The Effect of Nursing Intervention Guided by Orem's Self-care Theory on Health Cognition and Daily Activity Ability of Patients Undergoing Brain Tumor Surgery

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Introduction. To explore the effects of nursing interventions under the guidance of Orem's self-care theory on the health cognition level and daily activity ability of patients undergoing brain tumor surgery.

Methods. A total of 89 patients undergoing craniocerebral tumor surgery between March 2023 and February 2024 were randomly allocated into two groups using the random number table method. The control group (44 patients) underwent cranial tumor surgery, and the study group (45 patients) underwent cranial tumor surgery, and the corresponding nursing measures were taken under the guidance of Orem's self-care theory. A comparative analysis was conducted on the alterations in health perception and daily activity capabilities among the two groups following the nursing intervention.

Results. Prior to the nursing intervention, the two groups exhibited no statistically significant differences in terms of daily living ability score, health cognition score, Pittsburgh Sleep Quality Index (PSQI), Self-rating Anxiety Scale (SAS), and Self-rating Depression Scale (SDS) scores ($P>0.05$). After nursing, the scores of daily living ability and PSQI of the two groups were improved, and the scores of daily living ability in the study group were higher than those of the control group, and the PSQI score was lower than that of the control group ($P<0.05$); After nursing, the health cognition scores of the patients in the two groups increased, and the scores of drug cognition, disease cognition level and healthy lifestyle in the study group were higher than those in the control group ($P<0.05$); In the study group, the self-rating scale of anxiety (SAS) and self-rating scale of depression (SDS) exhibited significantly lower scores compared to the control group ($P<0.05$ for all comparisons).

Conclusion. During the nursing care of patients undergoing brain tumor surgery, the implementation of nursing interventions that are guided by Orem's self-care theory has been

found to effectively enhance the patients' daily living skills and notably raise their awareness towards their own health status. Simultaneously, this form of care can effectively alleviate the patient's anxiety and depression, and enhance the quality of their sleep. These beneficial alterations facilitate the patient's recuperation and enhance their overall quality of life.

Keywords. Orem Self-Care Theory; Patients undergoing cranial tumor surgery; Health cognition

INTRODUCTION

Cranial tumors refer to neoplasms arising from the nervous system within the cranial cavity, primarily affecting the brain and central nervous system, with high mortality and disability rates, and have become an important disease affecting life and health [1]. Intracranial tumors can occur at any age, and are more common in 20~50 years old. Depending on the site of origin, cranial tumors can be divided into primary intracranial tumors and secondary intracranial tumors. Among them, primary intracranial tumors refer to tumors that originate from intracranial tissues, while secondary intracranial tumors are tumors that metastasize from other distant parts of the body or extend from adjacent sites into the skull. According to the differences in biological behavior, cranial tumors can be divided into benign intracranial tumors and malignant intracranial tumors. Benign intracranial tumors grow slowly and have little invasion of surrounding tissues, while malignant intracranial tumors grow rapidly, are aggressive and metastasis, and posing a grave danger to the safety and well-being of patients. In recent years, the incidence of cranial tumors has been increasing year by year. According to the 2015 cancer statistics, cranial tumors are recognized as a common malignancy, accounting for about 2.36% of all malignant tumor cases[2]. Simultaneously, cranial tumors resulted in 2.16% of all malignant tumor fatalities, ranking it as the ninth primary cause of mortality from malignant tumors. According to the world's largest brain tumor statistics conducted by The Lancet in 2016, the incidence and mortality of central nervous system cancers are among the highest in the world [3]. In 2016, there were 330,000 cases of central nervous system cancer and 227,000 deaths worldwide. It is worth noting that East Asia became the region with

