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The Effect of Skill Training on Functional Abilities of Nursing Home Residents with Dementia

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The purpose of this experimental study was to compare the effects of skill training, a traditional stimulation approach, and regular care (control group) on the ability to perform the basic activities of daily living of nursing home residents with dementia. Sixty-three subjects were randomly selected and randomly assigned to the three groups. Ability to perform the basic activities of daily living (ADLs) and progress toward meeting individually set ADL-related goals were measured. Significant differences were found in two of the three measures used. In general, the greatest improvement was found in the skill training group, modest improvement in the simulation group; and decline in the control group. © 1994 John Wiley & Sons, Inc.

As many as 4 million older Americans suffer from Alzheimer's and related dementing diseases. It has been estimated that this number could double or even triple in the next century (National Institute on Aging, 1990). Although nursing homes report that 50–75% of their residents have some degree of dementia (Linderborn, 1988), systematic investigation of the efficacy of specific behavioral interventions for this population has been extremely limited (Beck & Heacock, 1988; Buckwalter, 1989). Jirovec (1991) observed that there is an "obvious and urgent need for development of more nursing approaches to address the limitations of the cognitively impaired, institutionalized elderly" (p. 149). The purpose of this study was to test the effectiveness of group-based skill training in improving the demented older adult's ability to perform the basic activities of daily living (ADLs) and progress toward meeting individual ADL-related goals compared with a more commonly used group stimulation approach and with the regular care received by nursing home residents with dementia.

For a clinical diagnosis of *dementia, memory* disturbance must be present and more than one type of cognitive function must be impaired without a clouding of consciousness (American Psychiatric Association, 1987; World Health Organization, 1987). The individual with a dementing disease evidences progressive intellectual deterioration in memory, attention, calculation, abstract thinking, and judgment (Office of Technology Assessment, 1987) affecting ability to perform, first in work and social situations, and later at home. Eventually, the individual becomes unable to perform the basic functions of everyday life independently, including dressing, grooming, eating, toileting, walking, or communicating with others (Berg, 1984; Traber & Gispen, 1985). This functional decline presents a considerable challenge to effective nursing management in long-term care institutions.

It has been theorized that the profound decline in ability to perform the basic activities of daily living in the advanced stages of dementing diseases may be greater than is justified by the underlying neuropathology. The existence of this *excess disability*, defined as the "gap between *actual function and judged potential function*,"

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(Brody, Kleban, Lawton, & Silverman, 1971, p. 125), is supported by numerous clinically based reports and a growing body of research (Dawson, Wells, & Kline, 1993; Reifler & Larson, 1989). Nurses may play a prominent role in preventing excess disability and assisting the demented individual to retain more of his or her ability to engage in the activities of daily life (Dawson et al., 1993).

It also has been suggested that psychomotor skill learning or procedural memory is relatively spared in people with Alzheimer's and related diseases (Eslinger & Damasio, 1985). Procedural memory, as opposed to declarative memory, involves learning tasks rather than facts or events. It is characterized as more automatic and less accessible to conscious recollection than declarative memory (Squire, 1987). Procedural memories are thought to be retrievable despite the deterioration of hippocampal function that appears to affect declarative memory in Alzheimer's disease (Shepherd, 1988).

Activation of the particular structures involved in learning tasks usually requires practice and repetition (Squire, 1987). Most self-care activities are overlearned behaviors (Dawson, Kline, Wiancko, & Wells, 1986) that are acquired in this manner and may be regained through the intensive practice and repetition of the type of skill training (Cicerone & Tupper, 1991) tested in this study.

The possibility of achieving improved function in a severely demented population given sufficient and appropriate treatment is supported by the results of a number of intervention studies done with this population. Although the multiple approaches within a given treatment modality make it difficult in some cases to identify which aspects were responsible for the improvement achieved, there is some evidence to support the use of targeted rather than generalized interventions and the use of prompting and reinforcement of appropriate self-care behaviors.

One of the earliest intervention studies done with a demented population found that focused treatment directed toward meeting specific individualized goals related to function led to significant improvement in the focus areas in 32 demented older women when compared with 32 matched controls. Treatment group improvement over a list of 109 variables, however, was not found (Brody et al., 1971).

