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Original Article

The effects of family follow-up nursing on elderly cognitive impairment patients' Barthel index scores and mental statuses

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Abstract: Objective: To explore the effects of family follow-up nursing on the Barthel Index scores and emotional statuses of elderly cognitive impairment patients. Methods: A total of 90 dementia patients with cognitive impairments were randomized into group A, which underwent routine family nursing, or group B, which underwent family follow-up nursing for 6 months. The patients' cognitive function was assessed using the Mini-Mental State Examination (MMSE) and the Montreal Cognitive Assessment (MoCA). Their disability levels were determined using the Barthel Index and the WHO rating scale (the WHODAS II scale), and the caregiver's burden levels were evaluated using the Zarit Caregiver Burden Interview (ZBI). The negative emotions were assessed using the Negative Mood Regulation Expectancies Scale (the NMRE-C). The two groups' quality of life and living abilities were assessed using the World Health Organization Quality of Life-BREF Scale (the WHOQOL BREF scale) and the Activities of Daily Living Scale (the ADL scale). Results: After the intervention, the MMSE and MoCA scores increased in group B compared with the scores in group A (P<0.01). The Barthel Index scores increased, but the WHODAS II scores decreased in group B compared with the scores in group A (all P<0.001). The ZBI score was (34.30±4.19) in group A and (31.64±3.69) in group B (t=3.196, P=0.002). The NMRE-C score was (122.38±10.20) in group A and (144.39±11.30) in group B (t=9.699, P<0.001), and the quality of life and living abilities of the patients in group B improved significantly compared with the quality of life and living abilities of the patients in group A (all P<0.01). Conclusion: Family follow-up nursing can alleviate cognitive impairment in elderly dementia patients reduce their negative emotions, increase their independent living abilities, and decrease the caregiver's burden. It should be widely applied in clinical settings.

Keywords: Cognitive impairment in elderly patients, family follow-up nursing, Barthel index, emotional status

Introduction

Cognition refers to the mental process of acquiring knowledge and converting it into mental activities [1]. Cognitive impairment, mainly manifested as dysfunctional cognition and language as well as reduced social function, is a common disease in aged patients [1]. According to epidemiological data, the incidence of cognitive impairment ranges from 10% to 20% in people over 65 years of age and is ranked fourth among diseases that endanger the lives of the elderly [2]. Apart from impaired cognition, patients with cognitive impairment are prone to have negative emotions due to their poor conditions and their inability to live independently that brings heavy burdens on their families [3]. It has been reported that patients with cognitive impairment tend to have negative emotions such as anxiety and depression. So, nurses should not only pay attention to their physical health, but also to their emotional status [4].

Family follow-up nursing is an emerging nursing model applied chiefly in each patient's home. It focuses on providing customized and continuous nursing services for patients [5]. Currently, family follow-up nursing has been applied in some clinical settings, especially for nursing elderly patients with diseases such as cervical carcinoma and pressure sores. It improves patients' independent living abilities and reduces the occurrence of complications [6].

Normally, patients with cognitive impairment receive routine nursing only within hospitals. So, it is likely that they may not receive the same routine nursing after being discharged from the hospital, leading to occurrence of complications or other accidents. Previous studies on family follow-up nursing for patients with cognitive impairment are few. Therefore, we have explored the effects of family follow-up nursing on the Barthel Index scores and on the mental statuses of elderly cognitive impairment patients.

Data and methods

General data

A total of 90 dementia patients with cognitive impairments who were admitted to our hospital from January 2019 to December 2020 were prospectively recruited as the study cohort. The patients were included if they met the diagnosis criteria of USA mental disorders [6], if they were 60 years of age, if they had family support, if they were able to cooperate with the nursing work, if their personal data were complete, and if they were able to participate in the whole study process, and if their clinical data were complete. Patients were excluded if they had vascular dementia, if they had serious physical diseases, if they had complications such as serious depression and mental disorders, if they were taking antipsychotic drugs, or if they had participated in other trials. A total of 90 dementia patients with cognitive impairment were randomized into group A, which underwent routine family nursing, and group B, which underwent family follow-up nursing in addition to the routine nursing for 6 months. There were 45 patients in each group. All the patients provided a written informed consent, and this research was approved by the ethics committee of our hospital.

