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The Construction of Integrated Nursing Model Prevention of Oxaliplatin Chemotherapy-Induced Peripheral Nerve Injury

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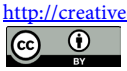

Abstract

Objective: To investigate the effect of the integrated nursing model in the prevention of chemotherapy-induced peripheral injury. Methods: A total of 60 tumor patients receiving oxaliplatin for 1 - 6 cycles of chemotherapy from January to September 2023 were selected. 30 patients were selected from January to March and divided into the control group, and 30 patients were selected from July to 9 as the experimental group. The control group received conventional chemotherapy nursing, while the experimental group received integrated nursing. Anxiety, peripheral nerve toxicity stage and quality of life score were compared between the two groups before and after intervention. Results: After intervention, the scores of the self-rating Anxiety Scale (SAS) and the total scores of the oxaliplatin Levi specific sensory neurotoxicity scale in the experimental group were significantly lower than those in the control group, and the differences were statistically significant (P< 0.05); The Quality of Life Scale (FACT-G) score of cancer patients was higher than that of control group, and the difference was statistically significant (P< 0.05). Conclusion: The integrated nursing model can effectively reduce the anxiety of patients, reduce the incidence of peripheral nerve injury and improve the quality of life of patients.

Keywords

Integrated Nursing Intervention Model, Chemotherapy, Peripheral Nerve Toxicity, Anxiety, Quality of Life

1. Introduction

Oxaliplatin (Oxaliplatin L-OHP) is the third generation of platinum-based an-

ti-tumor drugs after cisplatin and carboplatin [1], which causes a very high frequency of peripheral nerve toxicity and seriously affects the quality of life of patients [2]. Chemotherapy-induced peripheral neurotoxicity (CIPN) is mainly manifested as hand and foot numbness, tingling, muscle weakness, increased sensitivity to hot and cold stimulation, etc., which can lead to falls, self-care difficulties, postal hypotension, cardiovascular dysfunction, erectile dysfunction or digestive tract dysfunction [3]. CIPN occurs in about 50% to 90% of chemotherapy patients. Of these, 30% to 40% will turn into chronic neurological adverse reactions. After oxaliplatin treatment, patients with colorectal cancer had a higher CIPN incidence rate of 84% [4]. Integrated care is a concept that links the input, delivery, management and organization of diagnosis, treatment, nursing, rehabilitation, health promotion and other related services [5]. Nurse-led integrated care includes the participation of multidisciplinary teams, high-risk screening, holistic assessment and the development of individualized care plans. This study investigated the effect of constructing an integrated nursing intervention model in preventing chemotherapy-induced peripheral nerve toxicity injury.

2. Objects and Methods

2.1. Research Object

Cancer patients treated with oxaliplatin for 1 - 6 cycles of chemotherapy from January to September 2023 were selected, and 60 of them were selected as research objects. Inclusion criteria: 1) Tumor patients receiving oxaliplatin chemotherapy within the statistical period, 2) age ≥18 years old, 3) peripheral vein and central vein administration, 4) patients receiving single drug, dual drug, combined immunization, and targeted therapy.

Exclusion criteria: 1) patients with oral chemotherapy; 2) patients with heart, liver, kidney and other organ diseases; 3) patients with peripheral neuropathy and receiving corresponding treatment; 4) allergic constitution. Among the 60 patients, 40 were males and 20 were females. Age: 38 - 72 years old, mean (60.7 ± 9.69) years old; Among them, 8 cases of gastric cancer, 14 cases of rectal cancer, 8 cases of colon cancer, 4 cases of pancreatic cancer, 14 cases of esophageal cancer, 8 cases of lung cancer, and 4 cases of ovarian cancer. Among them, 32 patients had 1 - 3 cycles of chemotherapy and 28 patients had 4 - 6 cycles of chemotherapy. A total of 30 patients were selected from January to March and divided into the control group, and a total of 30 patients were selected from July to September as the experimental group. There was no significant difference in gender, age, disease type, condition and treatment plan between the two groups (all $P > 0.05$). It is comparable. This study was approved by the hospital Medical Ethics Committee.

