

## Original Article

# The effect of Orem's nursing theory on the pain levels, self-care abilities, psychological statuses, and quality of life of bone cancer patients

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**Abstract:** Objective: This study aims to explore the impact of Orem-based nursing intervention on the pain levels, self-care abilities, psychological statuses, and quality of life in bone cancer patients. Methods: A total of 91 patients with primary bone cancer admitted to our hospital from January 2019 to January 2020 were randomly placed into one of two groups. The patients in the control group (n=43) underwent routine nursing care, and the patients in the experimental group (n=48) underwent Orem-based nursing care during the perioperative period. The two groups were compared in terms of their postoperative recovery times and treatment effects, and their adverse emotion scores, pain levels, self-care abilities, and quality of life before and after intervention. Results: The treatment efficacy in the two groups was similar, but the postoperative recovery times in the experimental group were shorter than they were in the control group ( $P < 0.05$ ). Compared with before the intervention, the SDS, SAS, and VAS scores were significantly decreased in both groups ( $P < 0.05$ ), and their self-care abilities and quality of life were significantly higher ( $P < 0.05$ ) after intervention. Conclusion: Orem-based nursing combined with perioperative care can mobilize patients' initiative, significantly improve patients' adverse emotions and pain levels, shorten their postoperative recovery times, and help improve their self-care abilities and quality of life.

**Keywords:** Orem-based nursing, bone cancer, pain levels, self-care abilities, quality of life

## Introduction

Bone tumors are tumors that occur in the bones or other accessory blood vessels, nerves, and tissues, and they can be classified as benign or malignant [1]. Patients with benign bone tumors are generally asymptomatic, the condition is not life-threatening and it has a good prognosis [2]. Malignant bone tumors are also known as "bone cancer".

The incidence of primary bone cancer is not high. However, it develops rapidly and patients will show symptoms including swollen limbs, strong pressure, and pain, and the cancer will endanger their lives if treatment is delayed. In addition, about two-thirds of patients with advanced cancer will develop bone metastases, mainly in the spine, pelvis, ribs, etc., and 80% of patients will have bone pain, especially

late at night when the pain worsens, bringing great pain to patients [3, 4]. Severe bone pain is unbearable, and it can also cause fear, despair, and other negative emotions, which directly or indirectly leads to a decline in immune function and promotes the growth and metastasis of the tumor.

Currently, patients can be treated using multi-disciplinary comprehensive methods including surgery, radiotherapy, chemotherapy, immunotherapy, targeting, and other therapies. The bone pain that patients experienced is usually relieved by opioids in combination with radiotherapy and chemotherapy. However, opioids have severe side effects that can reduce the treatment effectiveness and the patients' quality of life [5, 6]. Studies have shown that, with the paradigm shift in medicine, specialized care for patients with bone cancer and advanced

# The effect of Orem's nursing theory on bone cancer patients

bone metastasis can significantly improve their quality of life and increase their survival rate [7, 8].

The purpose of this study was to analyze the effect of Orem-based nursing intervention on the care of bone cancer patients and to provide a theoretical basis for reducing pain levels, improving physical and mental health, and improving the quality of life in patients with bone cancer.

## Materials and methods

### *Baseline data*

Ninety-one patients with primary bone cancer admitted to our hospital from January 2019 to January 2020, including 58 males and 33 females, were recruited as the study cohort.

Inclusion criteria: (1) patients who met the NCCN criteria for bone cancer [9], (2) patients with an expected survival time of  $\geq 3$  months, and (3) patients with TNM stages III-IV.

Exclusion criteria: (1) patients with metastatic bone cancer, (2) patients with an expected survival time of  $< 3$  months, (3) patients also suffering from serious chronic diseases, (4) patients with severe liver or kidney impairment, and (5) patients with cognitive impairments.

The ninety-one patients were randomly grouped into a control group ( $n=43$ ) and an experimental group ( $n=48$ ). There were 26 males and 17 females in the control group, with an average age of  $(56.67\pm 15.82)$  years, and 32 males and 16 females in the experimental group, with an average age of  $(56.10\pm 15.63)$  years.

Personal files were established for each of the 91 patients, and informed consent forms were signed for their participation in this study. The ethics committee of Wenzhou Hospital of Traditional Chinese Medicine Affiliated to Zhejiang University of Traditional Chinese Medicine reviewed and approved this study.

