Diagnostic Brain Medicine

ORIGINAL RESEARCH

Open Access

Effects of Early Multidimensional System Nursing Model on Wandering Behavior, Cognitive Function and Quality of Life in Hospitalized Patients with Mild Alzheimer's Disease

Chunhua Gu[1, #, *] and Xiaozhi Zhu[2, #]

[1]Department of Emergency Medicine, Shenzhen Bao'an District People's Hospital, 518000 Shenzhen, Guangdong, China

[2]Tongtou Community Health Centre, Shiyan People's Hospital, Bao'an District, 518000 Shenzhen, Guangdong, China

Keywords

Multidimensional system nursing model, Mild Alzheimer's disease, Wandering behavior, Cognitive function, Quality of life

***Correspondence**

Chunhua Gu, Department of Emergency Medicine, Shenzhen Bao'an District People's Hospital, No. 118 Longjing 2nd Road, Bao'an District, 518000 Shenzhen, Guangdong, China.

E-mail: 459874514@qq.com

[#]These authors contributed equally.

Received: 6 February 2023; Revised: 23 February 2023; Accepted: 28 February 2023; Published: 3 March 2023

Diagnostic Brain Medicine 2023; 4(1): 1–9

Abstract

Objective To explore the effect of early multidimensional system nursing model on wandering behavior, cognitive function and quality of life in hospitalized patients with Alzheimer's disease (AD). **Methods** Patients with mild AD (60 cases) who received conventional nursing intervention in our hospital from January 2016 to May 2017 were selected as the control group, and patients with mild AD (60 cases) who received multidimensional nursing intervention in our hospital from June 2017 to December 2018 were selected as the observation group. The scores of cognitive function, daily living ability, quality of life, and wandering behavior were compared between the two groups of patients before and after nursing intervention, and the differences in the incidence of accidents and family satisfaction between the two groups of patients were also compared. **Results** After the intervention, the scores of the ability of daily living (ADL) scale, the quality of life-AD (QOL-AD) assessment scale, the mini mental state examination (MMSE) scale in the observation group were significantly higher than those in the control group (P<0.05); the scores of continuous walking, escape behavior, and spatial disorientation in the observation group were significantly lower than those in the control group (P<0.05); the total incidence of accidents in the observation group was significantly lower than that in the control group (P<0.05); the satisfaction of family members in the observation group (96.67%) was significantly higher than that in the control group (81.67%) (P<0.05). **Conclusion** The early multidimensional system nursing model can significantly improve the cognitive function, daily life ability and quality of life of patients with mild AD, reduce the incidence of wandering behavior and related accidents, and also improve family satisfaction.

Introduction

Alzheimer's disease (AD) is a neurodegenerative disorder with insidious onset signs and progressive development, and has a predilection for the elderly over 60 years of age [1]. According to statistics, with the world's rapidly aging population, the number of elderly people with AD will multiply, and the number of people with AD worldwide may reach 130 million by 2050 [2]. AD not only seriously affects patients' social, working and daily life, but also causes severe financial stress and psychological burden to patients and families [3]. Existing studies have found [4] that rational nursing interventions have an important role in improving the clinical symptoms of AD. Multidimensional system nursing model refers to that nursing staff carry out nursing work from multiple dimensions, which has the characteristics of standardizing nursing operation and enhancing patients' self-protection ability. At present, there are few studies about the early multidimensional system nursing model in the clinical nursing care of patients with mild AD. The purpose of this study was to explore the effect of early multidimensional system nursing model on wandering behavior, cognitive function and quality of life of hospitalized patients with mild AD, which is reported as follows.

Materials and methods

General data

Mild AD patients (60 cases) who underwent conventional nursing intervention in our hospital from January 2016 to May 2017 were selected as the control group, and mild AD patients (60 cases) who underwent multidimensional nursing intervention in our hospital from June 2017 to December 2018 were selected as the observation group. There were no significant differences in gender, age and education between the patients in two groups (P>0.05) and they were comparable, see Table 1. This study was approved by the ethics committee of our hospital, and all patients gave written informed consent. Inclusion criteria: all patients met the diagnostic criteria in the *American Mental Disorder Diagnosis and Statistic Manuel* (fourth edition) for mild AD [5]; and all patients were rated as having mild dementia according to the clinical dementia rating scale (CDR) [6]. Exclusion criteria: those with combined cardio, hepatic and renal dysfunction; those with the presence of severe somatic diseases; those with other psychiatric diseases.

