

Performance Errors in Activities of Daily Living of Older Persons with Alzheimer Dementia

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ABSTRACT

This study aimed to examine the types and frequency of performance errors in the activities of daily living of older persons with Alzheimer dementia. Semi-structured interviews were conducted with 41 caregivers caring for older persons with Alzheimer dementia. Activities of daily living were categorized according to the International Classification of Functioning, Disability and Health (ICF) model, and performance error types were classified according to expert opinions. Descriptive statistics to analyze the frequency of each performance error and chi-square to analyze the difference in performance error by dementia grade were performed using SPSS 22.0. The most frequent performance errors of older persons with Alzheimer dementia were “difficulty in remembering where they put things” and “wearing clothes that are out of season,” in ICF code d650 and d540, respectively. The ICF codes where there was a significant difference in the presence or absence of performance errors according to the dementia grade were ICF d510, d520, and d640. In the future, it will be necessary to conduct a large-scale study on errors in performing activities of daily living to find critical errors in the discrimination between healthy older persons, older persons with mild cognitive impairment (MCI), and older persons with dementia.

Keywords:-Activities of daily living; Alzheimer dementia; International Classification of Functioning, Disability and Health

Introduction

The number of dementia patients in Korea is expected to exceed 1 million by 2024 and 2 million by 2041, which is approximately three times faster than the rate of increase in dementia patients in other Organization for Economic Co-operation and Development (OECD) countries. A systematic review reported that the rate of delay and omission of dementia diagnosis was high [1]. Dementia is diagnosed through a comprehensive evaluation of cognitive function and mental status, physical and neuropsychological examinations, activities of daily living (ADL), and brain imaging. An evaluation of ADL is useful for early diagnosis of dementia [2, 3]. In addition, ADL evaluation is necessary to identify functional reserve and performance within the functional status for the diagnosis of dementia [4]. ADL comprises basic ADL (BADL) and instrumental ADL (IADL). As IADL performance decreases before cognitive decline, it can be used for early

diagnosis. It can be a useful tool for diagnosing dementia in patients with low education levels who have difficulty differentiating dementia through general neuropsychological tests [5].

ADL can be assessed using self-questionnaires, caregiver questionnaires, and performance-based questionnaires. Self-reported assessments are simple, convenient, and cost effective. However, owing to the low insight of older persons with dementia or mild cognitive impairment, they show problems such as overestimating or underestimating their own abilities [6]. Unlike self-reports, caregiver reports are not associated with problems of self-awareness in older adults because they are measured by auxiliaries [7, 8]. However, they may be associated with caregivers' stress and burden [9, 10] and are affected by the caregivers' relationship with the older persons with dementia and the amount of time of care [11]. The performance-based assessment has high validity and low floor and ceiling effects. It can sensitively assess the level of ADL in older persons [12]. However, performance-based evaluation tools are time consuming, have a large environmental impact, and have limited evaluation areas [13]. Therefore, a new evaluation method that can assess ADL in dementia and mild cognitive impairment (MCI) is needed.

The process of error adjustment consists of error detection and correction [14]. For example, individuals may fasten the wrong button while putting on clothes, they may then undo it and fasten it correctly. This process is called an error correction. Error detection refers to recognizing that the button is incorrectly locked, whereas error correction refers to the correct release of the wrong button. The ability of the older persons with dementia to detect and correct errors during ADL performance is significantly lower than that of healthy older persons. However, older persons with dementia correct most detected errors [15]. This means that even if the evaluator does not directly observe the ADL performance of the older persons with dementia, the error-adjusting ability of the older persons with dementia can be confirmed through the error detection evaluation.

Therefore, this study aims to investigate performance errors in ADL for the older persons with dementia and use them as a basis evidence for developing an evaluation item for detecting performance errors in ADL. The specific purpose of this study was to investigate the types and frequency of performance errors commonly seen during ADL performance by older persons with dementia and to analyze the differences in performance errors according to dementia grade.

Methods

Study procedure

This is a preliminary study to develop evaluation tool items to assess the ADL performance error detection ability of older persons with dementia in line with the culture of older persons in Korea. The researcher conducted an interview with caregivers of older persons with Alzheimer dementia about how the older person with dementia conducts ADL and what performance errors they show. Among the contents of each interview, ADLs are categorized according to the International Classification of Functioning, Disability and Health (ICF) code, and the performance errors are categorized according to the opinion of the expert panel. The frequency of performance errors by

ICF code and the difference in the presence or absence of performance errors according to dementia grade were analyzed using SPSS 24.0.

