

# A Functional Dementia Scale

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Development of a scale to quantify the severity of functional disabilities associated with dementia is described. The Functional Dementia Scale (FDS) is designed for use by caretakers of disabled elderly. It contains 20 items in three subscales: activities of daily living, orientation, and affect. Cronbach's  $\alpha$  coefficient of internal consistency for the scale was .90, and test-retest correlation was .88.

Organic brain syndrome is a relatively common problem, affecting about 10 percent of persons aged over 65 years and 20 percent of those over age 80.<sup>1</sup> The most common cause of organic brain syndrome in the elderly (senile dementia of the Alzheimer's type [SDAT] or primary neuronal degeneration) is a presently irreversible, progressive disease of unknown etiology. Although several promising leads are being investigated, there is presently no clearly effective treatment. The disease is characterized by intellectual decline with several related problems such as impaired judgment, emotional lability, incontinence, paranoia, hallucinations, and impaired ability to manage activities of daily living. Management usually involves controlling the associated problems, which vary in severity from patient to patient and even within the same patient, through the course of the illness.<sup>2,3</sup> The functional disabilities associated with dementia often lead to difficult decisions about placement. Many patients being maintained at home require extensive supportive services provided either by family or by community agencies. While the majority of patients with senile dementia live in the community, many ultimately require institutionalization. Between 50 and 75

percent of persons in nursing homes have impaired intellectual function.<sup>4</sup>

Because SDAT is progressive and because patients can have acute, reversible conditions superimposed on this underlying irreversible process, it is important that the physician have a method of establishing the severity of the illness. While short, simple, and reliable methods of quantifying the degree of cognitive impairment have been reported, there is a need for similar instruments to measure the degree of associated functional disabilities.<sup>5-7</sup> Intellectual impairment assumes particular importance when it affects an individual's ability to be maintained by caretakers, whether family in the community or staff in an institutional setting.

The purpose of this study was to develop a rating instrument capable of quantifying the severity of functional disabilities associated with dementia. Criteria for acceptability of the instrument were that it should be reliable and valid, simple enough to be completed by family members who provide the majority of care to elderly patients, short enough to be practical, capable of distinguishing degrees of severity of associated functional disabilities of dementia, and quantifiable.

A thorough review of existing geriatric assessment scales identified five that were of particular relevance to this project: the Physical and Mental Impairment of Function Evaluation in the Aged (PAMIE), the Nurses' Observation Scale for Inpatient Evaluation (NOSIE), the Stockton Rating Scale, the Geriatric Rating Scale (GRS), and the Sandoz Clinical Assessment-Geriatric (SCAG).<sup>8-12</sup> Although each of these instruments meets some of the criteria for a functional dementia scale, none

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meets all of the criteria. The PAMIE, with 77 items, is longer than desired. The Stockton and GRS, which are designed to measure a wide range of physical and mental function, include items unrelated to dementia (eg, vision and hearing). Some items in the Stockton, NOSIE, and GRS are applicable only to hospitalized patients (eg, regarding behavior on the ward). The SCAG, which is designed to distinguish depression from dementia, assumes administration by health professionals, not by family members. Thus, while each of these scales has a proven role in assessing elderly patients or evaluating aspects of treatment, there remains the need for a brief, focused instrument that families as well as health care providers can use to monitor functional disabilities associated with dementia.

### Development of the Instrument

The reliability of a questionnaire is enhanced if items are short and grammatically simple, and if sophisticated medical terminology is avoided.<sup>13</sup> Questions for the Functional Dementia Scale (FDS) were designed accordingly.

In an attempt to conceptualize the instrument at the onset of the project, 38 items were drafted to assess the presence and severity of functional disabilities commonly associated with dementia. Items were devised for six symptom areas: activities of daily living, emotional lability, memory and orientation, paranoia and hallucinations, agitation and wandering, and judgment. Each item employed a four-point rating scale ranging from "none or little of the time" (1) to "most or all the time" (4). All items were positive in the symptomatic direction, so that a high score indicates more severe problems.

A pilot study was conducted to identify ambiguities in the wording of questions and problems in use of such an instrument. Nursing staff in three different nursing homes completed the rating scale on a total of 25 patients in their facilities. Comments and suggestions from these staff supported reducing the scale to 26 items. In order to verify the acceptability of the questionnaire to families caring for demented persons, the 26-item scale was further piloted on eight family members caring for elderly demented patients seen at a family medicine center.

Sixty patients with moderate to severe demen-

tia, 20 residing in each of three separate nursing homes, were then rated by members of their respective nursing staffs using the revised 26-item scale. Two nurses who had daily contact with each patient independently completed the questionnaire, providing two sets of ratings for each patient.