Karl (1982) failed to demonstrate significant improvement in ability to perform basic ADLs using a physical exercise intervention. Using a combined program of memory training, reminiscence, social interaction, and physical activity, Panella, Lilliston, Brush, and McDowell (1984) also failed to achieve statistically significant improvement in cognitive or physical function in clients attending an Alzheimer's day care program, although some early but nonsustainable gains were observed clinically.

Principles of operant conditioning, which are thought to operate within the procedural memory system (Squire, 1987), were used in some of the early work with a demented population. Baltes & Zerbe (1976), for example, reported the efficacy of continuous, immediate reinforcement on feeding ability using a single subject ABAB design. Similar effects on self-feeding ability were found with four nursing home residents who initially were unable to feed themselves (Stevenson & Gray, 1981).

The effectiveness of five training modules utilizing a prompting and reinforcement system was tested on 15 demented and 15 nondemented psychiatric patients by McEvoy and Patterson (1986). The demented patients showed significant improvement in the basic ADLs but not in the higher level activities of daily living. The researchers concluded that people with moderate dementia can relearn these basic skills and that improvement is facilitated by emphasis on physical practice, feedback via multiple sensory systems, and a deemphasis on cognitive involvement.

It has been observed that nursing home staff who are not trained in these or other techniques make virtually no systematic attempts to elicit self-care behavior. For example, self-feeding behavior is not encouraged other than frequent verbal prompts to open the mouth (Phillips & Van Ort, 1990; Van Ort & Phillips, 1992). In addition, Osborn and Marshall (1993) found that demented nursing home residents were capable of significantly more independence in feeding than they usually demonstrated when graded assistance techniques (similar to those used in this study) were used by the researchers.

In summary, the more general stimulation or exercise interventions were generally found to be ineffective in terms of improving functional levels. Use of prompting, reinforcement, and graded assistance, however, generally has been found to be effective, particularly in regard to improving self-feeding performance.

In the present study, a targeted program of skill training in the basic activities of daily living (grooming, eating, bathing, dressing, toileting, standing, and walking) was compared to a more traditional general stimulation program that uti-

lized adult games, music, and conversation and to regular nursing home care, which included no group activities for this very impaired population. It was hypothesized that the group receiving the skill training would show the greatest improvement in basic ADLs, that the stimulation group would maintain their current level of ADL performance, and that the control group's overall level of ADL performance would decline. The skill training approach is described in more detail in the Procedures section.

METHOD

A three group, pretest–posttest, experimental design was utilized. Subjects were randomly selected from a nursing home population of 240 residents. Approximately 80% of this institution's population was judged by staff to be demented. Random selection from the entire population was done in order to avoid missing individuals whose dementia had become apparent after admission. Following random selection, each potential subject was screened for eligibility for the study and randomly assigned to one of the three treatments: skill training, stimulation, and regular care (control). Data collectors were blind to group assignment.

Sample

Screening of randomly selected subjects was done by chart diagnosis and testing with the Short Portable Mental Status Questionnaire (Pfeiffer, 1975). Subjects were selected on the basis of a chart diagnosis of dementia, six or more errors out of 10 items on the Short Portable Mental Status Questionnaire, and the ability to stand with the assistance of two people. Exclusion criteria were evidence of stroke, head injury, major psychiatric problem or mental retardation on chart review, which was conducted by a gerontological nurse practitioner.

The presence of dementia was confirmed by patient history and use of the Mini-Mental Status Exam (Folstein, Folstein, & McHugh, 1975). Validated against clinical diagnosis and the Wechsler Test, the Mini-Mental Status Exam tests orientation, attention, registration, calculation, recall, and language. Very high (.89) test–retest reliabilities have been reported. It has been reported to discriminate demented from nondemented individuals well (Hovaguimian, Henderson, Khachaturian, & Orley, 1989).

Of the 72 residents selected, 5 were lost to transfers or illness before pretesting was completed. An additional 4 were lost after pretesting: 1 transferred to another nursing home, and 3 were hospitalized and did not return to the nursing home during the study. Results are reported for 21 subjects in each treatment group and the control group.