Participants

This study was approved by the institutional review board (IRB 2020-004-HR-02) of Dongseo University. The study period was from September 1 to December 31, 2020. The participants were spouses, and daughters of the older persons with Alzheimer dementia who were recruited from rehabilitation hospitals, nursing homes, day care centers, and dementia relief centers located across the country. The inclusion criterion was those who had been caring for the older persons with Alzheimer dementia for more than three months. Forty-one individuals understood and agreed to the participate in the study.

Interview tool

We obtained data regarding the general characteristics of caregivers and older persons with Alzheimer dementia. For the general characteristics of caregivers, sex, age, and the relationship with the older persons with dementia were investigated. General characteristics of the older persons with Alzheimer dementia, including sex, age, duration of illness, and dementia grade were investigated. Semi-structured interviews were conducted on the performance of ADL of older persons with dementia.

According to the Occupational Therapy Practice Framework: Domain and Process (OTPF), 4th ed, ADLs for interviews were based on eight BADLs (bath/shower, toileting and toilet hygiene, dressing, eating, feeding, functional mobility, personal hygiene and grooming, and sexual activity) and 12 IADLs (caring for others, pets, raising babies, using communication tools, driving and community movement, money management, health care and maintenance, maintaining a home, preparing meals and washing dishes, religious/spiritual activities and expressions, safety measures and first aid measures, and shopping). Semi-structured interviews were conducted with caregivers to investigate the performance errors that older persons with dementia show during daily activities. The interviews were conducted to investigate how older persons with dementia performed each type of ADLs and errors frequently seen during performance.

Data Analysis

After obtaining consent from the interviewer, the recordings were documented and transcribed. The study results were summarized according to the International Classification of Functioning, Disability, and Health (ICF) model with reference to a previous study [16] on the decrease in ADL performance and errors in patients with dementia. The classification of performance errors according to the ICF code was verified by three occupational therapists with more than 10 years of clinical experience.

The general characteristics of older persons with dementia and the frequency of performance errors were analyzed using descriptive statistics. A chi-square test was performed to examine the difference in the frequency of performance errors according to the dementia grade. The grade

according to the severity of dementia was investigated as a long-term care grade. The data were analyzed using SPSS 24.0, and the significance level was set to .05.

Results

The following general characteristics of older persons with dementia were analyzed: gender, age, disease duration, and dementia grade. The patients included 17 men and 24 women, with an average age of 79.45 ± 8.74 years. For duration, there were 36 older people who had dementia for less than 5 years, and 5 older people who had dementia for more than 6 years, with an average of 4.53 ± 2.35 years. The average dementia grade was 3.29 ± 1.06 (Table 1). There were 4 male and 37 female caregivers. Their average age was 60 ± 5.12 , and the relationship with the older persons with dementia included 5 spouses, 8 daughters, and 28 caregivers.

Frequency of performance errors in ADL

As a result of analyzing the frequency of daily living performance errors according to ICF, the most frequent performance error was “difficulty in remembering where they put things” in ICF code 650-caring for household objects and assisting others. This was followed by “wearing clothes that are out of season” in ICF code d540-dressing. The most frequent performance errors were found in ICF d510-washing and d540-dressing. The types and frequencies of performance errors are presented in Table 2.

Differences in the presence or absence of performance errors according to the dementia grade

For each ICF code, the differences in the presence or absence of performance errors according to the dementia grade were analyzed. There were statistically significant differences in three areas: ICF d510-washing oneself, ICF d520-caring for body parts, and ICF d640-doing housework (Table 3).

Table 1. General characteristics.

