

# A cross-sectional survey of nursing-home inpatients with dementia or physical disability in patients' assessments

主治医意見書を用いた老人介護施設の入所患者の  
認知症や身体的機能低下に関する横断的研究

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## 1. INTRODUCTION

In Japan, the proportion of the population made up of persons 65 years of age or older is projected to increase from 17.3 percent in 2000 to 29.6 percent by 2030 because of the aging of the baby-boom generation and increased longevity<sup>1)</sup>. The fact that elderly persons use health care services at a greater rate than younger people has profound implications for the future delivery and financing of health care. Traditionally health care has included not only services like doctors' consultations, pharmaceutical benefits and hospital admissions but also nursing home and long-term care. Increases in the number of persons 65 years of age or older, ie, those who are most likely to require nursing home and other long-term care, is predicted to exert major pressures on the National Nursing Care Scheme, which pays for about half the total costs of nursing home care.

With this in mind the Japanese government has spun off the National Nursing Care Scheme (Kaigo Hoken) as an entity separate from the National Health Insurance system (Kokumin Kenko Hoken). This move aims to deal with aged care as a non-medical issue<sup>2)</sup>.

(Most elderly people admitted to nursing homes display some form of dementia. Predicting dementia can be a useful way of estimating future nursing care admissions.)

Presently the National Health Insurance system and National Nursing Care Scheme are separate systems, with

the former covering medical care only and the latter dealing with the provision of nursing care of the elderly. However in the case of severe dementia, there is a limit on the kind of care which can be given at a nursing home and in many cases patients need both medical and nursing care.

In general, it is well-established that, with the exception of Alzheimer's Disease, most dementia can be caused by underlying diseases such as stroke, head injury and long periods spent in a bed-ridden condition as a result of heart attack. Changes of circumstance such as admission into a nursing home or physical deterioration as a consequence of, for example, heart failure, renal failure or a major bone fracture, can trigger psychotic confusion and result in dementia. Inquiries into the incidences and causes of dementia is an important step towards improving the quality of care in nursing homes. Stroke induced dementia and Alzheimer's Disease in particular, are two of the leading causes of disability and decreased quality of life among the elderly<sup>3)</sup>.

In the next 50 years, the prevalence of dementia in "require for assistance" assessed by Residential Care Committee in every local government under the National Nursing Care Scheme (Kaigo Hoken) is projected to over double. This dramatic increase will result primarily from the general aging of the population. The percentage of Japanese older than 75 years of age is predicted to

increase from approximately 7.1 percent in 2000 to 21.5 percent in 2050<sup>1)</sup>. Information about the onset of disability caused by underlying disease or dementia is obviously important for patients, families and caregivers. It is also useful when planning for the provision of health care services.

The purpose of this study is to look at exactly what conditions lead to elderly people being admitted to nursing homes, and to design a functional classification of disability in elderly people based on firstly, underlying disease in general and secondly, the presence and degree of dementia.

## 2. METHODS

### (1) Sources of Data

Our study is based on 398 patient assessments taken from elderly patients in four nursing homes. The patient assessments consisted of a checklist of 88 items used to comprehensively evaluate patients' physical and mental condition, with particular reference to any underlying disease. The patient assessments followed the standardized format established by the Ministry of Labor, Health and Welfare in 2000. Every six months doctors assess and re-evaluate these items.

### (2) Data analysis

The data of patient assessments was analyzed with the aim of describing:

1. A functional classification of disability in elderly people suffering from the 15 types of diseases covered under the National Nursing Care Scheme.
2. A functional classification of disability in elderly people suffering specifically from dementia (being one of the 15 types) and receiving care under the National Nursing Care Scheme.
3. A classification of diagnosis in elderly people suffering from the underlying diseases (involving dementia).

Furthermore, we analyzed the assessments of 398 elderly patients in order to classify:

1. Disability as a function of disease, in accordance with

the 15 types of disease as set out by the National Nursing Scheme. Appendix 1 shows that the criterion (the level of disability) is divided into 9 categories from Normal (no disability) to C2 (unable to roll over without assistance). 2. Disability as a function of dementia in accordance with the 8 types of dementia set out by the National Nursing Scheme. Appendix 2 shows that the criterion (the degree of dementia) is divided into 8 categories from Normal (no disability) to M (extreme episodes of dementia). Finally we looked at socially inappropriate behaviors (cognitive disability, communicative competence, problematic behaviors) as a function of underlying disease (including dementia) .