The 63 subjects on whom results are reported ranged in age from 59 to 102; their average age was 84 (SD = 8.50). Seventy-five percent were female, which is representative of most community nursing home populations. Subjects' mean Mini-Mental score was 6.4 (SD = 6.57) out of a possible score of 30. Subjects had an average of six major medical diagnoses, with a range of one to 15. The three treatment groups did not differ significantly on any of these characteristics or on the two measures of functional level at pretest when subjected to analysis of variance across the groups (using an alpha level of .05 as the criterion).

Instruments

Functional level was measured by the Physical Self-Maintenance Scale (Kent, Kastenbaum, & Sherwood, 1972; Lawton & Brody, 1969) and the Performance Test of Activities of Daily Living (Kuriansky & Gurland, 1976). The Physical Self-Maintenance Scale is a brief, nonintrusive assessment scale based on the Langly–Porter Scale and validated against other functional assessment scales. Reliabilities have been reported in the .90 range. Each of the seven items (standing, walking, toileting, bathing, and other basic activities of daily living) has five gradations making it more useful in detecting changes in function than those that simply measure function versus absence of function. An eighth item measuring communicative function was added to the scale for this study. This scale has been found useful in the later stages of dementia, particularly in institutional settings (Hovaguimian et al., 1989). In contrast, the Performance Test of Activities of Daily Living is a test rather than a rating scale. It utilizes simple props (spoon, cup, etc.) in the testing of 16 specific tasks such as taking a sip of water, dialing the telephone, or turning off a light switch. The Cronbach's alpha for this instrument using data from the present study was .88.

Goal attainment was measured on a scale of 0 (*decline*) to +3 (*great improvement*) in the manner of Brody and associates (1971). Five goals related to the basic activities of daily living were set for each subject by one of the gerontological

nurse practitioner data collectors in consultation with the nursing home's physical therapist immediately after pretest evaluation of the subject. Goals were stated as objectives and included such items as "reduce urinary incontinence to once a week or less" or "walk without assistance from bed to bathroom." The goals were not shared with nursing home staff or with the group leader at any time. Subjects' degree of achievement was rated immediately after posttest evaluation by the same data collector who was blind to treatment group assignment (posttesting was done at the end of the 20 weeks of intervention). All data were collected by master's prepared gerontological nurse practitioners experienced in the care of nursing home residents with dementia.

Procedures

Written consent for participation in the study was obtained from next of kin or guardian in accordance with procedures approved by the University Committee for the Protection of Human Subjects. A simple verbal explanation was offered to each subject and assent to participate was obtained. The resident's physician also was notified and requested to verify the resident's ability to physically tolerate the planned intervention.

The study was conducted as three series of three concurrent groups (skill training, stimulation, and no treatment control) lasting 20 weeks each. Both the skill training and general stimulation interventions were done in a group setting 5 days a week, 2.5 hours per day by a master's prepared clinical specialist in gerontological nursing assisted by a rehabilitation aide. The maximum number of participants in a group was eight.

Subjects in two of the three treatment groups received group-based intervention. Functional skill training focused on regaining function in the basic activities of daily living (toileting, eating, bathing, dressing, grooming, standing, and walking) through repeated practice of each of these activities daily. During each 2½ hour session, each subject had the opportunity to practice *all* of these basic activities of daily living. For example, grooming included such activities as tooth brushing, hair combing, application of cosmetics for women and of aftershave lotion for the men. Eating included a mid-session snack and a complete meal (lunch). Verbal prompting, physical demonstration, and positive reinforcement were used to guide and support practice. The assistance provided was carefully graded according to the individual's ability to encourage independence but to keep frustration at a tolerable level (Tappen, 1992). Similar to the approach used by Osborn and Marshall (1993), graded assistance employs the least amount of assistance needed by the individual to complete the task in the following order: verbal prompts or cues, demonstration, physical guidance, partial physical assistance, and finally, complete physical assistance.

