



Impact of Health Education Based on Protective Motivation Theory on the Mood State, Cancer-Related Fatigue, and Hope Level of Gastric Cancer Patients

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Abstract

Background: Gastric cancer patients often feel physically tired and weak, lacking confidence and enthusiasm for relevant treatments. We aimed to explore the impacts of health education based on the theory of protective motivation on the emotional state, cancer-related fatigue, and hope levels of gastric cancer patients.

Methods: A total of 160 gastric cancer patients admitted to the Sanmenxia Central Hospital, Henan, China, from May 2019 to March 2022 were selected as subjects. The control group ($n=80$) received routine health education, while the observation group ($n=80$) received health education based on the theory of protective motivation. Intervention evaluations included the Morisky medication compliance score, Plain Mood State Scale (POMS), Cancer Fatigue Scale (CFS), Herth Hope Scale (HHI), and Simple Health Survey Scale (SF-36).

Results: After intervention, both groups showed an improvement in Morisky's medication compliance score, HHI scale score, and SF-36 scale score (all $P<0.05$). Additionally, the observation group exhibited greater improvement than the control group ($P<0.05$). There were no significant differences in POMS scale score and CFS scale score between the two groups before and after intervention. However, after intervention, both groups experienced a decrease in POMS scale score and CFS scale score (both $P<0.05$), with the observation group showing a more significant decrease compared to the control group ($P<0.05$).

Conclusion: Health education based on the theory of protective motivation effectively enhances the mood state, reduces cancer-related fatigue, and increases hope levels among gastric cancer patients, thereby improving their medication compliance and overall quality of life.

Keywords: Protective motivation; Health education; Gastric cancer

Introduction

Gastric cancer is a prevalent malignant tumor in clinical settings. In 2017, there were approximately 4.3 million new cancer cases in China, accounting for approximately 20% of the global cases, with at least 2.79 million deaths (1). Cancer pre-

vention, diagnosis, and treatment have become crucial public health concerns in China. In 2018, data released by the China Cancer Center indicated an annual occurrence of roughly 680,000 new gastric cancer cases, ranking second in both mor-



tality and incidence rate, second only to lung cancer (2). Despite the decreasing global trends in stomach cancer mortality and incidence due to advancements in medical and scientific technology, the mortality and incidence rates remain high in China. Patients with gastric cancer experience varying degrees of cancer-related fatigue, often leading to depression, apathy, physical fatigue, lack of confidence and enthusiasm for treatment, and a profound sense of hopelessness toward the disease. These emotional and physical challenges significantly affect patients' treatment and prognosis, prompting attention from the medical and psychological communities.

The effectiveness of health education based on the theory of protective motivation in enhancing postoperative functional recovery compliance among breast cancer patients (3). Similarly, systematic health education could improve treatment compliance in gastric cancer patients undergoing chemotherapy and alleviate anxiety and depression (4). Diversified health education interventions could improve treatment compliance and enhance the quality of life for antrum cancer patients, fostering a harmonious clinical nurse-patient relationship (5). A new health education model could improve the perioperative negative mood state of gastric cancer patients (6). A new health education model based on theory of protective motivation significantly improved coping styles and mood states in patients with progressive gastric cancer (7). Health education interventions for gastric cancer patients have proven effective in alleviating cancer-related fatigue and enhancing their quality of life. In line with these findings, health education mode interventions based on theory of protective motivation effectively improved the self-efficacy of gastric cancer patients and reduced cancer-induced fatigue (8). Furthermore, a close relationship between gastric cancer patients' hope levels and their mental state and social support (9). The health education model based on theory of protective motivation effectively improved the mood state and social support levels of gastric cancer patients, fostering increased confidence and survival hope, ultimately enhancing their hope levels.

Rehabilitation intervention is crucial for gastric cancer patients. However, current health education practices often rely on monotonous knowledge transfer, resulting in limited effectiveness.

Drawing on the theory of protective motivation, we formulated a health education model and conducted a randomized controlled trial. The aim was to provide valuable insights into and guidance for effective rehabilitation interventions in gastric cancer patients. By integrating motivational principles into the model, we strived to enhance patient engagement and compliance, leading to improved treatment outcomes and enhanced quality of life.