the highest incidence of central nervous system cancer in both men and women in 2016, with China ranking first in both morbidity and mortality. According to a 2019 survey conducted by the International Agency of Research on Cancer (IARC) of the World Health Organization, the annual incidence of primary brain and central nervous system tumors in the United States between 2004 and 2008 was 19.89 cases per 100,000 individuals. Specifically, the incidence rate among the age group of 0 to 19 years was 5.05 cases per 100,000, while it was 25.86 cases per 100,000 among individuals aged 20 years and older[4]. In addition, the annual incidence of malignant neoplasms is 7.32 per 100,000 population, while the annual incidence of non-malignant neoplasms is 12.56 per 100,000 population. Brain and central nervous system tumors accounted for 1.4% of all tumors in the body, and 2.4% of deaths caused by systemic malignant tumors. This data reveals the grim situation of cancer of the central nervous system, which requires great attention and attention from all over the world. The early symptoms of head tumors are confusing and may manifest as unexplained headaches, frequent nausea or vomiting, decreased vision, visual field defects, tinnitus, hearing loss, limb weakness or convulsions, etc., which may be misdiagnosed as other conditions, thus delaying treatment. Owing to their distinctive anatomical positioning and biological traits, it is difficult for most drugs to cross the blood-brain barrier to effectively act on tumor cells. Therefore, surgery has become a commonly used treatment method, but due to the particularity of the surgical site, the surgical operation of cranial tumors is relatively difficult, and various complications are prone to occur after surgery [5]. Yang Li studied the probability of secondary intracranial infection after surgery in 400 patients with intracranial tumors, and found that 46 of the 400 patients with intracranial tumors developed intracranial infection after surgery, with an infection incidence rate of 11.50% [6]. A study conducted by Zeng Yongqin involved the enrollment of 60 patients who had undergone surgery for intracranial tumors. The aim of the study was to investigate the likelihood and underlying reasons for coagulation dysfunction following surgery. The findings revealed that 24 out of the 60 patients exhibited coagulation dysfunction, while 36 patients exhibited normal coagulation function. The overall incidence of coagulation

dysfunction was determined to be 40.00%. Furthermore, the study identified postoperative hypothermia, postoperative hypocalcemia, and excessive red blood cell transfusion as independent risk factors for the development of coagulation dysfunction[7]. The incidence of cognitive impairment in patients with brain tumors ranges from 19%~83%, and its main symptoms include memory loss, language dysfunction, impaired visuospatial ability, disorientation, and inattention [8]. In addition to the above common complications, there may be other complications such as cerebral edema, epilepsy, etc., after brain tumor surgery. The occurrence of these complications not only affects the patient's recovery process, but also may pose a threat to the patient's life. Several studies have shown that clinical nursing interventions have a positive impact on patients who have undergone surgery for brain tumors [9-11]. Hence, it is imperative to identify suitable clinical nursing interventions aimed at enhancing patients' daily living skills and cognitive abilities, thereby elevating the overall quality of life for patients.

The nursing intervention approach guided by Orem's Self-Care Theory, as put forth by the renowned American nursing theorist Oremu, represents a method rooted in self-care principles. Its objective is to systematically integrate self-care into nursing practice, enhancing the personal, health, and functional aspects of care delivery, and sociocultural characteristics of self-care, mainly to enable patients and their families to take care of themselves, and to clarify the role of nurses in situations where self-care or care for others is not possible [12]. Human health is paramount, so it is important to ensure that all communities have access to adequate health care. However, the high cost of healthcare services has prompted people to start focusing on the concept of self-care. Over time, researchers have explored the connotation of self-care from multiple perspectives, arguing that self-care embodies traits such as independence, self-efficacy, authority, self-direction, and personal responsibility [13]. Nursing interventions guided by Orem's self-care theory mainly include three core structures: self-care structure, self-care deficit structure, and care system structure [14].Through the integrated use of these three structures, it is possible to provide comprehensive and systematic nursing interventions for clinical patients. Jeffrey Yuk

