

ORIGINAL RESEARCH

Effect of behavioral stage change theory on postoperative rehabilitation and quality of life in male patients with primary hepatocellular carcinoma resection: a retrospective study

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Abstract

This study aimed to examine the impact of the Transtheoretical model (TTM)-based nursing model on the self-management and psychological well-being of men diagnosed with primary hepatocellular carcinoma. From existing case records, a retrospective analysis was conducted on the clinical data of 96 male patients with primary liver cancer. Based on the different care methods recorded, the study included 48 patients in the observation group and 48 patients in the control group. All patients underwent hepatocellular carcinoma resection and were expected to survive for more than 3 months. Control group participants received standard treatment, whereas observation group participants underwent a patient self-management intervention based on the TTM nursing model. Both groups were assessed for postoperative rehabilitation, self-management capacity, anxiety and depression levels, psychological well-being, quality of life, tumor-related illness and satisfaction of both groups. After nursing intervention, in the observation group, the time to get out of bed, bowel sound recovery time, first exhaustion time and first defecation time were significantly shorter compared to the control group ($p < 0.05$). Self-care agency scale (ESCA) scores in the observation group were significantly greater than in the control group ($p < 0.05$). Self-rating anxiety scale (SAS), Self-rating depression scale (SDS) scores and quality of life were significantly lower in the observation group. As compared to the control group, the observation group exhibited a considerably decreased incidence of cancer-related symptoms, including fever, jaundice, abdominal pain and gastrointestinal hemorrhage ($p < 0.05$). The observation group was more satisfied overall than the control group. Behavioral stage change theory collaborative nursing model has shown promising results in enhancing self-care abilities and reducing negative feelings in male patients with primary liver cancer. Therefore, further promotion and implementation of this intervention is recommended.

Keywords

Primary hepatocellular carcinoma; TTM-based nursing model; Self-management; Psychological status

1. Introduction

Hepatocellular carcinoma is one of the most prevalent malignant diseases in clinical [1], which is often a complication of hepatitis C virus infection [2]. Due to changes in lifestyles and dietary practices, hepatocellular carcinoma incidence has increased annually in recent years [3]. Hepatocellular carcinoma is currently treated primarily by partial liver resection [4]. However, the long-term bed rest patients require after surgery, and the vomiting they experience after chemotherapy, can negatively affect life quality [5]. Males are more likely to suffer from hepatocellular carcinoma than females, and their

prognoses are also worse [6]. Transtheoretical model (TTM) is a nursing model based on behavior change theory. Based on multiple health theories, it emphasizes the primary role of patients in preventing and treating disease [7]. TTM provides patients with a variety of intervention measures to enhance self-management abilities and modify negative behaviors [8]. Several tumor diseases can be nursed effectively using the TTM-based nursing model [9, 10]. Application of this model to liver cancer patients is, however, lacking in research. We aimed to investigate the efficacy of TTM collaborative nursing model in treating male patients with primary liver cancer.

2. Materials and methods

2.1 Patient and general information

From existing case records, clinical data of 96 patients (48 per group) with hepatocellular carcinoma were retrospectively included. The sample size adequately met the parametric test assumptions, yielding an impact size of 0.30, a power of 90% with 5% margin of error, and allowing an attrition rate of 10%. According to the National Comprehensive Cancer Network (NCCN) Guidelines [11], all patients were diagnosed with hepatocellular carcinoma through imaging and pathological examination. A hepatocellular carcinoma resection was performed on all patients and they were expected to survive for more than 3 months.

Exclusion criteria: (1) Patients with blurred consciousness and mental disorders; (2) Patients with tumor metastases; (3) Patients had poor treatment compliance and did not actively cooperate.

2.2 Interventions

As a retrospective study, the care methods were already recorded in existing case records.

In the control group, patients were educated upon admission, during hospitalization and upon discharge, utilizing the conventional nursing method. During admission education, patients are informed about the ward environment, including applicable laws and regulations, work schedules and precautions. During hospitalization, patients were provided with dietary guidelines and medication safety instructions. Patient education follows discharge, including information about medication, physical activity, precautions, regular evaluations and follow-up appointments. Post-discharge follow-up: Perform a weekly telephonic assessment to evaluate the patients' present state and resolve any potential concerns.

