

Table 2 Continued

Variable	Category	Male caregiver		Female caregiver		P-value
		n %	n = 399	n %	n = 1193	
Money management	Independent	107	26.8	310	26.0	NS
	Mostly independent	75	18.8	194	16.3	
	Fairly dependent	58	14.5	171	14.3	
	Completely dependent	158	39.6	518	43.4	
Medication	Independent	149	37.3	389	32.6	NS
	Mostly independent	47	11.8	148	12.4	
	Fairly dependent	65	16.3	208	17.4	
	Completely dependent	137	34.3	447	37.5	
Telephone	Independent	138	34.6	409	34.3	NS
	Mostly independent	70	17.5	180	15.1	
	Fairly dependent	50	12.5	156	13.1	
	Completely dependent	141	35.3	448	37.6	
Shopping	Independent	30	7.5	84	7.0	NS
	Mostly independent	56	14.0	162	13.6	
	Fairly dependent	94	23.6	241	20.2	
	Completely dependent	219	54.9	706	59.2	
Transportation use	Independent	28	7.0	84	7.0	NS
	Mostly independent	48	12.0	163	13.7	
	Fairly dependent	99	24.8	237	19.9	
	Completely dependent	224	56.1	709	59.4	

The χ^2 -test was conducted between male and female caregiver groups. ADL, activity of daily living; IADL, instrumental activity of daily living; NS, not significant.

The ADL of the dependents in the male and female caregiver groups were matched, except for auditory capacity. Dependents in the female caregiver group were more dependent in IADL. A good explanation for this is that the male dependents were generally unskilled²² and more female caregivers cared for a male dependent than male caregivers.

As for the characteristics of the caregivers, consistent with previous studies,³⁻⁵ male caregivers were more likely to be older than their female counterparts. Also, as mentioned earlier, there was a kinship difference between the male and female caregiver groups. According to previous studies,^{17,23} the differences in age and kinship should be taken into account in analyzing our results.

In items of care services, consistent with previous studies, the male caregiver group was more likely to use home help.^{3,19} It is generally believed that men are less experienced with housework^{3,7} and our results probably reflect this situation. In addition, female caregivers were more likely to use a day care/service in our study. Sugiura *et al.* and Colline *et al.* previously explained that women tended to prefer respite care.^{3,6,22} Our results seem to support their suggestions. Contrary to what might be expected, more frequent use of home-visit nursing care by male caregivers was observed in this study. Male caregivers

were less likely than female caregivers to help an older person with different types of illnesses who may need more nursing care. However, to our knowledge, few studies have so far dealt with this issue.⁷ Additional studies are needed to obtain a more accurate appraisal of the gender differences in the use of in-home care.

Inconsistent with earlier studies,^{3,24} which found that female caregivers showed a higher depression rate than male caregivers, we detected no significant difference in GDS-15 in this study. In addition, the nurses' subjective assessment in this study showed that male caregivers used less formal or informal care, and that male caregivers were in worse health. It is possible that this had a negative effect on the male caregivers, resulting in a higher depressive mood, because there is a strong relation between caregiver burden and depression.^{20,21,25} However, the GDS-15 was developed to assess the depressive mood of the elderly²⁶ and not that of a younger population. We should think of this result only as a suggestion.

Gender differences in caregiver burden

This study focused on differences in caregiver burden according to gender. Our results, regardless of adjusting, did not reveal any difference between male and female caregivers with respect to caregiver burden.

Table 3 Gender differences in main caregiver characteristics

Variable	Categories	Male caregiver N %, mean \pm SD (range)	n = 399	Female caregiver N %, mean \pm SD (range)	n = 1193	P-value
Age (years)		68.3 \pm 12.7 (31–91)		62.5 \pm 12.1 (31–93)		<0.001
Kinship	Spouse	234	58.6	417	35.0	<0.001
	Child	143	35.8	419	35.1	
	Daughter/son-in-law	5	1.3	311	26.1	
	Sibling	8	2.0	27	2.3	
	Other	9	2.3	18	1.5	
	Unknown	0	0.0	1	0.1	
Types of care service use	Day care/service	166	41.6	586	49.1	0.009
	Home-visit rehabilitation	31	7.8	90	7.5	NS
	Home-visit bathing	46	11.5	165	13.8	NS
	Short stay	37	9.3	142	11.9	NS
	Home help	211	52.9	451	37.8	<0.001
	Family physician home-visit	256	64.2	707	59.3	NS
	Home-visit nursing care	232	58.1	609	51.0	0.014
	Housing adjustments	93	23.3	297	24.9	NS
	Care implements rental	237	59.4	770	64.5	NS
Depressive mood GDS-15		5.5 \pm 4.0 (0–15)		5.1 \pm 3.9 (0–15)		NS
Nurse's assessment Use of care service by caregiver	Sufficient	157	39.3	531	44.5	NS
	Average	189	47.4	545	45.7	
	Insufficient	53	13.3	115	9.6	
	Unknown	0	0.0	0	0.0	
Caregiving by family	Sufficient	167	41.9	656	55.0	<0.001
	Average	183	45.9	446	37.4	
	Insufficient	47	11.8	85	7.1	
	Unknown	2	0.5	0	0.0	
Caregiver's health	Excellent	141	35.3	522	43.8	<0.001
	Normal	193	48.4	529	44.3	
	Below standard	63	15.8	135	11.3	
	Unknown	2	0.5	0	0.0	

The χ^2 -test for categorical variables or the unpaired *t*-test for continuous variables was conducted between male and female caregiver groups. GDS, geriatric depression scale; NS, not significant.

This finding supports the result of Aoki *et al.*'s study⁵ and differs from various other studies which suggested that female caregivers showed more caregiver burden than their male counterparts.^{3,6–11} Our results suggest that further studies are needed to prove the gender difference in caregiver burden, at least in Japan. In Japan, the public long-term care insurance system which was implemented in 2000 provides a care-management system by professional care managers.^{27,28} Care management facilitates the selection of appropriate care services for elderly people among available care services provided in the community based on a care need assessment.²⁸ A care manager needs to monitor a dependent's physical and mental condition to assess the latest care need as occasion demands.^{27,28} Therefore, the system provides for a high level of care and helps caregivers cope with

stress, giving them relief from caregiver burden.²⁹ It is possible that the care management system lessened the female caregiver burden and narrowed the gender gap in caregiver burden. Moreover, female caregivers reportedly tend to seek informal support from family and neighbors.^{3,5} We did not investigate the use of informal care, except family care, and therefore we were unable to determine the extent to which caregivers were given informal support by care providers except family.

Study limitation

The current study has several limitations. Although the NLS-FE is a large-scale observational study, it does not include the complete spectrum of elderly patients in the Nagoya area. In addition, the selection of subjects was somewhat biased because the par-

Table 4 Gender differences in caregiver burden and depressive mood

Variable	Category	Male caregiver n %, mean \pm SD (range)	n = 399	Female caregiver n %, mean \pm SD (range)	n = 1193	P	Odds ratio unadjusted	95% CI	Odds ratio adjusted for age	95% CI	Odds ratio adjusted for age and other variables†	95% CI
Caregiver burden							1.004	0.997–1.011	1.004	0.998–1.012	1.004	0.995–1.012
J-ZBI		26.0 \pm 18.5(0–81)		27.3 \pm 17.6(0–84)		NS						
Nurse's assessment												
	Severe	113	28.3	274	23.0	NS						
	Moderate	215	53.9	715	59.9							
	Light	69	17.3	196	16.4							

†Controlling for dependent's age, marital status, number of residents, quality of family relationship, cognitive heart failure, ulcer disease, peripheral vascular disease, cerebrovascular disease person in charge of medication, auditory capacity, food preparation, home maintenance, laundry, caregiver's age, kinship, use of daycare/service, use of home help, use of home-visit nursing care, caregiving by family, and caregiver's health status. The χ^2 -test for categorical variables or the unpaired t-test for continuous variables was conducted between male and female caregiver groups. Multiple logistic regression was used to examine the association between dependent and caregiver characteristics and the Japanese version of the Zarit Burden Interview (J-ZBI). CI, confidence interval; NS not significant.

ticipants were groups of users of home nursing stations using home visiting nurses or care planning services.

Another limitation is that we requested that each station perform its own evaluation due to a shortage of staff and the large quantity of settings. This may have biased the assessors' evaluation and limited the validity of the results, including the nurses' subjective assessment.

Finally, this study is an analysis of data from a large-scale study. Therefore, our database does not always capture the full extent of the dependents' and caregivers' characteristics needed to obtain a precise analysis. A lack of data concerning caregiving period, caregiving hours per day or details of required care weakened the impact of our findings.^{23,30}

CONCLUSION

We conducted a subanalysis of a large scale observational study in Japan. Our results indicated that there were no differences in caregiver burden between male and female caregivers. Further studies are needed to confirm whether or not gender differences do in fact exist.

ACKNOWLEDGMENTS

We are grateful to all participants in this study. We also thank Ms. N. Sano for her editorial work.

Conflict of interest declaration

The authors declare that they have no competing interests.

REFERENCES

- Ito H, Tachimori H, Miyamoto Y, Morimura Y. Are the care levels of people with dementia correctly assessed for eligibility of the Japanese long-term care insurance? *Int J Geriatr Psychiatry* 2001; **16**: 1078–1084.
- Kuuppelomaki M, Sasaki A, Yamada K, Asakawa N, Shimanouchi S. Family carers for older relatives: source of satisfaction and related factors in Finland. *Int J Nurs Stud* 2004; **41**: 497–505.
- Sugiura K, Ito M, Mikami H. Evaluation of gender differences of family caregivers with references to the mode of caregiving at home and caregiver distress in Japan. *Nihon Koshu Eisei Zasshi* 2004; **51**: 240–251.
- Kawamoto R, Okamoto K, Yamada A, Oguri T. A study of the degree of burden and subjective sense of wellbeing in caregivers involved in home care. *Jpn J Geriatr* 1999; **36**: 35–39.
- Aoki Y, Yamada M, Matsumoto Y et al. Characteristics of male-caregiver's burden in home care for the aged with dementia: comparative analysis of burden to relevant factor and coping with female-caregiver. *Hokuriku Koshu Eisei Gakkaishi* 2003; **30**: 6–11.

