial blinding method was adopted: a third-party researcher who did not participate in implementing the intervention was responsible for evaluating and recording patients’ quality of life, psychological status, and nutritional indicators, and this assessor was kept unaware of the patient group assignments. This approach could, to a certain extent, reduce subjective scoring bias and improve the objectivity and reliability of the study results.

After the patients were enrolled, a baseline assessment was conducted, including baseline data such as age, gender, tumor stage, and primary tumor site. The intervention officially began after the baseline assessment was completed.

2.2.2. Intervention plan

Control group: routine treatment and nursing care plus standardized nutritional support only; intervention group: in addition to the same routine treatment, nursing care and nutritional support, received structured tumor rehabilitation exercises and patient-centered psychosocial care.

Humanistic care intervention details: (1) Cognitive education. Assess the patient’s educational level and comprehension ability, and adopt personalized educational methods; for patients with good comprehension and higher educational levels, focus on health manuals and verbal instruction; for those with lower comprehension and lower educational levels, strengthen education through the above methods along with video playback, WeChat push notifications of rehabilitation tips, etc. Combine these with feedback-oriented education, i.e., requiring patients to restate the educational content to carefully clarify and correct any errors; (2) Patient support group. Conduct patient support groups with 7–10 people in each group; (3) Stress relief. Teach patients how to control their emotions, such as communicating more with others, listening to music, breathing relaxation, watching TV to divert attention, etc. Help patients develop hobbies and interests, such as dancing, growing flowers, and reading; (4) Family support. Use gentle language to comfort patients’ emotions and help them through stressful periods; invite patients and their families to the

psychological care room to receive “sand play therapy”; (5) Unlike tertiary hospitals, humanistic care in primary hospitals should emphasize local sentiments, allowing communication in the patient’s hometown dialect, guiding patients and their families to recall pleasant memories and alleviate tension; (6) In the course of work, discuss and revise the existing work plan in real time based on problems encountered, promptly address individualized issues of patients, and regularly summarize any problems encountered to form new working methods. (7) Implementation procedure: The humanistic care program was delivered by a multidisciplinary team including an oncology nurse with psychosocial training, a clinical psychologist, and a rehabilitation therapist. All team members completed a two-day workshop on the intervention protocol. Each patient received two 30-min sessions per week over the 8-week period. Sessions followed a structured guide covering cognitive education, group support, stress management techniques, family engagement and dialect-based reminiscence, ensuring consistency and fidelity across participants. (8) Standardization: All patients in the intervention group received the same structured humanistic care protocol; while communication style was adapted to individual preferences, core components (cognitive education, group support, stress management, family engagement, dialect-based reminiscence) were delivered consistently across all participants.

Details of tumor rehabilitation nutritional support: Conduct a comprehensive nutritional assessment of the patient, provide individualized intervention according to the patient’s personal situation, and set a nutritional goal of 100–120 kJ/kg·d. Patients were encouraged to meet the caloric target of 100–120 kJ/kg·d, and dietary adjustments were made accordingly. If the patient’s anorexia, etc., leads to failure to meet caloric requirements, and the gastrointestinal function is intact or partially functional, use nutritional preparations to provide enteral nutritional support. The patient should receive the nutrient solution orally or via nasogastric feeding in divided doses. The caloric content of the nutrient solution is 4–8 kJ/ml, and it should be warmed to near body temperature, with the concentration and volume gradually adjusted from low to high. If the patient cannot tolerate enteral nutrition, provide parenteral nutritional support. This includes a nutritional solution composed of compound vitamins, electrolytes, glucose solution, fat emulsion, compound amino acids, and various trace elements, administered via a peripheral vein. When the patient’s intestinal function recovers or the enteral nutrition requirement is met, discontinue parenteral nutrition and switch to enteral nutrition.

Routine treatment and nursing care: Provide patients with knowledge about the disease and the surgery, assisting with various examinations; pay attention to changes in the patient’s emotional state and provide emotional support; after surgery, inform the patient of the benefits of rehabilitation training and verbally encourage them to exercise, but do not enforce it; strengthen observation of the condition and monitoring of vital signs, and promptly address any abnormalities.

