

Case Control Study

Impact of web-based positive psychological intervention on emotions, psychological capital, and quality of life in gastric cancer patients on chemotherapy

Yu-Yu Xin, Dan Zhao

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zhaod0102@163.com

Abstract

BACKGROUND

Gastric cancer is a malignant digestive tract tumor that originates from the epithelium of the gastric mucosa and occurs in the gastric antrum, particularly in the lower curvature of the stomach.

AIM

To evaluate the impact of a positive web-based psychological intervention on emotions, psychological capital, and quality of survival in gastric cancer patients on chemotherapy.

METHODS

From January 2020 to October 2023, 121 cases of gastric cancer patients on chemotherapy admitted to our hospital were collected and divided into a control group ($n = 60$) and an observation group ($n = 61$) according to the admission order. They were given either conventional nursing care alone and conventional nursing care combined with web-based positive psychological interventions, respectively. The two groups were compared in terms of negative emotions, psychological capital, degree of cancer-caused fatigue, and quality of survival.

RESULTS

After intervention, the number of patients in the observation group who had negative feelings toward chemotherapy treatment was significantly lower than that of the control group ($P < 0.05$); the Positive Psychological Capital Questionnaire score was considerably higher than that of the control group ($P < 0.05$);

the degree of cancer-caused fatigue was significantly lower than that of the control group ($P < 0.05$); and the Quality of Life Scale for Cancer Patients (QLQ-30) score was significantly higher than that of the control group ($P < 0.05$).

CONCLUSION

Implementing a web-based positive psychological intervention for gastric cancer chemotherapy patients can effectively improve negative emotions, enhance psychological capital, and improve the quality of survival.

Key Words: Internet; Positive psychology; Gastric cancer chemotherapy; Negative emotions; Psychological capital; Quality of survival

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Core Tip: Scientific and well-designed nursing interventions hold significant potential in mitigating negative emotions, enhancing psychological capital, and improving the overall quality of life for patients undergoing cancer chemotherapy. These interventions are crucial in supporting patients' mental and physical well-being.

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INTRODUCTION

According to the latest cancer data in China[1], there are 397000 new cases of gastric cancer each year, with the morbidity and mortality both ranking 3rd among various malignant tumors, and the new cases account for 44% of the global cases. Therefore, it is also known as "Chinese-style cancer". Considering the small number of cancer cells that may remain after laparoscopic radical gastric cancer surgery, most patients, except for a few, need postoperative chemotherapy to kill tumor cells further and prolong the survival period[2]. However, chemotherapy has high side effects, easily increases somatic discomfort, affects patients' confidence in treatment, and reduces the quality of survival[3]. Therefore, strengthening nursing measures is crucial in relieving psychological pressure, promoting the smooth progress of chemotherapy, and improving treatment success rates. Thus, this study proposed the application of web-based positive psychological interventions in such patients to provide a sufficient theoretical basis for clinically relevant nursing work.

Gastric cancer is a malignant digestive tract tumor that originates from the epithelium of the gastric mucosa and occurs in the gastric antrum, particularly in the lower curvature of the stomach[4,5]. Laparoscopic radical gastrectomy for gastric cancer, as the main treatment modality for this disease, can effectively resect local lesions and clear lymph nodes[6]. Postoperative supplementation with chemotherapy can further prevent the recurrence and metastasis of cancer cells and improve the prognosis of surgery[7]. However, in practice[8], most patients are affected by disease, surgery, drugs, and other factors and often suffer from malnutrition among others. In addition, chemotherapy inevitably damages normal tissue cells while acting on cancer cells, triggering related toxicity and side effects, impacting patients' physical and mental health, and subsequently affecting chemotherapy compliance and cancer-related fatigue (CRF), which is not conducive to the establishment of confidence in treatment. Therefore, the implementation of scientific and efficient nursing interventions plays a crucial role in reducing the negative emotions of patients receiving gastric cancer chemotherapy, constructing psychological capital, and improving their quality of survival. In recent years, the advantages of "Internet + " have gradually come to the fore, and the use of artificial intelligence technology to build a network platform has also become a new trend in medical and healthcare management. mHealth refers to providing medical services and information through mobile communication technology, specifically in the mobile Internet field, and is based on medical and healthcare applications for mobile terminal systems, such as Android and IOS[9,10]. Web-based positive psychological intervention is an Internet information-based care model that overcomes conventional disease care's time and spatial limitations and aims to provide patients with online and offline integrated mental health care services through Internet channels.