Characteristics		N(%)
Gender	Male	17(41.5)
	Female	24(58.5)
Age (years)	60~69	8(19.5)
	70~79	11(26.8)
	80~89	17(41.4)
	90~99	5(12.1)

Duration of illness (years)	1~5	36(87.8)
	6~10	5(12.1)
Dementia grade	Grade 1	2(4.9)
	Grade 2	11(26.8)
	Grade 3	12(29.3)
	Grade 4	12(29.3)
	Grade 5	4(9.8)

Table 2. The types and frequencies of performance errors in ADL of old persons with Alzheimer dementia

	ICF code	Reported performance errors	N(%)
d240	Handling stress and other psychological demands	Not asking for help in case of an accident	5(12.2)
		Lack of awareness of hazardous situations	4(9.8)
d310	Communicating with-receiving-spoken messages	Difficulty in understanding the meaning of words	5(12.2)
d330	Speaking	Repeating the same words, echolalia	1(2.4)
d360	Using communication devices and techniques	Decreased response to ringtone phone sounds	7(17.1)
		Difficulty in using communication devices	10(24.4)
		Difficulty communicating through communication devices	5(12.2)
d410	Changing basic body positions	Difficulty sitting in the upright position	3(7.3)
d415	Maintaining posture positions	Difficulty maintaining posture	1(2.4)
d460	Changing different	Difficulty finding a place	12(29.3)
		Wandering	3(7.3)

	locations	Not willing to move	1(2.4)
		Insistence on familiar place	1(2.4)
d470	Using transportation	Difficulty finding a location	13(31.7)
		Lack of safety awareness	3(7.3)
		Difficulty taking turns	2(4.9)
		Unwillingness to board a vehicle	3(7.3)
		Insistence on familiar location	4(9.8)
d510	Washing oneself	Lack of safety awareness	2(4.9)
		Refusal to accept help	9(22.0)
		Repetition of the washing procedure	6(14.6)
		Leaving foam on parts of the body	10(24.4)
		Unawareness of one's own body	2(4.9)
		Unwillingness to wash	6(12.2)
		Difficulty distinguishing between bath products	7(17.1)
		Difficulty performing activities in order	6(14.6)
		Prolonged washing activity	3(7.3)
d520	Caring for one's own body parts	Lack of safety awareness	2(4.9)
		Overuse of moisturizing lotions	4(9.8)
		Unable to clean oneself	1(2.4)
d530	Toileting	Difficulty in undressing	6(14.6)
		Difficulty in flushing after using toilets	7(17.1)
		Lack of awareness of cleanliness	8(17.4)
		Difficulty distinguishing between male and female toilets	2(4.9)
		Difficulty in cleaning oneself after using the toilet	10(24.4)
		Difficulty in distinguishing toilet amenities and their use	3(7.3)
		Inappropriate use of the toilet facilities	6(14.6)
		Urinary incontinence	1(2.4)
		Not recognizing the need to urinate	3(7.3)
d540	Dressing	Wearing clothes that are out of	16(39.0)

		season	
		Wearing dirty clothes	2(4.9)
		Difficulty in distinguishing spatial relationships	11(26.8)
		Difficulty distinguishing between belongings	3(7.3)
		Difficulty getting dressed in order	7(17.1)
		Difficulty distinguishing between underwear and outerwear	2(4.9)
		Difficulty remembering where they left their clothes	1(2.4)
		Forgetting how to get dressed	12(29.3)
		Difficulty dressing appropriately for the occasion	5(12.2)
d550	Eating	Difficulty chewing	4(9.8)
		Difficulty of controlling food intake	2(4.9)
		Playing with food	2(4.9)
		Eating only one kind of food	7(17.1)
		Difficulty using appropriate eating utensils	3(7.3)
d570	Looking after one's health	Difficulty taking the medicine on time	4(9.8)
		Difficulty swallowing at the right time	2(4.9)
		Refusing to take the medicine	2(4.9)
		Unable to remember if they took the medicine	1(2.4)
		Excessive health concerns	1(2.4)
d640	Doing housework	Tries to clean up but makes more mess	5(12.2)
		Difficulty in using kitchen supplies	8(19.5)
		Difficulty in using household appliances	3(7.3)
		Difficulty cleaning up after washing dishes	2(4.9)
d630	Preparing meals	Lack of safety awareness	2(4.9)