### *Intervention methods*

The patients in the control group underwent routine care during the perioperative period, such as preoperative examinations, health education, preoperative preparation, and assisting

the physician in monitoring various physiological parameters.

The patients in the experimental group underwent Orem-based nursing intervention in the perioperative period in addition to the routine care. A professional nursing team composed of clinically experienced nurses was formed to formulate a nursing plan as follows.

#### (1) Wholly compensatory nursing

The patients were in a state of severe mobility and self-care ability deficit and were unable to care for themselves, and the caregivers needed to provide comprehensive nursing for them.

Since this was general anesthesia surgery, the patients were unconscious, and the nursing staff needed to transfer the patients to a specialist ward after confirming that each patient regained consciousness. They closely monitored the patients' vital signs, ensured smooth breathing, paid attention to the cleanliness of the patients' wounds and oral cavities, prevented infections, promptly removed respiratory secretions, and fixed the urinary catheters to prevent urinary retention. Soft cushions were placed under the protruding bones to prevent pressure sores. The pain levels after the anesthesia wore off was estimated according to the doctor's orders, and they administered analgesic and sedative drugs and related care. The temperature was adjusted in the ward to a comfortable level and ventilation was provided at regular intervals.

#### (2) Partial compensatory nursing

After the patient awoke and gradually recovered, the nursing staff guided and assisted the patients to formulate rehabilitation plans and helped the patients master their self-care procedures.

After the patients' blood pressure stabilized at 48 hours after surgery, the patients were helped to turn over, and they were instructed to take deep breaths. Activities such as bathing, eating, using the toilet, etc. were assisted by the nurses, and the patients were guided to do proper exercises in bed if their physical condition allowed it. As the patients' physical conditions gradually recovered, the amount of exer-

## The effect of Orem's nursing theory on bone cancer patients

cise was increased appropriately until the patients could stand and walk.

The patients ate a liquid diet for 3 days after their operations, and the drainage tubes were removed at 5 days after their operations, and they were then fed a diet of highly nutritious and easily digestible food. Small and frequent meals were advised to avoid excessive intestinal pressure.

While the urinary catheters were still in place, the patients were assisted in cleaning their perineum to prevent urinary tract infections. After the catheter was removed, stimulation methods such as listening to the sound of running water were used to stimulate the patients to urinate by themselves.

### (3) Support educational nursing

① Health Education: The operation methods and information about the disease were explained to enhance their confidence in overcoming the disease through successful cases. The importance of rehabilitation training was emphasized to the patients and helped them master self-care skills. The patients were taught disease management so that they could recognize and treat any possible deterioration of their condition as soon as possible after their discharge from the hospital. ② Psychological counseling: The nurses put themselves in the patients' shoes. The patients were given comfort and relief for their negative emotions. Meanwhile, the patients' families were encouraged to communicate more effectively with the patients and to provide more care in their daily lives. ③ Medication and dietary guidance: The patients' medication compliance was monitored after their discharge from the hospital. A dietary plan was developed according to each patient's economic status and physical condition.

### Outcome measurement

#### *Post-operative recovery*

The timing of the postoperative exhausts, the defecation times, the out-of-bed activity times, and the lengths of the hospitalizations were recorded in both groups, and the patients' postoperative recoveries were determined.

#### *Treatment efficacy*

The patients were evaluated according to Response Evaluation Criteria in Solid Tumors (RECIST) [10]. If the foci completely disappeared for more than 4 weeks, it was judged as complete remission (CR). If the maximum diameter of the foci decreased by more than 30%, it was judged as partial remission (PR). If the maximum diameter of the foci decreased by less than 30% or increased by less than 20%, it was judged as stable disease (SD). If the diameter of the foci was increased by more than 20% or if new foci appeared, it was judged as progressive disease (PD).

The overall effective rate of disease = (CR + PR)/Total number of cases × 100%

#### *Pain levels*

A numerical pain rating scale (VAS) was used to rate the patient's pain level before intervention and at 7 days and 1 month after the intervention. A 0-10 scale was used to represent the varying pain levels, with 0 indicating no pain and 10 indicating severe pain. Higher VAS scores indicate a greater pain level.