- 6 Barusch AS, Spaid WM. Gender differences in caregiving: why do wives report greater burden? *Gerontologist* 1989; **29**: 667–676.
- 7 Miller B, Cafasso L. Gender differences in caregiving—factor or artifact? *Gerontologist* 1992; **32**: 498–507.
- 8 Neal MB, Ingersoll DB, Starrels ME. Gender and relationship differences in caregiving patterns and consequences among employed caregivers. *Gerontologist* 1997; **37**: 804–816.
- 9 Gilbar O. Gender as a predictor of burden and psychological distress of elderly husbands and wives of cancer patients. *Psychoncology* 1999; **8**: 287–294.
- 10 Gallicchio L, Siddiqi N, Langenberg P, Baumgarten M. Gender differences in burden and depression among informal caregivers of demented elders in the community. *Int J Geriatr Psychiatry* 2002; **17**: 154–163.
- 11 Higashino S, Kirino M, Taneda A, Yajima Y, Tsutui T, Nakajima K. Caregiver burden among family members of frail elderly Kousei. *No Shihyo* 2004; **51**: 18–23 (in Japanese).
- 12 Niino N, Imaizumi T, Kawakami N. A Japanese translation of the geriatric depression scale short-form. *Clin Gerontologist* 1991; **10**: 85–86.
- 13 Arai Y, Kudo K, Hosokawa T, Washio M, Hisamichi S. Reliability and validity of the Japanese version of the Zarit Caregiver Burden Interview. *Psychiatry Clin Neurosci* 1997; **51**: 281–287.
- 14 Hirakawa Y, Masuda Y, Kimata T, Uemura K, Kuzuya M, Iguchi A. Effects of home massage rehabilitation therapy for the bedridden elderly: a pilot trial with a three-month follow-up. *Clin Rehabil* 2005; **19**: 20–27.
- 15 Almborg B, Jansson W, Grafstrom M, Winblad B. Differences between and within genders in caregiving strain: a comparison between caregivers of demented and non-caregivers of non-demented elderly people. *J Adv Nurs* 1998; **28**: 849–858.
- 16 Acton GJ, Kang J. Interventions to reduce the burden of caregiving for an adult with dementia: a meta-analysis. *Res Nurs Health* 2001; **24**: 349–360.
- 17 Chumbler NR, Grimm JW, Cody M, Beck C. Gender, kinship and caregiver burden: the case of community-dwelling memory impaired seniors. *Int J Geriatr Psychiatry* 2003; **18**: 722–732.
- 18 Morimoto T, Schreiner AS, Asano H. Caregiver burden and health-related quality of life among Japanese stroke caregivers. *Age Ageing* 2003; **32**: 218–223.
- 19 Morris RG, Woods RT, Davies KS, Morris LW. Gender differences in cares of dementia sufferers. *Br J Psychiatry* 1991; **158**: 69–74.
- 20 Nishimura R. Consideration on the relationship between depression in elderly people and psychosocial factors. *Hiroshima J Med Sci* 1999; **52**: 218–221.
- 21 Maki N, Ikeda M, Hokoishi K *et al*. Effect of demographic factors on geriatric depression scale (GDS) in healthy older adults. *Ronen Seishin Igakkai Zasshi* 2001; **12**: 795–799 (in Japanese).
- 22 Collins C, Jones R. Emotional distress and morbidity in dementia carers: a matched comparison of husbands and wives. *Int J Geriatr Psychiatry* 1997; **12**: 1168–1173.
- 23 Ohya N, Suzuki M, Yamada K. Analysis of caregiver burden among the family caregivers. *Ronen Kango Gaku* 2001; **6**: 58–66.
- 24 Yee JL, Schulz R. Gender differences in psychiatric morbidity among family caregivers: a review and analysis. *Gerontologist* 2000; **40**: 147–164.
- 25 Arai Y, Sugiura M, Washio M, Miura H, Kudo K. Caregiver depression predicts early discontinuation of care for disabled elderly at home. *Psychiatry Clin Neurosci* 2001; **55**: 379–382.
- 26 Schreiner AS, Hayakawa H, Morimoto T, Kakuma T. Screening for late life depression: cut-off scores for the Geriatric Depression Scale and the Cornell Scale for Depression in Dementia among Japanese subjects. *Int J Geriatr Psychiatry* 2003; **18**: 498–505.
- 27 Nakatani H, Shimanouchi S. Factors in care management affecting client outcomes in home care. *Nurs Health Sci* 2004; **6**: 239–246.
- 28 Matsuda S. The health and social system for the aged in Japan. *Aging Clin Exp Res* 2002; **14**: 265–270.
- 29 Kitahama S, Takemasa S, Shimada T. Effect of long-term care insurance on physical ability and psychological states of its clients and care-burden of their caregivers. *Kobe Daigaku Igakubu Hokengakka Kiyo* 2003; **19**: 15–25.
- 30 Kuwahara Y, Washio M, Arai Y. Burden among caregivers of frail elderly in Japan. *Fukuoka Acta Med* 2001; **92**: 326–333.

Predicting Recovery of Upper-Body Dressing Ability After Stroke

Makoto Suzuki, MA, OT, Mikayo Omori, OT, Mayumi Hatakeyama, OT, Sumio Yamada, PhD, PT, Kazuhiko Matsushita, PhD, MD, Setsu Iijima, PhD, MD

ABSTRACT. Suzuki M, Omori M, Hatakeyama M, Yamada S, Matsushita K, Iijima S. Predicting recovery of upper-body dressing ability after stroke. *Arch Phys Med Rehabil* 2006;87:1496-502.

Objective: To identify predictors of the recovery of independent dressing ability after stroke.

Design: Prospective cohort study.

Setting: Rehabilitation unit at a university hospital.

Participants: Sixty-three consecutive stroke patients were enrolled in the study. Twelve patients were not able to complete the study because they were discharged or transferred to another hospital before study completion.

Intervention: Fifty-one patients underwent and completed 15 days of dressing training based on the time-delay method, which included the 10 component actions of upper-body dressing and 4 cues given by therapists.

Main Outcome Measures: The dressing item of the FIM instrument, Brunnstrom motor recovery stages, presence or absence of deep and tactile sensation, Rey-Osterrieth complex figure test, Kohs block design test, body image test, Weintraub cancellation task, and presence or absence of the visual extinction phenomenon and the motor impersistence phenomenon.

Results: The FIM upper-body dressing item score and the cancellation task score at the start of training were significantly better in patients who achieved independence in dressing within 15 training days than in patients who did not ($P < .05$). The motor impersistence phenomenon was found less frequently among patients who achieved independence in upper-body dressing than among patients who did not ($P < .05$). However, logistic regression analysis showed that only the FIM score for upper-body dressing on the first day of training was a significant independent predictor of dressing ability at the end of training (odds ratio, 4.33; 95% confidence interval, 1.51–12.37). The receiver operating characteristic curve indicated that a cutoff score of 3 would provide the best balance between sensitivity and specificity for the FIM upper-body dressing item. The positive predictive value of this cutoff score was .90, and the negative predictive value was .70.

Conclusions: Our findings indicate that the FIM upper-body dressing score on the first day of dressing training is an indepen-

dent predictor of recovery of upper-body dressing ability after stroke.

Key Words: Activities of daily living; Prognosis; Rehabilitation; Stroke.

© 2006 by the American Congress of Rehabilitation Medicine and the American Academy of Physical Medicine and Rehabilitation

INDEPENDENCE IN DRESSING enables a person to maintain a sense of dignity, self-respect, and achievement.¹ Therapists working with stroke patients spend a large proportion of the day teaching patients how to put on and take off items of clothing.² Despite such instruction, however, many patients are still unable to dress themselves independently for several weeks after hospital admission.³⁻⁶ Dressing is more difficult than undressing, and upper-body dressing requires more advanced recognition than lower-body dressing.^{1,2}

Many studies^{1,2,7-13} have shown a relation between difficulty in dressing and cognitive and physical impairments. Despite more than 50 years of research, it is still difficult to predict the extent or duration of loss of dressing ability.⁷⁻¹⁵ There is no clear understanding of the effect of early neurologic impairments and early dressing disorder on a stroke patient's ultimate recovery from dressing disorder.^{1,2,7-15} In a single-blind randomized controlled trial, Kwakkel et al¹⁴ investigated the effects of different intensities of arm and leg rehabilitation on the functional recovery of activities of daily living (ADLs) including dressing. They found no differences in ADL scores between the arm-training and control groups, and they suggested that stroke patients compensate for the loss of function in the paretic arm by using the nonparetic arm during ADLs. They noted that impairment was not always associated with dressing disorder in their patients. Jongbloed¹⁵ performed a critical review of 33 studies and concluded that the admission ADL score is a strong predictor of discharge ADL status, but its relation to improvement in cognitive and physical impairment is unclear.

Which is a stronger predictor of recovery of dressing ability, early neurologic impairments or early dressing disorder? Because it is still difficult to identify predictors of dressing ability, success in training is largely due to the extent of a therapist's experience rather than any scientific data. If we could identify predictors of recovery of dressing ability and predict the extent or duration of dressing ability loss, training in upper-body dressing skills would become more evidence based.

We conducted a prospective cohort study to identify predictors of the recovery of independent dressing ability after stroke.

METHODS

Outcome Measures

The study protocol is shown in figure 1. Each patient's upper-body dressing ability was assessed according to the FIM instrument dressing item¹⁶ on the first day of dressing training.

From the Departments of Rehabilitation Medicine (Suzuki) and Orthopedics (Matsushita), Kawasaki Municipal Tama Hospital, Kawasaki, Japan; Department of Rehabilitation Medicine, St. Marianna University School of Medicine Hospital, Kawasaki, Japan (Omori); Department of Rehabilitation Medicine, St. Marianna University, Yokohama City Seibu Hospital, Yokohama, Japan (Hatakeyama); School of Health Science, Nagoya University, Nagoya, Japan (Yamada); and Institute of Disability Sciences, University of Tsukuba, Bunkyo, Japan (Iijima).

No commercial party having a direct financial interest in the results of the research supporting this article has or will confer a benefit upon the author(s) or upon any organization with which the author(s) is/are associated.

Reprint requests to Makoto Suzuki, MA, OT, 1-30-37, Shukugawara, Tama-ku, Kawasaki-shi, Kanagawa, 214-0021 Japan, e-mail: m-suzuki@mariana-u.ac.jp.

0003-9993/06/8711-10708\$32.00/0

doi:10.1016/j.apmr.2006.07.267

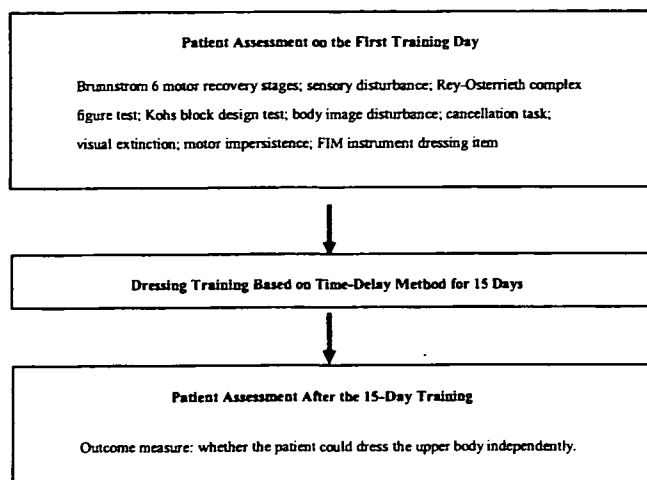


Fig 1. Study protocol.

The ability to dress the upper body is precisely defined by the FIM, and scores range from 1 to 7, with 1 indicating complete dependence during an activity and 7 indicating complete independence.