Materials and Methods

Research object

A total of 160 patients diagnosed with gastric cancer and admitted to the Department of Gastroenterology at Sanmenxia Central Hospital, Henan Province, China, from May 2019 to March 2022, were selected as subjects using a convenient sampling method. Using a random number method, the patients were divided into two groups: the control group ($n=80$) and the observation group ($n=80$). No significant differences were observed in age, sex, education level, type of gastric cancer, TNM (Tumor, Node, Metastasis) staging, and treatment methods between the two groups ($P>0.05$) (Table 1). This study was approved by the Ethics Committee of Sanmenxia Central Hospital (No. 11-2019) and patients and their families signed informed consent forms.

The inclusion criteria were as follows: All patients met the diagnostic criteria of gastric cancer according to Modern Oncology guidelines confirmed by pathology.

The exclusion criteria were as follows: 1) patients with hearing, speech, and consciousness impairment; 2) patients with serious mental illness; 3) patients with severe organ dysfunction; 4) patients with tumor metastasis or recurrence; 5) patients with other malignant tumors; 6) patients

with anxiety or depression; 7) patients who recently received related psychological treatment; 8) patients with physical conditions and low levels

of education unable to complete the relevant tests; and 9) patients with poor compliance or rejecting information exchange.

Table 1: Comparison of general data between the two groups

<i>Variable</i>	<i>Control group</i>	<i>Observation group</i>	<i>t/x²</i>	<i>P</i>
Male/Female	49/31	46/34	0.233	0.629
Age (yr)	30-78	31-79		
Average age (yr)	50.26±7.66	50.33±7.52	0.058	0.477
Degree of Education [n(%)]				
Junior high school and below	20(25.00%)	18(22.50%)	0.296	0.863
High school or technical secondary school	36(45.00%)	35(43.75%)		
Junior college and below	24(30.00%)	27(33.75%)		
Types of gastric cancer [n(%)]				
Gastric fundus and cardia cancer	25(31.25%)	23(28.75%)	0.119	0.942
Gastric body cancer	29(36.25%)	30(37.50%)		
Antral cancer of stomach	26(32.50%)	27(33.75%)		
Tumor TNM staging [n(%)]				
Stage 1	11(13.75%)	9(11.25%)	0.470	0.491
Stage 2	32(40.00%)	30(37.50%)		
Stage 3	37(46.25%)	41(51.25%)		
Therapeutic method [n(%)]				
Radical correction	32(40.00%)	35(43.75%)	0.231	0.631
Radical correction combined with chemotherapy	48(60.00%)	45(56.25%)		

Methods

Drawing on the intervention framings developed by Pei et al (10), the control group received routine health education, including basic care, dietary and medication interventions, psychological counseling, and discharge-related guidance, over the course of eight weeks. By contrast, the observation group received health education based on the theory of protective motivation, led by two nurses and one chief physician from the surgical and oncology departments. A health education group was established to create video and graphic materials that covered the definition, treatment, prevention, and related precautions of gastric cancer. Clinical data from patients were collected and specialized archives were created. Health education sessions were conducted twice a week,

with each session lasting 30-40 minutes, and collective health education was provided once a week, with a duration of 60-80 minutes, for a total intervention period of eight weeks. Specific intervention methods included:

1) Severity. Responsible nurses provided individualized videos and graphic materials to each gastric cancer patient, explaining the complications of the disease and related treatment methods. This intervention period lasted for one week.

2) Susceptibility. Emphasis was placed on the harmful effects of complications and the severity of uncontrollable diseases, such as possible pyloric obstruction, gastrointestinal bleeding, lesion metastasis, and negative psychological effects. This intervention period lasted for one week.

3) Internal Rewards. The responsible nurse conducted communication with patients to identify and record their current psychological problems and negative behaviors, such as decreased compliance. The causes of these issues were analyzed, focusing on identifying negative emotions like depression, pessimism, and psychological stress, or lack of awareness regarding the importance of medication intervention. Timely intervention and correction were implemented, and if the problems were due to psychological factors, specialized psychological training methods such as stress training, relaxation training, and music therapy were employed over a 3-7 week intervention period.

4) External Rewards. Patients received increased family support, and family members were invited to participate in coordination training together over a 3-7 week intervention period.

5) Response Effectiveness. A light schedule for daily work was developed, with patients completing each item according to the list, which included multiple aspects such as psychological regulation, exercise, diet, and medication. The responsible nurse supervised patients, provided guidance, corrected any incorrect aspects, and affirmed the patient's achievements. This intervention period lasted for 3-7 weeks.

