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Effect of a Case-management Program Intervention on Mild Dementia Patients Residing in a Local Community

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Abstract

This one group pre-posttest experimental design study examined the effect of a case-management program on the cognitive function, depression, and environmental safety of dementia patients living in the community and their satisfaction with this intervention. The subjects were 10 elderly who agreed to participate in this program. The intervention was conducted for 1 hour, once a week, for 10 weeks. A case-manager visited the subjects' home once a week and implemented the cognitive rehabilitation program, and assessed the environmental risks, degree of depression, ADL and IADL abilities, and medication compliance. Data were gathered before and after the program and analyzed using the SPSS 21.0 Win. Participants' general characteristics were analyzed using a descriptive statistics and also paired t-test were used to determine the differences between the pre and post intervention cognitive function, depression level, and environmental safety. There was significant decrease only in the depression score (t=2.68, p=.03). Therefore, it is necessary to present more objective research results through before and after case management comparison with the use of a tool with verified reliability and validity, after screening and classifying the patients in advance, based on the degree of dementia, and modifying the program accordingly.

Keywords*: Case-management, Cognition, Dementia, Depression, Elderly*

1. Introduction

Case management is a cooperative process in which inspection, planning, intervention, adjustment, monitoring, and assessment of services is conducted so that individual health demand can be satisfied with the use of communication and available resources for high quality and cost-effective results [1]. A case manager attempts to understand the situation through interview with the subject to accomplish the purpose of case management, provides emotional support and information to the subject, examines the resources and information regarding the local community in terms of service provision, procures formal and informal resources appropriate for the subject, and performs treatment intervention for the family of the subject, according to their needs [2]. Although there is an increase in the number of elderly who need to receive in-home services and in the family care demand of elders with low daily function performance, there is a gradual decrease in the protective capacity of the family because of the decrease in the number of family members owing to the nuclear family set-up, increased family responsibilities due to decrease in the traditional filial duties of caring for elderly parents caring.

Worldwide, Korea is the country experiencing the fastest aging of the population. Therefore, it has to sensitively respond to the changes in the economy and society that are followed by aging. Aging often leads to lowered physical and cognitive function; therefore, along with the lengthening of the average life expectancy, the duration of a dependent life has increased. Since 2000, when Korea was declared as an aging society, the ratio of the elderly population aged over 65 years increased up

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to 11.0% of the total population in 2010, and has continued to increase. According to Si, Gun, and Gu, Korea is an aging society in which 35.7% of has over 20% of elderly population among total population. However, 49.4% of the elderly reported that their subjective health was "bad," with a disease prevalence rate of 50.3% [3].

The disease with the highest prevalence rate in the elderly population was dementia, with an estimated prevalence of 9.1% in 2010, which increased to 26.8% from 2008 to 2012, despite an increase of 17.4% in the elderly population during this period. It is estimated that there will be more than 1 million elderly dementia patients, at a 14.5% increase rate, by 2025 [4]. With Korea's rapid transition from an aging society to an aged society [5], the number of dementia patients is expected to double every 20 years until 2050 (0.47 million in 2010, 1.14 million in 2030, 2.13million in 2050). Furthermore, Alzheimer's disease is expected to account for progressively more dementia cases in the future, since the prevalence of Alzheimer's disease increased consistently with age until 85 years or older, whereas that of vascular dementia peaks at age 75–79 years old and then decreases thereafter.

Dementia results in the loss of cognitive function and is a leading case of disability among older adults of all races and regions [6]. Dementia has become the most important independent contributor to disability for older adults in low-and middle-income countries [7]. Dementia contributed 11.2% of years lived with disability in people aged 60 years and older [8]. Dementia brings a huge burden on individuals, families, and societies, and has been established as a major challenge worldwide [9].

Case management is mainly used as an effective chronic disease management method. It involves individualized intervention according to the needs of a patient, which can be conducted with adequate education about the method and contents of the intervention. Although some studies attempted to develop a local community centered case management model and verify its effectiveness in the various settings such as home health care, mental health care, social welfare, and industrial health care, no study has examined the efficiency of case management with dementia patients [10].

A case manager needs to possess the ability to understand the situation through an interview with the subject, to accomplish the purpose of case management, provide emotional support and information to the subject, understand the resources and information available in the local community for service provision, procure formal and informal resources for the subject, and perform treatment interventions for the family of the subject based on their needs [11]. Case management is conducted in order to more effectively satisfy the complex demands of the subjects and his/her family in the home care service domain [12].

There have been case management studies with chronic patients of diabetes, hypertension, and others such illnesses [13, 14, 15] and with patients with mental illnesses [16]. However, there is a lack of studies on case management for dementia patients [17]. Therefore, the present study developed and examined the effectiveness of a case management program for dementia patients by regularly visiting the patients' home.

