

Effects of Integrated Nursing Based on an Integrated Knowledge-Attitude-Practice-Transtheoretical-Health Belief Model on Negative Emotions and Rehabilitation Outcomes in Patients with Early Gastrointestinal Cancer

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How to cite this paper: Tian, Z.M. and Sun, M.L. (2026) Effects of Integrated Nursing Based on an Integrated Knowledge-Attitude-Practice-Transtheoretical-Health Belief Model on Negative Emotions and Rehabilitation Outcomes in Patients with Early Gastrointestinal Cancer. *Journal of Biosciences and Medicines*, **14**, 285-295.

<https://doi.org/10.4236/jbm.2026.1410020>

Received: September 3, 2026

Accepted: October 23, 2026

Published: October 26, 2026

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Abstract

Objective: To observe the effects of integrated nursing based on an integrated knowledge-attitude-practice-transtheoretical-health belief model on negative emotions and rehabilitation outcomes in patients with early gastrointestinal cancer. **Methods:** A total of 120 patients with early gastrointestinal cancer who received treatment in our hospital from November 2024 to October 2025 were selected as the study subjects. Patients were divided into an integrated group and a routine group according to the random number table method, with 60 patients in each group. The routine group received routine nursing intervention, while the integrated group received integrated knowledge-attitude-practice-transtheoretical-health belief model (KTH) nursing intervention on the basis of routine nursing. Both groups received intervention for 3 months. Negative emotions, psychological resilience, self-management ability, quality of life, and rehabilitation-related indicators, including the incidence of nutritional risk and treatment compliance rate, were compared between the two groups before and after intervention. **Results:** After intervention, the GAD-7 score in the integrated group (4.15 ± 1.23) was lower than that in the routine group (6.82 ± 1.57), while the CD-RISC score (78.69 ± 9.25), CSMS score (94.62 ± 8.51), and SF-36 score (89.73 ± 10.24) in the integrated group were higher than those in the routine group (65.42 ± 8.76), (80.13 ± 7.96), and (76.41 ± 9.58), respectively, with statistically significant differences (all $P < 0.05$). The incidence of nutritional risk in the integrated group was 5.00%,

lower than 16.67% in the routine group, and the treatment compliance rate was 96.67%, higher than 81.67% in the routine group; the differences were statistically significant (all $P < 0.05$). **Conclusion:** KTH model-based integrated nursing can effectively relieve negative emotions, improve psychological resilience and self-management ability, reduce nutritional risk, and enhance treatment compliance and quality of life in patients with early gastrointestinal cancer. It has value for clinical application and promotion.

Keywords

Knowledge-Attitude-Practice-Transtheoretical-Health Belief Model, Integrated Nursing, Early Gastrointestinal Cancer, Negative Emotions, Rehabilitation Outcomes

1. Introduction

Early gastrointestinal cancer refers to cancerous tissue invasion limited to the mucosal or submucosal layer. Endoscopic minimally invasive therapy is the preferred radical treatment, and the 5-year survival rate exceeds 90%. However, after diagnosis, most patients are prone to negative emotions, cognitive bias, and poor treatment compliance, which affect therapeutic outcomes and quality of life [1]. Routine nursing is relatively simple in content and lacks systematic and individualized intervention, making it difficult to fundamentally improve patients' adverse conditions. The integrated knowledge-attitude-practice-transtheoretical-health belief model (KTH) incorporates the core concepts of multiple theories and can provide comprehensive nursing from multiple dimensions. It has achieved notable effects in nursing care for various diseases [2] [3]. At present, few studies have explored its application in patients with early gastrointestinal cancer, and its effects remain unclear. Therefore, this study selected 120 patients and implemented routine nursing and KTH integrated nursing in different groups to explore the value of this model in relieving negative emotions, improving psychological resilience, strengthening self-management ability, and promoting rehabilitation, thereby providing a basis for optimizing clinical nursing programs.