#### *Adverse emotions*

The Hamilton Anxiety Scale (HAMA) and the Hamilton Depression Scale (HAMD) were used to rate the patients' anxiety (SAS) and depressive (SDS) moods, with higher scores indicating more severe anxiety and depressive moods.

#### *Quality of life*

The patients were scored on four dimensions, including physical functioning, social functioning, role limitation (physical), and bodily pain using the Quality of Life Scale (SF-36) [11]. The higher the score, the better the quality of life.

#### *Self-care abilities*

The patients were rated in terms of their self-care abilities, self-care responsibilities, self-care concept, and health literacy using the 43-item Self-Care Competence Scale (ESCA) on a 5-point Likert scale, with 0 representing not at all like me and 4 representing very much like me [12, 13]. The higher the score the greater the self-care abilities.

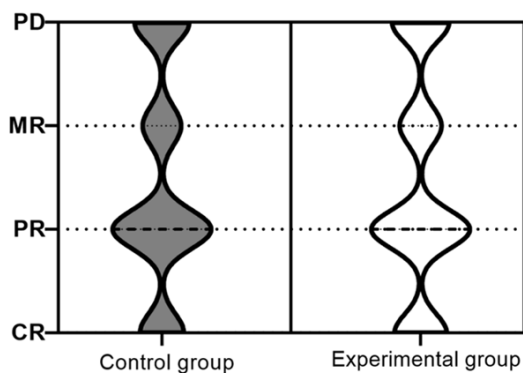
# The effect of Orem's nursing theory on bone cancer patients

**Table 1.** Comparison of the baseline data between the two groups ( $\bar{x} \pm s$ )/[n (%)]

Baseline data	Control group (n=43)	Experimental group (n=48)	t/X <sup>2</sup>	P
Gender			-0.714	0.605
Male	26	32		
Female	17	16		
Average age (years)	56.67±15.82	56.10±15.63	0.149	0.882
BMI (kg/m <sup>2</sup> )	22.33±3.78	22.91±4.56	-0.542	0.590
Body surface area (m <sup>2</sup> )	1.76±0.21	1.79±0.18	0.051	0.963
Education level			-1.464	0.239
Primary school and below	15	17		
Junior high school	9	10		
High school	13	12		
University and above	6	9		
Marital status			-1.038	0.503
Unmarried	6	11		
Married	37	37		
Tumor Location			-1.826	0.142
Upper limb	6	8		
Lower limb	11	13		
Spine	9	8		
Pelvic	8	9		
Other	9	10		

**Table 2.** The postoperative recovery in both groups (d,  $\bar{x} \pm s$ )

	Control group	Experimental group	t/X <sup>2</sup>	P
Exhaust time (h)	26.75±4.18	15.39±2.42	13.657	0.000
Defecation time (h)	28.66±4.63	17.94±3.19	11.106	0.000
Time out of bed (h)	25.32±2.43	16.74±3.61	11.501	0.000
Length of hospital stay (d)	6.46±0.15	4.57±0.14	20.654	0.000



**Figure 1.** Comparison of the RECIST in the two groups of patients. There was no significant difference in the overall treatment effect on the solid tumors in the two groups after the intervention ( $P > 0.05$ ).

## Statistical analysis

The data analysis was performed using SPSS 22.0 software. The count data were presented as n (%). The measurement data were presented as ( $\bar{x} \pm s$ ), with independent t-tests between groups and paired t-tests within the same group.  $P < 0.05$  was considered statistically significant.

## Results

### Comparison of the differences in the clinical parameters between the two groups

No significant differences were found in terms of the baseline data such as sex, age, weight, BIM, or body surface area between the two groups, which were comparable ( $P > 0.05$ ) (Table 1).