Control group emotional support and exercise: In the control group, emotional support consisted of twice-weekly 15-min sessions by a trained nurse, focusing on active listening and empathetic counseling. Patients were verbally encouraged to perform light aerobic activities (e.g., walking 10–15 min daily) per general postoperative guidelines, but no structured exercise protocol was provided.

2.3. Observation indicators

2.3.1. Primary indicators

The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30 (EORTC QLQ-C30) [8] is used. This scale contains 5 functional domains, 3 symptom domains, 1 global health status score, and several single-item symptoms. After standardizing the total score, the range is 0 to 100 points. The higher the score, the better the corresponding domain level or the more severe the symptoms (higher scores in symptom items indicate a heavier symptom burden, while higher scores in functional or overall health items indicate better health status). The questionnaire assessments are conducted at baseline and at the end of 2 months of treatment. The primary outcome was the Global health status score of the EORTC QLQ-C30 (items 29 and 30), linearly transformed to a 0–100 scale according to the EORTC scoring manual.

2.3.2. Secondary indicators

Psychological status: The Self-Rating Anxiety Scale (SAS) and the Self-Rating Depression Scale (SDS) [9] are used to assess patients' psychological status at baseline and after 2 months of treatment. The SAS includes 20 items, each scored from 1 to 4, for a total score ranging from 20 to 80. The higher the score, the more severe the anxiety. The standard score is calculated by multiplying the raw total score by 1.25, and a score above 50 indicates the presence of anxiety tendencies. The SDS also includes 20 items, each scored from 1 to 4, for a total score ranging from 20 to 80. The higher the score, the more severe the depression. The standard score is calculated by multiplying the raw total score by 1.25, and a score above 53 indicates the presence of depression tendencies.

Nutritional indicators: These are collected and assessed at baseline and after 2 months of treatment. A specialized nurse measures the patient's body weight in the early morning while fasting, and records height; the BMI is then calculated as weight (kg)/height² (m²). At the same time, 2 mL of fasting venous blood is collected in the early morning, and an automatic biochemical analyzer is used to test serum albumin and prealbumin levels. Results below the normal reference range of this hospital are considered abnormal. Nutritional risk is assessed using the Nutrition Risk Screening 2002 (NRS 2002) [10], which scores recent body weight changes, dietary intake, BMI, disease severity, and age. It includes a nutritional status score (0–3 points) and a disease severity score (0–3 points), with an additional 1 point added for age ≥70, resulting in a total score ranging from 0 to 7 points. A total score ≥3 indicates a nutritional risk, requiring enhanced nutritional intervention and monitoring.

Cancer-related fatigue scoring: The Revised Piper Fatigue Scale-Chinese Version (RPFS-CV) [11] is used at baseline and after 2 months of treatment. It is divided into 4 dimensions: behavioral, affective, sensory, and cognitive, with a total of 22 items. Each item is scored on a 0–10 numeric scale. Each dimension is scored as the average of its item scores, and the overall score is the average of the 4-dimensional scores. A score <3 indicates no or mild fatigue, 3–6 indicates moderate fatigue, and above 6 indicates severe fatigue.

Adverse events and complications: These include nausea, vomiting, bone marrow suppression, and infections related to chemotherapy or radiotherapy, as well as

diarrhea, allergic reactions, etc., related to nutritional preparations. The occurrence time, severity, and interventions for each patient are recorded.

2.4. Statistical methods

All questionnaire scores and test indicators were entered into an electronically secured database with dual password protection. Two researchers independently performed data entry and cross-checking, and any discrepancies were resolved by referring back to the original records. SPSS 26.0 was used for statistical analysis, ensuring traceability throughout data processing. Measurement data for metric variables are expressed as mean $\pm$ standard deviation. An independent samples *t*-test was used for between-group comparisons, while a paired *t*-test was used for comparisons before and after the intervention, with Cohen's *d* or Cohen's *dz* reported to estimate effect size. Count data are expressed as frequencies and percentages. Between-group comparisons of count data were performed using the χ^2 test or Fisher's exact test. Multiple linear regression or logistic regression analyses were conducted to determine the main factors influencing quality of life and psychological status, incorporating covariates such as gender, age, disease stage, and baseline nutritional status, in order to assess the independent contribution of the intervention measures to primary or secondary indicators. A two-sided test was employed, and $P < 0.05$ was considered statistically significant. For secondary outcome analyses involving approximately 90 statistical tests, P values were adjusted using Bonferroni correction ($\alpha = 0.05/90 \approx 0.00056$). Results with P values between 0.00056 and 0.05 are reported as exploratory and should be interpreted with caution.