### (3) Statistical analysis

We analyzed the data using correlation analysis with calculation of Pearson's correlation coefficient for the following factors: 1.the level of disability (9 categories), 2.the degree of dementia (8 categories), 3.cognitive ability (4 categories), 4.communicative competence (5 categories), 5.problematic behaviors (12 types), and 6.age-groups. In 5 problematic behaviors, where patients exhibited more than one problematic behavior the patient received a score for each behavior exhibited.

We used SPSS 12.0J statistical software (SPSS Japan) for all data analysis.

### (4) Ethical considerations arising from privacy issues in epidemiological studies

The data were taken from patient assessments, carried out in four nursing homes, for the purposes of the National Nursing Care Scheme. Although individual written informed consent was not obtained from each subject, prior to embarking on the study the researchers explained the purpose, contents and strict confidentiality of this study to the Directors of the nursing homes and received permission to access the data in compliance with Japanese Privacy Law. To preserve the confidentiality of questionnaire data researchers assigned random numbers instead of using actual names. Nor did researchers enter

addresses or dates of birth into the database but relied on the assigned random numbers. Codes matching the random numbers to individual names were kept under the control of the administrators of the nursing homes.

### 3. RESULTS

Table 1 shows patients classified according to disease. Men comprised 30.2 percent of the patients and women 69.8 percent. Most of the patients from the four nursing homes were aged between 70 and 89, and comprised 73.4 percent of the total number of patients.

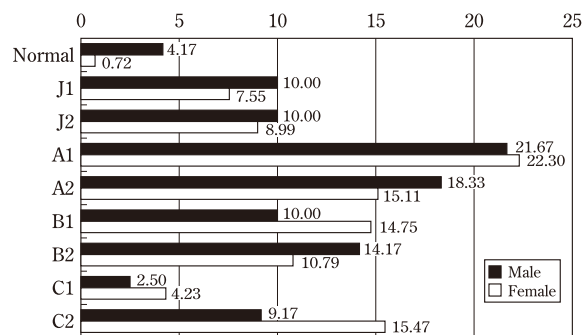
**Table 1** Number of participants, sex, categories of diseases and age

Sex	Categories of diseases	Age						Total
		50-59	60-69	70-79	80-89	90-99	100-	
Male	Dementia		1	9	16	5		31
	Cerebrovascular disease	1	5	32	21	3		62
	Musculoskeletal disorder		1	2	5	8		16
	Senile psychosis		1	3	1			5
	Disuse syndrome			3	1			4
	Chronic heart failure				1	1		2
	Total	1	8	49	45	17		120
	Female	Dementia	1	2	22	44	14	
Cerebrovascular disease		1	5	24	43	18	2	93
Musculoskeletal disorder		1	1	8	35	20	1	66
Senile psychosis				7	6	3		16
Disuse syndrome					2	9		11
Chronic heart failure					5	1		6
Chronic renal failure					2	1		3
Total		3	8	61	137	66	3	278
Total	4	16	110	182	83	3	398	

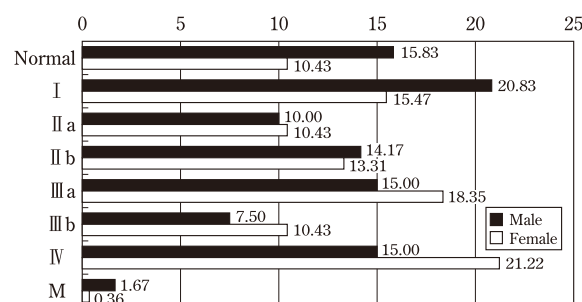
Fig.1 shows functional classification of disability in elderly people suffering from the 11 categories of diseases covered under the National Nursing Care Scheme. Fig.2 shows functional classification of disability in elderly people suffering from dementia.

According to the criteria for the level of disability, 40.6 percent of patients occupied the categories B1 to C2 inclusive. For patients of category B1 and above nursing care within the home is essential.

In particular, in categories C1 and C2 there was a significantly greater proportion of female patients than male. On the other hand, for patients exhibiting dementia, 44.8 percent fell within categories III a through M. Patients falling within category III a or above displayed socially inappropriate behaviors which made special nursing care essential.