1.1. Aim

The aim of this study was to conduct a case management program with mild dementia patients residing in a local community, to examine its influence on the patients' cognitive function, environmental risk assessment, depression, and satisfaction with the case management program.

The specific objectives were:

1) To examine the influence of the case management program on the cognitive function of the subjects.

2) To grasp the effect of the case management program on depression in the subjects.
3) To examine the influence of the case management program on the residential environment risk for the subjects.
4) To assess the subjects' degree of satisfaction with the case management program.

2. Methods

2.1. Design

A one group pre-posttest only design was used to examine the effectiveness of a case management program for mild dementia patents residing in a low-income local community.

2.2. Samples

Among the patients residing in Seoul in 2013, those registered with a public health center, and those diagnosed with mild dementia, the subjects was selected based on following criteria:

1) Those aged over 65 years.
2) Those who signed the written consent form for program participation after understanding the research objectives.
3) Those under dementia associated medication.
4) Those with dementia degree 0.5 points, as measured by the Clinical Dementia Rating (CDR).

2.3. Case-management program

Case management is a Cooperative process in which the inspection, planning, intervention, adjustment, monitoring, and assessment of a service is conducted so that individual health demands can be satisfied with the use of communication and available resources for high quality and cost-effective results [1]. In this study, the case management program included a home visit by a health care nurse, conducted across 10 weeks for mild dementia patients residing in a local community, to grasp their environmental risk, degree of depression, Activities of Daily Living (ADL) and Instrumental Activities of Daily Living(IADL) abilities, and medication compliance. The 10-week case management program was conducted for 1 hour/day, once a week. It was implemented by a public health center nurse. The details of the 10-week case management program have been presented in *Table 1.*

Table 1. Cognitive Health Activities included in the Case Management Program for Mild Dementia Patients Residing in a Local Community

	Title of the Activity	Objective
Week 1	Name introduction, Mosaic of name	Orientation, Concentration, Fine motor activities
Week 2	Creating a calendar	Concentration, Fine motor activities
Week 3	Concentration workbook	Concentration, Spatial perception
Week 4	Creating a clock	Spatial perception, Fine motor activities
Week 5	Find the differences between pictures	Concentration, Spatial perception

Week 6	Arranging clothes seasonally	Spatial perception
Week 7	Relay drawing workbook	Concentration, Spatial perception
Week 8	Recall	Recall capacity, Concentration
Week 9	Creating a flower ball	Concentration, Problem-solving capacity, Fine motor activities
Week10	Creating a frame	Spatial perception, Fine motor activities

2.4. Instruments

2.4.1. The MMSE-K: The Mini Mental Status Examination Korean version (MMSE-K), a revised and supplemented version of the MMSE developed by Folstein, Folstein, and McHugh [18], adapted for use with Korean elderly by Kwon and Park [19], was used to assess cognitive function in the present study. The MMSE-K is a 12-item questionnaire that includes time and place orientation, memory registration, memory recall, attention and calculation, language capabilities, understanding and judgement, and the highest score is 30 points; a score higher than 24 points is considered normal, and lower scores correlate to lower cognitive function. Because it has been educational level influences the MMSE score [20], correction points were assigned to the questions for which non-educated subjects had significantly fewer points. Using the standards of [21], the scores were classified as follows: higher than 24 points a normal; 20-23 points indicates mild dementia; 10-19 points indicates moderate dementia and lower than 9 points indicates severe dementia.

2.4.2. The CDR: The Clinical Dementia Rating (CDR) developed by Morris [22], which was translated and whose validity and reliability were examined on a Korean sample by Choi *et al*. [23]was used for assessment of dementia level. The CDR was developed as a tool to differentiate between stages of dementia. The score reflects the impact of cognitive impairment on daily activities and excludes physical disability as a result of the disease process. The updated CDR uses a semi-structured interview to rate performances across six domains associated with dementia: memory, orientation, judgment and problem solving, community affairs, home and hobbies, and personal care [22]. The domains are scored independently of each other, although memory is considered to be the primary category. The category with the highest ranking (i.e., greatest level of impairment) is used to determine the CDR global score (CDR-GS), which ranges between 0 and 3, where 0 = absence of symptoms, 0.5 = questionable, 1= mild, 2= moderate, and 3=severe dementia [24].

2.4.3. ADL/IADL: The K-ADL, an adaptation of a tool developed by Katz [25], adapted for use with Koreans by Won *et al*. [26] was used to assess ADL abilities. Similarly, the K-IADL, an adaptation of a tool developed by Lawton and Brody [27], adapted for use with Koreans by Won *et al*. [26] was used to assess IADL abilities.