Table 1 Comparison of general data between the two groups

Group	n	Gender		Age (years)	Education		
		Male	Female		Primary school	Middle school	University
Observation group	60	27	33	68.45±3.12	14	34	12
Control group	60	25	35	67.72±3.26	11	38	11
t/χ^2 value		0.136		1.253		0.626	
P value		0.713		0.213		0.731	

Methods

Control group

In the control group, a conventional nursing model was used, and during the patient's hospitalization, basic care such as diet, medication, and safety was implemented by the nursing staff, and health promotional education such as disease control and precautions was also implemented. After the patient was discharged, the nursing staff made regular telephone follow-up and recorded the patient's recovery status.

Observation group

On the basis of conventional nursing, the observation group implemented multidimensional nursing model, firstly, a multidimensional nursing model-based nursing intervention group was established, which consisted of: 1 chief physician, 1 rehabilitation

physician, 1 psychiatrist, 1 dietitian, and 2 nurses. A multidimensional nursing intervention program for the elderly with AD was developed by the nursing intervention group. The details are as follows:

Risk assessment and management

Risk assessment: a comprehensive assessment of the patient's cognitive function, ability of daily living, wandering behavior, and the occurrence of accidents was provided by the nursing intervention group, in which targeted nursing was provided to the patient according to the assessment; ward management: the severe patients were arranged in the specific wards with closed management during the night, which needed to be close to the nurses' station, and the monitoring management measures should be strengthened, and the patients' family members should accompany them all day; on admission, the nursing staff should lead the patients and their families to be familiar with the ward environment and the surrounding environment, and introduce the location of each department of the hospital to them in detail.

Primary symptom intervention

(1) Health education knowledge propaganda, the nursing staff explained the causes, process and preventive measures of mild AD to the patients and their families by means of videos and pictures, and told the patients to work and rest on time and give up smoking, staying up late and other bad living habits in time. (2) Cognitive function training, ① memory training: the nursing staff instructed the patients to do the text, figure repetition training, and instructed the patients to memorize some pictures, objects, etc. ② Directional ability training: patients were encouraged to recall their own and family members' and friends' names, repeatedly reminded patients of the time of three meals a day, going to bed and getting up; and patients were instructed to remember their home address and a certain route. When the patient went out, the family members should let the patient identify the location on their own as much as possible, so as to help the patient orient correctly; let the patient identify vegetables, fruits, plants and other items, and pointed out one of them to make the patient say as many items of the same category as possible. ③ Attention training: caregivers encouraged patients to do some interesting activities, such as jigsaw puzzle, drawing, reading newspapers, etc.; and instructed patients to do calculation ability training, first let patients be familiar with the concept of numbers, and then carried out simple digital calculation training. ④ Linguistic competence training: caregivers guided patients to conduct some simple text, word fill in table training, and encouraged patients to retell some simple events such as some news events, etc.; caregivers guided patients to conduct question and answer training, and encouraged patients to listen to radio and watch television more, so as to enhance the language communication ability of patients. (3) Daily living ability training, ① the nursing staff encouraged patients to complete basic daily activities such as eating, resting, and washing clothes by themselves. ② According to the severity of the patients' condition, the volume of daily activity should be reasonably arranged, and the patients were instructed to jog, dance, and walk and other activity training. (4) Mood intervention, ① the nursing staff needed to communicate with patients from the perspective of patients, full of sympathy and care, so as to enhance the confidence and motivation of patients to overcome the disease. ② Cultural activities were held, and rehabilitation patients were invited to share their success experiences to enrich the patients' cultural exchanges and establish the correct perception of health. (5) Nutritional intervention, the patient specific diet was developed by the nursing staff, the patients and families were instructed to eat healthy and balanced meals, and to abstain from poor dietary habits such as smoking and drinking.