2. Materials and Methods

2.1. General Information

A total of 120 patients with early gastrointestinal cancer who received endoscopic minimally invasive treatment in the Department of Gastroenterology and Endoscopy Center of our hospital from November 2024 to October 2025 were selected. Inclusion criteria were as follows: 1) patients meeting the diagnostic criteria for early gastrointestinal cancer [4]; 2) patients aged 18 years or older, with clear consciousness and normal language communication ability; 3) patients with an expected survival time of at least 1 year; and 4) patients who provided informed consent. Exclusion criteria were as follows: 1) patients with primary malignant

tumors in other sites; 2) patients with mental illness; 3) patients with immune diseases; and 4) patients who had recently received radiotherapy, chemotherapy, targeted therapy, or other antitumor treatments. The 120 patients were divided into an integrated group and a routine group using the random number table method, with 60 cases in each group. In the integrated group, there were 34 males and 26 females; the age ranged from 42 to 73 years, with a mean age of 56.84 ± 7.25 years. Lesion sites included early esophageal cancer in 11 cases, early gastric cancer in 28 cases, and early colorectal cancer in 21 cases. In the routine group, there were 32 males and 28 females; the age ranged from 40 to 75 years, with a mean age of 57.31 ± 7.62 years. Lesion sites included early esophageal cancer in 12 cases, early gastric cancer in 26 cases, and early colorectal cancer in 22 cases. There were no statistically significant differences in baseline data between the two groups ($P > 0.05$), indicating comparability.

2.2. Methods

The routine group received routine clinical nursing for 3 months. After admission, the responsible nurses provided reception and education, completed assessment, and monitored vital signs. Health education on early gastrointestinal cancer and endoscopic treatment was provided through oral instruction combined with manuals. Before surgery, examinations, bowel preparation, and fasting guidance were completed. After surgery, vital signs, abdominal pain, and bleeding were monitored; medication was administered according to medical orders; and guidance on diet and rest was provided. Requirements for medication, diet, activity, and follow-up examination were explained. At discharge, rehabilitation guidance and written instruction sheets were provided, and telephone follow-up was conducted at 1 and 3 months after discharge.

The integrated group received integrated KTH nursing intervention on the basis of the routine nursing provided to the routine group, with an intervention period of 3 months. Before intervention, a special nursing team was established, including two gastroenterologists, four responsible nurses, one clinical nutritionist, and one psychological counselor. All team members received unified training in KTH theory, nursing care for early gastrointestinal cancer, psychological counseling, and scale assessment, and began work only after passing the assessment.

First, intervention from the knowledge-attitude-practice (KAP) dimension was implemented. In the knowledge acquisition stage, diversified education methods including one-to-one bedside explanation, animated videos, illustrated manuals, and rehabilitation lectures were used to systematically explain the causes, risk factors, advantages and safety of endoscopic treatment, postoperative rehabilitation, prevention of complications, nutrition, medication, and the importance of follow-up for early gastrointestinal cancer. Misconceptions such as regarding early cancer as a terminal disease or endoscopic treatment as a high-risk procedure were corrected. In the belief-establishment stage, patients' concerns were patiently listened to, successful rehabilitation cases were introduced, and the high cure rate associated with early diagnosis and early treatment was emphasized, thereby help-

ing patients establish the belief that positive rehabilitation and standardized management can lead to a favorable prognosis. In the behavior-change stage, dietary transition was guided gradually according to postoperative recovery. Patients were instructed to stop smoking, limit alcohol intake, avoid irritating and rough foods, gradually perform moderate exercise, take medication regularly as prescribed, maintain regular work and rest schedules, and develop healthy rehabilitation behaviors.

