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Original Article

Standardized nursing mode effectively controls pain caused by radiotherapy and chemotherapy in patients with advanced cancer

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Abstract: Objective: To explore the application value of a standardized nursing model in pain management of advanced cancer patients undergoing radiotherapy and chemotherapy. Methods: The clinical data of 166 patients with advanced cancer who suffered pain after receiving radiotherapy and chemotherapy in the Oncology Department of Guang'an People's Hospital from June 2020 to June 2021 were retrospectively analyzed. Among them, 83 patients who received routine care were grouped as a control group, while the other 83 patients who received standardized cancer pain nursing based on routine nursing were set as the experimental group. The location, duration, and degree of pain (numeric rating scales, NRS) and quality of life (European Quality of Life Scale, QLQ-C30) of patients were evaluated. Results: Before treatment and nursing intervention, there were no significant differences in the location, duration, or degree of pain as well as in patients' quality of life between the two groups (all $P>0.05$). During and after radiotherapy, the pain was mainly concentrated in the skin of the radiation field, and the duration of pain increased with the number of rounds of radiotherapy. After nursing, patients in the experimental group showed lower NRS scores than those in the control group ($P<0.05$); the scores of physical function, role function, emotional function, cognitive function, social function and general health status of the experimental group were higher than those of the control group (all $P<0.05$); and the scores of fatigue, nausea and vomiting, pain, insomnia, loss of appetite and constipation in the experimental group were lower than those in the control group (all $P<0.05$). Conclusion: A standardized cancer pain nursing model can effectively alleviate the radio-chemotherapy induced pain of cancer patients and effectively improve their quality of life.

Keywords: Standardization of cancer pain care, radiochemotherapy, quality of life

Introduction

In recent years, concurrent radiotherapy and chemotherapy plus induction chemotherapy have become the best treatment method for locally advanced cancer, and can increase the local control rate to about 95% [1]. However, nausea and vomiting caused by radiotherapy and chemotherapy also increase with the extension of treatment time, which aggravate adverse emotions and cause a greater impact on sleep and quality of life of patients [2-4]. Cancer pain is a common clinical manifestation in patients with advanced cancer. It not only causes physical pain, but also brings them a heavy mental burden, leading to a significant decline in their quality of life [5-8]. Therefore, strengthening pain care is of great significance to improve the prognosis of patients with advanced cancer.

Standardized nursing is a series of orderly and complete nursing measures implemented according to the theoretical basis of the nursing procedure. Standardized cancer pain nursing mode is a common nursing mode in oncology [9-11]. According to the standardized model, the pain severity is scored and corresponding treatment and nursing plans are enacted, which are helpful to control the disease and improve quality of life. This study was designed to explore the application value of a standardized

nursing mode in pain management of advanced cancer patients undergoing radiotherapy and chemotherapy.

Methods

Case collection

In this retrospective study, we collected the clinical data of 166 patients with advanced cancer who suffered cancer pain after radiochemotherapy in the Oncology Department of Guang'an People's Hospital from June 2020 to June 2021. Among them, patients who received routine care were set as the control group (n=83), while those who received standardized cancer pain nursing on the basis of routine nursing were set as the experimental group (n=83).

Inclusion criteria: ① Patients with histopathologically confirmed cancer; ② Patients first receiving radiotherapy and chemotherapy; ③ Patients with an age of 16-65; ④ Patients with primary school education or above; ⑤ Patients with KPS score ≥70 and an estimated survival time >6 months [12]; ⑥ Patients with an ADL score ≥60, capable of self-care and accepting nursing intervention; ⑦ Patients with normal sense and language expression, no major disease or mental disorder before; ⑧ Patients who had provided informed consent.

Exclusion criteria: ① Patients with past or existing severe cognitive impairment and mental disorder; ② Patients with other tumors or systemic diseases; ③ Patients with distant metastasis; ④ Patients who only received radiotherapy for their own reasons; ⑤ Patients with serious hearing or communication difficulties; ⑥ Patients unable to complete the whole treatment (KPS<70 points [13], or voluntarily gave up treatment halfway or were complicated with systemic strictness, and those who suspended radiotherapy for serious diseases).