MATERIALS AND METHODS

General information

From January 2020 to October 2023, 121 gastric cancer patients on chemotherapy admitted to our hospital were enrolled and divided into a control group ($n = 60$) and an observation group ($n = 61$), according to the admission order. The baseline data of the two groups were well-balanced and comparable ($P > 0.05$; Table 1).

Table 1 Comparison of baseline information between the two groups

Group	Baseline information									
	Gender (M:F), n (%)	Age (year)	Lesion site				Tumor stage			
			Corpus	Fundus	Antrum	Multisite	Ia	Ib	II	III
Observation (n = 61)	31 (50.82):30 (49.18)	54.69 ± 5.14	16 (26.23)	15 (24.59)	28 (45.90)	2 (3.28)	12 (31.25)	18 (52.08)	26 (16.67)	5 (16.67)
Control (n = 60)	30 (50.00):30 (50.00)	54.33 ± 5.29	14 (23.33)	15 (25.00)	29 (48.33)	2 (3.33)	10 (16.67)	19 (31.67)	25 (41.67)	6 (10.00)
t/ χ^2	0.008	0.380	0.136	0.003	0.072	0.242	0.184	0.066	0.011	0.119
P value	0.928	0.705	0.712	0.958	0.789	0.623	0.668	0.797	0.915	0.730

The inclusion criteria were as follows: (1) Patients who were diagnosed with gastric cancer; (2) Patients who had a certain cultural level, were conscious, and could think independently; (3) Patients who had complete medical records; (4) Patients who had no contraindications to chemotherapy and were treated with chemotherapy; and (6) Patients who were aware of the purpose of this study and provided informed consent.

The exclusion criteria were as follows: (1) Patients who had other malignant tumors; (2) Those with mental diseases, such as long-term consciousness disorder and mental abnormality; (3) Those who died in the middle of the course or gave up the treatment; (4) Those with cancer cell infiltration and metastasis; and (5) Those with coagulation dysfunction.

Methods of care

Control group: The control group underwent routine nursing. We systematically assessed the patients' condition, provided them with a good ward environment, understood their basic situation, provided one-on-one verbal health education, fully informed them of the precautions during chemotherapy treatment. We strengthened the monitoring of vital signs and care of complications, advised patients to comply with the doctor's advice on regular use of medication, and provide nursing services in terms of safety, life, diet, and other aspects. We increased the number of ward rounds, strictly performed the daily nursing handover, and fully implemented the nursing work. We asked the patients about their psychological status and specific conditions during the morning check-up every day and promptly carried out symptomatic interventions in the event of any abnormalities.