Chiu Yip's study of Orem's self-care theory concluded that Orem's self-care deficit nursing theory is a suitable theoretical framework for nursing practice in primary care settings, with advantages and limitations in primary care settings [15]. Orem's theoretical work has been successfully applied to nursing practice and management around the world, validated and refined through nursing research, and used as a framework for nursing curricula at all levels of nursing education. Under the guidance of Orem's self-care theory, He Xiaofang conducted a study to investigate the impact of targeted nursing on blood pressure control among elderly hypertensive patients. The findings indicate that the application of Orem's self-care theory in targeted nursing exhibits a notable beneficial effect on blood pressure management among this patient population. Specifically, it can effectively lower both diastolic and systolic blood pressure, enhance patients' self-care capabilities, and elevate their overall quality of life. Furthermore, this nursing approach also helps maintain blood lipid levels within a healthy range, thereby contributing positively to the prevention of cardiovascular diseases[16]. Research has established that Orem's theory of self-care exerts a noteworthy positive influence on school-aged children diagnosed with asthma. By applying this theory, children's self-care abilities can be meaningfully enhanced, their condition can be effectively managed, and an overall enhancement in their quality of life can be achieved. This finding has important implications for clinical management and rehabilitation [17]. Han Ying conducted a study on the impact of the nursing model rooted in Orem's self-care theory on the post-surgical quality of life and prognosis of pancreatic cancer patients, and the results showed that the ESCA score, SQLI score, and RPFS score of patients were significantly improved after applying the Orem self-care theory, indicating that the nursing model of the Orem self-care theory played a pivotal role in enhancing the quality of life and prognosis of patients, and effectively promoted the improvement of patients' self-care ability[18]. These studies show that nursing interventions based on Orem's self-care theory have significant significance in promoting patients' recovery. However, for patients undergoing cranial tumor surgery, there is still insufficient research on the nursing effect of Orem's self-care theory nursing intervention.

Based on this, Drawing upon Orem's self-care theory, this article meticulously examines the impact of nursing interventions on the health cognition and daily activity capabilities of cranial tumor surgery patients. This research aims to establish a firmer theoretical and practical foundation for treating such patients, ultimately aiming to enhance their quality of life and mitigate the risks associated with postoperative complications.

1. INFORMATION AND METHODS

1.1 General Information

A total of 89 patients undergoing craniocerebral tumor surgery between March 2023 and February 2024 were randomly allocated into two groups using the random number table method. In the control group (44 cases), 24 males and 20 females underwent craniocerebral tumor surgery, aged 20~70 years, with an average age of (55.23±10.11) years, a disease duration of 1~14 months, and an average duration of (6.37±1.42) months. The 45 patients in the study group underwent craniocerebral tumor surgery and took corresponding nursing measures under the guidance of Orem's self-care theory, including 30 males and 15 females, aged 23~76 years, with an average age of (57.42±10.53) years, and a disease duration of 1~15 months, with an average duration of (6.91±1.03) months. There were no significant differences in age, gender and course of disease among the patients in the group (P<0.05). After strict review and evaluation by the ethics committee of our hospital, this study has been officially approved.

1.2 Inclusion and exclusion criteria

Inclusion Criteria: (1) After strict diagnosis by professional physicians, the patient's symptoms are consistent with the relevant diagnostic criteria for brain tumors. And through clinical CT scan and pathological examination, patients diagnosed with cranial tumors; (2) After clinical observation and diagnosis, the patient showed a certain degree of optic disc edema, accompanied by symptoms such as headache and vomiting; (3) Patients who underwent craniocerebral tumor surgery for the first time; (4) The survival period of the patient > 12 months; (5) Patients and their families are

aware of this experiment and sign informed consent.

Exclusion Criteria: (1) Patients with serious abnormalities of heart, liver and kidney function；(2) Patients with severe intracranial infection and critical condition; (3) Patients with autoimmune diseases；(4) Those who are judged by more than 2 senior doctors to be unable to participate in this experiment; (5) Patients with psychiatric disorders that make them unable to communicate verbally normally.

1.3 Research Methodology

The control group of patients undergoing cranial tumor surgery received routine nursing interventions, including close monitoring of vital signs, daily and specialized nursing services, and paid attention to the rehabilitation and health knowledge education of patients and their families, encouraged patients to take more bed rest, and provided professional guidance on psychological counseling and limb function exercises to promote the comprehensive recovery of patients.