**Fig.1** The proportion of functional classification of disability in elderly people suffering from the 15 categories of diseases by sex



**Fig.2** The proportion of functional classification of disability in elderly people suffering from dementia by sex

Table 2 shows a cross-sectional analysis between the level of disability and the level of dementia. Contrary to what one might expect there was actually one patient who fell with the category “Normal” in relation to both the level of disability and the level of dementia. 46 patients fell under disability category C2 and displayed category IV dementia. This was the largest group out of all the 72 possible combinations (9 categories of disability and 8 categories of dementia).

**Table 2** A cross-sectional category between the level of disability and the level of dementia

		The level of disability								Total
		Normal	I	II a	II b	III a	III b	IV	M	
The level of disability	Normal	1	2	1	2	0	0	1	0	7
	J1	8	9	5	9	1	1	0	0	33
	J2	16	8	5	3	3	1	0	1	37
	A1	13	22	10	14	21	6	2	0	88
	A2	3	10	9	13	15	10	3	1	64
	B1	5	10	8	7	11	3	9	0	53
	B2	2	6	2	5	11	8	12	1	47
	C1	0	0	1	1	3	6	4	0	15
	C2	0	1	0	0	4	3	46	0	54
Total	48	68	41	54	69	38	77	3	398	

Table 3 shows patients classified according to cognitive disability, communicative competence and problematic behaviors. Eighty percent of elderly patients suffered from short-term memory loss. In particular 49.5 percent of patients required special care because of diminished

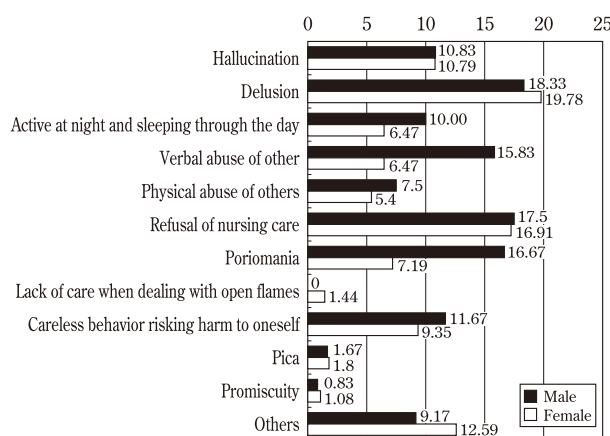
**Table 3** The distribution of comprehensive ability and memory

		Male		Female		Total	
		N	%	N	%	N	%
Short term memory	Experiences no problems	27	22.5	48	17.27	75	18.84
	Experiences problems	92	76.67	229	82.37	321	80.65
	No response	1	0.83	1	0.36	2	0.5
Cognitive ability	Normal	30	25	55	19.78	85	21.36
	Has some difficulty	38	31.67	76	27.34	114	28.64
	Supervision required	21	17.5	63	22.66	84	21.11
	Complete lack of cognitive ability	29	24.17	84	30.22	113	28.39
	No response	2	1.67	0	0	2	0.5
Communicative ability	Normal	48	40	86	30.94	134	33.67
	Has some difficulty communicating	27	22.5	74	26.62	101	25.38
	Communicate concrete concepts only	24	20	62	22.3	86	21.61
	Unable to communicate	20	16.67	55	19.78	75	18.84
	No response	1	0.83	1	0.36	2	0.5
Eating	Requires no assistance	103	85.83	220	79.14	323	81.16
	Cannot eat without assistance	15	12.5	56	20.14	71	17.84
	No response	2	1.67	2	0.72	4	1.01
Total		120	100	278	100	398	100

cognitive ability. Forty point five percent of patients suffered from diminished communicative competence, leading them to them becoming a greater burden on the care system. Seventeen point eight percent of patients cannot eat without assistance.

Forty four point two percent of patients exhibit some form of problematic behavior, and 28.4 percent suffer from more than one behavioral problem. Fig.3 shows the number of patients suffering from each of 12 types of problematic behaviors. The most common form of problematic behavior is delirium, exhibited by 19.3 percent of patients, followed by refusal of care (17.1 percent). Verbal abuse and poriomania occur more frequently in men than in women.

In the “Normal” category of disability, poriomania and nocturnal activity were the most common of the 12 types of problematic behaviors. In the A1 and A2 categories poriomania was the most common behavior. In categories B1 and B2 it was ‘careless behavior risking harm to



**Fig.3** The proportion of problematic behavior by sex

oneself’ and in the C1 and C2 categories, hallucination and delusion. In category I and II dementia, hallucination and delusion were the most frequent of the 12 types of problematic behaviors, followed by verbal abuse of others. In categories III through M delusion and refusal of nursing care were most frequent.