6) Self-Efficacy. Positive cases of mood improvement and active medication leading to postoperative recovery and disease control were shared with patients. Stable patients were invited to share their own experiences, encouraging others to overcome the disease, establish courage and confidence, and adopt relevant self-care behaviors (such as improving lifestyle habits, adjusting diet, and actively exercising) to enhance their effectiveness. This intervention occurred in the seventh week.

7) Reaction to Costs. In the eighth week, personalized health education and guidance were provided to patients to help them recognize that healthy self-care behaviors, a positive mood, and adherence to medication were greatly beneficial for the prognosis of the condition. After discharge, weekly telephone follow-ups were con-

ducted to supervise and encourage relevant behaviors and improve compliance.

Observation indicators

Medication compliance. Medication compliance was evaluated using the Morisky Medication Compliance Scale (11), with a total score of 8 points. Scores below 6 points indicated poor adherence, scores of 6-7 points indicated good adherence, and a score of 8 points indicated excellent adherence.

Mood state. The mood state of patients was evaluated using the Plain Mood State Scale (POMS), scale (12), which consisted of seven dimensions: intervention items (7 items), vitality-energy (8 items), puzzlement-confusion (7 items), dullness-fatigue (7 items), hostility-anger (12 items), disheartenment-depression (15 items), and anxiety-tension (9 items). Each item was scored on a 5-level Likert scale (0-4 points), with higher scores indicating stronger emotional dimensions. The scale's Cronbach's α coefficient was 0.92, the retest reliability was 0.89, and the construct validity KMO was 0.90.

Cancer-induced fatigue. The cancer-related fatigue status of patients was evaluated using the Cancer Fatigue Scale (CFS) scale (13). The Chinese version of the scale has 3 dimensions and 15 items (four cognitive items, four emotional items, and seven physical items). Each item was evaluated using a 4-level Likert scoring method, with severe fatigue scoring 5 points and non-fatigue scoring 0 points. The total score of the scale was 60 points, and higher scores indicated more severe fatigue symptoms. The scale's Cronbach's α coefficient was 0.88, the retest reliability was 0.90, and the construct validity KMO was 0.91.

Hope level. The Herth Hope Scale (HHI) scale was used to assess patients' level of hope (14). The Chinese version of the scale has 12 items and 3 dimensions evaluated using a 4-level Likert scoring method. The score range was between 12-48 points, with higher scores indicating a higher level of hope. The scale's Cronbach's α coefficient was 0.87, the retest reliability was 0.90, and the construct validity KMO was 0.89.

Quality of life. Patients' quality of life was evaluated using the SF-36 scale (15). The scale consists of 36 items and 8 dimensions (overall health, physiological function, mental health, vitality, physical pain, physiological function, emotional function, social function), with each dimension containing 2-10 items. Higher scores indicated better quality of life for patients. The scale's Cronbach's α coefficient was 0.89, and the construct validity KMO was 0.90.

Statistical Analysis

SPSS 20.00 software (IBM Corp., Armonk, NY, USA) was used to process the data. The measurement data was presented as ($\bar{x} \pm s$), with paired t-tests used within the group and independent sample t-tests used to compare data between groups. Example (%) was used to represent the

counting data, and χ^2 tests were applied. A significance level of $P < 0.05$ was used to indicate statistically significant differences.

Results

Changes in medication compliance between two groups of patients before and after intervention

No statistically significant difference in Morisky's medication compliance scores was noted between the two groups before and after intervention. After intervention, the medication compliance scores increased in both groups ($P < 0.05$). Furthermore, the observation group exhibited higher scores compared to the control group after intervention ($P < 0.05$) (Table 2).

Table 2: Changes in medication adherence of two groups of patients before and after intervention ($\bar{x} \pm s$, score)

Variable	Observation group (n=80)		Control group (n=80)	
	Before intervention	After intervention	Before intervention	After intervention
Medication compliance	4.15±0.35	7.22±0.61 ^{#&}	4.13±0.32	6.33±0.58 [#]

Note: Compared with the same group before intervention, [#] $P < 0.05$; Compared with the control group after intervention, [&] $P < 0.05$.

Changes in mood status of two groups of patients before and after intervention

No statistically significant difference in POMS scores between the two groups was observed before and after intervention. However, after inter-

vention, the POMS scores decreased in both groups ($P < 0.05$), with the observation group showing lower scores compared with the control group ($P < 0.05$) (Table 3).

