
Functional Skill Regression in Late-Stage Dementias

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One hundred fifty-two institutionalized persons with late-stage dementia were rated with a geriatric developmental screening scale that notes cognitive, language, sensorimotor, and self-care abilities. The results showed that the loss of functional abilities in late-stage dementias seems to occur in reverse order of their development in childhood. Developmental congruence was noted within these persons regardless of diagnosis. In addition, the average functional age rating correlated well with scores from the Folstein Mini Mental State examination (MMS) (Folstein, Folstein, & McHugh, 1975). The close correlation between scores indicates that the MMS is a fast and simple tool for predicting not only cognitive impairment but also the approximate stage of functional development.

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Aging has long been thought of as a return to childhood. Writers as different as Aristophanes and Shakespeare have held this view. A tendency to "infantilize the elderly" continues to be a current, troubling trend in some settings (Dolinsky, 1984). This pervasive view of the elderly probably stems from the conclusions drawn by untrained observers when confronted with the insidious progression of dependency, incontinence, communication problems, and the flexed, fetal postures seen in persons in late stages of dementia. Whether, in fact, the regression noted in elderly persons with dementia bears any similarity to normal childhood development is the subject of this paper.

The 1981 Report of the Royal College of Physicians defines dementia as "the global impairment of higher cortical functions including memory, the capacity to solve problems of day to day living, the performance of learned perceptuo-motor skills, the correct use of social skills and control of emotional reactions in the absence of gross clouding of consciousness. The condition is often irreversible and progressive" (Mahendra, 1984). This definition highlights the focal role of functional losses and the disappearance of learned behaviors in persons affected by dementia. The dependencies in eating, mobility, and self-care do not appear to be isolated events tied to physical limitations or to the behaviors of care givers that encourage "learned helplessness." Instead, they seem predictable and tied to the cognitive and sensorimotor changes that occur in dementia. The changes seem developmentally congruent and appear to occur in reverse order of the development of skills.

A search of the current literature revealed a single researcher dealing with these issues. A seven-step, ordinal scale developed by Barry Reisberg of the New York University Medical Center notes that the loss of key functional abilities in patients with Alzheimer's disease occurs in reverse order of the acquisition of these abilities in children. He notes that this reversal is limited to Alzheimer's disease, and that approximately the same amount of time is needed to learn a skill as to lose it. In contrast to the present study, however, his study included very few late-stage cases ($N = 12$) and was done in a community setting rather than in an institution. In addition, the scale is limited to cumulative, single functional losses and lacks a broad descriptive base of the overall cognitive, physical, language, and self-care abilities of persons in the various stages of dementia (Reisberg, 1985, 1986; Turkington, 1985).

If the loss of sensorimotor and daily living skills can be anticipated in the late stages of various dementias and can be tied to the easily recognizable pattern of childhood development, it will make care planning and programming easier for all those who

deal with the elderly in long-term care settings. It will be possible to anticipate needs, and goals and activities will be appropriate to the individual's abilities. Because the anticipation of functional changes has implications for care givers, rehabilitation professionals, and those who program activities, a method is needed to easily screen and predict these functional changes.

This paper reports on a cross-sectional, observational study conducted to look at activities of daily living and their cognitive, motor, and sensory components in elderly persons with dementias to determine whether developmental congruence was present and whether loss of functional abilities tended to occur in reverse order of their development. In addition, the Folstein Mini Mental State examination (MMS), a cognitive screening tool, was examined for its usefulness as a simple screening tool for predicting the actual level of function (Folstein, Folstein, & McHugh, 1975).

Method

Subjects

All residents of a 256-bed, long-term care facility were eligible for participation in this study. The average age was 85.4 years; the average length of stay was 4.9 years; all were from the Midwest, and all were Caucasian. To qualify for the study, a resident's score on the MMS had to fall between 0 to 19 to indicate dementia. The MMS is routinely administered to all residents of this facility on admission and twice a year thereafter. A total of 263 charts was examined. Nineteen persons were eliminated because they lacked MMS scores: 9 had severe communication problems; 10 refused to participate. Ninety-two had scores between 20 and 30 and were eliminated from the study because they did not evidence significant problems with dementia. The final study group was composed of 152 subjects (138 women and 14 men) evidencing dementia as indicated by a score of 0 to 19 on the MMS.