The patients in the experimental group underwent nursing intervention guided by Orem's self-care theory, in addition to the standard nursing provided to the control group, and three nursing systems proposed by Orem's theory, namely the complete compensation system, the partial compensation system and the support education system, were used to complete the nursing activities. (1) Full compensation. After surgery, due to the influence of anesthetic drugs, the patient will temporarily lose the ability to take care of himself and be unconscious. In this case, all nursing work must be performed by a nursing professional. Nursing staff need to pay special attention to the patient's oxygen needs and ensure that the patient's airway is unobstructed to protect his or her life. When the patient's vital signs remain stable, pay close attention to the patient's diet, life and other aspects, and closely monitor the patient's physiological indicators, so as to detect and deal with possible complications in time and ensure the safety and comfort of the patient. (2) Partial compensation. After the patient is awake, he will have a certain degree of self-care ability, and the medical staff should assist the patient to complete the care, and work with the patient to develop a nursing plan to improve the patient's initiative and speed up physical recovery. Inform patients about the importance of rehabilitation and assist patients

with functional exercises. Rehabilitation training such as turn-over training, hand function training, daily living ability training, and passive and active training are carried out. It also guides patients to master the correct rehabilitation training methods and skills, and enhances their compliance with rehabilitation training, so as to promote their recovery. (3) support the education system. Psychological support education. Patients are likely to have sequelae such as hemiplegia after surgery, their living ability is greatly reduced compared with before, and they have a heavy family and psychological burden, so it is necessary to educate patients psychologically, listen to their true thoughts, answer patients' questions, channel patients' negative emotions, and reduce their psychological pressure. It also introduces clinical success cases, guides patients to carry out autosuggestion, and enhances patients' courage and confidence in treatment. Carry out health education for patients and their families, and deepen patients' understanding of the causes of diseases and treatment methods. At the same time, they will explain in detail the various situations that may occur after surgery and teach coping strategies, aiming to improve the patient's self-care ability and alleviate the worries of the family, so as to promote the patient's recovery process and improve the overall treatment effect.

1.4 Observation indicators and judgment criteria

(1) The observations were conducted on the scores of patients' daily living abilities, both prior to and following the nursing intervention. The Activities of Daily Living (ADL) rating scale was used to assess the total score of 100, with a total score ≤of 40 for severe dependence and all need for care, 41-60 for moderate dependence, mostly requiring care, 61-99 for mild dependence, and a small number of need for care, and a total score of 100 for no dependence and no need for care. The individual's ability to perform daily tasks is directly proportional to their score, indicating a stronger capacity with higher scores.

（2）The health cognitive level of patients before and after nursing intervention was observed. The patient's health cognition includes the patient's disease cognition, drug cognition, and healthy lifestyle. Based on the health perception questionnaire of Li Zhiying [19]. The score is as follows: 1 point if the patient "can not do it mostly/do not

understand", 2 points if "occasionally do/understand somewhat", 3 points if "basically do/understand", and 4 points if "completely do/understand". A patient's disease awareness and healthy lifestyle performance are directly proportional to their total score. The higher the score, the more favorable the outcomes.

(3) The Sleep Quality Index (PSQI) was utilized to assess the sleep quality of patients across four grades, with a focus on observing the PSQI scores of patients prior to and following nursing intervention. The sleep quality of patients with scores between 0~5 is considered to be very good, the sleep quality of patients with scores between 6~10 is considered to be good, the sleep quality of patients with scores between 11~15 is average, and the sleep quality of patients with scores between 16~21 is poor.

(4) The anxiety and depression scores of patients before and after nursing intervention were observed. In this process, the Anxiety Self-Rating Scale (SAS) and the Depression Self-Rating Scale (SDS) were used as assessment tools. The SDS consists of 20 items, divided into 4 levels based on the frequency of symptoms. They were no depression, mild depression, severe depression and severe depression, and the corresponding scores from front to back were below 53 points, 53~62 points, 63~72 points, and more than 73 points. SAS has 4 scores, a total of 20 items, the scores of each item are added together to obtain a total score, according to the score is divided into normal, mild anxiety, moderate anxiety, severe anxiety, the corresponding score is less than 50 points, 50~59 points, 60~69 points, 69 points or more.