Table 3: Changes in mood state of two groups of patients before and after intervention ($\bar{x} \pm s$, score)

Variables	Observation group (n=80)		Control group (n=80)	
	Before intervention	After intervention	Before intervention	After intervention
Vitality-energy	2.32±0.45	1.70±0.30 ^{ab}	2.29±0.43	1.89±0.35 ^a
Puzzlement-confusion	2.92±0.39	1.79±0.29 ^{ab}	2.96±0.36	2.05±0.30 ^a
Dullness-fatigue	2.62±0.44	2.00±0.33 ^{ab}	2.65±0.41	2.19±0.36 ^a
Hostility-anger	3.18±0.49	1.96±0.42 ^{ab}	3.20±0.51	1.56±0.39 ^a
Disheartenment-depression	3.33±0.45	1.95±0.32 ^{ab}	3.29±0.41	1.58±0.30 ^a
Anxiety-tension	3.18±0.46	2.31±0.36 ^{ab}	3.19±0.42	1.78±0.26 ^a

Note: Compared with the same group before intervention, ^a $P < 0.05$; Compared with the control group after intervention, ^b $P < 0.05$

Changes in cancer-related fatigue before and after intervention in two groups of patients

No statistically significant difference in CFS scale scores was found between the two groups before and after intervention. Following intervention,

the CFS scale scores decreased in both groups ($P<0.05$), and the observation group exhibited lower scores compared to the control group ($P<0.05$) (Table 4).

Table 4: Changes in cancer-related fatigue before and after intervention in two groups of patients

Variable	Observation group (n=80)		Control group (n=80)	
	Before intervention	After intervention	Before intervention	After intervention
Body	22.98±2.19	11.22±1.45 ^{ab}	22.95±2.08	15.20±1.87 ^a
Emotion	12.09±2.55	5.21±2.10 ^{ab}	12.13±2.49	7.33±2.03 ^a
Cognition	12.32±2.89	4.02±2.08 ^{ab}	12.39±2.95	6.05±2.26 ^a
Total score	46.59±5.36	20.06±3.59 ^{ab}	46.69±5.49	26.85±4.16 ^a

Note: Compared with the same group before intervention, ^a $P<0.05$; Compared with the control group after intervention, ^b $P<0.05$.

Changes in hope levels of two groups of patients before and after intervention

No statistically significant difference in HHI scale scores was found between the two groups before and after intervention. However, after interven-

tion, the HHI scale scores increased in both groups ($P<0.05$), with the observation group demonstrating higher scores compared to the control group ($P<0.05$) (Table 5).

Table 5: Changes in hope levels of two groups of patients before and after intervention (x±s, score)

Variable	Observation group (n=80)		Control group (n=80)	
	Before intervention	After intervention	Before intervention	After intervention
Maintain close relationships with others	8.26±1.15	8.96±1.29 ^{ab}	8.19±1.12	8.49±1.20 ^a
Take positive action	8.19±1.26	9.43±1.09 ^{ab}	8.15±1.23	8.74±1.23 ^a
Show a positive attitude toward reality and the future	7.81±0.96	8.89±1.36 ^{ab}	7.86±0.92	8.15±1.05 ^a
Total score	24.15±3.99	27.05±4.16 ^{ab}	24.20±4.06	25.21±3.97 ^a

Note: Compared with the same group before intervention, ^a $P<0.05$; Compared with the control group after intervention, ^b $P<0.05$.

Changes in quality of life levels of two groups of patients before and after intervention

No statistically significant difference in SF-36 scale scores was observed between the two groups before and after intervention. Following

intervention, the SF-36 scale scores increased in both groups ($P<0.05$), with the observation group exhibiting higher scores compared to the control group ($P<0.05$) (Table 6).

Table 6: Changes in quality-of-life levels of two groups of patients before and after intervention

<i>Variable</i>	<i>Observation group (n=80)</i>		<i>Control group (n=80)</i>	
	Before inter- vention	After inter- vention	Before inter- vention	After inter- vention
Physiological role	62.59±5.48	77.25±6.39 ^{ab}	62.86±5.32	71.54±6.09 ^a
Mental health	44.35±6.89	76.21±7.84 ^{ab}	44.52±6.82	69.87±6.52 ^a
Vitality	55.28±7.49	75.02±8.39 ^{ab}	55.33±7.32	69.38±7.08 ^a
Body pain	65.05±6.21	75.23±6.87 ^{ab}	64.89±6.17	69.75±7.33 ^a
Physiological function	62.95±5.14	77.36±6.81 ^{ab}	62.36±5.28	71.59±6.93 ^a
Emotional function	53.06±7.55	75.82±8.16 ^{ab}	53.29±7.43	71.32±8.03 ^a
Social function	61.58±6.23	77.65±7.25 ^{ab}	61.32±6.10	71.20±7.43 ^a
Overall health	65.59±4.58	75.96±5.87 ^{ab}	64.29±4.63	70.67±6.32 ^a

Note: Compared with the same group before intervention, ^a $P < 0.05$; Compared with the control group after intervention, ^b $P < 0.05$.