Observation group: The observation group underwent routine care combined with a positive web-based psychological intervention. The former is the same as described above. The web-based positive psychological intervention consisted of the following stages: (1) Pre-preparation: A team was established, which involved selecting experienced and thoughtful medical staff, comprising one N3-level nurse in charge, two attending physicians, one N2-level nurse in charge, five nurses in charge, and two network publicity officers, all supervised and guided by the N3-level nurse in charge. A clear division of responsibilities was assigned, with the N3-level nurse responsible for ensuring progress in nursing care; attending physicians and nurses in charge responsible for implementing nursing content; and network publicity officers responsible for maintaining network security. In the month before the implementation of the intervention, on a weekly basis, the department director and the head nurse led the team in ensuring that the attending physicians and nurses in charge were able to implement nursing content and the network publicity officers could maintain network security. Likewise, in the month before the implementation of the intervention, the head of the department and the head nurse, led the team in holding a bi-weekly (every Monday and Friday) "network-based positive psychological intervention" training meeting. Each week, 1-2 members of the team were designated as responsible for the collection of defective cases from the department. They had to prepare an individualized analysis of each case and explain the case to the remaining members of the team during their shift the next morning or during the second meeting of the week. This was meant to comprehensively improve the quality of the nursing staff, enrich their cognitive skills, and cultivate in them the spirit of "prudence and solitude." Regular outings were also organized for them to deepen the connotations of nursing care and network technology in their work; (2) Designing the mobile technology based intervention: We requested the network information department of the hospital for developing a mobile technology based treatment application (app) for patients undergoing gastric cancer chemotherapy. The app was developed with the approval of the management of the hospital. The group members who developed the app browsed through authoritative literature and typical cases treated at the hospital in the past years. They searched the databases of Wanfang, Zhi.com, PubMed, the full-text database of China's journals, and Cochrane, among others, using keywords such as "network," "positive psychological intervention," "gastric cancer chemotherapy," "negative emotions," "psychological intervention" and "psychological capital," and "quality of life" in the literature search. Considering the actual situation of the department, they prioritized the needs of patients, collated and summarized the useful information, and began brainstorming to develop the app containing the following five modules: "Health education and popular science," "Breathing, meditation, and relaxation," "Communication and exchange of information," "About us," and "Notes." The unified implementation plan was constantly adjusted during the implementation period; (3) Modules 1 to 3: The first module, "Health education and popular science," included information on the pathogenesis of gastric cancer, causes, epidemiology, clinical manifestations, principles of chemotherapy, adverse reactions, and the latest research results at home and abroad, among others. Patients were instructed to browse and watch this in their spare time and focus on learning the relevant contents, such as "principles of chemotherapy" and "adverse reactions," to enhance their understanding of the process of chemotherapy. The second module, "Breathing, meditation, and relaxation," was a tutorial with video playback. Specifically, patients were guided

through sessions of deep breathing techniques and total relaxation, followed by meditation in a secluded environment with no external stimulation. They were asked to sit quietly and relax, without any turmoil in their minds, play their personal favorite soothing music to create a suitable atmosphere, breathe deeply and slowly *as per* the instructions softly spoken, gently close their eyes, feel the airflow and rhythm of every breath, and synchronize their body rhythm with their breath. They were asked to imagine their body swaying in unison with their breath and accept any thoughts that come into their mind. This session was conducted 3 times/d, 8–10 min each time. In the "Communication and exchange of information" module, a WeChat group of "gastric cancer chemotherapy patients" was formed inviting patients to join a group chat. Their personal name cards were changed to reflect their real names so that the medical staff could identify them. The necessary applications of the WeChat group chat were conveyed to ensure that patients possess the basic skills of sending and receiving text, making voice calls, sending pictures, and video chatting. The attending physician answered questions online every Friday from 9 to 10 a.m. The rest of the time, the nursing staff posted small videos and health quizzes, mostly relating to knowledge about chemotherapy for gastric cancer. These were accompanied by voice instructions and explanations asking patients to pay close attention to changes in their own emotions, understand their psychological state, learn to control their emotions, and contact the medical staff in time for psychological counseling if or when they were overwhelmed by their own negative emotions. In terms of medication, they were strictly prohibited from adjusting their dosage of medication without authorization or from stopping medication on their own. They were also counseled on their diet and advised to refrain from eating greasy and spicy food; (4) Module 4: The "About us" section contains a brief introduction of the medical team, departmental contact channels, and patient feedback services among others; and (5) Module 5: The "Notes" section contained instructions on how to set a specific period to operate reminders. It also contained automatic generation of nursing shift content for facilitating nursing staff to standardize the content of the shift handover.

The intervention was conducted for 12 consecutive weeks during which observations from both groups were noted.