Observation group was given TTM collaborative nursing measures. First, establish a nursing team, including a departmental director, supervise the nursing project. Work with other personnel on a knowledge booklet that will provide information on diseases and matters. A chief nurse prepares nursing plans, imparts nursing knowledge to the observation group, explains the study's objectives to patients and their families, and secures their cooperation. Nursing services are provided by 5 nurses who have completed a bachelor's degree or higher and have been employed for a minimum of 4 years. Patients are screened and treated by two physicians who have completed a master's degree or higher and have been employed for a minimum of 6 years. Care should be provided in accordance with the agreement of the patient, the family and the physician.

The detailed nursing process of TTM collaborative nursing mode is shown in **Supplementary Table 1**, including three parts: Pre-action, Action and Maintain.

2.3 Primary outcome

As a retrospective study, the outcome indicators results were already recorded in existing case records.

2.3.1 Postoperative rehabilitation

Include time to get out of bed, bowel sound recovery time, first exhaustion time and first defecation time.

2.3.2 Self-care ability [12]

Researchers used the exercise of self-care agency scale (ESCA) to assess self-care in primary liver cancer patients. The scale exhibits high reliability and validity. Scale components include health knowledge level, self-concept, self-responsibility and self-care skills. In total, 43 items are included. A total of 172 points is awarded for each item, ranging from 1 to 4. Higher scores indicate greater self-care.

2.3.3 Anxiety and depression

Self-rating anxiety scale (SAS) was utilized to assess anxiety levels [13]. SAS score consists of 20 items and adopts a 4-level scoring method with a cut-off value of 50 points. Self-rating depression scale (SDS), composed of 20 questions, was used to assess depression levels [14]. SDS score consists of 20 items and adopts a 4-level scoring method with a cut-off value of 53 points. SDS total score was inversely correlated with depression, and SAS total score was inversely correlated with anxiety.

2.3.4 Quality of life

The Medical Outcomes Study (MOS) 36-item short form health survey (SF-36) was employed as the instrument to examine the quality of life [15]. Four aspects are included in the scale: physiological function, somatic pain, social function and mental health. Both the functional scale and the overall quality of life measure are positively correlated with function or quality of life. Increased scores and symptoms or issues were positively correlated on both symptom scales and individual items.

2.3.5 Changes in cancer-related symptoms

Record and compare cancer-related symptoms such as fever, jaundice, abdominal pain, gastrointestinal hemorrhage.

2.3.6 Satisfaction

Newcastle nursing service satisfaction scale (NSNS) was used to assess nursing satisfaction among two distinct patient groups [16]. The total score of 19–95 points. <69 points means dissatisfy, 70–76 points means generally satisfy, 77–85 points means satisfy, ≥86 points mean very satisfy. Overall satisfaction = (generally satisfy + satisfy + very satisfy) cases/total cases × 100%.

2.4 Statistical methods

Data analysis was performed using SPSS 25.0 (IBM, Armonk, NY, USA). Normal distribution of measurement data was presented as mean ± standard deviation ($\bar{x} \pm s$), and *T*-test was performed for inter-group and intra-group comparisons. Count data were presented as examples (%) and χ^2 test was performed for comparison between groups. $p < 0.05$ indicates statistically significant differences.

3. Results

3.1 Clinical data

General information of both groups is shown in Table 1.

3.2 Postoperative rehabilitation

A shorter time to get out of bed, bowel sound recovery time, first exhaustion time and first defecation time in the observation group ($p < 0.05$) (Table 2).

3.3 Self-care ability

Before nursing, the total scores and scores for all dimensions did not differ statistically between both groups ($p > 0.05$). ESCA score differences between both groups were statistically significant ($p < 0.05$) (Table 3).

3.4 Anxiety and depression

Before nursing, SAS and SDS scores did not differ statistically between both groups ($p > 0.05$). After nursing, SAS and SDS scores in the observation group were significantly lower than those in the control group ($p < 0.05$) (Table 4).

3.5 Quality of life

The observation group had significantly higher quality of life in terms of physiological function, somatic pain, social function, and mental health than controls ($p < 0.05$) (Table 5).

3.6 Comparison of cancer-related symptoms change between both groups

The observation group showed significantly fewer cancer-related symptoms such as fever, jaundice, abdominal pain, gastrointestinal hemorrhage after nursing intervention ($p < 0.05$) (Table 6).

3.7 Satisfaction

Observation group patients were significantly more satisfied than control group patients ($p < 0.05$) (Table 7).