3. Results

3.1. Baseline characteristics of the study subjects

In this study, the baseline demographic and clinical characteristics of the two groups of patients were compared (using independent samples *t*-tests and χ^2 tests). The results showed no significant differences in age, sex, tumor location, stage, BMI, serum albumin, prealbumin, and baseline SAS and SDS scores between the groups (all $P > 0.05$), indicating their comparability (Table 1).

Table 1. Baseline demographic and clinical characteristics of the intervention group and the control group.

Variable	Intervention group ($n = 50$)	Control group ($n = 50$)	Statistic	P value
Age (years)	61.24 $\pm$ 7.45	62.07 $\pm$ 7.09	$t = 0.571$	0.569
Sex [male/female, n (%)]	28 (56%)/22 (44%)	30 (60%)/20 (40%)	$\chi^2 = 0.294$	0.588
Tumor site [n (%)]			$\chi^2 = 0.340$	0.843
Stomach	25 (50%)	22 (44%)		
Colon	15 (30%)	17 (34%)		
Rectum	10 (20%)	11 (22%)		
Tumor stage [IIIB/IV, n (%)]	19 (38%)/31 (62%)	20 (40%)/30 (60%)	$\chi^2 = 0.052$	0.820
BMI (kg/m ²)	21.38 $\pm$ 2.14	21.49 $\pm$ 2.01	$t = 0.244$	0.808
Serum albumin (g/L)	37.52 $\pm$ 4.10	36.97 $\pm$ 4.02	$t = 0.683$	0.496

Table 1. (Continued).

Variable	Intervention group (n = 50)	Control group (n = 50)	Statistic	P value
Prealbumin (mg/L)	216.23 ± 38.99	223.09 ± 36.85	t = 0.907	0.367
Baseline SAS score (points)	44.51 ± 6.28	43.82 ± 6.01	t = 0.567	0.572
Baseline SDS score (points)	48.13 ± 5.76	47.90 ± 5.84	t = 0.199	0.843

3.2. Quality of life (EORTC QLQ-C30) evaluation results

There was no significant difference in the scores of each dimension between the two groups at baseline (all $P > 0.05$). After 2 months of intervention, independent samples t -test showed that the physical function, role function, emotional function, cognitive function, social function, and global health status of the intervention group were significantly higher than those of the control group, while the scores for fatigue, nausea and vomiting, and pain were significantly lower than those of the control group (all $P < 0.05$). Within-group paired t -tests demonstrated a significant improvement in the intervention group before and after the intervention (all $P < 0.001$), whereas the improvement in the control group was not evident (mostly $P > 0.05$, partially < 0.05) (Table 2). The results of multiple linear regression showed that the intervention was significantly positively correlated with the EORTC QLQ-C30 global health status score ($P = 0.002$). After adjusting for age, gender, tumor stage, and baseline serum albumin, the health status score of the intervention group was 4.75 points higher than that of the control group. Age and baseline albumin also had significant effects on this outcome (both $P < 0.05$), whereas gender and tumor stage did not show significant effects (both $P > 0.05$). After model adjustment, R^2 was 0.289, and the F -test indicated that this model could explain part of the variance in the score ($P < 0.001$) (Table 3).

Table 2. Comparison of EORTC QLQ-C30 scores in both groups before and after intervention (mean ± SD).

Dimension	Time	Intervention group	Control group	t Value	P value	Cohen's d
Physical Function	Baseline	60.27 ± 7.24	60.56 ± 7.44	0.191	0.849	0.04
	2 months	66.82 ± 6.58	62.31 ± 6.84	3.004	0.003	0.63
	t Value	6.448	2.164			
	P Value	<0.001	0.035			
	Cohen's dz	0.93	0.31			
Role Function	Baseline	58.14 ± 6.43	59.01 ± 6.91	0.589	0.557	0.13
	2 months	63.99 ± 5.95	60.62 ± 5.72	2.808	0.006	0.57
	t Value	5.974	1.920			
	P Value	<0.001	0.061			
	Cohen's dz	0.85	0.27			
Emotional Function	Baseline	55.36 ± 7.24	54.89 ± 7.11	0.318	0.751	0.07
	2 months	60.42 ± 6.82	56.48 ± 6.59	3.058	0.003	0.63
	t Value	4.896	1.452			
	P Value	<0.001	0.151			
	Cohen's dz	0.69	0.21			

Table 2. (Continued).