Observation indicators

Negative emotions: The observation indicators included: (1) Forced psychology: Resistance to chemotherapy treatment and having to make themselves obey against their own will; (2) Nervousness: Excessive worry about the effect of chemotherapy, being in a spirit state of high readiness, and being unable to cooperate with the nursing staff; and (3) Fear of psychology: In the face of chemotherapy, because of the fear of the pain accompanied by attempts to get rid of the pain but cannot do anything about it, resulting in fear of strong repression of the emotional experience.

Psychological capital: The Positive Psychological Capital Questionnaire (PPQ)[7] was used, including four dimensions of optimism (42 points), hope (42 points), self-efficacy (49 points), and psychological resilience (49 points), with 28 entries and a total score of 182 points. The score is positively related to psychological capital.

Degree of cancer-caused fatigue: The Revised Piper Fatigue Scale (RPFS)[8] was used, which consists of four dimensions of physical symptoms, cognitive level, affective symptoms, and behavioral changes, with 22 items, all of which are assigned a score of 0–10. The scores are positively related to the degree of fatigue.

Self-perceived burden: The Self-Perceived Burden Scale[9] was used, and the content included physical burden (10 points), emotional burden (30 points), and economic burden (10 points), with a total of 10 entries scored on a Likert scale of 5, with a total score of 50 points. The higher the score, the heavier the self-perceived burden.

Survival quality: The Quality of Life Scale for Cancer Patients (QLQ-30)[10] was used, four functional dimensions of which were selected, namely, general condition (100 points), psychology (100 points), physiology (100 points), and social adaptation (100 points). The higher the score, the better the quality of life.

Statistical analysis

Data were statistically analyzed using SPSS Windows software version 26.0. Measurement data meeting a normal distribution, presented as the mean \pm SD, were compared by independent or paired-samples *t* tests. Measurement data not meeting a normal distribution, expressed as median with interquartile range, were compared by the Wilcoxon signed-rank test. Counting data, expressed as percentages (%), were compared by the χ^2 test. $P < 0.05$ was considered statistically significant.

RESULTS

Comparison of negative emotions

After intervention, the number of patients in the observation group who had negative emotions about chemotherapy treatment was significantly lower than that of the control group ($P < 0.05$). Further details are presented in Table 2.

Comparison of psychological capital

The psychological capital of the two groups was comparable before care ($P > 0.05$). After intervention, the PPQ score of the observation group was significantly higher than that of the control group ($P < 0.05$). Further details are presented in Table 3.

Table 2 Comparison of negative emotions, n (%)

Group	Cases	Obsessive-compulsive disorder	Nervousness	Fearfulness
Observation	61	4 (6.56)	3 (4.92)	2 (3.28)
Control	60	12 (60.00)	11 (18.33)	9 (15.00)
χ^2		4.763	5.321	5.028
P value		0.029	0.021	0.025

Table 3 Comparison of psychological capital (mean \pm SD, points)

Group	Cases	Pessimism		Wish		Self-efficacy		Mental toughness	
		Before care	After care	Before care	After care	Before care	After care	Before care	After care
Observation	61	25.28 \pm 3.72	35.30 \pm 2.64 ^a	25.21 \pm 3.75	36.28 \pm 2.69 ^a	33.33 \pm 2.91	40.22 \pm 3.58 ^a	32.35 \pm 3.61	40.30 \pm 2.66 ^a
Control	60	25.25 \pm 3.74	31.89 \pm 2.50 ^a	25.28 \pm 3.72	32.88 \pm 2.65 ^a	33.36 \pm 2.87	37.85 \pm 3.57 ^a	32.31 \pm 3.59	35.90 \pm 2.61 ^a
t value		0.044	3.016	0.141	4.610	0.185	4.784	0.061	2.922
P value		0.965	0.003	0.888	< 0.001	0.853	< 0.001	0.951	0.004

^a $P < 0.05$ compared to pre-care.

Comparison of degree of cancer-caused fatigue

The degree of CRF in the two groups was comparable before care ($P > 0.05$). After intervention, the degree of cancer-induced fatigue in the observation group was significantly lower than that of the control group ($P < 0.05$). Further details are presented in Table 4.