1.5 Statistical analysis

SPSS 26.0 software was used for rigorous statistical analysis of all data, and the measurement data were expressed as ($\bar{x} \pm s$), where x represents the mean value and s represents the standard deviation. The t-test statistical method was utilized for comparing the differences between groups, while the count data was presented in the format of [n (%)]. The comparison between groups was performed by χ^2. $P<0.05$ was statistically significant.

2. RESULTS

2.1 A comparison was made between the two groups in terms of their scores for daily living ability and sleep quality, both prior to and following the nursing intervention.

Prior to the intervention, no statistically significant difference was observed in the ADL and PSQI scores between the two groups (P>0.05) ; Following the intervention, the mean ADL score and PSQI of the study group were (77.56±5.26) and (10.35±3.36), respectively. These values were significantly higher compared to the control group, indicating a statistically significant difference (P<0.05).

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Table 1 Comparison of ADL score and PSQI score in the group[score, (x±s)]

Constituencies	Number of examples	ADL(score)		PSQI(score)	
		Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Control group	44	52.06±3.33	65.34±5.04	16.23±2.14	12.42±3.08
Study Groups	45	51.42±3.41	77.56±5.26	16.57±2.02	10.35±3.36
P-value		0.425	0.006	0.132	0.027
t-value		0.055	7.704	1.156	10.321

2.2 To conduct a comparative analysis of the health cognitive levels among two distinct groups, both prior to and following the implementation of nursing interventions.

Prior to the intervention, there were no statistically significant differences in drug cognition, disease cognition, or healthy lifestyle between the two groups (P>0.05). Following the intervention, both groups demonstrated an improvement in their cognition of drug abuse, disease cognition, and healthy living habits. However, the extent of this improvement was significantly greater in the study group compared to the control group (P<0.05).

Table 2 Comparison of drug cognition, disease cognition and healthy lifestyle among patients in the group[scores,(x±s)]

Constituencies	Number of examples	Drug cognition		Disease cognition		Healthy lifestyle	
		Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Control group	44	7.24±2.05	8.054±1.27	6.05±1.89	7.01±1.23	9.24±1.47	10.24±1.01
Study Groups	45	7.36±0.84	10.24±0.88	6.25±1.54	9.47±1.35	9.14±1.27	12.82±1.58
P-value		0.565	0.031	0.824	0.001	0.264	0.003
t-value		0.339	10.241	0.216	8.426	1.132	9.254

2.3 Proportion of anxiety and depression before and after care in the two groups

Before the nursing intervention, there was no statistically significant difference in the scores of anxiety and depression between the two groups ($P>0.05$); The scores for SAS and SDS in the study group were notably elevated compared to those of the control group, with the discrepancy being statistically significant at the level of $P<0.05$.

Table 3 Comparison of SAS and SDS scores of patients in the group [scores, (x±s)]

Constituencies	Number of examples	SAS（scores）		SDS（scores）	
		Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Control group	44	55.26±3.42	34.38±3.06	54.72±3.24	35.01±3.24
Study Groups	45	55.47±3.09	22.19±3.56	54.28±3.08	23.26±3.35
P-value		0.276	0.006	0.658	0.004
t-value		1.227	12.334	1.461	13.571