2.2. Methods

- Control Group

  The control group received conventional chemotherapy and psychological

nursing before chemotherapy. At the same time, introduce the knowledge of chemotherapy and the prevention and nursing of toxic reactions to the patients and their families to eliminate the fear of the patients; Instruct patients to wear gloves and socks and refrain from cold drinks and food during chemotherapy; Brush your teeth, wash and bathe with warm water; Do not touch cold objects such as stainless steel items (bed brackets and infusion racks) [6].

- On the basis of the control group, the experimental group constructed an integrated nursing model based on evidence-based intervention, and the specific methods were as follows:

1) Set up intervention team and establish mechanism: The team consists of 1 psychological consultant, 1 hospice nurse, 1 dietitian, 1 clinical pharmacist, 1 attending physician, 1 deputy chief nurse, 2 chief nurses, and 3 responsible nurses. The team members must have more than 5 years of work experience, rich clinical treatment and nursing work experience, and participate in unified training and assessment. Improve the nursing measures management system, nursing process and graded nursing routine for chemotherapy-induced peripheral nerve toxicity, and improve the assessment form for high-risk screening.

2) Integrate soothing techniques for emotional management: Before treatment, hospice specialist nurses use SAS scale [7] (Attached **Table 1**) to evaluate patients, pay attention to patients' psychological dynamics, listen to patients' attitudes toward disease and treatment, relieve patients' bad emotions, enhance patients' confidence in treatment, encourage patients to face the disease correctly, enhance self-psychological tolerance, and carry out emotional management, so as to improve patients' compliance. Evaluation was conducted again on the day of chemotherapy and 2 days after chemotherapy. Psychological communication skills were used to carry out psychological counseling, including supportive psychological intervention, progressive muscle relaxation training, and music therapy [8], so as to encourage patients to speak out their thoughts and doubts and answer them to meet their nursing needs. Pay attention to the degree of positive cooperation of family members for treatment. Regular seminars are held to invite recovered patients to return to the hospital to communicate with their families, share their own anti-cancer experience, and build confidence for patients to recover.

3) Integrating TCM appropriate nursing techniques to prevent injury aggravation: The peripheral neurotoxicity of patients was evaluated on daily shift. The total score of oxaliplatin Levi special sensory neurotoxicity scale was above grade 2. The rehabilitation department and Traditional Chinese Medicine Department were invited to consult and intervene in advance. Patients receiving peripheral intravenous oxaliplatin were given a warm compress wrapped in sea salt [9] or 50% magnesium sulfate along the intravenously centered wet compress at the injection site or Golden powder mixed with honey, then heated, and warm and wet compress along the vein [10] for 6 hours a day for three consecutive days. On the next day after the end of chemotherapy, patients were instructed to use traditional Chinese medicine prescriptions in the morning and evening to blithe

hands and feet (Chuanwu 1 g, grass 1 g, Chuanxiong 1 g, cinnamomum sinensis 1 g, bone deep grass 1 g, Artemisia argyi 1 g, Leonurus 1 g) [11] for a course of 7 days to reduce neurotoxic symptoms.

4) Integrated functional exercise alleviating response: Functional exercise is included in the morning nursing process. During hospitalization, the nurse in charge is responsible for explaining the necessity of functional exercise [12], giving one-to-one guidance to patients to ensure that they have mastered the method of finger fine movement, and assessing whether patients have mastered the exercise steps before discharge from the hospital, and guiding them to communicate through platforms such as wechat or QQ. The intervention period was from hospitalization to the next cycle of chemotherapy.

5) Integrated evidence-based graded care: multiple early interventions for patients in the experimental group:

a) Treatment areas: Conventional drugs such as antiemesis, liver protection and stomach protection should be given 2 days before chemotherapy, and calcium and magnesium mixture and neuronutrition agents should be used to reduce CIPN. For patients with peripheral intravenous infusion during chemotherapy, appropriate puncture site should be selected and the catheter should be properly fixed to prevent drug extravasation [13]. Patients should pay close attention to whether there are adverse reactions such as hand and foot numbness and tingling, and should be instructed to pay attention to the arm activities of patients at the side of puncture. On the day of chemotherapy and 2 days after chemotherapy, oxaliplatin Levi special sensory neurotoxicity Scale [14] (Attached **Table 2**) was used for evaluation and grading. Loxetine may be used to treat CIPN in grade IV patients.

b) Health guidance field: Responsible nurses adopt multiple maintenance health education methods according to the classification of neurotoxic symptoms, such as poster publicity, Douyin videos, and public accounts to regularly push knowledge.