Eighty of the subjects had scores on the MMS of 10 or less. Few residents had neurological or psychological evaluations related to their dementias, and the diagnoses listed on their charts were stylized and vague (e.g., senility, chronic organic brain syndrome, mental confusion). No attempt was made to group subjects by diagnosis. Significant hearing problems were noted in 11; 8 were legally blind; and 5 had both impaired vision and hearing. Orthopedic or neurological problems (e.g., fractured hip, cerebrovascular accident, arthritis, amputation) affected ambulation in 21 subjects. Seven had physical impairments affecting continence. A diagnosis of Parkinson's disease was noted in 8 subjects. Five had had cerebrovascular accidents.

Instrument

The instrument used was the Geriatric Functional Developmental Screening Scale (Banus, 1979), a scale based on normal pediatric development. It is a 7×10 matrix to be completed with information obtained from chart review, observation, or the report of a care giver. The checklist focuses on 10 variables: mobility, hand use, sensorimotor status, cognition, socialization, receptive language (comprehension), expressive language, feeding, toileting, and self-care skills. The scale includes seven developmental levels, based on normal levels of skill development in childhood: 0 months, 2 months, 6 months, 18 months, 48 months, 72 months, and 96 months. Operational definitions of each variable at each level are made applicable to a geriatric population (e.g., mobility at 6 months: stands/steps with support [performs pivot transfers and ambulates 10–20 feet with the assistance of one or two persons]). Subjects are assigned scores based on months (e.g., mobility = 6 months). Interrater reliability is .91 as determined by the independent rating of 10 individuals by two registered occupational therapists.

Procedure

The subject's chart and MMS worksheet were reviewed by a registered occupational therapist to determine the most appropriate rating in months for each category for each subject. They were completed by checking the interdisciplinary care plan, nursing summary, and flow sheets that had been completed within 3 months of the MMS. A mean was computed for each subject to obtain an average functional age in months. Statistical analysis used Pearson correlation coefficients and multiple regression analyses. The level of significance was set at .05.

Results

Each individual variable correlated well with the other variables. All items examined correlated at greater than .50, as is shown in Table 1. The average functional age was highly correlated to the dependent variables, as was expected (multiple $R^2 = .995$; $F = .0001$). Feeding, cognition, and mobility affected this result the most; socialization, the least. The significance of F for all variables was .0001. The MMS also showed a high degree of correlation (multiple $R^2 = .91$; $F = .0001$). The most significant contributing variables were receptive language, mobility, sensorimotor status, and cognition ($p < .01$). Toileting and self-care skills were the least related. Correlation of the MMS and functional age indicates that a score of 0 on the MMS is the equivalent of 7.8 months with a standard error of estimate of 7.6 months. An MMS score of 19 is the equivalent of 58 months (approximately 5

Table 1
Pearson Correlation Coefficient Matrix (N = 152)

Mobility															
Hand use	.66														
Sensorimotor status	.68	.90													
Cognition	.51	.76	.76												
Socialization	.63	.76	.74	.71											
Receptive language	.56	.76	.77	.78	.63										
Expressive language	.61	.81	.79	.78	.72	.85									
Feeding	.67	.79	.75	.69	.66	.70	.75								
Toileting	.62	.61	.58	.60	.53	.63	.65	.64							
Self-care skills	.68	.73	.68	.64	.65	.64	.73	.77	.76						
MMS ^a	.58	.88	.88	.86	.76	.88	.89	.80	.65	.72					
Ave. age	.76	.92	.91	.85	.81	.86	.90	.88	.76	.84	.92				
		Mobility	Hand use	Sensorimotor	Cognition	Socialization	Receptive	Expressive	Feeding	Toileting	Self-care	MMS ^a			
				status			language	language			skills				

Note. MMS = Mini Mental State score.

^an = 136. Sample size differed because of concern for validity of some MMS scores where severe visual, hearing, or hand problems affected the score. Individuals were included in the broader sample if their score on the MMS was less than 20, including scores obtained on the questionable items.

years). Each point on the MMS increases the functional age score by a little less than 3 months, as is indicated by Table 2.