Radiotherapy and chemotherapy method

Radiotherapy: Three dimensional intensity modulated radiotherapy (IMRT) was applied in both groups. Patients received 2 Gy each time for 5 consecutive days a week (Monday to Friday) with a total radiation dose of 50-70 Gy.

Chemotherapy (concurrent chemotherapy or induction chemotherapy plus concurrent chemotherapy): Concurrent chemotherapy regimen included single drug cisplatin 80-100 mg/m^2 from d1-3. The induction chemotherapy scheme mainly included docetaxel 75 mg/m^2 on d1 plus cisplatin 80 mg/m^2 from d2-3 or fluorouracil 750 mg/m^2 from d 2-6. The treatment was repeated every 3 weeks, with 2-3 cycles of chemotherapy at the same time.

Nursing methods

Control group

According to the routine radiotherapy care and routine pain care for tumor patients, the patients were educated on radiation and chemotherapy related knowledge, pain knowledge, nutrition, and health knowledge as well as given psychological care. The details are as follows: 1) Routine nursing of patients with cancer pain after radiotherapy included explaining the related knowledge of cancer pain and radiotherapy, encouraging a high protein and high calorie diet and avoiding spicy and fried food. 2) Nursing routines for chemotherapy included assessment and management of issues related to medical history, nutritional status, blood routine, liver and kidney functions, venous conditions and others related to chemotherapy. The nurses provided psychological care for the patients, weighed the patients once a week, paid attention to the general condition and calculated the dose of chemotherapy drugs for the next cycle. 3) Pain care routine included exploring the causes of pain and avoiding them. The nurses reasonably used pain relief methods, such as drug analgesia, self-controlled analgesia pump, physical analgesia, and acupuncture analgesia.

Experimental group

On the basis of the routine nursing care, standardized pain care was given to the patients before, during, and after radiotherapy in the order of evaluation, diagnosis, planning and implementation.

Evaluation stage: 1) Establishment of pain assessment registration file. After admission, the responsible nurse collected the personal data from patients, including name, gender, age, cancer stage [14], education level and treatment plan. According to the severity of the disease, the nurse shall timely grasp the infor-

mation required for nursing and make a preliminary assessment of the disease. 2) Pain assessment. The pain assessment is mainly based on the patient's subjective complaint, including the first assessment of the pain at admission, and a focus on the assessment of the patient's pain location, degree, and duration during radiotherapy. 3) Time and frequency of pain assessment. At admission, the pain level was evaluated for the first time. During the radiotherapy, the evaluation was carried out from 15:00 to 16:00 every radiotherapy working day until the end of radiotherapy, for a total of 30 times [15, 16].

Diagnosis stage: After the pain evaluation, the data were summarized, the causes and correlation of pain were analyzed, and effective nursing was put forward according to the characteristics of the pain. The causes of pain included primary cancer pain, pain caused by treatment, and pain caused by other factors.

Planning stage: The obtained data were analyzed and summarized in a timely manner. Combining the clinical experience and relevant literature review, the nursing team identified the problems that needed to be solved urgently for patients in the nursing practice and formulated a nursing plan consistent with the patient's condition and medical orders.

Implementation stage: First, the primary cancer pain before radiotherapy was alleviated. The nursing team should accurately assess and record the pain of patients at their admission. Patients with pain score ≥4 should be reported to the doctor in time and analgesics should be used according to the doctor's instructions. Re-evaluation of the pain is recommended after 30 minutes of intervention. The nurse should guide patients and their families to use the numerical rating scale (NRS) to evaluate their pain level and encourage them to express their sensation of pain. At different stages of radiotherapy, the severity of pain induced by radiotherapy was evaluated every day, and targeted intervention measures were taken after fully understanding the pain degree [17, 18].