2.3. Observation Indicators

- The severity of neurotoxicity was evaluated using oxaliplatin Levi's special sensory neurotoxicity scale, which was divided into 5 levels according to the severity and severity of paresthesia or bradyesthesia.
- The severity of psychological anxiety of patients was scored by the Self-Rating Anxiety Scale (SAS). SAS used a 4-level score, which mainly assessed the frequency of symptom occurrence. Among the 20 items, l5 items were stated with negative words and scored according to the L-4 order above. The remaining 5 items (Nos. 5, 9, 13, 17, 19) marked with * are stated in positive words and are scored in reverse order from 4 to 1.
- Quality of Life The quality of Life Measurement Scale for Cancer patients (FACT-G) [15] was composed of 27 items, which were divided into four areas: physiological status (GS1-GS7), social/family status (GS1-GS7), emotional status (GE1-GE6) and functional status (GF1-GF7). Each entry adopts

a five-level scoring method, with positive entries counted directly (0 - 4 points) and reverse entries scored in reverse (4 - 0 points). In the scale, except for GP1-GP7, GE1 and GE3-GE6, all items are positive items. The formula is expressed as: positive entry score = (0+ answer option number); Reverse entry score = (4+ response option number). Field and Total table scores are calculated as the sum of the scores of the items included in the respective fields. If there are unanswered items, the actual number of answered items is used to calculate.

2.4. Evaluation Method

On the day of chemotherapy, the responsible nurse conducted on-site assessment and issued relevant scales. 60 questionnaires were sent out this time, and 60 were effectively recovered.

2.5. Statistical Processing

SPSS 23.0 statistical software was used to analyze all the data after Epidata data processing, and T-test and repeated measurement analysis of variance were performed for comparison between groups. $P < 0.05$ was considered statistically significant.

3. Results

3.1. Comparison of the Classification of Neurotoxic Reactions before and after Intervention between the Two Groups

Before intervention, there was no significant difference in neurotoxicity grade between the two groups (P> 0.05);

After dry preconditioning, the neurotoxicity grade of the experimental group was lower than that of the control group, and the difference was statistically significant (P< 0.05), see Table 1.

Table 1. The comparison of neurotoxic reactions before and after intervention between the two groups.

			Neurotoxicity below grade 2			Neurotoxicity above grade 2		
Cycle	Group	Number of cases	Lv. 0	Lv. 1	Number of cases	Lv. 2	Lv. 3	Lv. 4
Period 1 - 3	Control group	6	0	6 (42.8%)	8	4 (28.5%)	3 (21.4%)	1 (7.1%)
	Experimental group	14	11 (61.1%)	3 (16.6%)	4	4 (22.2%)	0	0
	χ^2 value				4.0974			
	P value				0.04295			
Period 4 - 6	Control group	0	0	0	16	2 (12.5%)	7 (43.7%)	7 (43.7%)
	Experimental group	6	0	6 (50%)	6	6 (50%)	0	0
	χ^2 value				7.4287			
	P value				0.006419			

3.2. Comparison of Anxiety Severity between the Two Groups before and after Intervention

Before intervention, there was no significant difference in anxiety scores between the two groups (P> 0.05); After the intervention, the anxiety rating of the experimental group was lower than that of the control group, and the difference was statistically significant (P< 0.05), see Table 2.

3.3. Comparison of Scores of Quality of Life Scale before and after Intervention between the Two Groups

Before intervention, there was no statistically significant difference in the scores of all dimensions of the quality of life scale between the two groups (P> 0.05); After intervention, the scores of QLQ-C30 quality of life scale in the observation group were higher than those in the control group, and the difference was statistically significant (P< 0.05), see Table 3.