Continuation of care

① The nursing staff gave guidance to the family members on accompanying skills and matters needing attention, and told the family members to fully support the patients in the process of accompanying, and often encourage the patients, so as to enhance the self-confidence of the patients. ② The nursing staff

should try their best to contact the community managers and advocate the community to hold this type of activities frequently. The activities can take many forms, such as performance, sick friend exchanges, selection and interaction, so as to increase the opportunities for patients to communicate in the society and alleviate the patients' adverse emotions. ③ The nursing staff can recommend some books on AD to patients and their families, such as *Alzheimer's disease: prevention and early intervention*, *Can Alzheimer's disease be prevented* to strengthen the understanding and prevention of AD among patients and their families. ④ The nursing staff used telephone follow-up to record the patient's recovery status, and timely estrange the patient's adverse emotions, and to solve the physiological and safety problems of patients.

Outcome measures

Cognitive function, ability of daily living and quality of life

Before and after the intervention, cognitive function was assessed in both groups using the mini mental state examination (MMSE) [7], which consists of aspects of memory, attention, calculation, language, and orientation, with a total score of 30 points, and better cognitive function can be evidenced by higher scores; the ability of daily living scale (ADL) was used to assess the ability of daily living of the patients in two groups, which included aspects of stool and urine control, eating, walking, and bathing, the total score was 100 points, with higher scores indicating better ability of daily living; and the quality of life of the two groups was assessed using of the quality of life of AD patients (QOL-AD) assessment scale, which included aspects of physical health, living situation, family situation, economic situation, and overall evaluation of life, with a total score of 52 points, the higher the score, the better the quality of life of patients.

Wandering behavior

Before and after the intervention, patients in both groups were assessed for continuous walking, escape behavior, and spatial disorientation using the the revised Algase wandering scale (RAWS) [8], which consists of 20 items: 9 items for continuous walking, 4 items for escape behavior, and 6 items for spatial disorientation, 1 item for comprehensive judgment of wandering behavior. The score of 1~4 was used to evaluate the behavior, and RAWS≥3 was rated as having wandering behavior.

Incidence of accidents

Before and after the intervention, the occurrence of falls, injuries, lost and found, and sleep disorders in both groups were carefully recorded, and the incidence of accidents was calculated.

Family satisfaction

Family satisfaction was assessed using a self-made patient family satisfaction questionnaire in our hospital, and the rating was divided into three criteria: very satisfied, satisfied, and dissatisfied. Satisfaction = (very satisfied + satisfied)/total cases × 100%.

Statistical analysis

SPSS 20.0 was used for statistical analysis. The count data was expressed by the cases (percentage), the comparison between the two groups was analyzed by χ^2 test. The measurement data was expressed by mean ± standard deviation ($\bar{x}\pm s$), the comparison between the two groups was performed by *t* test, with $P<0.05$ as the difference being statistically significant.

Comparison of MMSE, ADL, and QOL-AD scores before and after intervention between the two groups

Before the intervention, the MMSE, ADL, and QOL-AD scores in the two groups were not significantly different ($P>0.05$), after the intervention, the MMSE scores in the control group were not significantly different from those before the intervention ($P>0.05$), the ADL and QOL-AD scores in the control group were significantly higher than those before the intervention ($P<0.05$); after the intervention, the MMSE, ADL, QOL-AD scores in the observation group were significantly higher than those

before the intervention (P<0.05), and the scores in the observation group were significantly higher than that in the control group (P<0.05); see Table 2.

Table 2 Comparison of MMSE, ADL, and QOL-AD scores before and after intervention between the two groups

Group	n	MMSE		ADL		QOL-AD	
		Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Observation group	60	17.82±3.64	21.62±3.74[a]	69.65±5.78	87.26±7.35[a]	29.25±2.37	38.42±5.39[a]
Control group	60	18.05±3.72	18.41±3.45	71.42±5.65	74.46±6.19[a]	28.79±2.46	31.15±4.28[a]
t value		-0.342	4.887	-1.696	10.318	1.043	8.182
P value		0.733	0.000	0.092	0.000	0.299	0.000

Note: compared with before intervention, [a]P<0.05

Comparison of RAWS scores before and after intervention between the two groups

Before the intervention, there were no significant differences between the two groups in the scores of continuous walking, escape behavior and spatial disorientation (P>0.05); after the intervention, the scores of continuous walking, spatial disorientation in the control group were not significantly different from those before the intervention (P>0.05), and the scores of escape behavior in the control group were significantly lower than those before the intervention (P<0.05); after the intervention, the scores of continuous walking, escape behavior and spatial disorientation were significantly lower in the observation group than those before the intervention (P<0.05), and the scores in the observation group were significantly lower than those in the control group (P<0.05), see Table 3.