### Comparative analysis of the postoperative recoveries of the two groups after intervention

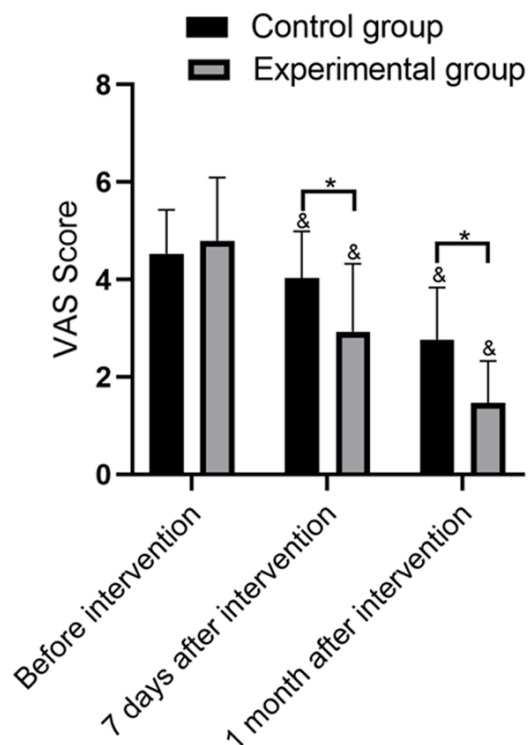
The postoperative exhaust times, the defecation times, the out-of-bed activity times, and the hospitalization length times in the experimental

group were shorter than the corresponding times in the control group, proving that the use of Orem nursing can promote recovery and shorten the lengths of the hospitalizations in patients with bone cancer (Table 2).

### Comparative analysis of the two groups' treatment outcomes

According to the MRI results and by using the RECIST criteria, the tumor foci of the two groups of patients were analyzed, and the overall effective rate of the patients was 60.4% (29/48) in the experimental group and 60.4% (29/48) in the control group ( $P > 0.05$ ) (Figure 1), suggesting that Orem care for bone cancer

## The effect of Orem's nursing theory on bone cancer patients



**Figure 2.** Changes in the VAS scores before and after the intervention in both groups. There was no significant difference in the VAS scores between the two groups before the intervention ( $P > 0.05$ ). At 7 days and 1 month after the intervention, the VAS scores in the experimental group were significantly lower than the VAS scores in the control group at each time point (& $P < 0.05$  before vs. after intervention, \* $P < 0.05$  between the two groups).

patients after surgery cannot affect the treatment efficacy on the tumor lesions.

### *Analysis of the changes in the pain levels before and after the interventions*

The two groups showed no significant differences in their VAS scores before intervention ( $P > 0.05$ ). After intervention, the VAS scores of the two groups were significantly lower, and at 7 days and 1 month after the intervention, the scores of the experimental group patients were lower than the scores of the control group patients ( $P < 0.05$ ) (Figure 2), demonstrating that the Orem care for bone cancer patients after surgery can reduce their pain levels.

### *An analysis of the adverse emotional changes in the two groups before and after intervention*

There were no significant differences in the SAS and SDS scores in the two groups before

the intervention ( $P > 0.05$ ). After the intervention, the two groups' SAS and SDS scores were significantly reduced, and at 7 days and 1 month after the intervention, the scores of the patients in the experimental group were lower than the corresponding scores in the control group ( $P < 0.05$ ) (Figure 3), demonstrating that Orem care for patients with bone cancer can better improve patients' adverse emotions.

### *An analysis of the changes in the quality of life before and after intervention*

There were no significant differences in the quality of life scores between the two groups before the intervention ( $P > 0.05$ ). After intervention, the quality of life scores increased compared with their pre-intervention levels, and the scores in the experimental group were significantly higher than the scores in the control group after the intervention ( $P < 0.05$ ) (Figure 4), showing that Orem care can improve the quality of life of bone cancer patients.

### *An analysis of the changes in the two groups' self-care abilities before and after the intervention*

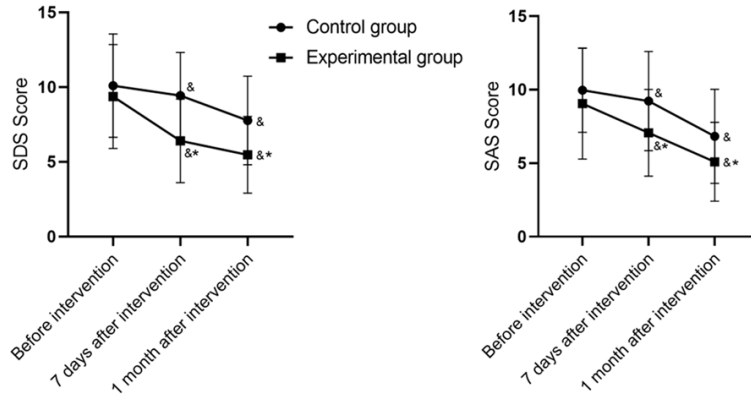
There were no significant differences in the ECSA scores between the two groups before the intervention ( $P > 0.05$ ). After the intervention, the two groups' scores increased compared to their pre-intervention levels, and the experimental group's scores were significantly higher than the control group's after the intervention ( $P < 0.05$ ) (Figure 5), indicating that Orem care can improve the self-care abilities of patients with bone cancer after surgery.