Discussion

The results presented in Table 2 indicate that the intervention led to a higher Morisky medication compliance score in the observation group compared to the control group. This finding suggests that health education based on the theory of protective motivation effectively promotes improved medication compliance among gastric cancer patients, which aligns with the findings by Zhang et al (16). The success of this approach could be attributed to comprehensive education methods such as individualized guidance, experience sharing, and collective education. These methods empower gastric cancer patients to gain a better understanding of their disease, mobilize their subjective initiative, and enhance enthusiasm for cooperating with their treatment (17-18).

The results presented in Table 3, after the intervention, the POMS scale score of the observation group was lower than that of the control group, indicating that health education based on the theory of protective motivation can effectively promote the improvement of mood state in gastric cancer patients, which is consistent with the report by Yang et al (19). The conventional health education model, limited to imparting relevant knowledge to patients through medical

staff, may result in patients being more passive and lacking effective communication between doctors, nurses, and patients. However, health education based on the theory of protective motivation intervenes with patients through various methods such as psychological counseling, manual distribution, experience sharing, video promotion, and special lectures, which is beneficial for the improvement and relief of negative emotions in patients, thereby playing a role in regulating their mood state (20-21).

Regarding the results in Table 4, after intervention, the CFS scale score of the observation group was lower than that of the control group, indicating that health education based on the theory of protective motivation can effectively promote the improvement of cancer-related fatigue in gastric cancer patients, which is consistent with the findings by Wang et al (22). The care of friends and family in health education based on the theory of protective motivation, the encouragement and support of stable patients, and their personal experiences also play an important role in enhancing patient confidence. Gastric cancer patients step out of a negative mindset, actively treat and face cancer, while maintaining an optimistic attitude toward life, gradually developing interest and passion for life

(23), thereby improving their cancer-related fatigue state. Health education based on the theory of protective motivation emphasizes health beliefs, including a positive mindset and confidence in overcoming diseases (24). When patients face cancer, their psychological resilience is relatively low, and they may experience depression, helplessness, negativity, and pessimism, which can adversely affect their confidence. Health education based on the theory of protective motivation improves the patient's state through experience sharing and psychological counseling, establishes a new psychological balance, and alleviates the patient's cognitive, emotional, and physical fatigue state.

Based on the results presented in Table 5, after intervention, the HHI scale score of the observation group was higher than that of the control group, indicating that health education based on the theory of protective motivation can effectively promote the improvement of hope in gastric cancer patients, which is similar to the findings by Lei et al (25). The theory of protective motivation encourages and supports patients to feel happy and warm; cases of good mood and positive medication shared with patients can help postoperative rehabilitation and disease control. Inviting patients with stable conditions to share their experience can encourage patients to overcome the disease, build courage and confidence, and let them know that there is hope for curing even cancer, fostering a positive mental attitude.

Based on the results in Table 6, after the intervention, the SF-36 scale score of the observation group was higher than that of the control group, indicating that health education based on the theory of protective motivation can effectively promote the improvement of quality of life in gastric cancer patients, which is consistent with the findings by Baudry et al (26). Health education based on protective motivation can enable patients to better grasp rehabilitation knowledge and implement it in clinical practice, improve self-care ability (27), and show initiative in autonomous movement. This intervention also alleviates negative emotions; changes suppressed living conditions (28).

This study has limitations as only selected gastric cancer patients from the Sanmenxia Central Hospital, with a small sample size. In future research, the scope of participants can be expanded to further validate the effectiveness of the protocol.

Conclusion

This study demonstrates the effectiveness of health education based on the theory of protective motivation in fostering patients' hope and courage to combat diseases through personalized guidance, family support, experience sharing, and collective education. The findings obtained from this study indicate a significant improvement in mood state, cancer-related fatigue, and hope levels among gastric cancer patients. Moreover, this intervention positively influences medication compliance and enhances the patients' quality of life and overall prognosis.

Journalism Ethics considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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