Methods

The patients in the two groups underwent routine nursing during their hospitalizations, including guidance on drug administration, nutritional support, as well as daily care. They, together with their families, learned about cognitive impairment. The patients in group A learned several nursing measures upon their discharge and were followed up once a week through telephone calls for 1 year. The patients in group B underwent family follow-up nursing and were visited within 3 days after their discharge [5, 6]. Thereafter, home visits were done every 14 days, and telephone calls were made every 7 days. Consultations were open for patients in group B 24 hours a day, and the home visits were done to address difficult nursing problems if necessary. Group activities were organized for the caregivers so they could discuss their difficulties with the nursing and to come up with a plan to solve these difficulties. The activities were held once each month, 2 hours each time, with 30 minutes left for individual consultation, during which, they received professional suggestions from the doctors.

Specific measures for family follow-up nursing: 1. Family rehabilitation plans were customized for each patient by specialists, rehabilitation doctors, etc. 2. We communicated with the caregivers upon their first home visit for improving the patients' living environment, such as redesigning staircases or handrails, to make their homes more suitable to live in. 3. We confirmed the rehabilitation plans with the caregivers and made sure they were implemented accordingly and completely. 4. The caregivers were asked to give psychological counseling to the patients so as to eliminate their fear and anxiety toward the disease and to encourage them to actively face the disease. 5. Tea parties were organized for to allow the recovered patients to share their successful experience and to communicate with the patients so as to increase the nursing quality. 6. Rehabilitation training: limb functions training was arranged, including joint function, postural transfer, standing, and body balance. Joint function training was performed in stages according to the degree of limb function and the patient movement. Patients with grade II limb function were encouraged to move on their own, such as turning over or sitting up on bed by themselves or maybe with some assistance. Balance and walking training were integrated into the daily lives of the patients with grade III limb function, such as using a high-back chair to practice standing, or a basketball to practice their balance. This act was not only helpful for the recovery of patients' psychological conditions, it was also conducive to their rehabilitation. 7. Aphasia and dysphagia training: patients with dysphagia, a disease that imposes great paint upon patients, were trained to open or close their mouths, and to use their masticatory muscles and move their tongues. Also, guidance on healthy dieting was delivered. For the patients with aphasia they were asked to relax their mouths first, then to blow and breath in air repeatedly with different mouth shapes. The coordinating function among their lips, tongue, and cheeks was practiced by the patients with normal developmental organs. 8. Living ability training: Basic activities were conducted for the living ability training for the patients with cognitive impairment. For instance, they were asked to differentiate the right and left sleeves while dressing and were helped putting on their shoes using their available upper extremities. Meanwhile, a customized knife and fork, for which the instructions were given in advance, were given to the patients to help them eat their food, thus exercising their food intaking action. 9. Medical monitoring: the patients' blood pressure, blood lipids, and blood glucose levels were measured regularly. The patients were also asked to maintain a healthy lifestyle, such as reducing their salt intake, abstaining from cigarettes and alcohol, and ensuring proper protein supplementation.

Outcome measures

The cognitive functions of the patients in the two groups

There are six items on the Mini-Mental State Examination (MMSE) scale, including immediate recall of language, time and place, calculating, memory recall, speaking, and imitating, for a total of 30 points possible. These items were rated as normal (27-30 points), mild (21-26 points), moderate (10-20 points) and severe (<9 points).

There are 11 items on the Montreal Cognitive Assessment (MoCA) scale, ranging from space to implementation ability, and the scale was used to assess the different functions. The total possible score was 30 points, and a score greater than 26 indicated good cognitive function.

The disability levels of the patients in the two groups

The Barthel Index scores were used to assess the patients' disability levels. The scale has a total possible score of 100 points across 10 items. The ratings included complete loss of living ability (<20 points), partially loss of living ability (21-40 points), almost independent (41-60 points), and totally independent (>60 points).

The WHO rating scale (WHODAS II scale) was also used to assess the patients' disability levels. The scale covers 6 items, such as body movement, independent living abilities, and social communication abilities. There were 5 points in total, with a higher score indicating a severe disability.

The zarit caregiver burden interview (ZBI) scores of the patients in the two groups

There were 22 items in the ZBI and the highest possible score was 88 points. The caregivers were judged as having no burden (<20 points), a little burden (20-39 points), a moderate amount of burden (40-59 points), and a heavy burden (≥60 points).

Emotional status of the patients in the two groups

The Negative Mood Regulation Expectancies Scale (NMRE-C) was used to assess the patients' emotions. There were 32 items in the scale, which were divided into 6 levels, with a higher score indicating more positive emotions.

The quality of life of the patients in the two groups

World Health Organization Quality of Life-BREF Scale (WHOQOL BREF scale), which is theoretically well-supported, is widely used in academic papers. The scale was used in this study to evaluate the quality of life of the patients before and after the nursing, with a higher score indicating a better quality of life.