General stimulation incorporated the traditional recreationally oriented group activities provided for dementia patients in therapeutically oriented settings (Maloney & Daily, 1986; Zgola, 1987). Specific activities involved adult games (such as dominoes, bowling, or ball toss), group discussion about resident's interests and pastimes, music (taped popular or classical music and rhythm band), and simple relaxation measures such as deep breathing and light neck and shoulder massage.

The control group received no additional treatment, just regular nursing care provided by the nursing home staff. Neither skill training nor group-based stimulation activities were provided to demented residents by nursing home staff.

RESULTS

Although the three treatment groups did not differ significantly at pretest on either the Physical Self-Maintenance Scale ($F(2,60) = .48$, $p = .62$) or the Performance Test of Activities of Daily Living ($F(2,60) = .02$, $p = .98$), inspection of the pretest means indicated that the individuals in the skill training group on average began treatment at a lower level of functional ability than did the stimulation or control groups. In order to control for these differences, an analysis of covariance (ANCOVA) was performed with pretest scores as the covariate. With the effect of the pretest scores removed, the effect of treatment on the Physical Self-Maintenance Scale was significant $F(3,59) = 3.17$, $p = .04$. The group receiving skill training showed an increase in mean score the equivalent of a full step (from major to moderate or from moderate to minor assistance, for example) increase on three of the eight items on this scale. The stimulation group had a smaller gain in mean score and the control group experienced a similar decline in their average score (see Table 1). Comparisons of the adjusted posttest means indicated a significant difference between the skill training ($M = 26.17$) and control group ($M = 22.63$), $t(20) = 2.49$, $p = .01$. The stimulation group ($M = 24.10$) did not differ significantly from the other two groups.

Table 1. Comparison of Treatment Group Means Over Time on Function Measures

Treatment Group	Pretest		Posttest	
	M	*SD*	*M*	*SD*
	Physical self-maintenance scale			
Skill training	21.76	7.80	25.09	7.53
Stimulation	23.56	8.05	24.38	7.65
Regular care (control)	24.26	9.46	23.52	8.85
	Performance test of ADL			
Skill training	43.01	13.09	46.02	12.77
Stimulation	43.45	12.30	44.31	10.35
Regular care (control)	42.62	16.28	41.48	14.84
	Goal attainment			
Skill training	—	—	1.75	.54
Stimulation	—	—	1.43	.58
Regular care (control)	—	—	1.10	.49

No significant effect of treatment over time was found on the Performance Test of Activities of Daily Living $F(3,59) = 2.16$, $p = .12$. However, the same pattern of increase for the skill training group, a smaller increase for the stimulation group and decline for the control group was found upon inspection of the means at pretest and posttest.

At posttest, each subject's progress toward meeting the goals set at pretest was rated on a 4-point scale from 0 (*decline*) to 3 (*great improvement*). Total score for goal attainment was the mean of the five goal achievement ratings. Analysis of variance comparing the means for the three groups indicated a significant difference between the groups $F(2,57) = 6.79$, $p = .0023$. Again, the skill training group had the highest mean at posttest followed by the stimulation group and the control group. A Tukey multiple comparison procedure, which controls for Type I experimentwise error, was performed following the significant ANOVA. There was a significant difference in goal attainment of the skill training group over the control group at $p = .05$. The stimulation group did not differ significantly from the other two treatment groups.

DISCUSSION

On the whole, the results of this study lend further support to the idea that people with advanced dementia can be helped and that functional skill training may be more effective than traditional approaches. The weaker and statistically nonsignificant changes seen in the stimulation group were consistent with the hypothesis that this group would maintain its pretest functional level. It also was generally in line with the results of the many previous studies that tested similar approaches with mixed results.

From a theoretical perspective, the improvement in function in the skill training group lends support to the concept of excess disability. As it is extremely unlikely that any behavioral treatment would reverse the processes of the disease itself, the improvement seems to suggest the existence of more functional impairment in untreated individuals than is necessary given the progression of the disease.

The design of the study did not provide for any test of the role of procedural memory in facilitating this improvement. In observing the treated groups, however, it did appear that the skill training group was more physically active by virtue of the tasks they were practicing. There was also anecdotal evidence of new learning as group members became acquainted with the group leader and were able to locate the room in which the treatment occurred. While this is a very elementary level of learning, it suggests that either learning or relearning may have occurred within the skill training groups.