Many studies^{1,2,7-12} have shown a relation between difficulty in dressing and cognitive and physical function impairments including motor palsy, sensory disturbance, constructional disorder, body image disturbance, visual inattention, unilateral spatial neglect, and motor impersistence. Therefore, the presence or absence of these impairments was also determined. The severity of motor palsy was assessed according to the 6 motor recovery stages of Brunnstrom¹⁷ representing muscle conditions ranging from the initial flaccidity of palsy to normal coordination. Sensory disturbance was evaluated according to the presence or absence of deep and tactile sensation. Constructional disorder was assessed by the Rey-Osterrieth complex figure test¹⁸ and Kohs block design test¹⁹; these are 36-point and 131-point scales, respectively. Body image disturbance was assessed by an unpublished test of each patient's ability to discriminate the head, nose, right shoulder, left shoulder, abdomen, and back of the neck (6-point scale). Visual inattention was evaluated by a cancellation task involving a sheet of paper containing 360 randomly arranged shapes, 60 of which were target stimuli.²⁰ Unilateral spatial neglect was measured by the presence or absence of the visual extinction phenomenon.²¹ Motor impersistence was assessed by each patient's ability to sustain tongue protrusion and eye closure simultaneously for 20 seconds.²² The reliability and validity of the 4 tests (FIM, Brunnstrom stages, Rey-Osterrieth complex figure test, Kohs block design test) have been established.^{21,23-32} We assessed 2 tests for their test-retest reliability in 15 stroke patients with an interval of 5 days between measurements. The intraclass correlation coefficients were .78 for the target cancellation task ($P < .01$) and 1.00 for the body image test ($P < .01$).

Participants

Sample size calculation was based on a desired 95% statistical power to detect a 1-point difference in the FIM dressing item score, with a 2-sided α of 5%. The average value and standard deviation (SD) of FIM dressing item scores in 20 stroke patients were assessed to determine the standard effect size. The average FIM dressing item score was 2.45 ± 1.50 points, and the standard effect size was .66. A sample size of 53

was derived by insertion of 1-power (.05), α (.05), and standard effect size (.66) values in the Hulley matrix.³³ We therefore planned to recruit about 50 stroke patients.

Between May 1, 2001, and May 1, 2004, 63 consecutive stroke patients from the Department of Rehabilitation Medicine, St. Marianna University School of Medicine Hospital, were enrolled in the study. Stroke was diagnosed according to the World Health Organization definition.³⁴ Eligibility criteria included hemiplegia, dependence on spoken cues or physical assistance to accomplish upper-body dressing, ability to sit up with a back-rest for more than 30 minutes, lucid consciousness, a period of less than 3 months since the stroke event, absence of severe cardiopulmonary or respiratory insufficiency, and a desire to participate in the study. Baseline characteristics of patients who satisfied the inclusion criteria are presented in table 1. The mean age of participants was 69.4 ± 10.6 years. There were 25 women and 38 men, 45 patients with cerebral infarction and 18 with cerebral hemorrhage, and 27 patients with right hemiplegia and 36 with left hemiplegia. The average time since the stroke event was 23.0 ± 17.2 days.

Twelve patients (6 with right hemiplegia, 6 with left hemiplegia) withdrew from the study because they were discharged or transferred to another hospital before study completion.

The study was approved by the St. Marianna University School of Medicine Institutional Committee on Human Research. Informed consent was obtained from each patient before his/her participation in the study.

Intervention

ADLs such as dressing are considered behavioral chains of component actions.³⁵ Such chains have been learned and performed since childhood. A patient with hemiplegia cannot dress by means of the behavioral chains of component actions used by a healthy person and thus has to learn new behavioral chains of component actions to achieve independence in dressing. It is necessary to control the cue stimulations and rewards

Table 1: Baseline Characteristics of Patients Who Satisfied the Inclusion Criteria

Characteristics	Values
Age (y)	69.4 ± 10.9
Sex (n)	
Male	38
Female	25
Diagnosis (n)	
Infarction	45
Hemorrhage	18
Time poststroke at assessment (d)	23.0 ± 7.2
Paralysis side (n)	
Right	27
Left	36
Sensory disturbance (n)	
Tactile sense	21
Deep sense	17
Visual extinction phenomenon (n)	28
Motor impersistence (n)	23
FIM dressing item	2.0 (2.0–3.0)
Brunstrom motor recovery stage	3.0 (2.0–4.0)
Kohs block design test score	0.0 (0.0–17.0)
Rey-Osterrieth complex figure test score	4.0 (0.0–21.4)
Target cancellation task	21.0 (0.0–49.0)
Disturbance of body image	6.0 (4.0–6.0)

NOTE. Values are mean ± SD, n, or median (interquartile range [IQR]).

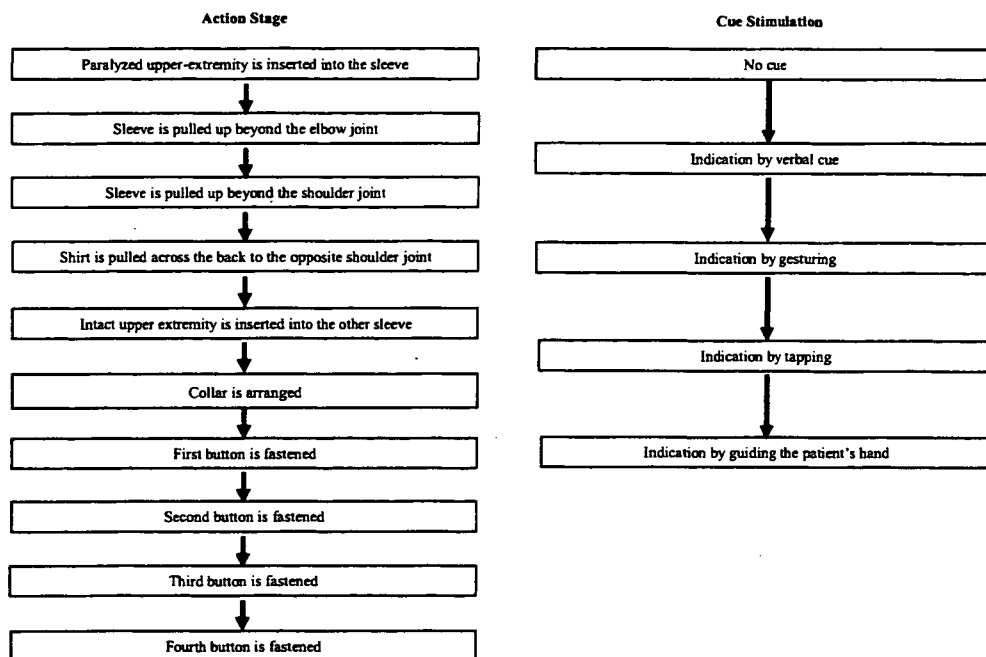


Fig 2. Upper-body dressing training by the time-delay method.

presented in training to support the organization of new behavioral chains.^{35,36} For the purpose of the study, upper-body dressing was viewed in 10 separate stages: (1) the paralyzed upper extremity is inserted into the sleeve, (2) the sleeve is pulled up beyond the elbow joint, (3) the sleeve is pulled up beyond the shoulder joint, (4) the shirt is pulled across the back to the opposite shoulder joint, (5) the intact upper extremity is inserted into the other sleeve, (6) the collar is arranged, (7) the first button is fastened, (8) the second button is fastened, (9) the third button is fastened, and (10) the fourth button is fastened (fig 2). These 10 component actions describe the entire process of upper-body dressing. The list was developed after observation of the behavioral chains of upper-body dressing used by 33 stroke patients with hemiplegia. The 22 stroke patients (66.7%) who achieved the greatest independence in upper-body dressing used these 10 component actions as a behavioral chain. Thus, these actions were selected for use in our current study.

The study patients underwent 15 days of training based on the time-delay method,³⁷ which is a recognized and effective training method.³⁸ In the time-delay method, cues are given after a set interval of time has elapsed, in this case 10 seconds. The starting position for dressing training was the patient grasping the shirt collar. Dressing training began with the verbal instruction, "Please put on the shirt." If the patient responded with inadequate component actions or if the patient did nothing for 10 seconds, the therapist offered cues at 4 levels in the following order: (1) verbal cue, (2) gesturing, (3) tapping, and (4) physical assistance. Verbal cues were instructions such as, "Can you pass your right hand into the sleeve?" or "Can you pull the sleeve up to your elbow?" Gesturing consisted of the therapist mimicking the component action of upper-body dressing. Tapping consisted of the therapist tapping the patient's clothes and body. Physical assistance consisted of the therapist taking the patient's hand and guiding it in the appropriate direction. When the patient performed each component action, the therapist praised him/her. After 15 days of training, each patient was assessed for his/her ability to dress the upper half of the body independently.

Statistical Analysis

Patients were classified into 2 groups: those who could perform the upper-body dressing tasks independently after the 15 days of training and those who required assistance. Cognitive and physical function and upper-body dressing ability on the first day of dressing training were compared between the 2 groups. Differences in categorical variables were analyzed by the chi-square test or Fisher exact test. The Mann-Whitney *U* test was used to analyze ordinal variables. Logistic regression analysis was used to identify the best independent predictors of independent upper-body dressing ability after 15 days of training. All statistical procedures were performed with SPSS software^a with a significance level set at *P* equal to .05. A receiver operating characteristic (ROC) curve was used to assess the clinical utility of the independent predictors.³⁹ Constructing the ROC curve involved setting several cutoff points for significant variables and calculating sensitivity, specificity, positive predictive value, and negative predictive value at each point.

RESULTS

Statistics related to subjects' performances of each task are presented in table 2. Upper-body dressing ability and visual attention at the start of training were significantly better in patients who achieved independence in dressing within 15 training days than in patients who did not. The FIM upper-body dressing item score for independent patients was higher than that for dependent patients (median score, 3 points; interquartile range [IQR], 2–3 points vs median score, 2 points; IQR, 1–2 points; *P* < .001). The target cancellation task score for independent patients was higher than that for dependent patients (median score, 40 points; IQR, 10.5–57.5 points vs median score, 2 points; IQR, 0–21 points; *P* = .004). In addition, motor impersistence was found less frequently among patients who achieved independence in upper-body dressing than among patients who did not. There were 4 (14.3%) independent patients and 12 (54.2%) dependent patients (*P* = .014) with motor impersistence. Independence in dressing was not

Table 2: Predictors of Upper-Body Dressing Ability After Stroke

Characteristics	Independent (n=28)	Dependent (n=23)	P*	Odds Ratio (95% CI)
Age* (y)	69.8±10.0	70.3±10.0	.837	NS
Sex (% male)	53.6	65.2	.580	NS
Diagnosis (% cerebral infarction)	71.4	69.6	.758	NS
Paralysis side (% right hemiplegia)	46.4	34.8	.259	NS
Tactile sense disturbance (% positive cases)	25.0	34.8	.543	NS
Deep sense disturbance (% positive cases)	17.9	26.1	.732	NS
Visual extinction phenomenon (% positive cases)	28.6	60.9	.079	NS
Motor impersistence (% positive cases)	14.3	54.2	.014	NS
FIM dressing item	3.0 (2.0-3.0)	2.0 (1.0-2.0)	<.001	4.33 (1.51-12.37)
Brunnstrom motor recovery stage	3.0 (3.0-4.3)	3.0 (2.0-3.5)	.163	NS
Kohs block design test score	7.0 (0.0-18.8)	0.0 (0.0-1.0)	.063	NS
Rey-Osterrieth complex figure test score	13.5 (1.3-24.5)	2.5 (0.0-6.5)	.088	NS
Target cancellation task	40.0 (10.5-57.5)	2.0 (0.0-21.0)	.004	NS
Disturbance of body image	6.0 (4.0-6.0)	6.0 (4.0-6.0)	.668	NS

NOTE. Values are mean ± SD, median (IQR), or as otherwise indicated. Odds ratios show logistic regression analysis. Abbreviations: CI, confidence interval; NS, not significant. *χ² test or Fisher exact test (categorical variables), Mann-Whitney U test (ordinal variables).

significantly associated with the severity of motor palsy or body image disturbance. Logistic regression analysis of the 14 variables showed only the FIM upper-body dressing score to be a significant predictor of the recovery of dressing ability (odds ratio, 4.33; 95% confidence interval, 1.51-12.37).