Second, intervention from the transtheoretical model (TTM) dimension was carried out. In the precontemplation and contemplation stages, active communication and counseling were provided, questions were answered, the harms of unhealthy behaviors were analyzed, and patients' willingness to actively participate in rehabilitation was stimulated, guiding them from passive resistance to active change. In the preparation stage, individualized rehabilitation plans for diet, exercise, medication, and follow-up were formulated jointly with patients and their family members. In the action stage, implementation of healthy behaviors was supervised daily, nonstandard behaviors were corrected promptly, and positive encouragement was used to strengthen behavioral motivation. In the maintenance stage, follow-up assessment was conducted regularly, rehabilitation problems were solved in a timely manner, recurrence of unhealthy behaviors was prevented, and healthy behaviors were consolidated over the long term.

Third, intervention from the health belief model (HBM) dimension was implemented. Patients' perceptions of disease susceptibility and severity were enhanced, and they were informed that nonstandard rehabilitation may increase the risk of recurrence and progression. The benefits of healthy behaviors in reducing complications, lowering recurrence risk, and improving quality of life were strengthened. Behavioral barriers such as dietary discomfort, exercise-related fatigue, and financial burden were identified and addressed in a targeted manner. Patients were encouraged to participate independently in rehabilitation management, and their rehabilitation progress was recognized to improve self-efficacy and confidence in persistent rehabilitation.

Fourth, psychological, nutritional, and continuing nursing interventions were provided. One-to-one psychological counseling was conducted weekly. Psychological counselors used relaxation training and music therapy to relieve negative emotions, together with peer support and emotional support from family members. The nutritionist developed individualized nutrition plans. After surgery, sequential enteral nutrition was used to support transition to oral diet, with emphasis on high-quality nutrition and small, frequent meals, followed by regular assessment and adjustment. A rehabilitation WeChat group was established to send daily health education messages and provide 24-hour online consultation support. After discharge, telephone follow-up was conducted every 2 weeks, and video or home follow-up was conducted monthly, thereby realizing continuous nursing inside and outside the hospital and dynamically optimizing the intervention program.

2.3. Observation Indicators

The Generalized Anxiety Disorder 7-item scale (GAD-7) was used to compare negative emotions between the two groups before and after intervention [5]. The scale contains 7 items scored on a 4-point scale from 0 to 3, with a total score ranging from 0 to 21. Scores of 0 - 4 indicate no anxiety, 5 - 9 mild anxiety, 10 - 13 moderate anxiety, and 14 - 21 severe anxiety.

The Connor-Davidson Resilience Scale (CD-RISC) was used to assess psychological resilience in the two groups [6]. The scale contains 25 items scored on a 5-point scale from 0 to 4, with no reverse scoring. The total score ranges from 0 to 100; a score below 60 indicates poor psychological resilience, 61 - 69 indicates general psychological resilience, 70 - 79 indicates good psychological resilience, and 80 or above indicates excellent psychological resilience.

The Chronic Disease Self-Management Scale (CSMS) was used to evaluate patients' self-management ability. The scale contains 3 dimensions and 27 items. All items are scored using a 5-point Likert scale, with a total score ranging from 27 to 135. Higher scores indicate stronger overall self-management ability. (Chinese version, validated by previous studies.)

The Short Form-36 Health Survey (SF-36) was used to evaluate patients' quality of life [7]. It contains 36 items covering 8 health dimensions. All items are ultimately converted into standardized scores ranging from 0 to 100. Higher scores indicate better health status in the corresponding dimension, with 0 representing the poorest quality of life and 100 representing the best quality of life.

Rehabilitation-related indicators included the incidence of nutritional risk and treatment compliance rate. First, the incidence of nutritional risk was evaluated using the Nutritional Risk Screening 2002 (NRS-2002) scale after 3 months of intervention. A score of 3 or higher was defined as nutritional risk, and the incidence of nutritional risk in the two groups was calculated. Second, treatment compliance was evaluated during the intervention period according to patients' implementation of diet, medication, exercise, and follow-up requirements. Compliance was categorized as complete compliance (strict adherence to all rehabilitation plans without violations), partial compliance (basic adherence to the rehabilitation plan with occasional minor violations), or noncompliance (frequent failure to follow the rehabilitation plan and refusal to cooperate with treatment and nursing). Treatment compliance rate = (number of completely compliant cases + number of partially compliant cases)/total number of cases $\times$ 100%.