A number of interesting questions are raised by the results of this study. One is the length of time needed to achieve improvement (treatment in this study continued for 20 weeks) and another is the intensity of the treatment (treatment occurred 5 days a week). Our impression of the effects after the first two series of treatments was that some decline occurred after the treatment ended but that subjects did not return to baseline and could have been maintained with training once or twice weekly. Whether less intensive "maintenance" skill training of once or twice a week could have prevented any decline should be studied. Another question concerns the failure to achieve significance on the Performance Test of ADLs. Despite its attractiveness as a direct test rather than an observational scale, the Performance Test has not been found to be particularly sensitive to change (Hovaguimian et al., 1989). It is not clear why this is so. Two possibilities are the discrete nature of some of the activities and the lack of relevance to nursing home residents of some items such as dialing a telephone or turning on a light switch.

A third question is the effect of the group setting. Would more or less improvement have oc-

curred with individual treatment? If the group setting alone was responsible for improvement, subjects receiving general stimulation should also have shown significant improvement. On the other hand, the possibility of a synergistic effect between skill training and a group setting cannot be discounted.

Further refinement and testing of the skill training approach is needed to answer questions about the specific aspects of the treatment that contributed to its effect: the cueing and prompting, the reinforcement, the practice itself, any increase in physical activity, the social setting, or a combination of these factors. In addition, testing skill training in individual activities of daily living such as grooming or self-feeding may lead to adaptations based upon the requirements of that particular skill.

The skill training intervention tested in this study is relatively expensive to implement in today's nursing home settings. Shorter, less intensive programs may be equally successful. It may also be possible to train ancillary staff and family members to conduct practice sessions under professional supervision. Economic constraints should not, however, become the overriding factor in decisions about the use of potentially therapeutic treatment for any group.

The results of this study support the continued development and testing of therapeutic approaches to the management of dementia in older people. A great deal of attention has been focused on the stress involved in caring for this patient population. A re-emphasis on designing effective interventions that reduce the dependency of the demented person would provide a direct benefit to the patient and indirectly reduce the burden on the caregiver as well.

REFERENCES

American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders*. (3rd ed. rev.) Washington, DC: Author.

Baltes, M.M., & Zerbe, M.B. (1976). Reestablishing self-feeding in a nursing home resident. *Nursing Research, 25*, 24–26.

Beck, C., & Heacock, P. (1988). Nursing interventions for patients with Alzheimer's disease. *Nursing Clinics of North America, 23*, 95–124.

Berg, L. (1984). Clinical dementia rating scale. *British Journal of Psychiatry, 145*, 339.

Brody, E.M., Kleban, M.H., Lawton, M.P., & Silverman, H.A. (1971). Excess disabilities of mentally impaired aged: Impact of individualized treatment. *The Gerontologist, 11*, 124–133.

Buckwalter, K.C. (1989). Applied services research. In E. Light & B.D. Lebowitz (Eds.), *Alzheimer's disease treatment and family stress: Directions for research* (pp. 434–457), (DHHS Publication No. ADM 89-1569). Washington, DC.: U.S. Government Printing Office.

Cicerone, K.D., & Tupper, D.E. (1991). Neuropsychological rehabilitation: Treatment of errors in everyday functioning. In D.E. Tupper & K.D. Cicerone (Eds.), *The neuropsychology of everyday life: Issues in development and rehabilitation* (pp. 271–293). Boston: Kluwer Academic Publishers.

Dawson, P., Kline, K., Wiancko, D.C., & Wells, D. (1986). Preventing excess disability in patients with Alzheimer's disease. *Geriatric Nursing, 7*, 298–301.

Dawson, P., Wells, D., & Kline, K. (1993). *Enhancing the abilities of older persons with Alzheimer's disease and related dementias: A nursing perspective*. New York: Springer.

Eslinger, P.J., & Damasio, A.R. (1985). Alzheimer's disease spares motor learning. *Society for Neurosciences Abstracts, 11*, 459.

Folstein, M., Folstein, S., & McHugh, P.R. (1975). Mini-mental state: A practical method of grading the cognitive state of patients for the clinician. *American Journal of Psychiatry, 12*, 189–198.