FIM upper-body dressing scores were plotted as an ROC curve (fig 3). Sensitivity, specificity, and predictive value at several cutoff points are presented in table 3. The curve indicated that a cutoff score of 3 being "moderate" would provide the best balance between sensitivity and specificity for the FIM upper-body dressing item (sensitivity, .68; 1 - specificity, .09). The positive predictive value of this cutoff score was .90, and the negative predictive value was .70. Characteristics of patients who withdrew from the study were similar to those of patients who completed the study (table 4).

DISCUSSION

Our results indicate that the FIM upper-body dressing score on the first day of dressing training is an independent predictor

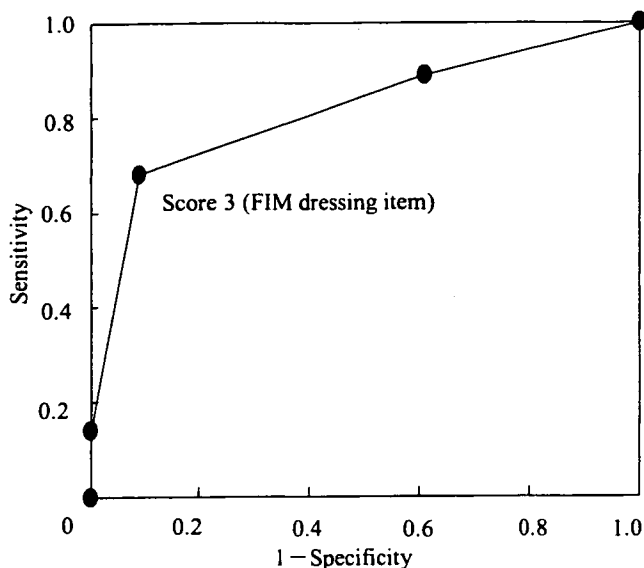


Fig 3. ROC curve for the FIM upper-body dressing item.

of recovery of upper-body dressing ability after stroke. Williams⁸ correlated the constructional abilities of 136 hemiplegic patients with their abilities to relearn upper-extremity dressing skills. Patients with normal constructional ability were more likely to be independent in upper-extremity dressing or had a greater capacity to achieve this skill than patients with a constructional disorder. In an evaluation of 60 stroke patients by the Nottingham Stroke Dressing Assessment and other physical and cognitive assessments, Walker and Lincoln² found that difficulty in lower-body dressing was associated with physical impairment and that difficulty in upper-body dressing was associated with visual inattention and sensory disturbance. Chen et al¹¹ investigated the relation between patterns of visuospatial inattention and performance of ADLs by means of the Klein-Bell ADL Scale and the Random Chinese World Cancellation Test in 64 patients with a right brain lesion. They found that hemi-inattention was highly related to poor ADL performance and that independence in dressing appeared to be more adversely affected by hemi-inattention than was independence in bathing and hygiene, eating, or use of the telephone. Hier et al¹² evaluated 41 patients with unilateral right hemisphere stroke for hemiparesis, hemianopia, constructional apraxia, spatial neglect, dressing disorder, and motor impersistence. Dressing disorder was associated with severe constructional apraxia, spatial neglect, motor impersistence, and hemianopia.

In marked contrast to the findings of earlier studies,^{1,2,7-12} the final regression model in our study showed no significant relation between the recovery of upper-body dressing ability and any underlying cognitive or physical impairment assessed in this study. As noted above, patients with hemiplegia are unable to use the same behavioral chains that are used by healthy people to accomplish dressing tasks. However, if a new behavioral chain is learned, patients can achieve a degree of

Table 3: Sensitivity, Specificity, and Predictive Values at 3 Cutoff Points

Cutoff Point	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
2	0.893	0.391	0.641	0.750
3	0.679	0.913	0.905	0.700
4	0.143	1.000	1.000	0.489

Table 4: Characteristics of Subjects Who Completed the Study and Those Who Withdrew

Characteristics	Patients Who Completed the Study	Patients Who Withdrew From the Study	P
Age (y)	70.0±9.9	66.6±15.4	.716
Sex (% male)	60.8	58.3	.383
Diagnosis (% cerebral infarction)	70.6	75.0	.563
Paralysis side (% right hemiplegia)	41.2	50.0	.290
Tactile sense disturbance (% positive cases)	29.4	50.0	.218
Deep sense disturbance (% positive cases)	21.6	50.0	.281
Visual extinction phenomenon (% positive cases)	43.1	50.0	.021
Motor impersistence (% positive cases)	31.4	0.7	.002
Period from crisis to measurement (d)	23.0±16.5	22.8±21.8	.620
FIM dressing item	2.0 (2.0-3.0)	2.0 (2.0-3.5)	.446
Brunnstrom motor recovery stage	3.0 (2.5-4.0)	2.0 (2.0-3.5)	.104
Kohs block design test score	0.0 (0.0-17.0)	0.0 (0.0-17.5)	.932
Rey-Osterrieth complex figure test score	4.0 (0.5-22.5)	0.0 (0.0-6.0)	.092
Target cancellation task	21.0 (0.0-50.5)	15.0 (0.5-23.0)	.453
Disturbance of body image	6.0 (4.0-6.0)	6.0 (2.5-6.0)	.617

NOTE. Values are mean ± SD, median (IQR), or as otherwise indicated.

independence in dressing. The reason why early dressing disorder is a stronger predictor of the recovery of dressing ability than cognitive or physical impairment is related to the degree of change to the original behavioral chain.

According to univariate analysis, visual attention at the start of training was significantly better in patients who achieved independence in dressing within 15 training days than in patients who did not. Also, motor impersistence was found less frequently among patients who achieved independence in upper-body dressing than among patients who did not. These findings corroborate those reported by Walker and Lincoln² and Hier et al.¹² There is still no clear understanding of the effect of underlying neurologic impairments on a stroke patient's ability to relearn to dress. Prior studies^{1,2,7-12} have failed to answer this question for several reasons. In some cases, multivariate analysis was not performed, and in others, variables were not tested for independent prediction. In addition, no prospective cohort study to identify the predictors of recovery of independent dressing ability has been conducted. In the present study, the target cancellation task score and motor impersistence on the first day of dressing training were independent predictors of recovery of upper-body dressing ability after stroke. However, the recovery of independent dressing ability was more strongly related to the FIM upper-body dressing score than to the target cancellation task score and motor impersistence.

Our analysis indicated that the FIM upper-body dressing score can serve as a valuable predictor of the ability to dress the upper body independently after stroke. Ninety percent of patients with a FIM upper-body dressing score of 3 or more on the first training day recovered the ability to dress the upper body independently within 15 training days. However, 70% of patients with a score of 2 or less could not perform this task independently after 15 days of training. Such patients require other solutions, such as different types of training or changes in materials or types of clothes. In addition, therapists should be consulted about the appropriate method for assisting these patients. Therapists can predict the recovery of independent dressing ability after stroke scientifically by an initial assessment with the FIM dressing item. Our findings will contribute to an increasingly evidence-based approach to upper-body dressing training for stroke patients.

The FIM score was investigated in relation to the burden of care; a 1-point change in the total FIM score was equivalent to

an average of 2 to 5 minutes of help from another person per day.²⁵⁻²⁷ Rogers et al.³⁸ examined the effectiveness of a behavioral rehabilitation intervention based on the time-delay method for improving the performance of morning care routines by nursing home residents with dementia. In their study,³⁸ physical assistance were provided for significantly smaller proportions of a morning care session during the behavioral rehabilitation intervention. However, the intervention took considerably more time than was needed for the usual care. Our results indicated that the time spent in nonassisted dressing increased for patients who could perform upper-body dressing independently after the 15 days of training. However, a therapist may spend more time with a patient who requires only partial assistance after the 15 days of training than with patients who require full assistance. Therefore, therapists should devise a method in which assistance and promotion of independence are balanced.

Study Limitations

Because this was a prospective cohort study, we did not randomize patients into groups before the training. Patients were classified into 2 groups after training: those who could perform the upper-body dressing tasks independently after the 15 days of training and those who required assistance. We also did not evaluate cognitive or physical function of patients after training. Therefore, the effect of dressing training based on the time-delay method is not clear in this study. If patients were allocated before or re-evaluated after the training, the effect of any natural recovery could be excluded. Further research in a randomized controlled trial is needed to verify the effect of dressing training based on the time-delay method.

The FIM upper-body dressing item used in this study is part of a standardized ADL test. However, this item does not distinguish the component actions of upper-body dressing, and it does not account for cues given by the therapist during evaluation of upper-body dressing ability. The difficulty of upper-body dressing varies according to the dressing components and is also affected by cues given during evaluation. Thus, the FIM upper-body dressing item cannot be used to evaluate details of upper-body dressing or the level of assistance required. Therefore, further research is needed to develop an upper-body dressing assessment scale that accounts for the individual components of dressing activities

and controls for cue stimulation during any evaluation of dressing skills.

The number of participants in our study was determined on the basis of Hulley's matrix for sample-size estimation.³³ However, a larger number of participants will be needed in further studies to remove the influence of natural differences between people in recovery from cognitive and physical impairments. With the addition of a detailed examination classifying participants by types of lesion and by attributes and the inclusion of a large number of patients, the results of a study like ours would be more generalizable.

CONCLUSIONS

We conducted a prospective cohort study to investigate the influence of early neurologic impairments or early dressing disorder on the recovery of independent dressing ability after stroke. Our findings indicate that early dressing disorder (as measured by the FIM upper-body dressing score) on the first day of dressing training is an independent predictor of the upper-body dressing ability after stroke. We expect our findings will contribute to a more evidence-based method of training in upper-body dressing skills.

The most popular behavioral chain of component actions in dressing training based on the time-delay method was used in this study. However, the behavioral chain of component actions will vary according to the seriousness of impairments in cognitive and physical function. There was no significant relation between the recovery of upper-body dressing ability and any underlying cognitive or physical impairment assessed in this study, but this finding may be related to the fact that only 1 behavioral chain was targeted. Therefore, it is necessary to investigate the relation between cognitive and physical impairments and several different behavioral chains of component actions.

Acknowledgments: We thank Mihoko Nakadate, OT, Sachiko Izawa, OT, Yuko Matsumoto, OT, Ari Watanabe, OT, Akiko Kataoka, OT, Eriko Musha, OT, Seiko Sugano, OT, Junko Matsumoto, OT, Masuo Sasa, PhD, MD, and Yoshikatsu Tagawa, OT, for help and assistance in the study.