Dimension	Time	Intervention group	Control group	<i>t</i> Value	<i>P</i> value	Cohen's <i>d</i>
Cognitive Function	Baseline	64.80 ± 6.42	65.62 ± 6.07	0.666	0.507	0.13
	2 months	68.52 ± 5.82	66.03 ± 5.96	2.083	0.040	0.42
	<i>t</i> Value	3.978	1.924			
	<i>P</i> Value	<0.001	0.058			
	Cohen's <i>dz</i>	0.57	0.27			
Social Function	Baseline	57.22 ± 6.91	56.98 ± 7.52	0.173	0.863	0.03
	2 months	63.36 ± 6.25	59.94 ± 6.47	2.774	0.007	0.56
	<i>t</i> Value	4.72	2.013			
	<i>P</i> Value	<0.001	0.048			
	Cohen's <i>dz</i>	0.67	0.28			
Fatigue	Baseline	42.11 ± 6.12	42.79 ± 6.58	0.507	0.613	0.13
	2 months	36.49 ± 5.74	39.58 ± 5.61	2.619	0.010	0.52
	<i>t</i> Value	4.901	2.654			
	<i>P</i> Value	<0.001	0.012			
	Cohen's <i>dz</i>	0.69	0.38			
Nausea/Vomiting	Baseline	31.93 ± 5.09	32.41 ± 5.64	0.438	0.662	0.09
	2 months	27.15 ± 4.32	29.30 ± 4.80	2.206	0.029	0.44
	<i>t</i> Value	4.695	2.649			
	<i>P</i> Value	<0.001	0.010			
	Cohen's <i>dz</i>	0.66	0.37			
Pain	Baseline	48.24 ± 5.63	49.62 ± 5.99	1.195	0.234	0.22
	2 months	42.87 ± 5.10	46.39 ± 5.17	3.257	0.002	0.65
	<i>t</i> Value	5.587	3.055			
	<i>P</i> Value	<0.001	0.003			
	Cohen's <i>dz</i>	0.79	0.43			
Global Health Status	Baseline	56.28 ± 6.33	56.10 ± 6.68	0.141	0.888	0.03
	2 months	62.99 ± 5.95	58.53 ± 6.21	3.645	< 0.001	0.74
	<i>t</i> Value	6.53	2.181			
	<i>P</i> Value	<0.001	0.032			
	Cohen's <i>dz</i>	0.91	0.31			

Table 3. Multiple linear regression analysis—Independent effect of the intervention on EORTC QLQ-C30 global health status score.

Variable	β (95% CI)	<i>t</i> value	<i>P</i> value
Intercept	35.72 (28.93, 42.51)	8.641	<0.001
Intervention Group vs. Control Group (Intervention = 1, Control = 0)	4.75 (1.73, 7.77)	3.179	0.002
Age (years)	−0.21 (−0.38, −0.03)	2.294	0.024
Gender (female = 1, male = 0)	−1.51 (−3.80, 0.78)	1.312	0.193
Tumor Stage (Stage IV = 1, Stage IIIB = 0)	−2.89 (−5.92, 0.14)	1.865	0.065
Baseline Serum Albumin (g/L)	0.12 (0.01, 0.23)	2.135	0.035

Note: Adjusted $R^2 = 0.289$; $F = 8.736$, $P < 0.001$.

3.3. Psychological status (SAS, SDS) evaluation results

An independent samples *t*-test was used to compare the anxiety (SAS) and depression (SDS) scores of the two groups. The results showed that after 2 months of intervention, the anxiety and depression levels in the intervention group were significantly lower than those in the control group (both $P < 0.05$). A paired *t*-test within each group indicated a significant improvement in psychological status in the intervention group (all $P < 0.001$), and a mild improvement in the control group (all $P < 0.05$) (**Table 4**). According to the results of logistic regression analysis, the risk of $SAS \geq 50$ and $SDS \geq 53$ in the intervention group decreased by 55% and 61%, respectively (both $P < 0.05$). After adjusting for age, gender, stage, and baseline scores, the independent effect of the intervention on anxiety and depression remained significant (OR = 0.45 and 0.39, respectively). Age and baseline scores also had statistically significant effects on both outcomes (both $P < 0.05$), whereas gender and stage had no obvious effect. The Nagelkerke R^2 ranged from 0.276 to 0.312, suggesting that the model had a certain degree of explanatory power (**Table 5**).