Discussion

The study appears to provide substantial statistical evidence to support the notion of developmental congruence in persons with late-stage dementias regardless of the diagnosis. This finding differs from that of Reisberg but may be due to the fact that his sample was largely community based and weighted toward early stages (Turkington, 1985). There also appears to be some evidence to support the hypothesis that loss of an ability occurs in reverse order of its development, since the most severely impaired persons

showed the lowest average functional ages in months. Because of the cross-sectional nature of this study, it was not possible to determine whether regression was occurring in reverse developmental order in individual subjects.

Although all variables were significantly related, the lowest single correlation coefficients involved mobility and toileting. This may have been due to the high number of subjects with physical impairments affecting ambulation and continence, but it is in contrast to the findings of Reisberg, who noted that the loss of both ambulation and continence was predictable in persons with Alzheimer's disease (Reisberg, 1986).

A secondary finding of this study was the ability of the MMS to predict functional age. The study found that the numeric scores on the MMS were meaningful and were related to activities of daily living (ADL) and perceptual motor abilities. Thus the MMS has a use beyond simply determining whether a patient has a cognitive disorder (Folstein et al., 1975). The simplicity of administration and the minimal amount of time required to administer the MMS makes it an excellent tool to predict a patient's developmental age and the functional daily living skills he or she can be expected to have.

Further research on this topic is indicated. This study is limited by its cross-sectional nature and chart review methodology, and the homogeneity of the sample limits the generalization of results. In any future study, a longitudinal design would be especially important to predict whether regression actually occurs in reverse developmental order. To determine whether late stages of various conditions are actually similar, or whether this population tends to be heavily weighted toward a single etiology, it would have been helpful to use a sample population where clinical evaluations of the dementias had taken place and

Table 2
Relationship Between Functional Age and Mini Mental State

Mini Mental State Score	Functional Age in Months
0	7.9
1	10.5
2	13.2
3	15.8
4	18.4
5	21.0
6	23.6
7	26.2
8	28.8
9	31.4
10	34.0
11	36.6
12	39.3
13	41.9
14	44.5
15	47.1
16	49.7
17	52.3
18	54.9
19	57.5

Note. Standard error of estimate = 7.6 months.

fairly reliable diagnoses had been established. It would also have been helpful to do complete developmental workups on individuals to check for the presence of early reflex activity and covert sensorimotor patterns. The large multiple R^2 and the high correlations among the variables may indicate that the variables are not independent. Factor analysis would aid in the identification of the variables that relate and overlap.

Implications

The most important implications for a theory of developmental congruence and regression center on goal setting and programming in long-term care settings. For example, a person functioning at approximately a 6-month level in terms of cognition, hand use, and sensorimotor skills cannot be expected to feed himself or herself and will not be able to participate in large group activities. Given the progressive and irreversible nature of dementias, an appropriate goal at this stage would not be to regain spoon feeding, but to maintain finger feeding or the ability to drink from a cup. Activity programming for a patient at this level would need to focus on environmental enrichment and relational issues, with goals like making eye contact or reacting spontaneously to stimuli, rather than attendance at programs or participation in tasks. Individuals with treatable conditions can also benefit from care planning based on developmental staging, but because they can be expected to improve, their goals should be directed toward achieving the next developmental task rather than maintaining their present level. It is imperative that persons exhibiting signs of dementia or loss of functional skills receive adequate medical and psychological evaluations to rule out reversible causes. In addition, as occupational therapists, we need to be especially alert to assessing the

effects of a care giver's behavior on the patient's self-care and to enhance performance through environmental compensations when organic dysfunctions (physical and cognitive) are present. Screening with the MMS when change is noted, as well as on a regular quarterly or semiannual basis, is recommended.

Caution is needed in our approach. Care planning based on developmental staging is a far cry from treating an aged adult like a child. The individual must be treated with respect, and dignity and self-worth must be maintained. Let us maximize the use of abilities by first assessing each individual's functional and developmental status, and then setting appropriate goals and providing the needed personal and environmental programming and support.

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