4. Discussion

Hepatocellular carcinoma is a prevalent and very aggressive form of liver cancer. Patients are typically diagnosed at an advanced stage, which limits their chances of being cured. The disease is more prevalent in men due to factors such as lifestyle, hormone levels and genetic susceptibility [17]. Psychological and physical distress are also common among people with the disease. Health advice is crucial for enhancing patient and family nursing proficiency. Nursing mode TTM is based on behavior change theory and emphasizes patients' primary role in disease prevention and treatment [18]. By providing patients with a variety of interventions, it enhances their ability to self-manage and addresses negative behaviors [19]. The model is based on several health theories. In this perspective, human behavior changes are gradual and ongoing. Without continuous intervention, most people will remain in the early stages of behavior change [19]. This approach has been found to be beneficial for establishing a positive doctor-patient re-

TABLE 1. Comparison of clinical data between both groups.

Project	Observation group (n = 48)	Control group (n = 48)	t/χ^2	p
Age ($\bar{x} \pm s$, yr)	49.27 \pm 8.32	47.54 \pm 6.95	1.105	0.272
Marital status				
Married	42 (87.50%)	43 (89.58%)	0.103	0.749
Unmarried	6 (12.50%)	5 (10.42%)		
BMI ($\bar{x} \pm s$, kg/m ²)	21.17 \pm 1.65	20.41 \pm 2.24	1.879	0.063
AFP at diagnosis ($\bar{x} \pm s$, μ g/L)	504.86 \pm 65.52	493.31 \pm 50.29	0.969	0.335
Staging of carcinoma (BCLC classification)				
Stage A1	16 (33.33%)	10 (20.83%)	1.997	0.368
Stage A2	23 (47.92%)	26 (54.17%)		
Stage A3	9 (18.75%)	12 (25.00%)		

BMI: Body Mass Index; AFP: Alpha-fetoprotein; BCLC: Barcelona Clinic Liver Cancer.

TABLE 2. Comparison of postoperative rehabilitation between the two groups (points, $\bar{x} \pm s$).

Groups	Control group (n = 48)	Observation group (n = 48)	t	p
Time to get out of bed	45.48 \pm 5.43	33.79 \pm 3.91	12.103	<0.001
Bowel sound recovery time	56.04 \pm 5.07	44.00 \pm 3.18	13.946	<0.001
First exhaustion time	58.25 \pm 4.84	48.60 \pm 4.48	10.137	<0.001
First defecation time	71.38 \pm 6.60	61.92 \pm 6.79	6.918	<0.001

TABLE 3. Comparison of Self-care ability between both groups after intervention (points, $\bar{x} \pm s$).

Groups	Time	Control group (n = 48)	Observation group (n = 48)	<i>t</i>	<i>p</i>
Health knowledge level					
	Before intervention	30.65 ± 3.87	30.98 ± 3.56	0.439	0.661
	After intervention	37.00 ± 4.21	42.85 ± 3.07	7.778	<0.001
Self-concept					
	Before intervention	18.02 ± 2.21	17.50 ± 2.24	1.147	0.254
	After intervention	23.02 ± 3.20	28.23 ± 2.89	8.370	<0.001
Self-responsibility					
	Before intervention	14.73 ± 1.25	14.77 ± 1.32	0.158	0.874
	After intervention	19.58 ± 2.04	25.79 ± 2.70	12.718	<0.001
Self-care skills					
	Before intervention	25.02 ± 3.14	24.50 ± 2.88	0.846	0.400
	After intervention	30.60 ± 3.42	37.79 ± 3.84	9.682	<0.001

TABLE 4. Comparison of SAS and SDS scores between both groups after intervention (points, $\bar{x} \pm s$).

Groups	Time	Control group (n = 48)	Observation group (n = 48)	<i>t</i>	<i>p</i>
SAS scores					
	Before intervention	20.56 ± 4.16	21.35 ± 4.72	0.871	0.386
	After intervention	17.69 ± 3.55	15.48 ± 4.30	2.743	0.007
SDS scores					
	Before intervention	6.02 ± 1.41	6.48 ± 1.17	1.738	0.086
	After intervention	4.71 ± 1.40	3.40 ± 0.82	5.612	<0.001

SAS: Self-rating anxiety scale; SDS: Self-rating depression scale.

TABLE 5. Comparison of quality of life between both groups after intervention (points, $\bar{x} \pm s$).