Evaluation method

Upon admission

The patients in both groups filled in a general information questionnaire, including numerical rating scale (NRS), pain site and pain duration, and quality of life questionnaire (QLQ-C30) after providing informed consent.

During radiotherapy

The pain degree (NRS score), pain site, and duration of the patients were evaluated and recorded at 15:00-16:00 every day on the working day of radiotherapy until the end of radiotherapy, with a total of 30 times. At different stages of radiotherapy (1-10 courses of radiotherapy, 11-20 courses of radiotherapy, 20 courses of radiotherapy - end), the complications of patients after radiotherapy, and the symptoms and signs of patients were recorded in detail.

At the time of discharge

The quality of life of patients during hospitalization was assessed by European Quality of Life Scale (EORTC QLQ-C30).

Evaluation index

Numerical rating scale (NRS)

NRS is developed from visual analog scale proposed by Scott and Huskisson, and the numbers 0-10 indicate the severity of pain with 0 indicating no pain, 1-3 points indicating mild pain, 4-6 points indicating moderate pain, 7-8 points indicating severe pain, and 10 points indicating the most severe pain.

Quality of life measurement scale (QLQ-C30)

This was developed by the European Organization for Research and Treatment of Cancer (EORTC) to evaluate the quality of life of cancer patients, with good reliability and validity. The scale has 30 items covering 15 domains. Among them, higher scores of functional domain and overall health status indicate better quality of life and functional status. Higher scores of symptom domain and single measurement items indicate a worse quality of life [19].

Statistical analysis

All data were analyzed by SPSS17.0 software package. The measured data were expressed as mean ± standard deviation ($x \pm s$) and analyzed by t-test or analysis of variance (ANOVA). The repeated measures data were statistically

Table 1. Comparison of pain duration before treatment between the two groups

Project		Control Group	Experimental Group	X^2/Z	P
Pain Duration	T24≤2 h	2 (2.4)	1 (1.2)	0.439	0.661
	2 h<T24≤6 h	2 (2.4)	2 (2.4)		
	6 h<T24≤12 h	6 (7.2)	9 (10.8)		
	12 h<T24≤24 h	25 (30.1)	22 (26.5)		

Table 2. Comparison of pain duration between the two groups

		Control Group	Experimental Group	X^2/Z	P
Pain duration after 10 courses of radiotherapy	≤2 h	36 (43.4)	53 (63.9)	2.423	0.015
	2 h-6 h	19 (22.9)	13 (15.7)		
	6 h-12 h	18 (21.7)	8 (9.6)		
	12 h-24 h	10 (12.0)	9 (10.8)		
Pain duration after 20 courses of radiotherapy	≤2 h	12 (14.5)	18 (21.7)	2.210	0.027
	2 h-6 h	26 (31.3)	42 (50.6)		
	6 h-12 h	20 (24.1)	15 (18.0)		
	12 h-24 h	25 (30.1)	18 (21.7)		
Pain duration after 30 courses of radiotherapy	≤2 h	5 (6.0)	8 (9.6)	2.396	0.017
	2 h-6 h	19 (22.9)	28 (33.7)		
	6 h-12 h	29 (34.9)	30 (36.2)		
	12 h-24 h	30 (36.2)	17 (20.50)		

analyzed by repeated measures ANOVA. The counted data were expressed as percentage and analyzed by χ^2 test or Fisher exact test as appropriate. A nonparametric test was used for analysis of non-normally distributed data and rank data. The test level was set at α=0.05, and the difference was regarded assignificant at P<0.05.

Results

Comparison of pain location and duration among patients within the two groups

Upon admission, the cancer pain of patients was mainly caused by the primary tumor. 38.6% of the patients in the control group and 45.8% of the patients in the experimental group had primary pain. The pain site and duration of the patients in the two groups before treatment were not significantly different (all P>0.05). See **Table 1** for details.

During and after radiotherapy, the pain of patients was mainly concentrated in the skin of the radiation site, and the duration of pain also increased with the radiotherapy courses. There was a statistical difference in the pain duration during and after radiotherapy between the two groups (P<0.05). See **Table 2**.