The Activities of Daily Living Scale (ADL) was used to evaluate the patients' living abilities. Its total possible score is 100 points, with a higher score indicating better independent living abilities.

Statistical analysis

SPSS 23.0 software was used to analyze the cognition, disabilities, burdens, emotional statuses, and quality of life of the patients in the two groups. Independent sample t tests were used for the between-group comparisons, and paired t tests were used for the within-group comparisons. χ^2 tests were used for other indi-

Table 1. The baseline data of group A and group B (n, $\bar{x}$ ± sd)

Index	Group A (n=45)	Group B (n=45)	χ^2/t	*P* value
Sex			0.708	0.400
Male	32	29		
Female	13	16		
Average age (years)	71.4±8.3	70.9±8.5	0.282	0.778
Average course of illness (months)	6.1±3.1	5.90±3.5	0.287	0.775
BMI (kg/m^2)	24.06±1.04	23.98±1.12	0.650	0.573
Marriage status (n)			0.603	0.740
Married	22	20		
Divorced	15	14		
Widowed	8	11		
Education status (n)			0.756	0.682
Elementary school or illiterate	12	14		
Junior high	23	24		
College degree and above	10	7		
Caregiver relationship (n)			0.185	0.917
Spouse	20	18		
Children	15	16		
Babysitter	10	11		

Note: BMI: body mass index.

Table 2. Comparison of the cognitive function between group A and group B ($\bar{x}$ ± sd)

Scores	Group A (n=45)	Group B (n=45)	t	*P* value
MMSE score (scores)				
Before intervention	20.05±2.30	20.69±2.12	1.373	0.173
After intervention	23.05±3.20	25.23±2.80	3.439	<0.001
t	5.107	8.672		
P	<0.001	<0.001		
MoCA score (scores)				
Before intervention	19.25±3.50	20.17±3.09	1.322	0.190
After intervention	24.08±2.89	26.05±3.05	3.145	0.002
t	7.138	9.085		
P	<0.001	<0.001		

Note: MMSE: Mini-Mental State Examination; MoCA: Montreal Cognitive Assessment.

cators and were expressed as (n/%). P<0.05 was considered a significant difference.

Results

Comparison of the baseline data

There were no significant differences in terms of the genders, ages, courses of the illness, marriage statuses, education statuses, or relationships with the caregivers between group A and group B (all P>0.05). See **Table 1**.

Comparison of the cognitive function

There was no significant difference in the cognitive function scores between group A and group B before the intervention (P>0.05). But after the intervention, the MMSE and MoCA scores were increased in both groups (all P<0.01), with a more significant increase observed in group B than in group A (all P<0.01). See **Table 2**.

Comparison of the disability levels

There was no significant difference in the disability levels of the patients in group A and group B before the intervention (P>0.05). But after the intervention, the Barthel index scores were increased and the WHODAS II scores were reduced in both groups (all P<0.01), with a more significant increase observed in group B than in group A (all P<0.001). See **Table 3**.

Comparison of the ZBI scores

There was no significant difference in the ZBI scores between group A (50.30±3.65) and group B (51.14±2.96) before the intervention (t=1.199, P=0.234). But after the intervention,

Table 3. Comparison of the disability levels of the patients in groups A and B ($\bar{x} \pm sd$)

Scores	Group A (n=45)	Group B (n=45)	t	P
Barthel index score (scores)				
Before intervention	43.05±7.69	42.93±7.50	0.075	0.941
After intervention	54.60±6.10	66.17±4.90	9.920	<0.001
t	7.894	17.400		
P	<0.001	<0.001		
WHODAS II score (scores)				
Before intervention	98.60±10.23	99.07±9.68	0.224	0.823
After intervention	75.28±6.27	68.91±5.89	4.967	<0.001
t	13.040	17.860		
P	<0.001	<0.001		

the Barthel Index scores for the assessment of disability levels were reduced in both groups (group A: 34.30±4.19; group B: 31.64±3.69) (t=3.196, P=0.002). See **Figure 1**.

Comparison of the mental status

There was no significant difference in NMRE-C scores between group A (96.22±6.80) and group B (95.24±6.59) before the intervention (t=0.694, P=0.489). But after the intervention, the Barthel Index scores for the assessment of the disability levels were increased in both groups. The NMRE-C scores were 122.38±10.20 in group A and were 144.39±11.30 in group B (t=9.699, P<0.001). See **Figure 2**.