Comparison of self-perceived burden

The self-perceived burdens of the two groups before care were comparable ($P > 0.05$). After intervention, the self-perceived burden of the observation group was significantly lower than that of the control group ($P < 0.05$). Further details are presented in Table 5.

Comparison of quality of survival

Before care, there was no significant difference in the quality of survival scores between the two groups ($P > 0.05$). After intervention, the QLQ-30 scores of the observation group were significantly higher than those of the control group ($P < 0.05$). Further details are presented in Table 6.

DISCUSSION

This study showed that after the joint use of a web-based positive psychological intervention, the number of patients in the observation group who had negative emotions about chemotherapy treatment was significantly lower than that of the control group, and the PPQ score was significantly higher than that of the control group ($P < 0.05$). These results suggest that web-based positive psychological interventions can alleviate adverse emotions in patients undergoing gastric cancer chemotherapy. Conventional care often ignores individualized differences among patients and therefore has a poor effect. However, in modern society, along with the innovative transformation of the medical model, the bio-psycho-social integrated model has emerged, which explicitly proposes that a variety of integrated factors mostly cause modern diseases. Therefore, it is necessary to consider the role of four major factors, emotion, personality, maladaptive behaviors, and psychological stress, while carrying out all-around diagnostic treatment[11]. A large number of studies have fully confirmed[12] that psychological factors occupy an important position in the process of disease occurrence, development, and regression. Therefore, clinical care workers should try to meet the psychological needs of patients, help them regulate their social roles, stabilize mood fluctuations, alleviate psychological pressure and stress, enhance their ability to adapt to the disease, and build confidence in their treatment. Positive psychological intervention, as a kind of consciousness nursing, is based on the theory of positive psychology, with the characteristics of being "comprehensive," "hierarchical," and "systemic," aiming to fully incorporate love, empathy, and psychological stress into the whole nursing process to reduce patients' mental stress and alleviate their negative emotions[13]. Simultaneously, the implementation of positive psychological interventions based on the Internet can meet the physical, mental, and spiritual needs of patients, aiming to implement the whole process of assisted care through information technology; information release is convenient, and resource sharing is strong, which can effectively compensate for the limitations of conventional care[14].

Table 4 Comparison of degree of cancer-caused fatigue (mean ± SD, points)

Group	Cases	Somatic symptoms		Cognitive level		Emotional symptoms		Behavioral changes	
		Before care	After care	Before care	After care	Before care	After care	Before care	After care
Observation	61	5.28 ± 0.70	4.33 ± 0.84 ^a	5.23 ± 0.75	4.26 ± 0.69 ^a	5.31 ± 0.91	4.24 ± 0.58 ^a	5.34 ± 0.61	4.31 ± 0.66 ^a
Control	60	5.26 ± 0.74	4.84 ± 0.70 ^a	5.25 ± 0.72	4.89 ± 0.65 ^a	5.36 ± 0.85	4.83 ± 0.57 ^a	5.37 ± 0.59	4.95 ± 0.61 ^a
<i>t</i> value		0.123	2.913	0.120	4.150	0.251	4.531	0.221	4.447
<i>P</i> value		0.903	0.005	0.905	< 0.001	0.803	< 0.001	0.826	< 0.001

^a*P* < 0.05 compared to pre-care.**Table 5 Comparison of self-perceived burdens (mean ± SD, points)**

Group	Cases	Physical burden		Emotional burden		Economic burden		Physical burden	
		Before care	After care	Before care	After care	Before care	After care	Before care	After care
Observation	61	8.39 ± 0.33	2.54 ± 0.30 ^a	26.10 ± 1.02	11.81 ± 1.11 ^a	8.16 ± 0.19	2.42 ± 0.16 ^a	8.39 ± 0.33	2.54 ± 0.30 ^a
Control	60	8.42 ± 0.36	5.42 ± 0.34 ^a	26.31 ± 1.07	15.05 ± 1.17 ^a	8.13 ± 0.13	5.05 ± 0.17 ^a	8.42 ± 0.36	5.42 ± 0.34 ^a
<i>t</i> value		0.478	49.428	1.105	15.629	1.012	87.646	0.478	49.428
<i>P</i> value		0.634	< 0.001	0.271	< 0.001	0.314	< 0.001	0.634	< 0.001