Item intercorrelations were examined to identify redundancies, and correlations of items to the total scale score were examined to identify items that best predicted total score. Internal consistency of the scale was determined using Cronbach's  $\alpha$ .<sup>14</sup>

Interrater reliability was analyzed using Cohen's  $\kappa$  to determine items that were scored inconsistently.<sup>15</sup> Although the statistical significance of kappa was considered, special attention was directed to the locus of responses along the diagonal of paired ratings. Items that raters agreed were rarely characteristic of the patients were judged to be insensitive to functional disabilities associated with dementia.

Empirical clusters of items were identified using elementary linkage analysis<sup>16</sup> and were compared with the six theoretical symptom areas originally conceptualized. This analysis led to the redefinition of subscales into 7 items in activities of daily living, 6 items in orientation (including memory and orientation, and judgment), and 7 items in affect (including lability, paranoia and hallucinations, and agitation and wandering).

As a result of these statistical analyses, the scale was reduced to the 20 items shown in the Appendix. This final instrument was then tested for reliability and validity.

### Methods

To examine the temporal stability of items in the instrument, 40 of the initial 60 patients previously rated in two of the three nursing homes were evaluated by the same raters two weeks after the initial assessment. Patients' test and retest scores on each of the items in the final instrument, on the three subscales, and on the 20-item total were correlated.

Thirty-four patients not included in the initial assessment were rated by one member of the nursing staff at each of the two participating nursing homes. These patients were cared for by faculty and residents in a family medicine residency program and included patients whose disabilities ranged on the continuum from no dementia to se-

**Table 1. Reliability Analyses of Functional Dementia Scale**

Item	Interrater Agreement (%)		Test-Retest T <sub>1</sub> -T <sub>2</sub>
	Plus or Minus One Point		
	Exact		(r)*
Activities of Daily Living Subscale ( $\alpha = .85$ )			.88
1 Difficulty completing tasks	65	90	.50
2 Purposeless activity	66	86	.51
5 Assistance in eating	63	88	.84
7 Disorderly appearance	58	82	.51
9 No bowel control	60	83	.90
11 No bladder control	67	88	.91
12 Needs to be watched	50	82	.64
Orientation Subscale ( $\alpha = .83$ )			.79
3 Wanders at night	62	80	.50
6 Loses things	48	84	.56
16 Unaware of limitations	58	78	.33
17 Confused	67	88	.75
18 Trouble remembering	75	92	.57
20 Wanders during the day	66	76	.37
Affect Subscale ( $\alpha = .84$ )			.77
4 Hears things	66	88	.65
8 Moans	58	80	.31
10 Threatens others	68	87	.60
13 Destructive	58	82	.53
14 Shouts or yells	73	90	.75
15 Accuses others	65	87	.69
19 Mood changes	48	83	.59
Total Instrument ( $\alpha = .90$ )			.88

\*P < .01

vere dementia. Internal consistency of the scale was determined using Cronbach's alpha. Interrater reliability of each item was determined by computing the percentage of ratings that agreed exactly or within one point.

Validity was indexed by correlating scores for the total scale and its three subscales with data obtained from the Short Portable Mental Status Questionnaire<sup>6</sup> (SPMSQ) and the SET Test<sup>7</sup> administered to each of the 34 patients.

**Results**

The reliability of the Functional Dementia Scale administered to 40 patients was evaluated using

Cronbach's  $\alpha$  coefficients for internal consistency, percent agreement values for interrater reliability, and Pearson correlation coefficients (r) for temporal stability between first (t<sub>1</sub>) and second (t<sub>2</sub>) administrations. These statistics are displayed in Table 1. An  $\alpha$  of .90 was obtained for the 20-item FDS scale, .85 for the 7-item activities of daily living subscale, .83 for the 6-item orientation subscale, and .84 for the 7-item affect subscale. With respect to interrater reliability, exact agreement between raters (eg, both raters gave a patient a 3 rating on the 4-point scale) ranged from 48 percent to 75 percent of ratings on the 20 items, and agreement within a one-point difference (eg, one rater gave a 3 rating while the other rater gave a 2

or a 4 rating) ranged from 76 percent to 92 percent. Correlation coefficients indexing stability of the FDS scale and the three subscales from first to second administration ranged from .77 to .88. Similar coefficients for the 20 items ranged from .31 to .91. All are significant at  $P < .01$ .