Outcome assessors and blinding: All outcome measures were assessed by independent research nurses who were blinded to group allocation. The CSMS used was the validated Chinese version. Treatment compliance was evaluated using a standardized checklist administered by an independent assessor not involved in the intervention.

Primary and secondary outcomes: The primary outcome was the GAD-7 score at 3 months post-intervention. Secondary outcomes included CD-RISC, CSMS, SF-36, incidence of nutritional risk, and treatment compliance rate. The sample

size was determined based on a pilot study assuming a mean difference of 2.5 in GAD-7 with a standard deviation of 4.0, $\alpha = 0.05$, power = 0.90, yielding 60 patients per group. No adjustment for multiple testing was applied to secondary outcomes; results should be interpreted cautiously.

2.4. Statistical Methods

SPSS 27.0 statistical software was used for data analysis. In this study, scale scores and other measurement data were expressed as mean $\pm$ standard deviation, and the independent-samples t test was used. Treatment compliance rate was count data and was expressed as frequency (n) and percentage (%). The test level was set at $\alpha = 0.05$. For repeated continuous outcomes, a linear mixed model with group, time, and group $\times$ time interaction was used to estimate between-group differences and 95% confidence intervals, treating patients as random effects.

3. Results

3.1. Comparison of Negative Emotions

Before intervention, there was no significant difference in GAD-7 scores between the two groups ($P > 0.05$). After intervention, GAD-7 scores were significantly decreased in both groups ($P < 0.05$), and the GAD-7 score in the integrated group (4.15 ± 1.23) was significantly lower than that in the routine group (6.82 ± 1.57) ($P < 0.05$), as shown in Table 1.

Table 1. Comparison of GAD-7 scores between the two groups (mean $\pm$ SD).

Group	n	Before intervention	After intervention
Integrated group	60	10.52 $\pm$ 2.46	4.15 $\pm$ 1.23*
Routine group	60	10.38 $\pm$ 2.51	6.82 $\pm$ 1.57*
t		0.308	10.369
P		0.758	<0.001

*Note: Compared with before intervention within the same group, *P < 0.05.

3.2. Comparison of Psychological Resilience

Before intervention, there was no significant difference in CD-RISC scores between the two groups ($P > 0.05$). After intervention, CD-RISC scores were significantly increased in both groups ($P < 0.05$), and the CD-RISC score in the integrated group (78.69 ± 9.25) was significantly higher than that in the routine group (65.42 ± 8.76) ($P < 0.05$), as shown in Table 2.

3.3. Comparison of Self-Management Ability

Before intervention, there was no significant difference in CSMS scores between the two groups ($P > 0.05$). After intervention, CSMS scores were significantly increased in both groups ($P < 0.05$), and the CSMS score in the integrated group

(94.62 ± 8.51) was significantly higher than that in the routine group (80.13 ± 7.96) ($P < 0.05$), as shown in **Table 3**.

Table 2. Comparison of CD-RISC scores between the two groups (mean ± SD).

Group	n	Before intervention	After intervention
Integrated group	60	52.36 ± 8.14	78.69 ± 9.25*
Routine group	60	51.87 ± 8.32	65.42 ± 8.76*
t		0.326	8.068
P		0.744	<0.001

*Note: Compared with before intervention within the same group, * $P < 0.05$.

Table 3. Comparison of CSMS scores between the two groups (mean ± SD).

Group	n	Before intervention	After intervention
Integrated group	60	62.15 ± 7.34	94.62 ± 8.51*
Routine group	60	61.89 ± 7.41	80.13 ± 7.96*
t		0.193	9.632
P		0.847	<0.001

*Note: Compared with before intervention within the same group, * $P < 0.05$.