^a*P* < 0.05 compared to pre-care.**Table 6 Comparison of quality of survival (mean ± SD, points)**

Group	Cases	Overall situation		Psychology		Physiology		Social adaptation	
		Before care	After care	Before care	After care	Before care	After care	Before care	After care
Observation	61	59.31 ± 5.84	88.85 ± 4.78 ^a	60.24 ± 5.23	90.60 ± 4.39 ^a	60.28 ± 4.22	90.22 ± 4.98 ^a	62.31 ± 5.84	91.85 ± 5.74 ^a
Control	60	59.26 ± 5.62	80.55 ± 3.97 ^a	60.35 ± 5.12	86.28 ± 4.65 ^a	60.36 ± 4.27	85.55 ± 3.07 ^a	62.26 ± 5.62	86.55 ± 4.93 ^a
<i>t</i> value		0.048	10.382	0.117	5.256	0.104	6.197	0.048	5.445
<i>P</i> value		0.962	< 0.001	0.907	< 0.001	0.918	< 0.001	0.962	< 0.001

^a*P* < 0.05 compared to pre-care.

CRF is a feeling of fatigue or exhaustion related to cancer or cancer treatment. It is a painful, persistent, subjective feeling of fatigue or exhaustion with somatic, emotional, or cognitive aspects[15]. Fox *et al*[16] noted that CRF is prevalent in patients receiving chemotherapy; more than 75% of metastatic tumor patients experience cancer-caused fatigue, and the quality of their survival is severely affected, which is an essential factor hindering the daily life of cancer patients. In this study, we found that the degree of CRF in the observation group was significantly lower than that of the control group, and the burden of self-perception was reduced after the web-based positive psychological intervention (*P* < 0.05). These results suggest that web-based positive psychology programs can improve CRF in patients with gastric cancer. After the patients were admitted to the hospital, the nursing staff explained in detail the basic knowledge about chemotherapy for gastric cancer and helped them quickly identify their conditions. Further, the nursing staff highlighted the risk factors and adverse reactions accompanying chemotherapy to make the patients fully aware that this is a normal phenomenon without excessive panic. Moreover, the patients only needed to actively cooperate with the treatment, and they were guided to form a correct cognition, further relieve their psychological burden, improve their health literacy, and enhance their confidence in chemotherapy through subconsciousness, notably confidence, in chemotherapy to improve the quality of life[17-19].

While the current study provides valuable insights into the impact of web-based positive psychological interventions on gastric cancer chemotherapy patients, there are some limitations that need to be acknowledged. First, the sample size of 121 patients, although sufficient for initial findings, may not fully represent the broader population of gastric cancer patients on chemotherapy. Second, the study was conducted in a single hospital, limiting the generalization of the results to other healthcare settings. Additionally, the duration of the intervention and follow-up period were relatively short, limiting the ability to assess the long-term effects of the web-based positive psychological interventions. Furthermore, the

study relied primarily on self-reported measures, which may be subject to recall bias or participant subjectivity. Finally, other factors that could potentially influence the outcomes, such as social support and comorbidities, were not fully considered in the analysis.

CONCLUSION

Web-based positive psychological intervention for gastric cancer patients can significantly reduce negative emotions such as compulsion, fear, and nervousness, improve their psychological capital, and enhance the quality of their survival. This can be used as an ideal care method for postoperative gastric cancer patients undergoing chemotherapy.

FOOTNOTES

Author contributions: Xin YY designed the research study; Xin YY and Zhao D performed the primary literature review and data extraction; Xin YY and Zhao D analyzed the data and wrote the manuscript; Xin YY was responsible for revising the manuscript for important intellectual content; all authors read and approved the final version.

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Country of origin: China

ORCID number: Yu-Yu Xin 0009-0005-6469-7593; Dan Zhao 0009-0000-6650-316X.

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