Groups	Time	Control group (n = 48)	Observation group (n = 48)	<i>t</i>	<i>p</i>
Physiological function					
	Before intervention	48.31 ± 5.61	49.15 ± 4.84	0.779	0.438
	After intervention	53.10 ± 4.65	58.75 ± 5.01	5.723	<0.001
Somatic pain					
	Before intervention	52.27 ± 4.69	51.81 ± 4.32	0.498	0.620
	After intervention	57.56 ± 4.92	66.31 ± 5.39	8.309	<0.001
Social function					
	Before intervention	53.08 ± 5.32	53.33 ± 5.38	0.229	0.819
	After intervention	59.77 ± 4.24	67.65 ± 5.91	7.500	<0.001
Mental health					
	Before intervention	54.31 ± 5.99	55.33 ± 7.27	0.751	0.455
	After intervention	60.00 ± 6.30	72.25 ± 7.60	8.579	<0.001

TABLE 6. Comparison of cancer-related symptoms change between both groups (points, $\bar{x} \pm s$).

Groups	n	Fever	Jaundice	Abdominal pain	Gastrointestinal hemorrhage	Total
Control group	48	4 (10.42%)	3 (6.25%)	3 (6.25%)	3 (6.25%)	13 (27.08%)
Observation group	48	1 (2.08%)	2 (4.17%)	0 (0.00%)	1 (2.08%)	4 (8.33%)
χ^2						4.575
<i>p</i>						0.032

TABLE 7. Comparison of satisfaction between both groups.

Groups	n	Very satisfy	Satisfy	Generally	Dissatisfy	Satisfaction
Control group	48	11 (22.92%)	18 (37.50%)	6 (12.50%)	13 (27.08%)	35 (72.92%)
Observation group	48	27 (56.25%)	10 (20.83%)	8 (16.67%)	3 (6.25%)	45 (93.75%)
χ^2						6.075
<i>p</i>						0.014

lationship. Patients' psychological stress can be alleviated when nurses improve their understanding of chemotherapy and disease, comprehend their physical and mental health, offer psychological support, establish patient communication groups and encourage one another. During the nursing process, document the extent to which the patient's health plan is being implemented, promptly modify the nursing direction, assist the patient in managing adverse reactions independently, and enhance the patient's self-management capabilities [20].

We found that behavioral phasing change theory collaborative care significantly enhanced the ESCA scores of hepatocellular carcinoma patients compared to the control group. Patients' self-management efficacy and capacity to self-care have been significantly enhanced. In combination with health education, cognitive intervention, self-care measures, communication and other methods, TTM enhances individualized guidance, increase patients' awareness and confidence, promote active cooperation with medical treatment, and assist patients in becoming more competent at self-care and receiving effective nursing strategies outside of the hospital [20]. Moreover, patients observed significant improvements in their quality of life, anxiety and depression when compared with the control group. Quality of life is currently a critical metric for estimating tumor treatment efficacy in European and American cancer research institutions [21]. TTM-based interventions for cancer patients have gained increasing attention as a means of improving patients' quality of life, confidence and favorable clinical outcomes [7]. Based on TTM, cancer patient care interventions are methodical, structured, centralized and convenient. By actively managing their illness, acquiring problem-solving skills and cultivating self-assurance, patients actively participate in managing illness. Several constraints hindered our study. This study was conducted exclusively at one institution, which led to a particular bias in the selection of participants. Consequently, an additional medical facility should be included in this study. Furthermore, this investigation is retrospective, rendering selection bias inevitable. This study has an inadequate sample size, and a multi-center study would be more beneficial.

5. Conclusions

To summarize, the TTM collaborative nursing mode is beneficial to patients with hepatocellular carcinoma. By improving patients' ability to manage their health and self-confidence, it reduces the negative effects of the disease and improves their quality of life.

AVAILABILITY OF DATA AND MATERIALS

The authors declare that all data supporting the findings of this study are available within the paper and any raw data can be obtained from the corresponding author upon request.

AUTHOR CONTRIBUTIONS

LLD, FFZ—designed the study and carried them out; supervised the data collection, analyzed the data, interpreted the data, prepared the manuscript for publication and reviewed the draft of the manuscript. Both authors have read and approved the manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval was obtained from the Ethics Committee of the First Affiliated Hospital of Soochow University (Approval no. 2024-548). Written informed consent was obtained from a legally authorized representative for anonymized patient information to be published in this article.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found, in the online version, at <https://oss.jomh.org/files/article/1873622467615834112/attachment/Supplementary%20material.docx>.

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