		Difficulty cooking in order	1(2.4)
		Difficulty feeding their pets on time	2(4.9)
		Difficulty remembering where they put things	18(43.9)
d650	Caring for household objects and assisting others	Hiding things	3(7.3)
		Difficulty in awareness of their belongings	2(4.9)
		Obsession with familiar objects	2(4.9)
		Difficulty in management of household objects	3(7.3)
		Emotional detachment	2(4.9)
		Expressing excessive intimacy	6(14.6)
		Obsession with a specific person	1(2.4)
d720	Complex interpersonal interactions	Offensive and disrespectful behavior	7(17.1)
		Difficulty distinguishing between acquaintances and strangers	1(2.4)
		Depended on others	1(2.4)
		Demanding excessive respect from others	2(4.9)
d760	Family relationships	Lack of family awareness	5(12.2)
		Difficulty remembering how to buy things	4(9.8)
		Difficulty in handling money transactions	2(4.9)
		Overspending	4(9.8)
d860	Basic economic transactions	Lack of awareness of the value and purpose of money	7(17.1)
		Difficulty remembering where they keep their money	6(14.6)
		Difficulty in managing money	8(19.5)
		Greedy behavior	4(9.8)

Table 3. Differences in the presence or absence of performance errors according to the dementia grade.

ICF code		Errors	Grade					X^2	p
			1	2	3	4	5		
d240	Handling stress and other psychological demands	X	2	9	10	8	3	1.778	0.776
		O	0	2	2	4	1		
d310	Communicating with-receiving-spoken messages	X	1	11	10	12	4	9.051	0.600
		O	1	0	2	0	0		
d330	Speaking	X	1	11	9	10	4	5.646	0.227
		O	1	0	3	2	0		
d360	Using communication devices and techniques	X	1	11	9	10	4	5.646	0.227
		O	1	0	3	2	0		
d410	Changing basic body position	X	2	11	9	12	4	7.822	0.098
		O	0	0	3	0	0		
d415	Maintaining a body position	X	2	11	11	12	4	2.477	0.649
		O	0	0	1	0	0		
d460	Moving around in different locations	X	1	10	7	5	2	6.361	0.174
		O	1	1	5	7	2		
d470	Using transportation	X	0	5	7	6	1	3.22	0.521
		O	2	6	5	6	3		
d510	Washing oneself	X	2	5	3	1	0	1.977	0.027*
		O	0	6	9	11	4		

d520	Caring for body parts	X	2	11	12	7	3	11.649	0.020*
		O	0	0	0	5	1		
d530	Toileting	X	0	6	4	3	1	3.671	0.452
		O	2	5	8	9	3		
d540	Dressing	X	0	3	5	1	0	5.891	0.207
		O	2	8	7	11	4		
d550	Eating	X	2	9	6	8	2	4.076	0.396
		O	0	2	6	4	2		
d570	Looking after one's health	X	2	9	10	8	2	3.206	0.524
		O	0	2	2	4	2		
d640	Doing housework	X	0	4	11	7	4	13.506	0.009**
		O	2	7	1	5	0		
d650	Caring for household objects and assisting others	X	0	6	4	5	2	2.639	0.620
		O	2	5	8	7	2		
d720	Complex interpersonal interactions	X	0	7	8	5	1	5.464	0.243
		O	2	4	4	7	3		
d760	Family relationships	X	2	11	11	8	4	7.536	0.110
		O	0	0	1	4	0		
d860	Basic economic transactions	X	0	6	7	2	2	6.759	0.149
		O	2	5	5	10	2		

*p<.05

Discussions

An evaluation tool reflecting the cultural characteristics of the Republic of Korea, which can detect ADL performance errors among older persons with dementia and MCI, is needed. This study investigated the errors frequently seen during ADL performance among older persons with dementia to develop evaluation tool items.

Although ADL performance is important for the diagnosis of dementia or MCI, it has been pointed out that it is ambiguous [17,18]. Therefore, it is important to study the type of errors in ADL performance shown by people with dementia and MCI. Information about performance errors perceived in older persons with dementia, when performing ADLs in an environment, is accurately captured by caregivers who directly observe and provide direct assistance. Information was obtained from interviews with caregivers because data on regular and recurring performance errors are required rather than data on one-time performance errors seen on the evaluation site.

Analyzing the frequency of ADL performance errors in older persons with dementia revealed that “difficulty remembering where they put things” is the most common error. This is consistent with the initial change observed in older persons with dementia reported by Johannessen and Moller [19] in a qualitative study of 20 caregivers.