Table 3 Comparison of RAWS scores before and after intervention between the two groups

Group	n	Continuous walking		Escape behavior		Spatial disorientation	
		Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Observation group	60	3.17±0.75	2.22±0.45[a]	3.42±0.56	1.88±0.37[a]	3.34±0.47	2.49±0.59[a]
Control group	60	3.23±0.69	3.09±0.51	3.39±0.51	2.51±0.93[a]	3.39±0.52	3.21±0.54
t value		-0.456	-9.908	0.307	-4.876	-0.553	-7.092
P value		0.649	0.000	0.760	0.000	0.582	0.000

Note: compared with before intervention, [a]P<0.05

Comparison of the incidence of wandering behavior related accidents between the two groups

After the intervention, there were 2 cases of falls and 3 cases of sleep disorders in the observation group, and 8 cases of falls, 3 cases of injuries, 4 cases of lost and found and 11 cases of sleep disorders in the control group, and the overall incidence of wandering behavior related accidents in the observation group (8.33%) was significantly lower than that in the control group (43.33%) (P<0.05), as shown in Table 4.

Comparison of family satisfaction between the two groups

After the intervention, family satisfaction in the observation group (96.67%) was significantly higher than that in the control group (81.67%) (P<0.05), see Table 5.

Table 4 Comparison of the incidence of wandering behavior related accidents between the two groups

Group	n	Falls	Injuries	Lost and found	Sleep disorders	Overall incidence
Observation group	60	2	0	0	3	5 (8.33)
Control group	60	8	3	4	11	26 (43.33)
χ^2 value						19.181
P value						0.000

Table 5 Comparison of family satisfaction between the two groups

Group	n	Very satisfied	Satisfied	Dissatisfied	Satisfaction
Observation group	60	48	10	2	58 (96.67)
Control group	60	41	8	11	49 (81.67)
χ^2 value					6.988
P value					0.008

Discussion

AD is a serious neurological disease, and its clinical manifestations are mainly memory decline, self-care ability decline, abnormal mental symptoms, dyskinesia and so on [9-11]. In recent years, with the gradual increase of the incidence of AD, the disease has aroused general concern [12]. Nursing plays an important role in the clinical treatment of patients with AD. Research shows that [13], multidimensional nursing model can significantly promote the rehabilitation effect of stroke patients, improve the psychological state and self-care ability of patients as well as the quality of life of patients. Therefore,in this study, the early multidimensional system nursing model was performed in the treatment of patients with AD, the results demonstrated that the early multidimensional system nursing model can significantly improve the clinical symptoms of patients with mild AD, and reduce the occurrence of accidents.

The early multidimensional nursing model can significantly improve the cognitive function of patients with mild AD

AD patients often present with memory decline, language communication impairment, cognitive decline and other symptoms, and are prone to extreme behaviors, which seriously affect the health status of patients [14-15]. Clinical studies have shown [16] that corresponding nursing measures play an important role in improving the clinical symptoms of elderly patients with mild AD. In this study, the cognitive function scores in the observation group were significantly higher than those in the control group, indicating that the multidimensional system nursing model was more effective than the conventional nursing model in improving the cognitive function of patients. The reasons were as follows: ① in multidimensional system nursing, caregivers instructed patients to carry out training in text and number repetition, etc., and mentored patients to remember pictures and objects with distinctive characteristics, thereby improving the memory of patients; ② caregivers often encouraged patients to carry out activities such as jigsaw puzzle and reading newspapers, and perform simple digital calculation training, which is helpful to improve the attention of patients; ③ through guiding patients to recall their own and family names, home addresses and routes, caregivers can help patients orient correctly, so as to improve patients' orientation ability; ④ caregivers

directed the patients to repeat simple events, such as news events and short stories, and to communicate with the patients in a question-and-answer format, which helps to enhance the language ability of the patients. Therefore, the early multidimensional system nursing model can obviously improve the cognitive function of patients.