Comparison of NRS scores between the two groups

The pain degree of patients was increased along with the course of radiotherapy due to an increase of radiation dose and worsening of the complications. After the standardized cancer pain nursing intervention, the NRS scores of the experimental group were significantly lower than those of the control group at different radiotherapy sessions (P<0.01). See **Table 3**.

According to a multivariable test, the difference in pain score between the two groups at different times was significant (P<0.05, **Table 4**), and there was an interaction between each time and group (P<0.05), indicating that the effect of time varied with the groups. The rising trend of pain score in the control group was significantly higher than that of the experimental group.

In the inter group effect test, there was a significant difference in pain scores between the experimental group and the control group (P< 0.05, **Table 5**). As for intra group effect test, the pain degrees of the experimental group and the control group at different times were different (P<0.05, **Table 6**). The pain gradually increased with the time of radiotherapy, and the change trend was different for different groups (P<0.05, **Table 7**).

Comparison of quality of life between the two groups

At the time of admission, there was no statistical difference between the two groups in each item of the QLQ-C30 scale (all P>0.05). After nursing, the scores of physical function, role function, emotional function, cognitive function, social function, and general health status

Table 3. Comparison of NRs scores between the two groups of patients

	Before Intervention	After Intervention		
	Before Treatment	After 10 courses	After 20 courses	End of radiotherapy
Control Group	1.31±2.09	4.53±1.20	6.46±1.04	7.58±1.11
Experimental Group	1.39±1.85	3.11±1.38	4.49±1.08	5.35±0.98
T	0.236	7.077	11.965	13.740
P	0.814	0.000	0.000	0.000

Table 4. Multivariable test of pain scores of the two groups at different times

Effect	Method	Value	F	Hypothesis df	Error df	P
Time	Pillai's Trace	0.956	101.236	29.000	136.000	<0.01
	Wilks'Lambda	0.044	101.236	29.000	136.000	<0.01
	Hotelling's Trace	21.587	101.236	29.000	136.000	<0.01
	Roy's Largest Root	21.587	101.236	29.000	136.000	<0.01
Time*Group	Pillai's Trace	0.420	3.391	29.000	136.000	<0.01
	Wilks' Lambda	0.580	3.391	29.000	136.000	<0.01
	Hotelling's Trace	0.723	3.391	29.000	136.000	<0.01
	Roy's Largest Root	0.723	3.391	29.000	136.000	<0.01

Table 5. Inter group effect test of pain scores of the two groups at different times

	Source	Type III Sum of Squares	Mean Square	F	P
NRS	intercept	92260.889	92260.889	6897.009	0.000
	group	2632.86	2632.86	196.821	0.000
	error	2193.818	13.377		

Note: NRS, numerical rating scale.

Table 6. Intra group effect test of pain scores of the two groups at different times

Source		Type III Sum of Squares	Mean Square	F	P
Time	Greenhouse-Geisser	14512.852	1684.861	524.597	0.000
Time*Group	Greenhouse-Geisser	441.556	51.262	15.961	0.000
Error	Greenhouse-Geisser	4537.025	3.212		

Table 7. Comparison of pain scores between the two groups at different times

Source	Dependent variable	Type III Sum of Squares	Mean Square	F	P
Group	10^{th} time	2.175	2.175	1.218	0.271
	20^{th} time	3.47	3.47	2.126	0.147
	30^{th} time	206.175	206.175	188.783	0.000

Note: the pain degree (numerical rating scale (NRS) score), pain site, and duration of the patients were evaluated and recorded at 15:00-16:00 every day on the working day of radiotherapy until the end of radiotherapy, for a total of 30 times.

of the experimental group were all higher than those of the control group (all P<0.05). The scores of fatigue, nausea and vomiting, pain, insomnia, loss of appetite and constipation in the experimental group were lower than those of the control group (all P<0.05). See **Table 8**.