3. DISCUSSION

Scientific studies have shown that the most common functional impairment in patients with brain tumors is movement disorder (96. 2%) and balance disorders ataxia (96. 2%), 57.69% of patients were concurrent with lower extremity deep vein thrombosis at the time of admission, 80.76% were on antiepileptic drugs, and 61.53% had severe movement disorders, and patients may have neurological deficits and functional impairments after surgery [20]. Motor dysfunction and balance disorder ataxia seriously affect the patient's ability to take care of himself or herself in daily life, resulting in a significant decrease in the level of ability. In addition, brain tumors are prone to cause a variety of complications after surgery, which poses a serious challenge to improving the treatment effect and patients' self-care ability, which is not conducive to the rehabilitation and quality of life of patients [21]. At the same time, the disease will have a serious impact on the patient's sleep nervous system and seriously affect the patient's sleep quality level. Hence, enhancing patients' daily self-care capabilities and optimizing their sleep quality are crucial. The Orem self-care theory is committed to providing precise and personalized care plans for patients with brain tumors after surgery. The theory emphasizes the comprehensive assessment of the patient's physical and mental condition, to ensure the comprehensiveness and pertinence of the nursing work, through the implementation of humanized nursing measures, to create a high-quality nursing environment, aiming to ensure the physical and mental comfort and pleasure of the patient, and finally through all-round, multi-level comprehensive care, to enhance the patient's capabilities in daily living and to elevate their sleep quality, to achieve the best rehabilitation effect. The results of this study showed that after the nursing intervention guided by Orem self-care, the ADL score and PSQI score of patients after brain tumor surgery were (77.56±5.26) and (12.42±3.08) points, and the score of daily living ability and PSQI score belonged to the good level of sleep quality, which was significantly higher than that of patients with cranial tumor surgery under conventional nursing mode, and the difference was statistically significant (P<0.05). This shows that under the guidance of Orem's self-care theory, medical staff have

taken all-round and targeted nursing measures, and effectively intervened for patients' sleep disorders and functional disorders, so as to improve patients' self-care ability, in order to enhance patients' abilities in daily living and optimize their sleep quality.

The results of this study showed that the drug cognition, disease cognition and healthy lifestyle of the two groups were improved to varying degrees after nursing, and the drug cognition of the study group after intervention was (10.24±0.88), disease cognition was (9.47±1.35) points, and healthy lifestyle was (12.82±1.58) points, which were higher than those of the control group (P<0.05). This shows that the nursing intervention guided by Orem's self-care theory not only focuses on the physiological needs of patients, but also focuses on the psychological, social and spiritual needs of patients. This integrated approach to care allows patients to be more proactive in their care plans when dealing with illness and surgery, giving them greater control over their health. At the same time, through the nursing intervention guided by Orem's self-care theory, comprehensive and detailed health education was provided for patients, and the patients' understanding of diseases and surgery was improved. In the process of receiving treatment and nursing, patients can not only acquire professional medical knowledge, but also learn self-care skills and methods, which enables patients to continue to maintain good self-care habits after being discharged from the hospital, and reduce the recurrence of diseases and complications. Furthermore, the patients can also experience the compassion and assistance provided by the medical personnel throughout the nursing intervention process. This enhances the trust and cooperation between the patients and the medical team, thereby facilitating the recuperation of the patients.

Patients with cranial tumors after surgery often bear a heavy psychological burden due to the disease. These patients may be concerned about their health, the effectiveness of treatment, and their future quality of life. They may feel fear, anxiety, depression, or helplessness, which not only affect their mental health, but can also affect their physical recovery and treatment outcomes. Zhang Hongbo et al. investigated the depression before and after brain tumor surgery and found that the number and prevalence of preoperative depression in 140 patients with brain tumors

were 50 cases (35.7%), with a score of 15.36±6.52, and the number and prevalence of postoperative depression cases were 9 cases (6.4%), Patients with brain tumors have varying degrees of perioperative depression, which may be related to the pathological nature and location of brain tumors [22]. Nursing interventions implemented under the guidance of Orem's self-care theory pay special attention to the psychological needs of patients and aim to provide them with the necessary psychological support to alleviate their anxiety and depression symptoms. The results of this study showed that the SAS and SDS scores of patients with craniocerebral tumors after surgery were significantly lower than those before nursing intervention under the guidance of Orem's self-care theory, and the reduction in the study group was higher than that in the control group (P<0.05). The findings revealed that the nursing intervention, guided by Orem's self-care theory, prioritized the psychological well-being of the patients. This approach effectively alleviated their anxiety and depression by providing psychological counseling, ultimately facilitating their recuperation.This intervention method reflects the attention and attention to the psychological needs of patients, and helps to improve the rehabilitation effect of patients.

In summation, the nursing intervention, steered by Orem's theory of self-care, possesses considerable worth in the care of patients who undergo cranial tumor surgery. This approach effectively enhances the cognitive level of health and daily activity abilities among these patients. Furthermore, it also improves their sleep quality and mitigates negative emotions.

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