4. Discussion

4.1. Effects of Integrated Nursing Intervention Mode on Chemotherapy-Induced Peripheral Nerve Toxicity

The literature shows that the incidence of CIPN after oxaliplatin treatment is as high as 84%. However, moderate management can reduce the incidence of CIPN and improve the quality of life of patients. The European Society of Medical Oncology (ESMO) has formulated clinical practice guidelines for anti-tumor treatment-induced peripheral neurotoxicity [16]. At present, domestic medical personnel have insufficient understanding of CIPN and lack of continuity in nursing methods. With the integrated nursing mode, the neurotoxicity grade of the experimental group decreased significantly (P< 0.05), indicating that the integrated nursing model can successfully reduce the neurotoxic symptoms of patients.

Table 2. The anxiety severity before and after intervention in both groups.

Group	Number of cases	Anxiety score		Physiological status score	
		Period 1 - 3	Period 4 - 6	Period 1 - 3	Period 4 - 6
Control group	30	60.39 ± 6.99	75.50 ± 3.72	20.06 ± 5.29	18.17 ± 5.64
Experimental group	30	60.00 ± 6.50	45.00 ± 3.57	17.86 ± 3.21	14.56 ± 3.72
T value		−0.16089	21.831	−1.370	−2.038
P value		0.8733	2.2e−16	0.181	0.052

Table 3. The scores of each dimension of quality of life scale before and after intervention in two groups.

Group	Number of cases	Social/family situation score		Affective status score		Function status score	
		Period 1 - 3	Period 4 - 6	Period 1 - 3	Period 4 - 6	Period 1 - 3	Period 4 - 6
Control group	30	26.72 ± 4.69	21.25 ± 4.25	19.67 ± 4.24	18.75 ± 3.19	26.22 ± 4.71	23.92 ± 4.10
Experimental group	30	22.86 ± 3.46	18.06 ± 3.70	19.21 ± 4.17	14.06 ± 2.98	21.71 ± 3.15	17.75 ± 3.80
T value		−2.582	−2.120	−0.301	−3.997	−3.080	−4.107
P value		0.015	0.044	0.765	0.00047	0.0044	0.00035

4.2. Influence of Integrated Nursing Intervention Mode on Patients' Anxiety

The integrated care model puts the patient at the heart of care and ensures that the patient feels loved and respected in the integrated care process by building a close partnership with the patient and family, providing personalized and warm care, listening to the needs of the patient, providing emotional support and psychological care. The results of this study showed that after the intervention of integrated nursing mode, the anxiety of patients in the experimental group decreased significantly compared with the control group during 4 - 6 cycles, and the difference was statistically significant (P< 0.05) in 1 - 3 cycles, because the chemotherapy cycle is too short, patients' anxiety score is low, so there is no significant difference before and after nursing. Overall, integrated nursing intervention mode can effectively reduce the burden of anxiety for patients with long chemotherapy cycle, which is conducive to patients coping with the disease with a positive attitude.

4.3. Impact of Integrated Nursing Intervention Mode on Patients' Quality of Life

With the progress of disease and treatment, neurotoxic reactions often seriously affect the diet, sleep and comfort of patients, and affect the quality of life of patients. With the promotion of modern bio-psycho-social medical model in tumor treatment and nursing, medical staff pay more and more attention to the improvement of patients' quality of life [17]. Integrated nursing is to provide professional team services for cancer chemotherapy patients and reduce the discomfort and psychological pressure of neurotoxic symptoms on patients. The results of this study showed that after intervention, the scores of relevant dimensions of quality of life in the experimental group were higher than those in the control group, and the difference was statistically significant (P< 0.05), indicating that the integrated nursing intervention model effectively improved the quality of life of patients.

5. Summary

In summary, the integrated nursing intervention model has positive effects on reducing neurotoxic symptoms and improving the quality of life of patients, and is worthy of further promotion and application in nursing work. However, there are still many shortcomings in this study, such as the selected cases are only limited to patients admitted to our hospital within the past year, and the observation indicators are few, which is highly subjective, which may cause the conclusion to be one-sided and limited. Therefore, it is necessary to increase the number of samples and observation indicators to conduct further studies in the future, so as to objectively analyze the impact of integrated nursing intervention mode on chemotherapy-induced peripheral nerve toxicity and patients' quality of life.

Conflicts of Interest

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

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