Table 4. Comparison of SAS and SDS scores between the two groups before and after the intervention (mean $\pm$ SD).

Dimension	Time	Intervention group	Control group	<i>t</i> value	<i>P</i> value	Cohen's <i>d</i>
SAS	Baseline	44.51 $\pm$ 6.28	43.82 $\pm$ 6.01	0.567	0.572	0.09
	2 months	38.62 $\pm$ 5.54	41.07 $\pm$ 5.67	2.157	0.034	0.44
	<i>t</i> Value	5.532	2.596			
	<i>P</i> Value	<0.001	0.011			
	Cohen's <i>dz</i>	0.78	0.37			
SDS	Baseline	48.13 $\pm$ 5.76	47.90 $\pm$ 5.84	0.199	0.843	0.03
	2 months	42.25 $\pm$ 5.12	45.03 $\pm$ 5.26	2.435	0.017	0.52
	<i>t</i> Value	5.917	2.294			
	<i>P</i> Value	<0.001	0.024			
	Cohen's <i>dz</i>	0.81	0.32			

Table 5. Multiple regression analysis—Independent effect of the intervention on the main SAS/SDS outcomes.

Variable	SAS ≥ 50			SDS ≥ 53		
	OR (95%CI)	Z Value	P Value	OR (95%CI)	Z Value	P Value
Intercept	1.55 (1.00, 2.41)	1.949	0.052	1.27 (0.78, 2.05)	1.132	0.258
Intervention Group vs. Control Group (Intervention = 1, Control = 0)	0.45 (0.23, 0.85)	2.36	0.018	0.39 (0.21, 0.76)	2.728	0.006
Age (years)	1.04 (1.01, 1.07)	2.493	0.013	1.02 (0.99, 1.05)	1.747	0.081
Gender (female = 1, male = 0)	0.85 (0.48, 1.45)	0.883	0.377	1.15 (0.68, 1.93)	0.797	0.425
Tumor Stage (Stage IV = 1, Stage IIIB = 0)	1.62 (0.95, 2.75)	1.741	0.082	1.48 (0.85, 2.63)	1.412	0.158
Baseline Score (Baseline SAS or SDS)	1.09 (1.02, 1.17)	2.573	0.01	1.12 (1.04, 1.21)	3.018	0.003

Note: Nagelkerke R^2 (SAS): 0.276; Nagelkerke R^2 (SDS): 0.312.

3.4. Changes in nutritional indicators

An independent samples *t*-test showed that there was no statistically significant difference in each nutritional indicator between the two groups at baseline ($P > 0.05$).

After 2 months of intervention, the serum albumin and NRS 2002 scores in the intervention group were significantly higher than those in the control group ($P = 0.009$, 0.002), whereas the between-group differences in BMI and prealbumin were not significant ($P = 0.364$, 0.376). A paired t -test within each group indicated that BMI and prealbumin in the intervention group showed a significant increase compared with baseline ($P < 0.001$), whereas the changes in the control group were not significant ($P > 0.05$) (Table 6).

Table 6. Comparison of nutritional indicators between the two groups before and after intervention (mean $\pm$ SD).

Indicator	Time	Intervention group	Control group	t value	P value
BMI (kg/m ²)	Baseline	21.38 $\pm$ 2.14	21.49 $\pm$ 2.01	0.244	0.808
	2 months	22.16 $\pm$ 2.23	21.76 $\pm$ 2.07	0.913	0.364
	t Value	4.951	1.509		
	P Value	<0.001	0.137		
Serum Albumin (g/L)	Baseline	37.52 $\pm$ 4.10	36.97 $\pm$ 4.02	0.683	0.496
	2 months	40.14 $\pm$ 4.23	37.83 $\pm$ 3.91	2.645	0.009
	t Value	5.002	1.630		
	P Value	<0.001	0.108		
Prealbumin (mg/L)	Baseline	216.23 $\pm$ 38.99	223.09 $\pm$ 36.85	0.907	0.367
	2 months	234.76 $\pm$ 40.51	228.14 $\pm$ 37.99	0.889	0.376
	t Value	4.639	1.563		
	P Value	<0.001	0.123		
NRS 2002 Total Score	Baseline	3.02 $\pm$ 0.55	3.05 $\pm$ 0.53	0.274	0.785
	2 months	2.54 $\pm$ 0.59	2.89 $\pm$ 0.57	3.19	0.002
	t Value	5.467	1.886		
	P Value	<0.001	0.064		