References

- Walker CM, Walker MF. Dressing ability after stroke: a review of the literature. *Br J Occup Ther* 2001;64:1-7.
- Walker MF, Lincoln NB. Factors influencing dressing performance after stroke. *J Neurol Neurosurg Psychiatry* 1991;54:699-701.
- Zhu L, Fratiglioni L, Guo Z, Aguero-Torres H, Winblad B, Viitanen M. Association of stroke with dementia, cognitive impairment, and functional disability in the very old: a population-based study. *Stroke* 1998;29:2094-9.
- Edmans J, Lincoln NB. The frequency of perceptual deficits after stroke. *Clin Rehabil* 1987;1:273-81.
- Granger CV, Dewis LS, Peters NC, Sherwood CC, Barrett JE. Stroke rehabilitation: analysis of repeated Barthel index measures. *Arch Phys Med Rehabil* 1979;60:14-7.
- Chino N, Anderson TP, Granger CV. Stroke rehabilitation outcome studies: comparison of a Japanese facility with 17 US facilities. *Int Disabil Stud* 1988;10:150-4.
- Walker MF, Lincoln NB. Reacquisition of dressing skills after stroke. *Int Disabil Stud* 1990;12:41-3.
- Williams N. Correlation between copying ability and dressing activities in hemiplegia. *Am J Phys Med* 1967;46:1332-40.
- Warren M. Relationship of constructional apraxia and body scheme disorders to dressing performance in adult CVA. *Am J Occup Ther* 1981;35:431-7.
- Tsai IJ, Howe TH, Lien IN. Visuospatial deficits in stroke patients and their relationship to dressing performance. *J Formos Med Assoc* 1983;82:353-9.
- Chen SM, Henderson A, Cermak SA. Patterns of visual spatial inattention and their functional significance in stroke patients. *Arch Phys Med Rehabil* 1993;74:355-60.
- Hier DB, Mondlock J, Caplan LR. Recovery of behavioral abnormalities after right hemisphere stroke. *Neurology* 1983;33:337-44.
- Lorenze EJ, Cancro R. Dysfunction in visual perception with hemiplegia: its relation to activities of daily living. *Arch Phys Med Rehabil* 1962;43:514-7.
- Kwakkel G, Wagenaar RC, Twisk JW, Lankhorst GJ, Koetsier JC. Intensity of leg and arm training after primary middle-cerebral-artery stroke: a randomized trial. *Lancet* 1999;354:191-6.
- Jongbloed L. Prediction of function after stroke: a critical review. *Stroke* 1986;17:765-76.
- Chino N, Riu M, Sonoda S, Domen K. *Nosottyu kanjya no kino hyoka*. Tokyo: Springer-Verlag Tokyo; 2003.
- Brunnstrom S. Motor testing procedures in hemiplegia: based on sequential recovery stages. *Phys Ther* 1966;46:357-75.
- Liberman J, Stewart W, Seines O, Gordon B. Rater agreement for the Rey-Osterrieth Complex Figure Test. *J Clin Psychol* 1994;50:615-24.
- Yoshikazu O. *Kohs rippoutai kumiawase tesuto siyoubu tebiki*. Kyoto: Sankyobo; 1979.
- Weintraub S, Mesulam MM. Right cerebral dominance in spatial attention: further evidence based on ipsilateral neglect. *Arch Neurol* 1987;44:621-5.
- Anton HA, Hershler C, Lloyd P, Murray D. Visual neglect and extinction: a new test. *Arch Phys Med Rehabil* 1988;69:1013-6.
- Fisher N. Left hemiplegia and motor imperistence. *J Nerv Ment Dis* 1956;123:201-8.
- Ottenbacher KJ, Hsu Y, Granger CV, Fiedler RC. The reliability of the functional independence measure: a quantitative review. *Arch Phys Med Rehabil* 1996;77:1226-32.
- Hamilton BB, Laughlin JA, Fiedler RC, Granger CV. Interrater reliability of the 7-level functional independence measure (FIM). *Scand J Rehabil Med* 1994;26:115-9.
- Granger CV, Cotter AC, Hamilton BB, Fiedler RC, Hens MM. Functional assessment scales: a study of persons with multiple sclerosis. *Arch Phys Med Rehabil* 1990;71:870-5.
- Granger CV, Cotter AC, Hamilton BB, Fiedler RC. Functional assessment scales: a study of persons after stroke. *Arch Phys Med Rehabil* 1993;74:133-8.
- Granger CV, Divan N, Fiedler RC. Functional assessment scales: a study of persons after traumatic brain injury. *Am J Phys Med Rehabil* 1995;74:107-13.
- Fox JV, Harlowe D. Construct validation of occupational therapy measures used in CVA evaluation: a beginning. *Am J Occup Ther* 1984;38:101-6.
- Loring DW, Martin RC, Meador KJ, Lee GP. Psychometric construction of the Rey-Osterrieth Complex Figure: methodological considerations and interrater reliability. *Arch Clin Neuropsychol* 1990;5:1-14.
- Tupler LA, Welsh KA, Asare-Aboagye Y, Dawson DV. Reliability of the Rey-Osterrieth Complex Figure in use with memory-impaired patients. *J Clin Exp Neuropsychol* 1995;17:566-79.
- Carr EK, Lincoln NB. Inter-rater reliability of the Rey figure copying test. *Br J Clin Psychol* 1988;27:267-8.
- Elderkin-Thompson V, Boone KB, Kumar A, Mintz J. Validity of the Boston qualitative scoring system for the Rey-Osterrieth com-

- plex figure among depressed elderly patients. *J Clin Exp Neuropsychol* 2004;26:598-607.
33. Hulley SB, Cummings SR. *Designing clinical research*. Philadelphia: Lippincott Williams & Wilkins; 1988.
 34. Stroke—1989: recommendations on stroke prevention, diagnosis, and therapy. Report of the WHO Task Force on Stroke and Other Cerebrovascular Disorders. *Stroke* 1989;20:1407-31.
 35. Alberto PA, Troutman AC. *Applied behavior analysis for teachers [Japanese translation]*. Tokyo: Bell & Howell; 2003.
 36. Schultz W. Getting formal with dopamine and reward. *Neuron* 2002;36:241-63.
 37. Halle JW, Marshall AM, Spradlin JE. Time delay: a technique to increase language use and facilitate generalization in retarded children. *J Appl Behav Anal* 1979;12:431-9.
 38. Rogers JC, Holm MB, Burgio LD, et al. Improving morning care routines of nursing home residents with dementia. *J Am Geriatr Soc* 1999;47:1049-57.
 39. Portney LG, Watkins MP. *Foundation of clinical research*. 2nd ed. Upper Saddle River: Prentice Hall Health; 2000. p 79-110.

Supplier

- a. SPSS Inc, 233 S Wacker Dr, 11th Fl, Chicago, IL 60606.

〈原 著〉

高齢重度認知症患者および高齢進行癌患者の在宅終末期ケアに関する研究 ～在宅終末期ケアを推進する診療所群における前向き研究から～

平川 仁尚¹⁾ 益田雄一郎¹⁾ 葛谷 雅文¹⁾
井口 昭久¹⁾ 旭 多貴子¹⁾ 植村 和正²⁾

要約 目的：高齢化に伴い、高齢認知症患者と高齢癌患者が増加しているが、両者の終末期ケアの相違に関する実証研究はほとんどない。本研究は、在宅における認知症高齢者と高齢進行癌患者の終末期ケアの実態を明らかにすることを目的として、日本ホスピス在宅ケア研究会の協力を得て実施した「高齢者の在宅終末期ケアに関する前向き研究」のデータの二次解析を行った。**方法：**この研究は、日本ホスピス在宅ケア研究会に所属する医師 16 名が担当した患者のうち、2002 年の 10 月から 2004 年の 9 月までの間に、最終的に自宅で看取られた 65 歳以上の高齢患者 240 名を対象としたものである。調査内容は、患者の特徴（性別、年齢、障害老人の日常生活自立度（JABC）、痴呆性老人の日常生活自立度、死因など）、死亡前 48 時間以内に観察された症状と実施された終末期ケア、などであった。これらのデータの収集は、患者の死後、カルテや家族の話などを参考に、患者の担当医師が質問紙に回答する形式で行われた。解析にあたって、重度認知症患者群（痴呆性高齢者の日常生活自立度 III 以上）と進行癌患者群を比較・検討した。**結果：**進行癌患者群と比較して、重度認知症患者群において、疼痛、悪心・嘔吐、せん妄が少なく、発熱、咳嗽が多かった。また、痰の吸引や抗生剤の投与の実施頻度が高く、輸液量は多かった。麻薬系鎮痛剤の投与について、重度認知症患者群では実施されていなかったが、進行癌患者群では約半数に実施されていた。**結論：**今回の結果から、重度認知症患者と進行癌患者の終末期の特徴の違いに配慮する必要があることが示唆された。

Key words：麻薬、症状、終末期ケア、疼痛、痴呆

（日老医誌 2006；43：355-360）

緒 言

わが国は世界でも類を見ない速さで高齢社会を迎えている。そして、人は老いて死ぬことが避けられない以上、高齢社会の到来は、高齢者の死の増加を意味する。とくに、認知症や癌は高齢者によくみられる疾患であり、その多くが進行性であることから、認知症患者や癌患者の死亡が増加することが予想される。

終末期ケアの目標は、苦痛な症状を管理し、患者の QOL を最大限に高めることである。そのためには、終末期によくみられる症状や実施可能な終末期ケアに関する十分な情報に基づいて議論を行い、患者と家族の希望に沿った終末期のケアの計画を立てる必要がある¹⁾。高齢認知症患者と高齢癌患者の終末期の特徴には違いがあ

ることが指摘されているが^{2)~4)}、先行研究は少なく、両者の違いに関する実証データの蓄積が必要である。

一方、近年、高齢者の在宅終末期ケアが、注目されている⁵⁾。わが国では、他の先進国と同様⁶⁾、病院で死亡する患者が多いが⁵⁾、在宅で最期を迎えたいと希望する高齢者が多いことが示唆されている⁵⁾⁷⁾。最期を迎える場所により、終末期ケアが違う可能性があり⁸⁾、在宅終末期ケアに関するデータの蓄積も必要である。

本研究の目的は、「高齢者の在宅終末期ケアにおける前向き研究」のデータを用いて、高齢重度認知症患者と高齢進行癌患者の終末期の特徴を比較検討し、その違いを明らかにすることである。

対象と方法

「高齢者の在宅終末期ケアに関する前向き研究」は、日本ホスピス在宅ケア研究会の協力を得て実施した。この前向き研究は、日本ホスピス在宅ケア研究会に所属する医師 16 名が担当した患者のうち、2002 年の 10 月から 2004 年の 9 月までの期間に、最終的に自宅で看取ら

1) Y. Hirakawa, Y. Masuda, M. Kuzuya, A. Iguchi, T. Asahi : 名古屋大学大学院医学系研究科老年科学

2) K. Uemura : 名古屋大学医学部附属総合医学教育センター

受付日：2005. 10. 7. 採用日：2005. 11. 24

Table 1 患者の特徴

項目	内訳	認知症 (n=36) n (%)	癌 (n=116) n (%)	p
性別	女	24 (66.67)	51 (43.59)	0.017
年齢 (平均 ±SD, 歳)		87.61 ± 0.837	74.52 ± 1.238	0.000
障害老人の日常生活自立度	J	0	2 (1.71)	0.004
	A	1 (2.78)	11 (9.40)	
	B	4 (11.11)	25 (21.37)	
	C	31 (86.11)	59 (50.43)	
死因 (原発巣)	不明	0	19 (16.24)	
	胃	—	22 (18.80)	—
	肺	—	30 (25.64)	—
	肝	—	19 (16.24)	—
	大腸	—	9 (7.69)	—
	膵	—	3 (2.56)	—
	腎	—	3 (2.56)	—
	血液	—	0	—
	脳	—	1 (0.85)	—
	その他	—	17 (14.53)	—
	不明	—	12 (10.26)	—
死因 (非癌疾患)	不明	—	12 (10.26)	—
	呼吸器	14 (38.89)	—	—
	循環器	5 (13.89)	—	—
	脳血管	2 (5.56)	—	—
	腎	2 (5.56)	—	—
	肝	0	—	—
	消化器	0	—	—
	その他	12 (33.33)	—	—
	不明	1 (2.78)	—	—