3.4. Comparison of Quality of Life

Before intervention, there was no significant difference in SF-36 scores between the two groups ($P > 0.05$). After intervention, SF-36 scores were significantly increased in both groups ($P < 0.05$), and the SF-36 score in the integrated group (89.73 ± 10.24) was significantly higher than that in the routine group (76.41 ± 9.58) ($P < 0.05$), as shown in **Table 4**.

Table 4. Comparison of SF-36 scores between the two groups (mean ± SD).

Group	n	Before intervention	After intervention
Integrated group	60	62.28 ± 9.16	89.73 ± 10.24*
Routine group	60	64.95 ± 9.32	76.41 ± 9.58*
t		1.582	7.357
P		0.116	<0.001

*Note: Compared with before intervention within the same group, * $P < 0.05$.

3.5. Comparison of Rehabilitation-Related Indicators

After intervention, the incidence of nutritional risk in the integrated group was significantly lower than that in the routine group, and the treatment compliance rate was significantly higher than that in the routine group (both $P < 0.05$), as shown in **Table 5**.

Table 5. Comparison of rehabilitation-related indicators [n (%)].

Group	n	Incidence of nutritional risk	Treatment compliance rate
Integrated group	60	3 (5.00)	58 (96.67)
Routine group	60	10 (16.67)	49 (81.67)
χ^2		4.227	6.987
P		0.039	0.008

Participants flow and missing data: A total of 120 patients were randomized (60 per group). All 120 completed the 3-month intervention and outcome assessments; no missing outcome data were observed. Randomization was performed using a computer-generated random number table, and allocation concealment was ensured with sequentially numbered opaque sealed envelopes.

4. Discussion

As an early malignant tumor with an excellent clinical prognosis, the therapeutic effect and rehabilitation quality of early gastrointestinal cancer depend not only on the technical level of endoscopic minimally invasive treatment, but also on patients' psychological status, cognitive level, treatment compliance, self-management ability, and rehabilitation behaviors. Therefore, identifying a scientific, systematic, and effective nursing intervention model to improve negative emotions, enhance psychological resilience and self-management ability, and promote post-operative rehabilitation has become an important research direction in clinical nursing for early gastrointestinal cancer.

The results of this study showed that after intervention, the GAD-7 score in the integrated group was significantly lower than that in the routine group, while the CD-RISC score was significantly higher than that in the routine group. These findings indicate that KTH integrated nursing can effectively relieve anxiety and negative emotions in patients with early gastrointestinal cancer and significantly improve their psychological resilience. The reasons may be as follows: 1) routine nursing provides only simple psychological comfort and lacks systematic psychological intervention, whereas KTH integrated nursing carries out psychological counseling and cognitive intervention from multiple dimensions. KAP intervention corrects patients' misconceptions through systematic knowledge education and eliminates fear and anxiety caused by insufficient cognition; 2) the TTM provides targeted psychological support according to patients' stages of behavioral change and gradually guides them to accept the disease and establish confidence in rehabilitation; 3) the HBM helps patients establish positive health beliefs by strengthening their perception of disease risk and rehabilitation benefits [8]; and 4) professional psychological counselors and multiple psychological intervention methods are also combined to comprehensively relieve negative emotions and enhance patients' psychological adjustment ability in response to stress and setbacks, thereby effectively improving psychological resilience.