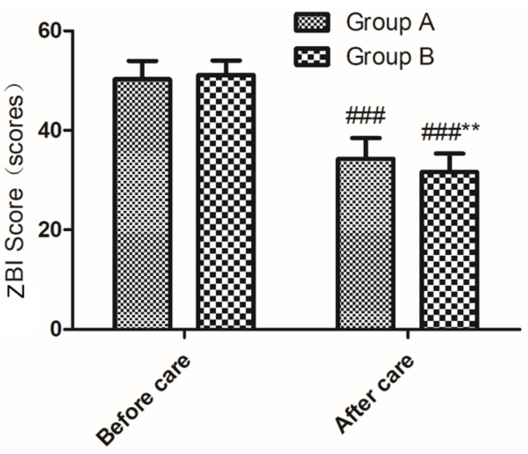

Figure 1. Comparison of the CBI scores of the patients in the two groups. Compared with before the nursing, $^{###}$P<0.001; Compared with group A, **P<0.01. ZBI: Zarit Caregiver Burden Interview.

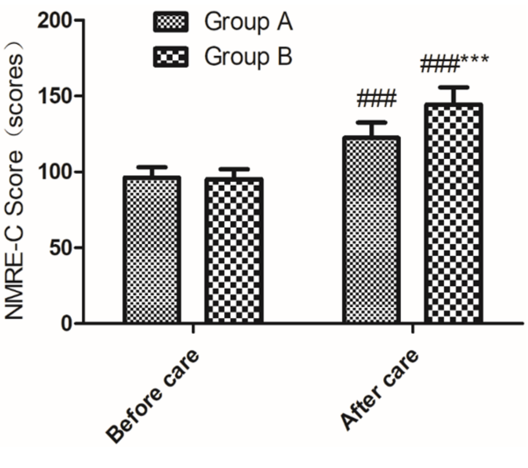

Figure 2. Comparison of the patients' mental status in the two groups. Compared with before care, $^{###}$P<0.001; Compared with group A, ***P<0.001.

Comparison of the quality of life

There was no significant difference in the quality of life scores between group A and group B before the intervention (P>0.05). But after the intervention, the quality of life scores were increased in both groups, with a more significant increase observed in group B than in group A (P<0.01). See **Table 4**.

Comparison of the ADL scores

There were no significant difference in the ADL scores between group A (42.05±4.10) and group B (41.36±4.33) before the intervention (t=0.776, P=0.440). But after the intervention, the ADL scores were increased in both groups. The NMRE-C scores were 56.28±3.36 in group A and 59.28±4.11 in group B (t=3.791, P=0.003). See **Figure 3**.

Discussion

Senile dementia is a common neurodegenerative disease, and it is mainly manifested as a continuous decline of cognitive function with a cryptic and high occurrence rate. The disease is a worldwide public health problem [7]. According to previous studies, with the growth in the aged population, the rate of cognitive impairment due to dementia has been gradu-

Table 4. Comparison of quality of life of the patients in groups A and B ($\bar{x}$ ± sd)

Scores	Group A (n=45)	Group B (n=45)	t	P
Physical function (scores)				
Before intervention	58.12±7.15	57.69±7.33	0.282	0.779
After Intervention	65.17±8.10	72.04±7.99	4.051	<0.001
T	4.377	8.878		
P	<0.001	<0.001		
Mental status (scores)				
Before intervention	60.15±6.80	60.93±6.11	0.572	0.569
After Intervention	66.52±7.06	71.28±6.90	3.235	0.002
t	4.359	7.533		
P	<0.001	<0.001		
Social ability (scores)				
Before intervention	54.28±6.25	55.30±6.00	0.790	0.432
After Intervention	63.08±6.11	68.12±7.18	3.586	0.006
t	6.754	9.191		
P	<0.001	<0.001		
Marriage status (scores)				
Before intervention	58.62±5.71	59.01±5.13	0.341	0.734
After Intervention	66.20±7.33	71.30±6.83	3.415	0.001
t	5.473	9.652		
P	<0.001	<0.001		

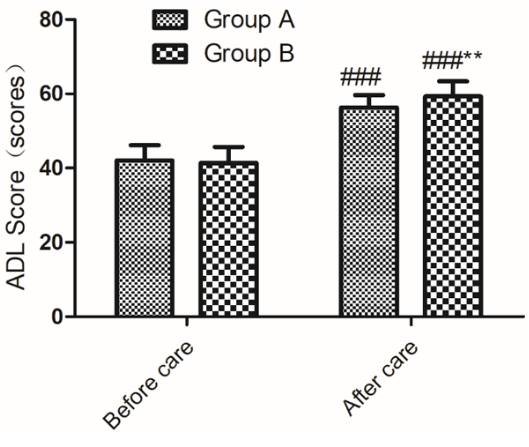

Figure 3. Comparison of the patients' ADL scores in groups A and B. Compared with before the care, $^{\#\#\#}$P<0.001; Compared with group A, **P<0.01. ADL: activities of daily living scale.

ally increasing. It mainly occurs in patients over 60 years old who have significant language and memory dysfunctions. The hospitalization and disability rates of patients with the disease are relatively high, and their prognoses are poor [8].