2.4.4. Depression: It was measured using the Korean version of the Short Form of the Geriatric Depression Scale (SGDS) developed by Cho *et al*. [28]. It was administered as a basic screening measure for depression in older adults. This is a 15-item self-reported binary response format with a range of scores from 0 to 15. The responses are scores as follows: “Yes”=1 point and “No”=0 point. The higher the score, the more severe is the depression. Scores below 5 points are classified as normal, those of 5–9 as high possibility of depression, and 10 and above as depression.

2.4.5. Environmental assessment: The environment in and outside the family home, which can affect the safety of the dementia patient, was assessed using 23 questions with 'Yes' or 'No' responses. Higher scores are indicative of a highly safe family environment. The tool is divided into seven criteria that focus on how the environment can promote: 1) meaningful interaction between patients, their families 2) well-being, 3) eating and drinking, 4) mobility, 5) continence and personal hygiene, 6) orientation, 7) calm, safety and security.

2.4.6. Medication compliance: Data related to the name and type of current medication; use of psycho-pharmaceuticals such as anti-anxiety, anti-depressant, and sleeping pills; medical monitoring of drugs consumed; and medication compliance were collected.

2.5. Data analysis

Collected data were analyzed using the IBM SPSS 17.0. Descriptive statistics were examined for the general characteristics of the subjects and their cognitive function, ADL/IADL abilities, depression, safety of family environment, and medication assessment measured before intervention. Differences in the MMSE scores, and depression and family environment safety scores of the subjects before and after the implementation of the case management program were examined with the paired t-test.

3. Results

3.1. General Characteristics of the Subjects

The sample comprised 10 subjects, including 2 men and 8 women, with an average age of 73.7 years. Five elderly lived alone, and only 1 subject lived with his/her spouse or siblings. The average MMSE score was 16.0 points and average CDR score was 1.05±0.72 points. The average ADL score was 6.2 points, average IADL score was 12.1 points, and average depression score was 6 points. These results are presented in *Table 2*.

Table 2. Characteristics of the subjects (N=10)

Characteristics	categories	N (%)	range	Mean(SD)
Gender	Man	2 (20%)		
	woman	8 (80%)		
Age(yr)	65-70	2 (20%)		73.7 (3.9)
	71-75	6 (60%)		
	76-80	2 (20%)		
Cohabitation	Single residence	5 (50%)		
	With spouse	4 (40%)		
	With spouse and others	1 (10%)		
MMSE-KC	-	-	10 ~ 25	16.0 (4.4)
CDR score	-	-	0.5 ~ 3.0	1.1 (0.7)

ADL	-	-	0 ~ 24	6.2 (7.7)
IADL	-	-	4 ~ 21	12.1 (5.2)
Depression	-	-	3 ~ 8	6.0 (1.9)

3.2. Effect of the Case Management Program

The pre and post intervention MMSE scores were 16 and 13.5 points, respectively, out of a total of 30 points, presenting no significant differences between the two assessments. The pre and post intervention depression scores were 6 and 3.22 points, respectively, out of the total 9 points, presenting a significant difference (t=2.676, p=.028). The pre and post intervention environmental risk assessment scores were 11.9 and 12 points out of the total 23 point, presenting no statistically significant differences, despite a marginal increase in the score. This was assessed based on 9 questions that employed a 5-point rating scale. The mean score was 39.22± 5.54 points out of a total of 45 points, and 4.36±0.62 points out of a total of 5 points for the question, indicating very high satisfaction. In medication compliance, out of the 10 subjects, 5 were on medication such as psycho-pharmaceuticals (2 persons), anti-anxiety (1 persons), anti-depressant (3 persons), and sleeping pill (1 persons). Among them, 1 subject responded that he/she did not have opportunities to discuss about the medication with a doctor although he/she was under medication. In regards to medication compliance, most subjects reported "Always" (4 persons), followed by "80% or higher" (2 persons), and "Under 80%" (2 persons). These results are presented in *Table 3*.

Table 3. Comparison of Scores before and after the Implementation of the Case Management Program Intervention (N=10)

Variables	Before Mean (SD)	After Mean (SD)	t	*p*
MMSE-KC	16.0 (4.4)	13.5 (4.1)	1.20	.26
Depression	6.0 (1.9)	3.2 (2.1)	2.68	.03
Environment safety	11.9 (3.1)	12.3 (2.3)	0.58	.57
Satisfaction	-	4.0 (0.6)	-	-

4. Discussion

The aging population is predicted to lead to an increase in the prevalence of cognitive impairment and dementia, with the majority of people with a diagnosis of dementia living in the community [29]. Though disability in the older adult is multi-factorial, a fairly consistent set of risk factors is associated with functional decline in older adults admitted. Age, lower functional status, cognitive impairment and pre-morbid IADL disability are associated with functional decline [30]. Additionally, patients with dementia are more likely to be admitted to hospital than age-matched peers and acute exacerbations of medical conditions accelerate functional decline [31].