## Discussion

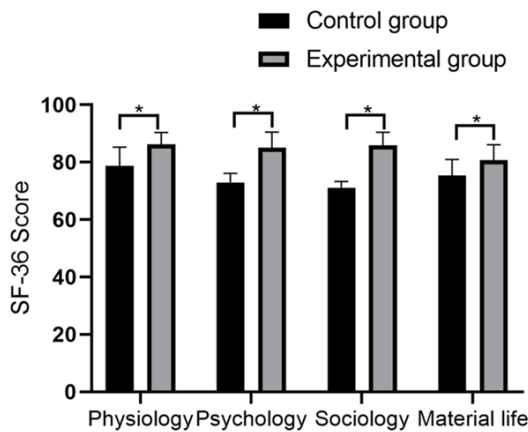
Bone cancer can cause serious damage to patients' physical health, and due to the long treatment cycle and low cure rate, patients with bone cancer will suffer from bone pain, pathological fractures, bone deformities, and other complications for a long time [14, 15]. Bone cancer patients are under tremendous pressure both physiologically and psychologically and are prone to negative emotions such as anxiety and fear, which in turn lead to low compliance and affect the therapeutic effect [16]. Studies have shown that effective nursing for cancer patients can significantly reduce their pain levels, relieve their psychological pressure, and have a positive impact on their



## The effect of Orem's nursing theory on bone cancer patients



**Figure 3.** Changes in the SDS and SAS scores before and after the intervention. There were no significant differences in SDS and SAS scores between the two groups before the intervention ( $P > 0.05$ ). At 7 days and 1 month after the intervention, the SDS and SAS scores in the experimental group were significantly lower than they were in the control group at each time point (& $P < 0.05$  before vs. after intervention, \* $P < 0.05$  between the two groups).



**Figure 4.** Analysis of the changes in the SF-36 scores after the intervention in both groups. The scores in the experimental group were significantly higher than the scores in the control group after the intervention (\*represents  $P < 0.05$  between the two groups after intervention).

prognoses and quality of life [17, 18]. However, routine care only provides patients with medication and dietary guidance, and it lacks guidance on improving patients' self-care abilities, which leads to patients' slow postoperative recoveries, increased pain levels, and reduced nursing efficiency due to a poor knowledge of the disease and a lack of self-care in the perioperative period.

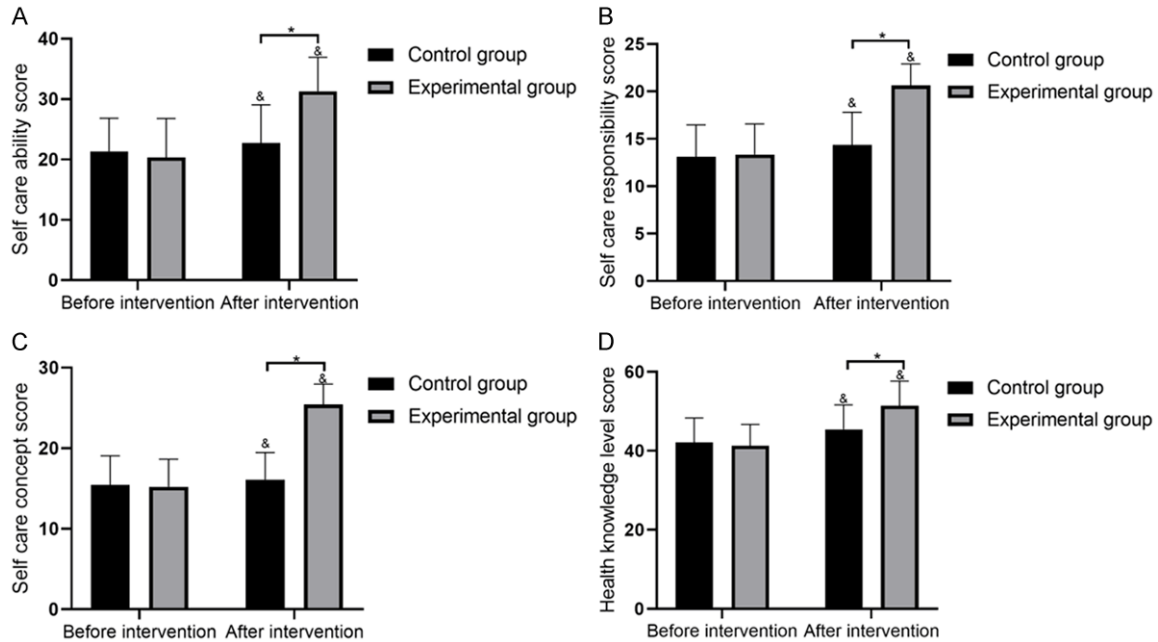
The Orem self-care model was proposed in 1959 to encourage patients to be as independent as possible. The Orem care model pro-