The next most frequent performance errors were “wearing clothes that are out of season” and “forgetting how to dress.” Problems with dressing in older persons with early to mid-stage dementia was reported as the most stressful concern for caregivers [20,21]. However, previous related studies have mainly dealt with caregivers’ coping strategies and burden of care, and prior studies on the performance errors of older persons with dementia are scarce. The present study is meaningful because it investigates performance errors and presents them quantitatively.

Analyzing the ADL performance errors of older persons with dementia according to the ICF model revealed that older persons with dementia showed the most errors in the areas of BADL, such as dressing and washing themselves. Of the 41 participants in this study, 25 had a long-term care grade of 3 or higher and needed help from others when performing ADLs. Performance errors in BADLs were prominent because the patients are in a state where it is difficult to perform IADLs independently. Additionally, analysis of the performance errors in ADLs according to the dementia grade revealed that the performance errors were significantly different in two BADLs—washing oneself and caring for one’s own body parts—and one IADL—doing household work.

Many studies have reported that older persons with MCI show slight errors in IADL activity compared to healthy older persons [22,23]. More complex activities require more cognitive functions. Since IADLs require more complex cognitive organization than BADLs, these are more at risk because of early cognitive decline [24,25].

Thus far, no study has analyzed performance errors in IADL performance in older persons with dementia. Ouchi et al. [26] investigated the difference in IADL performance of older persons with MCI and healthy older persons using Lawton IADL [27] and a qualitative IADL evaluation tool. The results of previous studies are not consistent with the results of this current study. A previous study reported a statistically significant difference in performance errors in the ICF

codes of shopping, preparing meals, and using public transportation between the healthy older persons and older persons with MCI, but this study did not show a significant difference. In addition, in this study, there was a statistically significant difference in the presence or absence of performance errors according to the dementia grade in the ICF code housework, but no such significant difference was observed in previous studies. This may be because the evaluation criteria for ADL in the two studies were different in terms of independence and the frequency of performance errors and because participants with dementia as well as MCI were involved in this study.

Analysis of the frequency of BADL performance errors according to dementia grade revealed statistically significant differences in dressing and managing body parts. Giebel, Sutcliffe, and Challis [28] investigated BADL performance using the Katz Index of independence in ADL [29] for 122 older persons with dementia. In a previous study, the ADLs that showed significant differences according to dementia stage were bathing, dressing, controlling urination, and using the toilet. The Katz evaluation tool used in previous studies also evaluated ADLs, focusing on performance independence. Further research on ADL performance errors in older persons with dementia is needed.

ADL performance error in older persons with dementia is important because it gradually worsens from the beginning and can capture difficulties that cause general functional deficits or dependence on life [16]. Performance errors differ depending on the task and clinical disease [15]. Therefore, it is necessary to investigate the performance errors during various tasks for older persons with dementia and those with MCI. Analyzing the correlation between NAT and neuropsychological evaluation for older persons with dementia and healthy older persons revealed that there was no significant correlation between NAT scores and specific neuropsychological evaluation scores such as executive ability and semantic knowledge [15]. In particular, MCI has a low sensitivity for discrimination through neuropsychological evaluation. This means that ADL performance errors should be evaluated separately. There is a need to study critical ADL performance errors to help diagnose healthy older persons, MCI, and dementia.

This study is significant as it is the first to investigate performance errors during ADL in older persons with dementia in Korea. In this study, the quantification of performance errors was investigated by interviewing caregivers rather than using the traditional self-questionnaire, information provider questionnaire, or performance-based evaluation tool. Thus, the expert was able to identify and record performance errors while obtaining information on the performance of comprehensive ADL. ADL performance errors of older persons with dementia were identified in this study using a new method for evaluating such performance.

In a future study, it will be necessary to analyze the critical performance errors and the difference between healthy older persons and older persons with MCI in terms of such errors by investigating performance errors in IADL targeting the older persons with MCI.

Conclusion

In this study, performance errors in ADL of the older person with dementia were investigated targeting caregivers for the older people with dementia. The difference in the presence or absence

of performance errors according to dementia grade was seen in ICF d510-washing oneself, ICF d520-caring for body parts, and ICF d640-doing housework. The reported performance errors of the older person with dementia were less in IADL than in BADL, which is thought to be because their participation in IADL decreased as dementia progressed. In the future, performance errors seen during ADL for the older person with MCI should be investigated. This study can be used as a basis for developing a Republic of Korean version evaluation tool for error detection in ADL to discriminate the older people with dementia.

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