**Table 4** Number of problematic behaviors in each category of both the level of disability and dementia (N)

	Sex			The level of disability					The level of dementia					
	Male (120)	Female (278)	Total (398)	Normal (7)	J (70)	A (152)	B (100)	C (69)	Normal (48)	I (68)	II (95)	III (107)	IV (77)	M (3)
Hallucination	13	30	43	1	6	16	11	9	0	4	11	14	12	2
Delusion	22	55	77	1	6	32	24	14	0	5	16	37	16	3
Active at night and sleeping through the day	12	18	30	2	0	10	11	7	0	0	3	14	11	2
Verbal abuse of other	19	18	37	1	2	18	11	5	0	4	6	19	6	2
Physical abuse of others	9	15	24	1	2	13	4	4	0	2	3	13	6	0
Refusal of nursing care	21	47	68	1	7	29	22	9	0	3	11	36	16	2
Poriomania	20	20	40	3	3	26	8	0	0	1	11	20	7	1
Lack of care when dealing with open flames	0	4	4	0	1	3	0	0	0	0	3	1	0	0
Careless behavior risking harm to oneself	14	26	40	0	2	19	13	6	0	2	5	21	12	0
Pica	2	5	7	0	0	1	3	3	0	0	0	5	2	0
Promiscuity	1	3	4	0	0	3	1	0	0	0	1	2	1	0
Others	11	35	46	2	4	21	13	6	0	5	14	18	9	0
Total	144	276	420	12	33	191	121	63	0	26	84	200	98	12

Table 5 shows the result of correlation analysis. There was no significant correlation between age- groups and other 5 factors (1. the level of disability, 2. the degree of dementia, 3. cognitive ability, 4. communicative competence, and 5. problematic behaviors). There is a positive correlation between the following four factors: disability resulting from disease, dementia, cognitive ability and communicative competence. That is to say, these four factors are in correlated, irrespective of the different values of correlation coefficients. There was also a weak positive correlation between the following three factors: problematic behaviors, level of dementia, and cognitive ability.

**Table 5** The value of Correlation analysis

	Age	The level of disability	The level of dementia	Cognitive ability	Communicative ability	Problematic behavior
Age	—					
The level of disability	.171**	—				
The level of dementia	.223**	.649**	—			
Cognitive ability	.188**	.526**	.821**	—		
Communicative ability	.082	.546**	.748**	.804**	—	
Problematic behavior	.093	.046	.384**	.340**	.164**	—

\*\*p < .01

Our results indicated that the degree of disability in elderly people had a linear correlation with the level of dementia, cognitive ability and communicative competence. In addition, our results indicated that as dementia worsens the first symptoms to manifest are a decrease in cognitive ability along with displays of socially inappropriate behavior.

#### 4. DISCUSSION

Our study of the use of a standardized patient assessment describing the mental and physical condition of elderly patients in nursing homes provides a unique perspective on the relationship between individual factors (such as age, medical history and underlying physical injury or disease) and the development of dementia, and further, provides a new methodology to analyze socially inappropriate behaviors in patients receiving nursing care.

In our study there was actually one patient who fell with the category “Normal” in relation to both the level of disability and the level of dementia. This patient had no

relatives, had experienced problems living alone and following a period of homelessness was admitted to a nursing home under local government policy.

It is commonly accepted that being bedridden for extended periods as the inevitable result of, for example, fractures, stroke or dehydration can lead to the development of dementia in elderly patients<sup>4)</sup>. The results of correlation analysis showed a strong correlation between the level of dementia and the level of disability. Our study showed that once patients' underlying physical diseases worsened, the patients tended to develop secondary dementia with cognitive and communicative disability, however, social problematic behaviors caused by secondary dementia were not an obstacle in the provision of nursing home care.

We suggest two reasons for this. Firstly, care specialists in nursing homes are trained to cope with dementia and its attendant behaviors. In addition, where behavioral problems did interfere with the provision of care, we surmise that such patients were admitted to psychiatric hospitals by their treating physicians.