vides compensatory care for patients with different levels of self-care deficits, encourages patients to actively participate in the self-care process, and improves their quality of life by improving their self-care skills [19].

This study used Orem-based nursing intervention for bone cancer patients in the perioperative period in addition to routine nursing care, and the results showed that the times to postoperative recovery and the hospital stays of the experimental group were shorter than they were in the control group. The overall effective

treatment rate was about 60%, with no significant differences in the two groups. Compared with the pre-intervention period, the VAS, SAS, and SDS scores of the patients were decreased in both groups, and the quality of life and self-care ability scores were increased significantly compared with the pre-intervention period scores. After the intervention, the experimental group exhibited significantly lower VAS, SAS, and SDS scores and significantly higher quality of life and self-care ability scores than the control group. Hasanpour-Dehkordi et al. showed that the concept of self-care was determined by the four attributes of education, interaction, self-control, and self-dependence, and the Orem self-care model can improve the self-care awareness of chronic diseases, especially among cancer patients [20, 21]. The study of Khatiban et al. indicated that both the Orem self-care model and routine nursing can improve patients' self-care knowledge, attitude and behavior, but the improvement in the Orem self-care intervention group was greater than it was in the routine nursing group [22]. Through the establishment of a professional nursing team and the formulation of nursing plans, the patients were provided with targeted nursing care according to their state of consciousness and ability to take care of themselves, and in the postoperative phase of wholly compensatory nursing, the patients were provided with comprehensive nursing care to shorten their recovery times. In partial compensatory nursing, their own self-care to the best of their abil-

## The effect of Orem's nursing theory on bone cancer patients



**Figure 5.** Changes in the self-care ability scores in the two groups before and after the intervention. There was no significant difference between the self-care ability scores between the two groups before the intervention ( $P > 0.05$ ). After the intervention, the scores in the experimental group were higher than the scores in the control group (& $P < 0.05$  before vs. after the intervention, \* $P < 0.05$  between the two groups).

ity was encouraged to improve the effectiveness of the nursing. According to their pain levels, medication and nursing measures were adjusted in a timely manner. In supportive educational nursing, health education and psychological intervention were conducted to improve the patients' adverse emotions, eliminate the patients' fears about the disease and inspire their motivation by explaining the disease and the treatment plan [23, 24]. Nursing knowledge was introduced during the supportive phase to improve their self-care abilities after discharge. Family members were advised to give more care and encouragement to the patients to improve their postoperative quality of life [25, 26].

In summary, the Orem-based nursing model can significantly reduce the postoperative recovery times, shorten their hospitalization times, relieve patients' pain symptoms and adverse emotions such as anxiety and depression, and improve their self-care abilities and quality of life, so it has clinical promotion significance. However, this study included a small sample size and an insufficient follow-up time for the patients, and the postoperative recurrence and progression of the disease were not analyzed, so it will be improved in the future.

### Disclosure of conflict of interest

None.

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## The effect of Orem's nursing theory on bone cancer patients

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