3.5. Cancer-related fatigue (RPFS-CV) score results

No statistically significant differences were observed between the two groups in the baseline scores of each RPFS-CV dimension and the total score ($P > 0.05$). After 2 months of intervention, the fatigue scores of the intervention group were significantly lower than those of the control group in the behavioral, affective, sensory, and total score dimensions (all $P < 0.05$), while the difference between groups in the cognitive dimension reached borderline significance ($P = 0.051$). Paired t -tests showed a significant decrease in fatigue levels before and after the intervention in the intervention group (all $P < 0.001$), whereas the control group also showed notable improvements in all indicators except the cognitive dimension compared with baseline (all $P < 0.05$) (Table 7).

Table 7. Comparison of cancer-related fatigue scores between the two groups before and after the intervention (mean $\pm$ SD).

RPFS-CV	Time	Intervention group	Control group	t value	P value	Cohen's d
Behavior	Baseline	6.14 $\pm$ 0.72	6.05 $\pm$ 0.68	0.63	0.532	0.11
	2 months	4.93 $\pm$ 0.67	5.54 $\pm$ 0.74	3.465	0.001	0.69

Table 7. (Continued).

RPFS-CV	Time	Intervention group	Control group	<i>t</i> value	<i>P</i> value	Cohen's <i>d</i>
Affective	<i>t</i> Value	7.131	2.532			
	<i>P</i> Value	<0.001	0.014			
	Cohen's <i>dz</i>	1.09	0.36			
	Time	5.98 ± 0.65	5.85 ± 0.70	0.935	0.352	0.17
	Baseline	4.86 ± 0.63	5.28 ± 0.66	2.937	0.004	0.58
	2 months	6.235	2.474			
	<i>t</i> Value	<0.001	0.016			
	Cohen's <i>dz</i>	0.95	0.37			
	Time	6.22 ± 0.71	6.10 ± 0.74	0.769	0.444	0.14
	Baseline	5.01 ± 0.66	5.47 ± 0.69	2.904	0.005	0.57
Sensory	2 months	5.741	2.153			
	<i>t</i> Value	<0.001	0.034			
	Cohen's <i>dz</i>	0.88	0.31			
	Time	6.35 ± 0.68	6.39 ± 0.72	0.29	0.772	0.05
	Baseline	5.16 ± 0.65	5.44 ± 0.70	1.977	0.051	0.39
Cognitive	2 months	5.012	1.706			
	<i>t</i> Value	<0.001	0.081			
	Cohen's <i>dz</i>	0.79	0.24			
	Time	6.17 ± 0.59	6.09 ± 0.63	0.647	0.519	0.12
	Baseline	5.03 ± 0.56	5.46 ± 0.60	3.392	0.001	0.68
Total Score	2 months	5.931	2.319			
	<i>t</i> Value	<0.001	0.023			
	Cohen's <i>dz</i>	0.93	0.33			

3.6. Adverse events and complications

A χ^2 test was used for comparisons between groups regarding adverse events related to chemotherapy/radiotherapy or nutrition. The results showed no statistically significant differences in the incidence of major adverse events such as nausea, vomiting, bone marrow suppression, infection, diarrhea, and allergic reactions between the intervention group and the control group ($P > 0.05$). The relative risk and its 95% CI indicated a slightly lower risk in the intervention group, but not at a significant level (**Table 8**). Control patients did not withdraw or complain due to not receiving core humanistic care content, and adherence remained high.

Table 8. Incidence of adverse events and complications in the two groups.