Discussion

According to the results of cancer-related pain research, at least 20% of cancer patients suffer pain at the time of cancer diagnosis or disease progression, with the pain being most severe in patients with advanced cancer [20]. In 2001, the International Association of Pain (IASP) defined pain as an unpleasant sensation and an emotional subjective feeling, which is not only a feeling but also an expression of emotion, and it was classified as the fifth vital sign. Our study found that 28.3% (47/166) of cancer patients had pain lasting for more than 12 hours within

Table 8. Comparison of QLQ-C30 scores between the two groups before and after treatment

Item	Before intervention		After intervention	
	Control group	Experimental group	Control group	Experimental group
Functional domain				
Somatic function	89.90±10.37	89.67±8.64	50.86±17.12	63.42±17.38***
Role function	86.05±14.97	83.18±14.87	43.54±15.80	67.75±15.57***
Emotional function	78.42±12.82	75.51±11.43	57.07±14.00	69.77±11.31***
Cognitive function	80.16±18.12	78.51±16.95	48.49±19.01	63.49±17.51***
Social function	64.37±13.26	64.60±12.79	36.34±14.35	61.29±12.17***
Symptom domains				
Fatigue	13.83±18.81	16.41±22.13	66.95±17.28	58.08±23.22**
Nausea and vomiting	1.01±4.77	1.41±8.33	64.55±21.32	52.59±18.81***
Pain	15.02±23.67	17.25±24.64	74.46±20.67	60.48±19.26***
Single measurement items				
Shortness of breath	10.02±21.94	9.24±21.08	21.04±21.49	19.22±26.10
Insomnia	16.05±25.14	18.41±26.67	70.08±24.95	52.20±36.96***
Loss of appetite	3.18±9.79	3.98±10.80	86.60±21.04	73.65±20.67***
Constipation	0.80±5.09	1.19±6.19	28.33±21.00	21.53±19.72*
Diarrhea	0.80±5.10	1.00±5.39	6.40±15.24	4.41±13.28
Economic difficulties	37.58±15.42	38.06±14.19	46.98±19.50	52.14±18.84
General health	70.70±14.27	71.73±14.11	36.98±11.71	51.81±13.31***

Note: Compared to control group, *P<0.05, **P<0.01, ***P<0.001.

24 hours before treatment, and the pain was mainly caused by primary cancer pain. After the start of radiotherapy, the pain duration of the two groups also increased. With the increase of radiotherapy time, the pain degree of patients was gradually aggravated. However, after nursing intervention, the pain score of the experimental group was lower than that of the control group during and after radiotherapy, indicating that the standardized pain care mode can effectively control the pain level of cancer patients.

With the progress in medical technology, the survival rate of tumor patients has been significantly improved, and evaluation of quality of life has become one of the important indicators for the final evaluation of clinical efficacy [21, 22]. The quality of life of patients with cancer pain is sharply reduced due to the disease itself and radiotherapy and chemotherapy, as well as anxiety, fear and other negative psychological states. This study evaluated the quality of life of patients before and after treatment through the quality-of-life questionnaires EORTC QLQ-C30. The results showed that there was no difference in the quality of life between the two groups before treatment, while after radiotherapy, the life quality of the experimental group was higher than that of the control group, which is consistent with the results of many reports [23]. These results indicate that the standardized cancer pain care model can effectively improve the quality of life for patients.

In this study, we investigated the pain degree of cancer patients suffering pain and explored a standardized pain care model, with the hope of increasing the attention of nursing staff to pain during treatment. Based on the nursing procedure of standardized pain care mode, nursing staff should know what to do and how to do it well in the treatment of tumor patients, and how to improve the continuity of nursing work and nursing quality. However, due to the individual differences in pain and the influence of multiple factors, a study with a larger sample size is required to improve the accuracy of pain assessment.

In conclusion, tumor patients may suffer from moderate to severe pain during radiotherapy and chemotherapy. Standardized cancer pain nursing measures can effectively alleviate the degree of pain and improve the quality of life of cancer patients.

Disclosure of conflict of interest

None.

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