It has been demonstrated that, regardless of education, participation in stimulating cognitive activities in adulthood may boost reserve, delaying the onset of dementia [32]. However, it is not clear whether engagement in cognitive activities for short-term periods of time is sufficient to impart reserve. In this regard, there is scant evidence to support that the benefits of cognitive intervention programs in Alzheimer's disease patients will vary with educational attainment [33]. Contador *et al*.[33] found evidence of beneficial effects of cognitive interventions in

patients with mild Alzheimer's disease, regardless of educational attainment. Meanwhile, Olazaran *et al*.[34] reported that patients with mild cognitive impairment and mild to moderate Alzheimer's disease patients with low educational attainment benefited more than highly educated patients from a cognitive-motor intervention after 6 and 12 months of intervention. Therapies focused on cognitions are widely recognized for people with dementia, although the effectiveness and potential improvements of the diverse approaches in non-cognitive domains are not consistently established [35].

Similar to the present study [36], according to a case report on in-home management by Choi [17], there was no change in the cognitive function measured using the MMSE-K as a result of an in-home management intervention of over 1 year with 71 males. Furthermore, it was reported that there was only partial control of patient's symptoms with instruction on continuous medication, and positive improvement in the physical disability and daily life performance domains. Kim *et al*. [14] reported that there was a significant improvement in the motor and cognitive function as a result of a case management program for 61 stroke patients. This study indicated that the cognitive function of dementia patients completing case management did not improve evidently. In accordance with this result, the present study suggests that it is important to delay aggravation of disease by case management. Further research will be considered in the light of the outcome of this study.

As prevalence rates of between 30% and 50% are most frequently reported, depression is fairly common in patients with Alzheimer's disease and other dementias [37]. Depression is related to serious adverse consequences such as substantial distress for both the individual concerned and their caregiver. Moreover, depression reduces quality of life, triggers social and interpersonal function impairment, results in more rapid cognitive decline and greater caregiver burden and depression [38]. Residents with depression are strongly associated with symptoms of agitation, verbal and physical behavioral difficulties, and higher care needs which increases with the severity of the depressive symptoms [39].

Recently, researches in the US have reported the results of study of a prospective behavioral activities intervention (BE-ACTIV) to treat depression in nursing home residents with dementia [40]. The purpose of 10-week intervention is to increase residents' involvement in simple, pleasurable activities, thereby increasing pleasure and positive affect. This study could be understood in the same context. As the program progressed, mild dementia patients engaged and form a rapport with their nurses. In other words, the conclusion I draw from this study is that people with dementia would be more inclined to feel less depressed if they were involved in case management.

There has been an inseparable link between dementia and environment. As the symptoms of dementia are aggravated, activity of daily living will be reduced and risk of unexpected accidents will be increased. Moreover, as only one caregiver looks after the patient, environmental support to alleviate one's anxiety is urgently needed. Accordingly the creation of more dementia-friendly environments that enable people to retain their independence is now recognized as an integral element in improving the care of people with dementia [41]. Working with the housing and dementia research consortium, the reliability of the tools will be tested and given consideration to the usefulness of aggregating scores from a range of different sites. It is also envisaged that the tools will be used for research and development purposes. They focus on those aspects of the physical care environment that are particularly important for people with dementia, getting these right for people with dementia also likely to enhance the experience of all the people who live in, work in and visit a range of care environments [42]. Although, the relation between case management and environmental safety was not reported, the form of a home visit by a health care nurse was well-suited for assessing environment safety. From now on,

case management program in Korea is needed to take active intervention in regard to the environment.

A significant decrease in the burden on the subjects and their family was reported, which indicated a very favorable reaction toward the case management. Although these findings cannot be directly compared due to the difference in the sample, the subject and family satisfaction was very high in the present study (4.4 point out of 5). Thus, it implies high compliance with case management.

Generally, case management turns into an individualized program even when detailed guidelines are provided beforehand. Although this is the strongest advantage of the case management method, it is nearly impossible to conform to the program schedule or quantify the degree of goal accomplishment due to this variability. Since the quantification of the process and results of the assessment of the program are solely dependent on the professionalism of the case manager, there may vary by how the case manager works. Therefore, it is necessary to present more objective research results through before and after case management comparisons using a tool with proven reliability and validity after screening and classifying the patients in advance, based on the degree of dementia, and modifying the program accordingly.

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