Patients with the disease have dysfunctional cognition, leading to declined sensations, perception, attention, and intelligence. The MMSE and MoCA scales are trustworthy and effective at evaluating cognitive function, and they have been widely used in clinical studies at home and broad [9]. It is also reported that cognitive impairment due to dementia is caused by brain function disorders resulting from brain tissue damage [10]. However, effective nursing can improve patients' cognitive function and their prognoses. Family follow-up nursing, an effective nursing intervention, can improve language and movement abilities in patients, and the improvement may be associated with an elevated level of heme oxygenase through increased expressions of the N-methyl-D-aspartate receptors in the brain. Cao reported that 1 year of family follow-up nursing for patients with cognitive impairment, including nursing for their diet, living, extremities and so on, can improve patients' cognitive functions and enable some of them to carry out simple daily activities [11]. The result, which was confirmed in this study, was also consistent with some other studies at home [12, 13]. In this study, we found that family follow-up nursing delayed disease development by building a warm environment for patients to live in and a harmonious family atmosphere to increase their sense of belonging and pleasure while they were at home.

Elderly cognitive impairment patients have some disabilities, including not just physical disabilities, but also structural injuries, limited movement function as well as other dysfunctions [14]. The Barthel Index and WHODAS II scores used in this study can reflect patients' movement abilities, provide comprehensive evaluations of their disabilities and show their participation in social activities. We found that family follow-up nursing for elderly cognitive impairment patients reduced the patients' disabilities because this kind of nursing can improve the patients' cognitive function of patients as well as their ability to conduct daily activities through repeated training of limb functions and constant stimulation in the brain [12]. The patients with cognitive impairment who underwent family follow-up nursing also showed lower disability levels through constant learning and training of limb functions to assist in the formation of lateral muscle strength and the connections among the target tissues [15, 16].

ZBI, a scale that chiefly evaluates the feelings of caregivers, reflects the degree of burden of caregivers who take care of the elderly patients. Patients with cognitive impairment are not able to live independently, for they have short memories and uncoordinated limbs, so they are susceptible to accidents. Therefore, caregivers are sure to have financial and psychological pressure while taking care of the patients [17, 18]. But family follow-up nursing, which can facilitate the recovery of patients' upper extremities thorough joint function training and training on simple dressing abilities, had a great significance on the reduction of caregivers' burdens. Shao Jing proved that family follow-up nursing for patients with cognitive impairment gradually improved their movement abilities, reduced the burden of caregivers and increased their confidence in the treatment through the long-term training of different functions, thus improving the nursing efficacy [19]. In our study, we found that family follow-up nursing for patients with cognitive impairment declined the burden of caregivers, which is consistent with the study result of Lee [20].

Patients' lack of knowledge about their conditions can increase their psychological burden and fear of the disease, which can be reflected by the NMRE-C scores. So, family follow-up nursing, which includes the use of the NMRE-C scale, can increase the patients' as well as caregivers' knowledge of cognitive impairment and reduce the psychological burdens and negative emotions of the patients by encouraging communications between them and caregivers. Wang Shanshan reported that family follow-up nursing strengthened the psychological counseling of caregivers with their patients, improved the immune capacity within patients by stimulating the neuro-endocrine-immune system, accelerated disease recovery, and reduced the occurrence of negative emotions in patients [21]. The WHOQOL BREF scale can reflect the real physical and mental conditions of elderly cognitive impairment patients from the perspectives of physiology, psychology, society, etc. Family fallow-up nursing, which emphasizes independent nursing, helps patients' motivation to undergo ADL rehabilitation training, increasing their independent living abilities and improving their quality of life. This result conforms to Hou's findings [22].

Family follow-up nursing is advantageous for the patient's recovery, but this nursing system is still under development and has not been popularized widely. In the end, there are some limitations to this study, such as its undiversified sample structure and its universal study methods and results. So, for the following study, we should strengthen our cooperation with other units and adopt more study methods so as to produce more results, in hope of providing empirical support for clinical nursing.

In summary, family follow-up nursing markedly improves cognitive function in elderly dementia patients with cognitive impairment, reduces their negative emotions, increases their independent living abilities, and decreases the caregiver's burden, so it should be widely used in clinical settings.

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Disclosure of conflict of interest

None.

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