れた 65 歳以上の高齢患者 240 名を対象とした。調査内容は、患者の特徴 (性別、年齢、寝たきり度 (障害老人の日常生活自立度, JABC)、痴呆性老人の日常生活自立度、疾病および死因など)、死亡前 48 時間以内に観察された症状と実施された終末期ケア、などである。今回の調査で使用した症状とケアの項目は次の通りである。

症状

呼吸困難、疼痛、自製内疼痛、昏睡、せん妄、不安、めまい、吐き気・嘔吐、食欲不振、下痢、便秘、発熱、尿便失禁、吐血、喀血、下血、その他の出血、咳、痰、など

終末期ケアおよび検査

心臓マッサージ、気管内挿管、人工呼吸器、酸素吸入、エアウェイ留置、痰の吸引、高カロリー輸液、末梢点滴、抗生剤、昇圧剤、輸血 (成分輸血を含む)、麻薬、尿導カテーテル留置、心理的ケア、宗教的癒し、など

これらのデータの収集は、患者の死後、カルテや家族の話などを参考に、患者の担当医師が質問紙に回答する形式で行われた。

解析にあたって、statview5.0 日本語版を使用した。

連続量には t 検定を、離散量には χ^2 乗検定を用いた。p < 0.05 を統計学的に有意差があるものとし、高齢重度認知症患者群 (以下、認知症患者群) と高齢進行癌患者群 (以下、癌患者群) を比較・検討した。尚、本調査において、重度認知症を痴呆性高齢者の日常生活自立度 III 以上と定義し、認知症患者群に分類した。また、質問紙の死因欄に癌が明記されている場合にのみ癌患者群に分類した。すなわち、癌患者であっても、癌以外の疾患で死亡した可能性がある患者は解析から除外した。

成績

解析対象者は、認知症患者群 36 人、癌患者群 116 人であった。対象者の特徴 (表1) について、平均死亡年齢は、認知症患者群で有意に高かった (認知症患者群 87.61 ± 0.84 歳 vs 癌患者群 74.52 ± 1.24 歳)。また、性別は、認知症患者群で女性が多かった。障害老人の日常生活自立度について、認知症患者群で自立度が低い傾向がみられた。死因について、認知症患者群では、呼吸器疾患が約 40% と最も多く、循環器疾患が約 15% と続いた。癌患者群の癌の部位では、肺が約 25% と最も多く、胃

Table 2 死亡前 48 時間以内に観察された症状

症状	認知症 (n=36) n (%)	癌 (n=116) n (%)	p
呼吸困難	14(38.89)	56(47.86)	0.324
我慢できない疼痛	0	25(21.37)	0.002
自制内疼痛	2(5.56)	57(48.72)	0.000
昏睡	12(33.33)	50(42.74)	0.297
せん妄	3(8.33)	26(22.22)	0.060
不安	2(5.56)	14(11.97)	0.266
眩暈	1(2.78)	2(1.71)	0.691
悪心嘔吐	3(8.33)	33(28.21)	0.013
食欲不振	18(50.00)	70(59.83)	0.272
下痢	2(5.56)	7(5.98)	0.915
便秘	2(5.56)	9(7.69)	0.656
発熱	18(50.00)	29(24.79)	0.005
失禁	3(8.33)	17(14.53)	0.327
吐血	1(2.78)	4(3.42)	0.844
咯血	0	1(0.85)	0.576
下血	4(11.11)	7(5.98)	0.304
出血 (吐血・下血・咯血以外)	1(2.78)	9(7.69)	0.292
咳嗽	15(41.67)	15(12.82)	0.000
喀痰・痰詰り	15(41.67)	35(29.91)	0.200
その他	5(13.89)	29(24.79)	0.169

Table 3 死亡前 48 時間以内に実施された終末期ケア

ケア	認知症 (n=36) n (%)	癌 (n=116) n (%)	p
心臓マッサージ	2(5.56)	1(0.85)	0.077
挿管	0	0	—
人工呼吸器	0	0	—
酸素吸入	8(22.22)	45(38.46)	0.068
エアウェイ	0	3(2.56)	0.330
吸痰	16(44.44)	29(24.79)	0.026
高カロリー輸液	2(5.56)	14(11.97)	0.266
抗生剤	12(33.33)	11(9.40)	0.001
昇圧剤	0	0	—
輸血	0	0	—
末梢点滴	11(30.56)	38(32.48)	0.805
輸液量 (平均 ±SD, ml)			
24 ~ 48 時間前	880 ± 110.353	502.22 ± 55.920	0.003
0 ~ 24 時間前	800 ± 108.711	467.14 ± 54.079	0.004
麻薬	0	60(51.28)	0.000
尿道カテーテル	6(16.67)	23(19.66)	0.673
心理的ケア	0	3(2.56)	0.330
宗教的癒し	0	1(0.85)	0.576
その他	3(8.33)	9(7.69)	0.911

が約 20% と続いた。

死亡前 48 時間以内に観察された症状を表に示す (表 2)。我慢できない疼痛および自制内疼痛は、癌患者群と比較して、認知症患者群で有意に少なかった。悪心・嘔吐とせん妄は、認知症患者群で少なかったが、せん妄に

関しては統計学的に有意差が認められなかった。一方、発熱と咳嗽は、認知症患者群で有意に多かった。

死亡前 48 時間以内に実施されたケアを表に示す (表 3)。心臓マッサージ、挿管、人工呼吸器は、両群ともほとんど実施されていなかった。痰の吸引や抗生剤の投与

は、癌患者群と比較して、認知症患者群で広く実施されていた。末梢点滴の実施率には両群で有意差がみられなかったが、輸液量は認知症患者群で有意に多かった。また、麻薬の投与は、認知症患者群では実施されていなかったが、癌患者群では約半数に実施されていた。

考 察

平成 15 年度の厚生労働省「人口動態統計」(<http://www.mhlw.go.jp/toukei/saikin/hw/jinkou/geppo/nengai03/index.html>)によると、加齢とともに死因全体に占める肺炎の割合が増加し、90 歳以上の高齢者の死因では心疾患が一位 (19.9%)、二位に肺炎 (17.1%)、悪性新生物は三位 (12.2%) となる。本研究における認知症患者の死因では呼吸器疾患が全体の約 40% を占め、一般の高齢者と比べて死因に占める割合が高い。加齢以外の要素として、重度認知症患者は嚥下性肺炎で死亡することが多いこと²¹⁾が影響していると考えられる。

前述のように、高齢重度認知症患者と高齢進行癌患者において、終末期にみられる症状やケアに違いが見られることが指摘されている²¹⁾が、今回の結果は、これを裏付けるものであった。すなわち、疼痛、せん妄、悪心・嘔吐、発熱、咳で、その頻度に両群間に違いがみられた。

疼痛について、認知症患者群ではほとんど観察されなかったのに対して、癌患者群では多くの患者で観察された。癌は疼痛を伴うことが多い疾患である一方、認知症患者は疼痛に対して寛容であるという意見があり⁹⁾、こうした背景が結果に反映されたと考えられる。また、今回の結果では認知症患者群は癌患者群と比較して高齢であったが、一般的に高齢者は若年者と比べて疼痛の訴えが少ないといわれており²⁷⁾、この年齢の違いが両群にみられた理由と考えられる。さらに、認知症患者群は、痛みを感じてもコミュニケーション能力の低下などにより疼痛を訴えることができなかつたとも考えられる⁹⁾¹¹⁾。

認知症はせん妄の危険因子であるが¹²⁾、癌患者群と比べて、認知症患者群のせん妄の出現率は低かった。我々の知り得る範囲では、癌患者と認知症患者のせん妄の出現率を比較した調査はないため、新たな知見である可能性がある。麻薬の使用や疼痛もせん妄の危険因子であるため¹²⁾、これらの頻度が癌患者群で高かったことも今回の結果に影響を与えている可能性がある。

今回の結果では、悪心・嘔吐は癌患者群で広く観察された。悪心・嘔吐は、終末期癌患者、とくに消化器癌の患者において高頻度に見られる症状である¹³⁾。癌患者群において約 3 分の 1 が胃癌と大腸癌である一方で認知症患者群において消化器疾患で死亡した患者がいなかつた

こと、癌患者群で麻薬の使用や疼痛が多かつたこと、などが理由として考えられる¹³⁾。

咳と発熱は、癌患者群と比較して、認知症患者群で広く観察された。咳の原因として、肺炎や肺癌など肺疾患が多い¹⁴⁾。今回の結果では、認知症患者群の約 40%、癌患者群の約 25% が肺疾患で死亡していたため、この差が咳の出現率の差の説明になり得る。しかし、転移性肺癌は、今回の調査結果には含まれていないことを考慮する必要がある。また、高齢者では、発熱は見られないことがしばしばあるが¹⁵⁾、今回の結果では、認知症患者群で、抗生物質を多く投与され、高齢であったにもかかわらず、発熱が多くみられた。ステロイドや非ステロイド性解熱鎮痛剤など解熱効果のある薬剤の使用頻度は調査していないが、高齢の重度認知症患者においても発熱の管理が必要であることが示唆される。

死亡前 48 時間以内に、両群において、心臓マッサージや人工呼吸器の使用など苦痛を伴う延命治療の実施はほとんどみられなかつた。場所により終末期ケアが異なると言われていた⁹⁾、在宅は、他の場所と比較して³⁾、終末期患者への延命治療が差し控えられる傾向があるかもしれない。

認知症患者群では、痰の吸引が広く行われていた。痰の出現頻度に有意差がみられていなかったことから、癌患者群では、吸引を必要としない程度の少ない痰であったと推察できる。

癌患者群と比較して、認知症患者群で抗生剤は広く使用されていた。発熱が癌患者群と比較して高頻度で観察されたことがその主要因と考えられるが、終末期の重度認知症高齢者への抗生剤の使用には、副作用の出現など問題点を指摘する意見があり³⁾¹⁶⁾、議論を深める必要がある。

わが国において、終末期癌患者に対する適切な輸液量に関しては、医師の間で一致した見解は得られていないが¹⁷⁾、終末期癌患者に対する過剰な輸液を控えることで、気道の分泌物を減らし、苦痛を軽減することができる¹⁰⁾¹⁸⁾。今回の結果では、癌患者において約 500ml/日であり、認知症患者と比べて輸液量が少なかった。本研究に参加した医師は、終末期ケアに関心が高いと考えられ、苦痛を軽減するため、輸液を控えた可能性が示唆される。一方、重度認知症患者の終末期においても、輸液量を控えることで、苦痛を緩和できる可能性がある¹⁹⁾。今後、重度認知症高齢者の終末期の輸液のあり方も議論されるべきであろう。