Recently discussion<sup>5)</sup> has focused on whether it is more appropriate for the elderly who are suffering from mild dementia or mild physical disability to be treated at home or given nursing home care. Some reports<sup>6)7)</sup> even suggest that admitting elderly people with underlying diseases to a hospital can be the event which triggers the development of symptoms of dementia. In the initial period following admission to a nursing home elderly patient may be confused by their new surroundings, resulting in the symptoms of secondary dementia. However, if the nursing home environment is closer to that of a house than that of a hospital, we suggest it would take patients less time to become acclimatized and that the symptoms of dementia may be ameliorated. Nursing home based specialized service, adjusted to the specific needs of individuals, may be the key to solving the social problem of providing nursing care for Japan's increasing elderly population.

In Japan, children have traditionally cared for their

parents when they become elderly. The number of two incomes families is increasing and fewer families are taking care of elderly family members at home<sup>8)</sup>. Changes in the family structure (decreases in the number of extended families and a decrease in the number of children per family) combined with changing trends in social institutions (fewer people getting married) will lead to elderly people having to care for other elderly people<sup>9)</sup>. In the Japanese welfare system nursing home care based on the National Nursing Care Scheme (Kaigo Hoken) plays a far more important role than at-home care. The Group Home Care System is growing and will eventually be the largest component of the National Scheme.

The study does however have some limitations. It may not be possible to generalize these results beyond the sample group, which comprised patients from four neighboring nursing homes in one prefecture. Further studies should be conducted based on larger samples. Moreover, as the research design was cross-sectional we cannot establish a temporal relationship between becoming bedridden due to underlying disease or injury and the onset of secondary dementia (ie non-Alzheimer's related). Longitudinal studies would provide valuable information on the etiology of secondary dementia and the duration of disability due to underlying disease or injury.

Our research suggests that the degree of disability in elderly patients has a crucial influence on cognitive ability, communicative competence and the development of dementia. There are however many variables besides those examined in this study. Doctor's diagnostic bias in patient assessments (at least four doctors wrote the patient assessments), the categorical bias of disability and dementia (the levels of dementia overlap), and unclear differentiation in the 12 types of problematic behaviors could all possibly be associated with the over or under-estimation of dementia in our data analysis. Therefore, more research is needed to investigate the interrelated factors which affect the levels of disability and dementia in the elderly.

Future progress in meeting the public health challenges

of dementia in nursing homes should aim not only to increase the life expectancy of patients but to also improve patient quality of life and work towards the prevention of the kinds of disease and injury which lead to the development of dementia.

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## Appendix 1

Functional classification of disability in elderly people suffering from the 15 categories of diseases covered under the National Nursing Care Scheme.

Normal : Perfectly healthy adult. (Some illness present but completely self reliant.)

Rank J : Despite the presence of some minor disabilities the person can live by themselves and make trips outside the home.

J1 : Able to use public transport.

J2 : Able to walk around their neighborhood.

Rank A : Self reliant within the home but unable to make trips outside the home without assistance.

A1 : Physically active and able to go out shopping etc with assistance.

A2 : Spends a considerable part of the day in bed and rarely ventures outside.

Rank B : Usually confined to bed and requires assistance within the home but able to maintain an upright position in bed.

B1 : Able to use a wheelchair, feed themselves and go to the toilet without assistance.

B2 : Requires assistance when using a wheelchair, when eating and when going to the toilet.

Rank C : Confined to bed all day, requires assistance with eating, dressing and going to the toilet.

C1 : Some mobility in bed (able to roll over).

C2 : Unable to roll over without assistance.

## Appendix 2

Functional classification of disability in elderly people suffering from dementia and receiving care under the National Nursing Care Scheme.

Normal : Perfectly healthy adult. (Some illness present but completely self reliant).

I : Affected by mild dementia, but self reliant at home and socially.

II : Experiences mild symptoms of dementia, for example socially inappropriate behavior, poor rapport and affective contact, however the person can live self-reliantly given occasional supervision.

II a : Displays mild symptoms of dementia outside the home.

II b : Displays mild symptoms of dementia when at home.

III : Experience moderate symptoms of dementia, for example socially inappropriate behaviors, poor rapport and affective contact, necessitating regular supervision.

III a : Displays moderate symptoms of dementia during the day.

III b : Displays moderate symptoms of dementia during the night.

IV : Experience severe episodes of dementia, for example, socially inappropriate behaviors, poor rapport and affective contact, and require constant supervision.

M : Displays extreme episodes of dementia, resulting in for example, hallucinations, violent behavior towards others or the onset of debilitating conditions such as heart failure and renal failure, necessitating medical treatment.