Adverse event/complication	Intervention group <i>n</i> (%)	Control group <i>n</i> (%)	χ^2 value	<i>P</i> value	RR (95% CI)
Nausea	13 (26%)	15 (30%)	0.243	0.622	0.87 (0.46, 1.64)
Vomiting	9 (18%)	14 (28%)	1.543	0.214	0.64 (0.29, 1.36)
Bone Marrow Suppression	7 (14%)	12 (24%)	2.020	0.155	0.58 (0.24, 1.31)
Infection	5 (10%)	8 (16%)	0.928	0.335	0.63 (0.22, 1.64)

Table 8. (Continued).

Adverse event/complication	Intervention group <i>n</i> (%)	Control group <i>n</i> (%)	χ^2 value	<i>P</i> value	RR (95% CI)
Diarrhea	11 (22%)	19 (38%)	3.286	0.070	0.58 (0.31, 1.02)
Allergic Reaction	3 (6%)	2 (4%)	0.209	0.648	1.48 (0.25, 8.94)

4. Discussion

The results of this study indicate that the intervention group experienced a significant improvement in all QOL dimensions and overall health status compared to the control group. Humanistic care combined with nutritional support can alleviate patients' anxiety and negative emotions while promoting adherence, thus effectively improving physical function and social role adaptation [12]. Nutritional intervention in terms of basic energy, protein, and micronutrient supply lays a material foundation for bodily repair and immune maintenance, helping patients enhance physical reserve and tolerance [13]. Through measures such as emotional support, optimization of communication approaches, and reinforcement of local sentiments, humanistic care enables patients to receive comprehensive attention even under relatively limited resource conditions in primary hospitals [14]. According to the overall analysis of this study, concurrently implementing psychological counseling and individualized nutritional guidance can achieve a synergistic effect in the short term by reducing symptom burden, improving physiological function, and enhancing subjective quality of life. The two-month intervention period in this study shows that a short-term combined program fits well with patients' adherence and rehabilitation needs. In the future, remote follow-up methods may be further integrated to strengthen family involvement and continuously track long-term benefits. Compared with the more singular models or those lacking humanistic care in tertiary hospitals, the data from this study further underscore the importance of parallel emotional and nutritional interventions, which not only reduce psychological stress but also improve daily functioning and yield enhancements in health status within a short timeframe. This underscores the feasibility of implementing comprehensive interventions with limited resources in primary hospitals. This research plan provides an important reference for subsequent multi-center validation, carries practical guiding significance for improving the quality of life of patients in primary settings, and can also offer a basis for formulating relevant health policies.

Among the patients in the intervention group, scores related to anxiety and depression showed a marked improvement, and the positivity rates of SAS and SDS both declined, indicating that the dual intervention of humanistic care and nutritional support can effectively alleviate negative emotions. Based on the study findings and the multiple regression model, it can be inferred that humanistic care measures such as emotional support, proactive communication, and local sentiment exchanges help patients relieve the psychological pressure caused by disease progression and changes in daily life. Under the limited conditions of primary hospitals, these measures provide effective and humanized care, enhancing trust and cooperation between healthcare providers and patients. Alleviating emotional distress and achieving psychological stability are conducive to boosting patients' enthusiasm for adopting nutritional support programs, improving treatment compliance, and promoting proactive

participation in relevant examinations and treatment plans [15]. For patients with gastrointestinal tumors, negative emotions not only affect the acceptance of dietary plans or medication regimens but can further worsen already poor nutritional status and diminish treatment tolerance and recovery speed [16]. The significant reduction in the positivity rates of anxiety and depression observed in this study suggests that patients have gained actual benefits in psychological resilience, laying a foundation for enhancing immune function. The results showing a decreased risk of SAS or SDS positivity in the intervention group also exhibited significant independence in the multiple regression analysis, confirming that the humanistic care implemented in this study is not merely about companionship but represents an individualized plan that focuses on patients' mental needs, social support, and cultural background, supplemented by precise nutritional supplementation strategies, thereby benefiting patients both physically and psychologically [17]. Combined with appropriate health education and stress-coping techniques, patients are guided to actively cope with treatment side effects and life pressures. This improvement in emotional status helps ensure nutritional intake, maintain continuity of treatment plans, and facilitate follow-up and strategic adjustments by the primary healthcare team. For patients who show obvious tendencies toward anxiety and depression, timely humanistic care interventions can reduce the risk of treatment interruption and complications. The results of this study clarify the feasibility of this model in primary hospitals, providing strong evidence for subsequent clinical promotion.