麻薬の使用は、認知症患者では報告されず、癌患者群で多く報告された。疼痛が癌患者群で高頻度に見られ、

認知症患者では疼痛がほとんど見られなかったことから、妥当な結果であるといえる。しかし、認知症患者群で呼吸困難を訴える患者が少なからず存在した。麻薬は呼吸困難を緩和する作用があり²⁾、認知症患者群において麻薬の使用が適切であったかどうかは、さらなる詳細な調査が必要である。

本研究の限界について以下に述べる。

1. 疼痛以外は、症状の程度や頻度を調査していない。
2. 今回の対象者は、在宅で終末期ケアを受け、最期に在宅で看取られた患者であった。そのため、症状が重度であった患者は、看取りの直前に病院に転送された可能性がある。
3. 今回の調査では対象施設は、在宅終末期ケアに関心を持つ集団であったことが結果に影響を与えた可能性は否定できない。

4. 両群で性別の割合に違いがみられたが、性別は、症状に影響を与える可能性がある²⁰⁾。

以上より、今回の結果をわが国の在宅終末期ケアの実態として一般化することは難しい。今後、これらの課題をふまえ、追加調査が必要であると考えられる。

まとめ

今回、高齢者の在宅終末期ケアに関する前向き調査のデータの二次解析を行い、重度認知症高齢者と高齢癌患者の終末期にみられる症状と行われたケアの相違を明らかにした。死亡前48時間以内に、認知症患者において、疼痛、悪心・嘔吐、せん妄が少なく、発熱、咳嗽が多かった。また、行われたケアについて、痰の吸引や抗生剤の投与について認知症患者群で頻度が高く、輸液量については認知症患者群で有意に多かった。また、麻薬系鎮痛剤の投与について認知症患者群では全員に行われていなかったが、癌患者群では約半数で使用されていた。

今回の結果から、重度認知症患者と進行癌患者の終末期の特徴の違いに配慮する必要があることが示唆されたが、本研究の限界を踏まえ、追加調査が必要である。

謝辞

本研究にご協力いただいた、日本ホスピス・在宅ケア研究会の関係者、ご遺族の皆様に深謝する。ならびに、名古屋大学大学院医学系研究科老年科学教室の佐野典子氏に感謝する。尚、本研究は、厚生労働省長寿科学総合研究事業の一環として行われた。

文 献

- 1) Pekmezaris R, Breuer L, Zaballero A, Wolf-Klein G, Jadoon E, D'Olimpio JT, et al.: Predictors of site of death

of end-of-life patients: the importance of specificity in advance directives. *J Palliat Med* 2004; 7: 9-17.

- 2) 植村和正: 高齢者の終末期医療の特徴。これからの老年学(井口昭久編)。名古屋大学出版会、名古屋、2000、p302-305.
- 3) 平川仁尚、益田雄一郎、木股貴哉、植村和正、葛谷雅文、井口昭久: 緩和医療の行われていない療養型病床群2施設における痴呆性高齢者の終末期医療に関する研究。日老医誌 2004; 41: 99-104.
- 4) 鈴木祐介、井口昭久: 高齢者医療の現状と展望・高齢者総合医療—ターミナルケアの考え方—。日内会誌 2004; 93: 2508-2513.
- 5) 橋本 肇: 患者本人の意思に基づくターミナルケアの確立。医療白書2001年度版(医療経済研究機構編)、日本医療企画、東京、2001、p47-58.
- 6) Sauvaget C, Tsuji I, Li JH, Hosakawa T, Fukao A, Hisamichi S: Factors affecting death at home in Japan. *Tohoku J Exp Med* 1996; 180: 87-98.
- 7) Tiden VP, Tolle SW, Drach LL, Perrin NA: Out-of-hospital death: advance care planning, decedent symptom, and caregiver burden. *J Am Geriatr Soc* 2004; 52: 532-539.
- 8) Paice JA, Muir JC, Shott S: Palliative care at the end of life: comparing quality in diverse settings. *Am J Hosp Palliat Care* 2004; 21: 19-27.
- 9) Porter FL, Malhotra KM, Wolf CM, Morris JC, Miller JP, Smith MC: Dementia and response to pain in the elderly. *Pain* 1996; 68: 413-421.
- 10) 森田達也、角田純一、井上 聡、千原 明、一木崇宏: 終末期癌患者における身体症状の頻度と危険因子。癌の臨床 1998; 44: 879-884.
- 11) Shuster JL: Palliative care for advanced dementia. *Clin Geriatr Med* 2000; 16: 373-386.
- 12) Kuebler KK, Heidrich DE: In: Delirium/acute confusion, In: End-of-life care-Clinical practice guidelines, Kuebler KK, Berry PH, Heidrich DE (eds), WB Saunders, Philadelphia, 2002, p253-267.
- 13) Griffie J, Mckinnon S: Nausea and vomiting. In: End-of-life care-Clinical practice guidelines, Kuebler KK, Berry PH, Heidrich DE (eds), WB Saunders, Philadelphia, 2002, p333-343.
- 14) Berry PH: Cough. In: End-of-life care-Clinical practice guidelines, Kuebler KK, Berry PH, Heidrich DE (eds), WB Saunders, Philadelphia, 2002, p235-241.
- 15) 葛谷雅文: 高齢者の疾病の特徴。これからの老年学(井口昭久編)、名古屋大学出版会、名古屋、2000、p51-56.
- 16) Evers MM, Dushyant P, Daniel P, Khalid K, Marin DB: Palliative and aggressive end-of-life care for patients with dementia. *Psychiatr Serv* 2002; 53: 609-613.
- 17) Morita T, Shima Y, Adachi I: Attitudes of Japanese physicians toward terminal dehydration: a nationwide survey. *J Clin Oncol* 2002; 20: 4699-4704.

- 18) Andrews M, Bell ER, Smith SA, Tischler JF, Veglia JM : Dehydration in terminally ill patients. Is it appropriate palliative care? *Post Grad Med* 1993 ; 93 : 201-208.
- 19) 村井淳志 : 重度痴呆性老人のケア—終末期をどう支えるか. 医学書院, 東京, 2000, p135-156.
- 20) Cobb JL, Glantz MJ, Nicholas PK, Martin EW, Paul-Simon A, Cole BF, et al. : Delirium in patients with cancer at the end-of-life. *Cancer Pract* 2000 ; 8 : 172-177.

Home end-of-life care for advanced dementia vs advanced cancer elderly patients: Dying elderly at home project

Yoshihisa Hirakawa¹⁾, Yuichiro Masuda¹⁾, Masafumi Kuzuya¹⁾, Akihisa Iguchi¹⁾, Takiko Asahi¹⁾ and Kazumasa Uemura²⁾

Abstract

AIM: The aim of this study was to assess the frequency of symptoms and end-of-life care received in advanced dementia and advanced cancer elderly patients dying at home during the last two days of their lives and to evaluate the differences observed between the two groups.

METHODS: We used data from the Dying Elderly at Home (DEATH) project, which was a prospective study of home elderly patients dying with end-stage illness. Consecutive deceased subjects aged 65 or older who were seen at 16 study clinics belonging to the Japanese Society of Hospice and Home-care with diagnoses of all illnesses including advanced dementia and advanced cancer and died at home from October 2002 to September 2004 were included in the study. We evaluated 36 deceased subjects with advanced dementia and 116 with advanced cancer. We collected the following information: sociodemographics, ADLs, cognitive impairment, observed symptoms and end-of-life care provided during the last 48 hours of life.

RESULTS: Deceased subjects with advanced dementia were less likely to show symptoms of pain, acute confusion, or nausea/vomiting and more likely to display fever or cough than advanced cancer patients. Also, those with advanced dementia were more likely to receive intravenous drip injection or narcotic analgesia and more likely to be given sputum suction, or antibiotics.

CONCLUSION: We observed that the dying process and end-of-life care for advanced dementia elderly patients was different from that for advanced cancer elderly patients.

Key words: *Opioid, Symptom, End-of-life care, Pain, Dementia*

(*Jpn J Geriat* 2006; 43: 355-360)

1) Department of Geriatrics, Nagoya University Graduate School of Medicine

2) Center of Medical Education, Nagoya University School of Medicine

簡便な操作で痛みの強さを記憶する痛み計の臨床試行

深谷 陽子¹⁾, 安藤 詳子²⁾, 稲垣 聡美³⁾, 宮崎 雅之³⁾,
中村みゆき¹⁾, 澤井 美穂²⁾, 野田 幸裕³⁾, 神里みどり²⁾

1) 名古屋大学大学院医学系研究科博士前期課程, 2) 名古屋大学医学部保健学科看護学専攻, 3) 名古屋大学医学部附属病院薬剤部

受付日 2005年9月26日 / 改訂日 2006年2月7日 / 受理日 2006年4月17日

本研究の目的は、患者が簡便な操作で随時、主観的な痛みの強さを記録できる「痛み計」を開発し、臨床における有用性を確認することである。「痛み計」(23cm x 6cm x 2cm, 160g)は、0-10 Numeric Rating Scale (NRS)を採用した11個の押しボタンを有し、患者が疼痛に相当する数値のボタンを押すとその数値と日時を記憶する。「痛み計」をパソコンに接続すると、痛みの強さをグラフとして印刷できる。研究方法は事例検討である。大学病院に入院中でがん性疼痛のある患者1例に14日間、痛み計の使用を依頼した。印刷したグラフは患者と医療スタッフに渡した。その結果、以下の点が示唆された。1. 0-10NRSを用いたことにより、患者は痛みを円滑に表現できた。2. 操作を簡便にしたことにより、患者は随時、入力できた。3. 1日の痛みの推移をグラフで出力したことは、疼痛アセスメントに有効であった。

Keywords: 疼痛測定, 数値的評価スケール, がん性疼痛, 測定機器, 端末機

緒言

米国の Joint Commission on Accreditation of Healthcare Organizations (JCAHO) は、2001年に疼痛を第5のバイタルサインと位置づけて全ての患者に疼痛のモニタリングが必要であることを明言した [1]。痛みを積極的にアセスメントし、緩和ケアを促進するためにその意義は高い。疼痛の強さは熱や脈と異なり、適切な客観的測定法は未だなく [2]、患者が主観的に認知する程度が指標となる。しかし、がん患者は痛みの訴えを躊躇する傾向 [3] があり、医療者が患者の主観的な疼痛をモニタリングすることは難しい。そのため患者による症状の記録が重要であり、近年では紙の記録から電子記録に変わり、携帯性やパソコンとの互換性に優れた Personal Digital Assistance (PDA) の開発について研究されている [4]。痛みの記憶は思い出した時の感覚に影響される [5] ため、PDA と紙の記録を比較した研究では、実際は多くの患者が振り返って記入していた紙の記録ではなく、入力時間が記録される PDA の有用性が報告されている [6]。しかし、PDA の操作は必ずしも患者にとって容易ではなく [7]、入力忘れが多いことも指摘されているため [8]、患者が簡便な操作で随時、主観的な痛みの強さを記録できる「痛み計」の着想に至った。本研究の目的は、「痛み計」を実際に事例に試みて有用性を確認することである。

方法

1. 痛み計の着想 (図 1)

痛み計は、縦 6cm, 横 23cm, 厚さ 2cm, 重量 160 g の電子機器であり、主観的な痛みの強さを記録するための道具である。痛みの強さの評価は、0(全く痛みが無い)から 10(最悪の痛み)