Hovaguimian, T., Henderson, S., Khachaturian, Z., & Orley, J. (1989). *Classification and diagnosis of Alzheimer's disease: An international perspective*. Toronto: Hogrefe and Huber.

Jirovec, M.M. (1991). The impact of daily exercise on the mobility, balance and urine control of cognitively impaired nursing home residents. *International Journal of Nursing Studies, 28*, 145–151.

Karl, C.A. (1982). The effect of an exercise program on self-care activities for the institutionalized elderly. *Journal of Gerontological Nursing, 8*, 282–285.

Kent, D.P., Kastenbaum, R., & Sherwood, S. (1976). *Research planning and action for the elderly: The power and potential of social science*. New York: Human Sciences Press.

Kuriansky, J., & Gurland, B. (1976). The performance test of activities of daily living. *International Journal of Aging and Human Development, 7*, 343–352.

Lawton, M.P., & Brody, E.M. (1969). Assessment of older people: Self-maintaining and instrumental activities of daily living. *The Gerontologist, 9*, 179–186.

Linderborn, K.M. (1988). The need to assess dementia. *Journal of Gerontological Nursing, 14*, 35–38.

Maloney, C.C., & Dailey, T. (1986). An eclectic group program for nursing home residents with dementia. In E.D. Taira (Ed.), *Therapeutic interventions for the person with dementia* (pp. 55–80). New York: Haworth Press.

McEvoy, C.L., & Patterson, R.L. (1986). Behavioral treatment of deficit skills in dementia patients. *The Gerontologist, 26*, 475–478.

National Institute on Aging (1990). *Special report on aging: 1990* (DHHS Publication No. 1990-274-012 120719). Washington, DC: U.S. Government Printing Office.

Office of Technology Assessment, U.S. Congress. (1987). *Losing a million minds: Confronting the tragedy of Alzheimer's disease and other dementias* (OTA-BA-323). Washington, DC: Government Printing Office.

Osborn, C.L., & Marshall, M.J. (1993). Self-feeding performance in nursing home residents. *Journal of Gerontological Nursing, 19*(3), 7–14.

Panella, J.J., Lilliston, B.A., Brush, D., & McDowell, F.H. (1984). Day care for dementia patients. An analysis of a four-year program. *Journal of the American Geriatrics Society, 32*, 883–886.

Pfeiffer, E. (1975). A short portable mental status questionnaire for the assessment of organic brain deficit in elderly people. *Journal of the American Geriatrics Society, 23*, 433–441.

Phillips, L., & Van Ort, S. (1990). Identifying intervention strategies for facilitating self-care behaviors among Alzheimer's disease patients. Unpublished manuscript, University of Arizona College of Nursing, Tucson.

Reifler, B.V., & Larson, E. (1989). Excess disability in dementia of the Alzheimer's type. In E. Light & B.D. Lebowitz (Eds.), *Alzheimer's disease treatment and family stress: Directions for research* (pp. 363–382). DHHS Publication No. ADM 89-1569. Washington, DC: U.S. Government Printing Office.

Shepherd, G.M. (1988). *Neurobiology* (2nd ed.). New York: Oxford University Press.

Squire, L.R. (1987). *Memory and brain*. New York: Oxford University Press.

Stevenson, J., & Gray, P. (1981). Rehabilitation for long-term residents. *Geriatric Nursing, 2*, 127–131.

Tappen, R.M. (1992). Non-pharmacological treatment of Alzheimer's disease. *Aging and Neuroscience, 1*, 9–17.

Traber, J., & Gispen, W. H. (1985). *Senile dementia of the Alzheimer type*. New York: Springer-Verlag.

Van Ort, S., & Phillips, L. (1992). Feeding nursing home residents with Alzheimer's disease. *Geriatric Nursing, 13*, 249–253.

World Health Organization. (1987). *International classification of diseases* (10th ed.). Geneva: Author.

Zgola, J.M. (1987). *Doing things. A guide to programming activities for persons with Alzheimer's disease and related disorders*. Baltimore: The Johns Hopkins University Press.