The early multidimensional system nursing model can significantly improve the daily living ability, quality of life and family satisfaction of patients with mild AD

Patients with mild AD are associated with reduced ability of daily living and quality of life [17-18]. In this study, it was found that the early multidimensional system nursing model could obviously improve the daily living ability and quality of life of patients. This may be due to that under the multidimensional system nursing model, caregivers often encouraged patients to complete basic daily activities by themselves, such as eating, bedding, etc., which could effectively improve the self-care ability of patients. According to the progress of patients' condition, caregivers arranged reasonable and appropriate exercises for patients, and guided the patients to conduct such activities as jogging, dancing, and walking, which could effectively improve the physical fitness of patients. At the same time, cultural activities are held to advocate the exchange of sick friends, so as to effectively establish a correct perception of health for patients, thereby improving the quality of life of patients. In addition, this study found that early multidimensional system nursing model could obviously improve patient family satisfaction. Under the early multidimensional system nursing model, caregivers provided meticulous management to patients: firstly, risk assessment was practiced on patients to achieve hierarchical classification management, which effectively improved the efficiency of care for patients, thereby improving the satisfaction of patients and families. Second, through emotional intervention, caregivers communicated with patients in the perspective of patients to make patients and families fully feel humane care. Additionally, after the patients were discharged from the hospital, the caregivers improved the patients' physical and psychological problems and reduced the burden of accompanying family members by telephone follow-up and the way that the relevant books for AD were recommended to the patients; caregivers also conducted promotional education by mobilizing the community, and organized doctor-patient communication events to provide social support and effectively reduce the burden of accompanying family members of patients. Caregivers effectively cared for patients from multifaceted measures, and in turn, improved the satisfaction of patients' families.

Early multidimensional nursing model can significantly reduce the incidence of wandering behavior and accidents in patients with mild AD

Wandering behavior refers to some purposeless, repetitive, temporary spatially oriented movements that occur in elderly and is the most common clinical symptom of AD. Relevant studies have shown that wandering behavior in patients with AD is one of the important factors leading to accidents such as walking loss, falls, injuries and so on [19]. It has been shown [20] that improving patients' cognitive function can significantly reduce patients' wandering behavior, and in the present study, the observed group had a significantly lower incidence of wandering behavior and related accidents than the control group, indicating that an early multidimensional nursing model can significantly reduce the incidence of accidents in patients with mild AD. Under the early multidimensional system nursing model, the caregivers practiced cognitive function training on patients to improve their spatial orientation ability, memory, attention, and so on, thus strengthening the plasticity of the patients' brain function and contributing to the improvement of the patients' cognitive function. In addition, caregivers performed personalized nutritional intervention on patients, and told patients to work and rest on time, give up smoking,and staying up late as well as other bad habits in time, contributing to improve the physical

fitness of patients and reduce the wandering behavior. In addition, caregivers explained to patients and families about the onset and prevention of AD by using videos and pictures to increase their correct understanding of wandering behavior, so as to improve the prevention awareness of patients and their families on wandering behavior. Caregivers also effectively improve the efficiency of accompanying of family members by guiding the accompanying skills and accompanying precautions, which can effectively reduce the incidence of accidents in patients.

In summary, the early multidimensional system nursing model can significantly improve the cognitive function, daily living ability and quality of life, reduce the incidence of wandering behavior and the related accidents in patients with mild AD, and can effectively improve the nursing satisfaction of family members.

Acknowledgement

Not applicable.

Conflict of Interest

The authors declare no conflicts of interest.

Author Contributions

Conceptualization, Data curation and Writing-Original draft, X.Z.Z; Writing-review and editing, C.H.G; All authors have read and agreed to the published version of the manuscript.

Ethics Approval and Consent to Participate

The study was approved by the Medical Ethics Committee, and the patients were informed and consented.

Funding

This work was supported by the 2018 basic research project (medical care and health care) of Science, Technology and Innovation Bureau in Bao'an District of Shenzhen city (Project No.: 2018JD253; Project leader: Chunhua Gu).

Availability of Data and Materials

The data presented in this study are available on request from the corresponding author.

Supplementary Material

Not applicable.

References

[1] Lingmiao Xu, Han Wang. Application of three element linkage care model in the management of patients with Alzheimer's disease [J]. Guangdong Medical Journal, 2019, 40(20):2950-2953+2957.