の Numeric Rating Scale (NRS: 数値的評価スケール)を採用した。操作は、患者が簡便に入力できることを重視し、電源を入れ、痛みの強さに該当する数値のボタンを押すという2つの手順とした。押した数値は表示窓に表示され、15秒後に電源は自動的に切れる。入力された痛みのデータは、日時とともに痛み計内に記録され、専用のソフトをインストールしたパソコンに取り込むことによって出力することができる。本研究では、痛みの強さの推移が視覚的に分かるよう、1日単位の折れ線グラフで印刷した。

2. 事例への試み

大学病院に入院中の患者に対し、試作した痛み計を2週間使用するように依頼して協力を得た。患者の負担を軽減するため入力時間や回数は任意とし、さらに入力回数は痛み計の簡便性を評価する指標とした。グラフは1日に1回出力し、患者と医療スタッフの双方に渡した。なお、本研究は名古屋大学医学部倫理委員会保健学部の承認および対象施設の承諾を得て実施し、対象者に研究の主旨と倫理的配慮について説明して依頼し、文書で承諾を得た。



図 1. 痛み計。

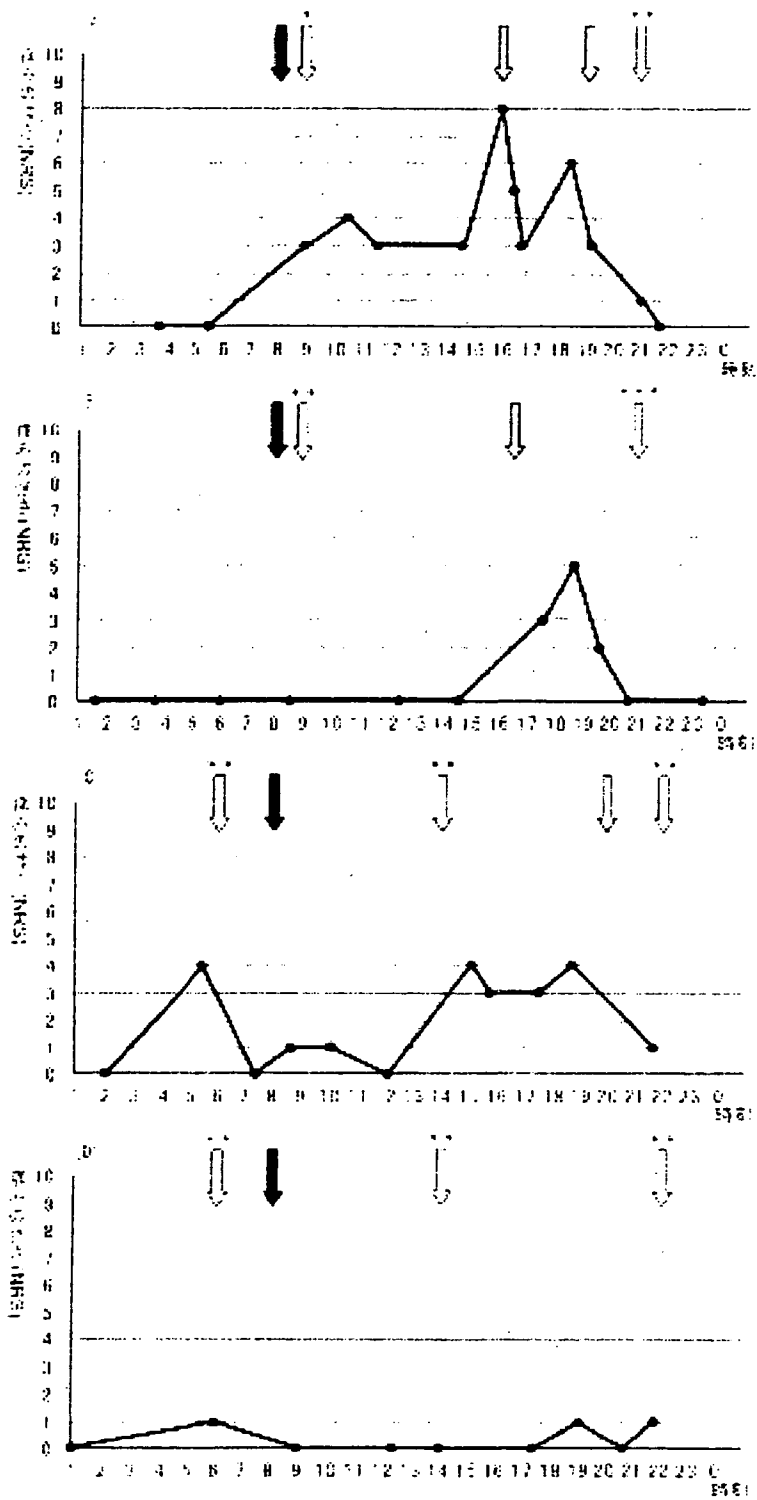


図2. 痛み計使用による痛みの強さの推移.(A) 痛み計使用2日目,(B) 痛み計使用6日目,(C) 痛み計使用10日目,(D) 痛み計使用13日目.
 白色矢印: 塩酸オキシコドン徐放剤
 *5mg, **10mg, ***15mg
 灰色矢印: 塩酸モルヒネ内服薬 5mg
 黒色矢印: 非ステロイド性消炎鎮痛薬 10mg
 NRS: Numeric Rating Scale

結果

1. 事例紹介

A氏は58歳の女性で、肺がんの術後に気管支およびリンパ節転移に対して、化学療法と放射線療法を施行中である。左胸部と背部の疼痛に対して、塩酸オキシコドン徐放剤（以下、オキシコドン）と非ステロイド性消炎鎮痛薬を内服している。

2. 痛み計使用の実際（図2）

痛み計導入日（オキシコドン開始9日目）までのA氏は「痛かったけど、もうすぐ鎮痛剤の時間だから我慢してた。」と語り、痛みを我慢することがあった。痛み計導入当初は、レスキューを複数回使用する状況であり（図2-A）、まずオキシコドンを増量した（図2-B）。しかし、21時の定期内服前に疼痛が強くなる傾向があり、A氏本人の「薬が切れるせいかな、夕方になると痛みが出てくる」という自覚を考慮して、痛み計9日目にオキシコドンをさらに増量し、12時間ごとの内服を8時間ごとの内服に変更したところ（図2-C）、痛み計13日目には終日0-1のレベルで過ごすことができるようになった（図2-D）。痛み計への入力操作はスムーズで、1日平均10.6（範囲：4-14）回であった。

A氏は、痛み計3日目に「昨日はつい我慢してしまい、本当に辛かった。だからか、レスキューを飲んであんまり効かなくて、また痛くなった。」とグラフを見て語り、痛み計7日目には「夜中は、オキシコドンが効いてるけど、トイレに行きたくて目が覚めるついでに記録してあるの。だから、0や1ばかりでしょ。このことも先生にも伝えなきゃね。」と説明した。また、痛み計を2週間使用した後に「疼痛が強くなったときに、その場で記録しておくことは難しいけど大切。値はすぐ忘れてしまうので、この器械があったのは本当に良かった。ぜひ改良して皆さんに使ってあげてほしい。」と感想を述べ、改良が必要な点として、小型化、起動時間の短縮などをあげた。

考察

A氏は0-10NRSを用いた疼痛の評価に混乱する様子はなく、痛みを数値化することができた。すべての患者が痛みの強さを数値化できるとは限らないが、痛み計に採用したことは妥当であったと判断できる。

A氏の入力回数が、1日平均10.6回であったことは、これまでに開発された疼痛を記録する電子機器では、1日3回と規定した入力回数のコンプライアンスが91-94%^[6, 8]、本研究と同様に入力回数を任意とした報告^[5]では平均6.08回であったことから、痛み計の操作の簡便性を支持する結果であった。

データをグラフとして出力したことにより、A氏と医療スタッフの双方にとって痛みの強さの推移が分かりやすくなった。A氏による痛み計3日目の振り返りは、グラフとして表示した痛みの強さを見たことで、改めて痛みと鎮痛薬のタイミングの理解につながったことを示した。医療スタッフは、グラフに表示された痛みの傾向とA氏の自覚をもとに、オキシコドンは1日2回の投与で有効とされる薬剤であるが、増量および1日3回の投与に変更した。実際の疼痛緩和は、オキシコドンの増量、投与間隔の短縮、化学療法および放射線療法の

影響といった様々な要因が考えられるが、医療スタッフに痛みの推移を視覚的に提示したことは、疼痛アセスメントの助となったと言える。

A氏は痛み計によって、痛みの強さを随時、記録することの重要性や痛みの記録がサポートされたと感じ、そのデータを主体的に医療スタッフとの会話に活用していた。また、改善が必要な点も指摘しており、今後はさらに多くの患者で痛み計の効果を検証すること、および患者の意見とコストを考慮した改善を重ねることが課題である。

結論

疼痛のある患者自身が、簡便に痛みの強さを入力できる痛み計を開発し、1事例に試みた結果、入院患者が痛み計を使用することは、以下の点でペインコントロールに役立ち、有用な道具としての可能性を示唆した。1. 痛み計に用いた0-10NRSによって、患者は痛みを円滑に表現できた。2. 痛み計の操作は簡便でシンプルな機能にしたことにより、患者は随時、入力できた。3. 1日の痛みの推移をグラフ化して視覚的に分かり易く出力することは、疼痛アセスメントに有効であった。

ただし、今回は1事例であるため、より多くの患者の協力を得て検討を重ねる必要がある。

引用文献

- 1) 熊澤孝朗. "痛みの10年宣言"と脳の世紀. 医学のあゆみ 2004; 211(5): 605-609.
- 2) 嶋津秀昭, 瀬野晋一郎, 加藤幸子, 他. 電気刺激を利用した痛み定量計測法の開発と実験的痛みによる評価. 生体医工学 2005; 43: 117-123.
- 3) 西川晶子, 安藤祥子, 神里みどり, 他. がん性疼痛管理の妨害因子に対する看護師の認識. がん看護 2004; 9: 74-79.
- 4) Mick P. Couper. Technology Trends in Survey Data Collection. Social Science Computer Review 2005; 23: 486-501.
- 5) Wendy B. Smith, Martin A. Safer. Effects of Pain Level on Recall of Chronic Pain and Medication Use. Pain 1993; 55: 355-361.
- 6) Arthur A. Stone, Joseph E. Schwartz, Michael R. Hufford. Patient Compliance with Paper and Electronic Diaries. Controlled Clinical Trials 2003; 24: 182-199.
- 7) Jan Gaertner, Frank Elsner, Klaus Pollmann-Dahmen, et al. Electronic Pain Diary: A randomized Crossover Study. Journal of Pain and Symptom Management 2004; 28: 259-267.
- 8) Leslie A. Aaron, Lloyd Mancl, Judith A. Turner, et al. Reasons for missing interviews in the daily electronic assessment of pain, mood, and stress. Pain 2004; 109: 389-398.

謝辞

本研究にご協力頂きました患者様、病院スタッフの皆様、厚く御礼申し上げます。なお、本研究は平成16-17年度文部科学省科学研究費（萌芽研究）の助成を受けており、特許出願中（特願2004-378244）である。