In terms of self-management ability and quality of life, the results of this study showed that after intervention, CSMS and SF-36 scores in the integrated group were significantly higher than those in the routine group, suggesting that KTH integrated nursing can significantly enhance self-management ability and comprehensively improve quality of life in patients with early gastrointestinal cancer. The reasons may be as follows: 1) routine nursing lacks systematic cultivation of patients' self-management ability, and patients are mostly in a passive state of receiving care with weak self-management awareness. In contrast, KTH integrated nursing incorporates the cultivation of self-management ability throughout the intervention process. KAP intervention helps patients master self-management knowledge and skills; the TTM guides patients in stages to actively implement healthy rehabilitation behaviors; and the HBM stimulates patients' internal motivation for self-management by improving self-efficacy and eliminating behavioral barriers. Meanwhile, continuing nursing intervention provides whole-course self-management guidance both inside and outside the hospital, enabling patients to shift from passive nursing to active self-management and effectively improving comprehensive self-management abilities, including disease, diet, exercise, and emotion management [9]; and 2) good self-management ability helps patients better implement rehabilitation plans, reduce postoperative discomfort and complications, improve physiological, psychological, and social functions, and thereby comprehensively improve quality of life. This is consistent with previous findings on KTH integrated nursing in patients with coronary heart disease and breast cancer [10].

In terms of rehabilitation outcomes, the results of this study showed that the incidence of nutritional risk in the integrated group was significantly lower than that in the routine group, while the treatment compliance rate was significantly higher than that in the routine group. These results indicate that KTH integrated nursing can effectively reduce nutritional risk, improve treatment compliance, and promote postoperative rehabilitation. The reasons may be as follows: 1) after surgery, patients with early gastrointestinal cancer have impaired gastrointestinal function and decreased appetite, making them prone to malnutrition, which affects postoperative recovery. Routine nursing provides only simple dietary guidance and lacks individualized nutritional intervention, whereas KTH integrated nursing includes professional nutritionists who formulate precise nutritional support plans according to patients' individual conditions, monitor nutritional status throughout the whole process, and adjust dietary plans promptly, thereby effectively preventing malnutrition and reducing nutritional risk [11]; and 2) through cognitive reconstruction, belief strengthening, psychological counseling, and continuing support, KTH integrated nursing enables patients to fully understand the importance of standardized treatment and rehabilitation, eliminates treatment-related concerns, significantly improves patients' compliance with medication, diet, exercise, and follow-up, ensures effective implementation of treatment and nursing measures, reduces complications, accelerates postoperative rehabilitation,

and improves rehabilitation outcomes.

Limitations and confounding: We acknowledge that individualized nutritional support, psychological counseling, WeChat-based continuing care, and intensified follow-up may independently influence outcomes. The specific contributions of these adjunctive components cannot be disentangled from the KTH framework itself in the present design. Additionally, the cohort included esophageal, gastric, and colorectal cancers; heterogeneity in histology, lesion depth, size, endoscopic procedure, and postoperative complications may affect rehabilitation. These factors were not uniformly adjusted in the analysis and should be interpreted as potential confounders.

In summary, integrated nursing based on an integrated knowledge-attitude-practice-transtheoretical-health belief model can effectively relieve negative emotions such as anxiety, improve psychological resilience, enhance self-management ability, reduce postoperative nutritional risk, and improve treatment compliance and quality of life in patients with early gastrointestinal cancer. It significantly promotes postoperative rehabilitation, has high clinical application value and is suitable for clinical promotion.

Ethics Statement

This study was approved by the Ethics Committee of the First Hospital of Yangtze University (approval number: 2024-KY-089). All participants provided written informed consent prior to enrollment. The study was conducted in accordance with the Declaration of Helsinki.

Acknowledgements

We thank all the participants and the nursing staff of the Department of Gastroenterology for their cooperation.

Author Contributions

Conceptualization: Z.M.T., M.L.S.; Methodology: Z.M.T.; Software: Z.M.T.; Validation: Z.M.T., M.L.S.; Formal Analysis: Z.M.T.; Investigation: Z.M.T., M.L.S.; Resources: Z.M.T.; Data Curation: Z.M.T.; Writing - Original Draft: Z.M.T.; Writing - Review & Editing: Z.M.T., M.L.S.; Visualization: Z.M.T.; Supervision: M.L.S.; Project Administration: Z.M.T.; Funding Acquisition: M.L.S. All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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