[2] Lihua Xu, Min Zhang, Ziye Wen. Burden and stress of family caregivers of patients with Alzheimer's disease and its influencing factors [J]. Chinese Journal of Gerontology, 2016, 36(12):3025-3027.

[3] Huifen Ling, Likai Sun, Jianxia Yang. Application of a transitional care scheme for elderly dementia patients based on comprehensive geriatric assessment [J]. Journal of Nursing Science, 2018, 33(12):76-79.

[4] Guilin Yao, Jianfeng Chen, Meihu Zhang, et al. Evaluation of the Effect of Five Elements Health Exercise on Cognitive Function in Patients with Mild Senile Dementia [J]. Chinese and Foreign Medical Research, 2019, 17(22):177-179.

[5] Shanghong Qin, Li Liang, Xianzhu Feng, et al. Effects of recreation therapy on patients with mild to moderate Alzheimer's disease [J]. Chinese Youjiang Medical Journal, 2019, 47(12):916-919.

[6] Li Liang, Yan Zhang, Mei Liang, et al. Effect of personalized handcraft and entertainment nursing combined with transcranial magnetic stimulation on cognitive function, mental behavior and daily living ability in patients with mild to moderate Alzheimer′s [J]. Internal Medicine, 2019, 14(06):734-736.

[7] Bozhan Huang, Xiaoling Chen, Guixi Deng, et al. Potential effect of continuous nursing on neuropsychiatric pain in patients with Alzheimer's disease [J]. Jilin Medical Journal, 2020, 41(02):475-476.

[8] Yan Zhang, Yaling Wang, Jie Ma. Effect of three-dimensional intervention on wandering behaviors during hospitalization of patients with mild Alzheimer's disease [J]. Journal of Nursing Science,

2019, 34(13):38-42.

[9] Wong M W, Braidy N, Poljak A, et al. The application of lipidomics to biomarker research and pathomechanisms in Alzheimer's disease[J]. Curr Opin Psychiatr. 2017, 30(2):136-144.

[10] Xiaojun Sun. Study on Application and Effect of Safe Nursing Management Mode in the Elderly Patients with Dementia [J]. China Health Industry, 2016, 13(21):130-132+149.

[11] Baoli Song. Effect of continuous nursing on mental state and activities of daily living of senile dementia patients [J]. Chinese General Practice Nursing, 2017, 15(27):3384-3387.

[12] Yun Shi. Nursing safety management of senile dementia patients during hospitalization [J]. Journal of Traditional Chinese Medicine Management, 2016, 24(23):92-93.

[13] Rongqing Chen. Effects of hospital community family multidimensional care in stroke rehabilitation [J]. Chinese Journal of Modern Drug Application, 2018, 12(12):163-165.

[14] Jiaying Shen. Application effect of comprehensive rehabilitation nursing on patients with moderate and mild Alzheimer's disease [J]. China Higher Medical Education, 2019(07):146-147.

[15] Li Zhang, Jianguo Chen. Influence of health belief nursing intervention on cognitive impairment and quality of life of patients with Alzheimer's disease [J]. Journal of Clinical Medicine in Practice, 2017,21(14):27-30.

[16] Shanshan Yang, Lihong Li, Mingming Zhu, et al. Effect of early family nursing intervention on mild cognitive impairment in patients with Alzheimer's disease [J]. Renowned Doctor, 2019(12):178.

[17] Hanyu Weng, Rong Ma, Zhidong Wu, et al. Effect of multimodal nursing intervention on cognitive function and quality of life in patients with dementia [J]. Chinese Journal of Practical Nervous Diseases, 2018, 21(12):87-92.

[18] Wenyu Xiao, Shuhua Zheng, Xiaozhen He. The effect of community nursing intervention on quality of life of alzheimer patients and caregivers [J]. Chinese Journal of General Practice, 2016, 14(01):150-152.

[19] Juqing Xia. Hospital care for elders with dementia in Canada and its prompt [J]. Chinese Nursing Management, 2019, 19(09):1302-1305.

[20] Ali N, Luther S L, Volicer L, et al. Risk assessment of wandering behavior in mild dementia [J]. Int J Geriatr Psych, 2016, 31(4):364-374.