Concurrent validity studies were conducted by comparing the FDS to existing scales used to assess cognitive impairment associated with dementia. Results are listed in Table 2. The correlation coefficients between the FDS scale and the criterion SPMSQ and SET Test were statistically significant at  $P < .05$ . The orientation subscale was most strongly correlated with the criterion tests, statistically significant at  $P < .002$ , whereas the affect subscale did not correlate with either criterion.

**Discussion**

Dementia is a major health problem of the elderly. While there are several instruments available to assess the degree of cognitive impairment, there is a shortage of instruments that can quantitatively assess the severity of the functional disabilities frequently associated with this condition. Such an instrument is needed to aid in following the clinical course of dementia as well as in helping to assess the impact of interventions that are presently aimed at alleviating management problems rather than altering the underlying cognitive impairment.

The Functional Dementia Scale provides a method of quantifying the severity of these functional disabilities. Items of the FDS were selected to include major problems associated with dementia such as emotional lability, wandering, agitation, incontinence, and memory loss. The high  $\alpha$  coefficients of both the FDS scale (.90) and its component subscales (.85, .83, and .84) confirm that the items are homogenous, measuring coherent clinical entities. The interrater reliability measures demonstrate that the items are perceived and applied similarly by different raters. The FDS scale is also stable over time, as indicated by the test-retest correlation of .88. It is of interest that test-retest correlations for the orientation and affect scales (.79 and .77) are slightly lower than for activities of daily living (.88). While this difference may be due to lower temporal stability of the items in these two scales, it may also be a greater mutability in the patients' orientation and affect than in activities of daily living functions.

Subscales	SPMSQ	SET Test
Activities of daily living	.32	.41*
Orientation	.53*	.61*
Affect	.07	.11
Total	.39*	.48*
* $P < .05$		

Validity of the instrument was difficult to evaluate because of the lack of standardized measures assessing the same problems addressed by the functional dementia scale. Two of the most widely used tests of cognitive function, the SET Test and the SPMSQ, correlate highly with the FDS scale and with the orientation subscale, which deals primarily with cognitive function. That the activities of daily living and affect subscales correlate less closely with the SET Test and the SPMSQ is consistent with the clinical impression that functional disabilities and the resulting management problems are not related solely to the degree of cognitive impairment. It is precisely because cognitive measures are insensitive to these other aspects of dementia that an instrument of this type is needed in addition to traditional methods of mental status evaluation.

The Functional Dementia Scale is a brief scale, capable of distinguishing varying degrees of severity of functional limitation, and suitable for use by caretakers of demented patients. Although the scale was validated and initial reliability studies were conducted in nursing homes, pilot studies involving family members of ambulatory demented patients indicate that it is equally acceptable in that setting. Further work will be necessary to determine whether the instrument is sufficiently sensitive to measure changes associated with either the progression of the disease or results of intervention.

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Appendix

Functional Dementia Scale

Patient \_\_\_\_\_

Observer \_\_\_\_\_

Position or relation to patient \_\_\_\_\_

Facility \_\_\_\_\_ Date \_\_\_\_\_

Circle one rating for each item:

- 1 None or little of the time
- 2 Some of the time
- 3 Good part of the time
- 4 Most or all of the time

- 1 2 3 4 [01] Has difficulty in completing simple tasks on own, eg, dressing, bathing, doing arithmetic
- 1 2 3 4 [02] Spends time either sitting or in apparently purposeless activity
- 1 2 3 4 [03] Wanders at night or needs to be restrained to prevent wandering
- 1 2 3 4 [04] Hears things that are not there
- 1 2 3 4 [05] Requires supervision or assistance in eating
- 1 2 3 4 [06] Loses things
- 1 2 3 4 [07] Appearance is disorderly if left to own devices
- 1 2 3 4 [08] Moans
- 1 2 3 4 [09] Cannot control bowel function
- 1 2 3 4 [10] Threatens to harm others
- 1 2 3 4 [11] Cannot control bladder function
- 1 2 3 4 [12] Needs to be watched so doesn't injure self, eg, by careless smoking, leaving the stove on, falling
- 1 2 3 4 [13] Destructive of materials around him, eg, breaks furniture, throws food trays, tears up magazines
- 1 2 3 4 [14] Shouts or yells
- 1 2 3 4 [15] Accuses others of doing him bodily harm or stealing his possessions when you are sure the accusations are not true
- 1 2 3 4 [16] Is unaware of limitations imposed by illness
- 1 2 3 4 [17] Becomes confused and does not know where he/she is
- 1 2 3 4 [18] Has trouble remembering
- 1 2 3 4 [19] Has sudden changes of mood, eg, gets upset, angered, or cries easily
- 1 2 3 4 [20] If left alone, wanders aimlessly during the day or needs to be restrained to prevent wandering