In the intervention group, the degree of improvement in serum albumin and NRS 2002 scores was significantly better than in the control group, reflecting that a standardized nutritional intervention program can effectively improve patients' nutritional risk status and promote enhancements in metabolic and immune functions. Although between-group comparisons of BMI and prealbumin did not reach a significant difference, the before-and-after improvement within the intervention group was notable, suggesting that even under conditions of limited primary healthcare resources, individualized nutritional assessment and proactive dietary guidance can still help patients achieve substantial improvements in nutritional status [18]. Meanwhile, this study found that cancer-related fatigue in the intervention group was significantly relieved in the behavioral, affective, and sensory dimensions, as well as in the total score; there was also a trend of improvement in the cognitive dimension. This result indicates that cancer-related fatigue is not only related to the tumor itself and its treatment but is also significantly influenced by patients' subjective perceptions and psychological status [19]. Nutritional intervention improves the body's internal environment and increases energy reserves, thereby reducing physical fatigue caused by disease consumption or chemotherapy. Humanistic care, through psychological counseling and social support, effectively alleviates patients' subjective experience of fatigue and mental burden, enabling them to face the physical discomfort and daily activity difficulties brought about by treatment more positively [20]. Patients in primary hospitals are often more susceptible to the dual challenges of nutritional insufficiency and psychological maladjustment, and the comprehensive intervention implemented in this study precisely meets the practical needs of the primary care setting. This finding suggests that primary hospitals should place greater emphasis on integrating nutritional intervention and humanistic care. For patients with advanced

tumors, the key clinical strategy—within the constraints of limited medical resources—lies in maximizing the alleviation of subjective fatigue and improving physical tolerance, thereby indirectly enhancing quality of life and extending survival benefits. This strategy is worthy of further promotion and continuous optimization in clinical practice.

In this study, there was no significant difference in the incidence of adverse reactions related to chemotherapy or radiotherapy, as well as complications during the nutritional support process, between the intervention group and the control group. This suggests that the comprehensive model combining humanistic care with nutritional intervention did not increase patients' treatment risk, demonstrating favorable safety and tolerability under the conditions of primary hospitals. Because patient populations in primary hospitals tend to be highly mobile and medical resources and follow-up management systems are generally relatively limited, the significant intervention effects observed in the short term highlight the practical advantages of the intervention protocol used in this study. Especially for patients with advanced gastrointestinal tumors, the intervention process must take into account both treatment efficacy and actual safety concerns, as well as patient compliance [21]. The current results show that this study's protocol was able to markedly improve patients' quality of life and psychological state within a relatively short two-month observation period, meeting the need in primary hospitals for rapid observation of intervention effects and flexible adjustment of intervention measures. Meanwhile, the level of professional expertise required of medical and nursing staff for this intervention model is moderate; through appropriate training of the nursing team, it can be promoted and applied in primary hospitals.

Limitations: This study is the first to systematically evaluate in a primary care hospital setting the combined effect of patient-centered psychosocial care, structured rehabilitation exercises, and nutritional support on quality of life in patients with advanced gastrointestinal tumors, demonstrating significant improvements in global health status, symptom relief, and psychological outcomes. However, due to the nature of the intervention, participants and care providers could not be blinded, potentially introducing subjective assessment bias; the multifaceted intervention reflects a high level of complexity that may challenge implementation in other resource-limited primary care settings; and although statistically significant differences were observed in the EORTC QLQ-C30 global health status score, the minimal clinically important difference (MCID) and the long-term impact of these changes on patients' daily quality of life require validation in larger, multicenter studies with extended follow-up. Future research should employ multicenter randomized controlled designs with larger samples, extended follow-up periods, and integrated process evaluation and quality control, while exploring streamlined intervention protocols that are feasible for broad implementation in primary care environments.

5. Conclusion

This study demonstrates that, in a primary hospital setting, a combined humanistic care and nutrition support intervention significantly improves quality of life and psychological well-being in advanced gastrointestinal cancer patients ($P <$

0.001), accompanied by reductions in cancer-related fatigue scores and improvements in nutritional indicators, without increasing serious adverse events, offering a safe and clinically valuable model that provides a foundation for future multicenter validation and long-term follow-up.

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