

## **Behavioral Pathology in Alzheimer's Disease (BEHAVE-AD) Rating Scale**

**Barry Reisberg, Stefanie R. Auer, and Isabel M. Monteiro**

---

Before the development of the Behavioral Pathology in Alzheimer's Disease (BEHAVE-AD) rating scale in 1987 by Reisberg and colleagues and its predecessor scale, the Symptoms of Psychosis in Alzheimer's Disease (SPAD) rating scale, in 1985 by Reisberg and Ferris, other scales were available for measuring behavioral disturbances and psychiatric disorders in patients with Alzheimer's disease. However, these scales generally mixed together cognitive disturbances with behavioral symptoms and sometimes included functional impairments as well. These predecessor scales also were not specifically designed to assess the types of behavioral problems seen in Alzheimer's disease. If a scale did address behavioral disturbances of dementia, it tended to be seriously underspecified in terms of the nature of behavioral disturbances.

### **PREDECESSORS TO THE BEHAVE-AD RATING SCALE**

Developed in 1968 by Blessed and colleagues, the Blessed Dementia Scale, a widely used instrument at the time the BEHAVE-AD was developed, contains subscales that measure changes in the patient's "performance of everyday activities," "changes in habits," and "changes in personality, interests, and drive." For example, this scale assesses patients' ability to shop and handle money, as well as their ability to recall recent events and their tendency to dwell in the past. Each of these items is assessed on the so-called "changes in performance of everyday activities" subscale. Changes in eating, dressing, and continence are also measured by the "changes in habits" subscale. Changes in "personality, interests, and drive" are reflected by items assessing "increased rigidity," "increased egocentricity," "hilarity in inappropriate situations," "sexual misdemeanors," "purposeless hyperactivity," "hobbies relinquished," and diminished initiative; the last two symptoms are seemingly signs of both cognitive and functional impairment. Several of these symptoms also are not typically associated with Alzheimer's disease. The section of the Blessed Dementia Scale

---

From the Aging and Dementia Research Center, and the Zachary and Elizabeth M. Fisher Alzheimer's Disease Education and Resources Program at the New York University Medical Center, New York, New York, U.S.A. (B. Reisberg, MD; S. R. Auer, PhD; and I. M. Monteiro, MD).

assessing changes in "personality, interests, and drive," but still mixing together cognition, functioning, and behavior, is the only portion of this scale addressing behavioral disturbances in any form.

The Sandoz Clinical Assessment-Geriatric (SCAG) Scale, developed by Shader and colleagues in 1974, is another scale that had been very widely used in research on the treatment of dementing disorders. The SCAG includes symptoms, such as decreased appetite, fatigue, and dizziness, which could be conceived of as behavioral and which occur in depressive disorders. However, the relationship of these symptoms to Alzheimer's disease is questionable. The SCAG also includes items that assess cognitive symptoms (e.g., items assessing "confusion" and "disorientation") and there are items that assess mood and behavior symptoms (e.g., there are items that assess "mood depression," "anxiety," "irritability," and "hostility"). Hence, the SCAG scale mixes the assessment of cognition with assessment of mood and behavior and assessment of items apparently unrelated to Alzheimer's disease.

The Hamilton Rating Scale, developed by Hamilton in 1960, includes several cognitive and functional items as well as items assessing mood and behavioral changes in the context of dementia. Using this scale, the clinician rates changes in work and activities (e.g., decreased time spent on activities), retardation (e.g., slowness of thought and speech, impaired ability to concentrate, and decreased motor activity), and insight (e.g., denial of illness). Clearly, these items represent functional and cognitive changes in the context of a dementing disorder. Thus, in the context of Alzheimer's disease, the Hamilton Rating Scale also mixes together cognition, functioning, and behavioral and mood disturbances.

The Brief Psychiatric Rating Scale (BPRS) consists of 18 items, some of which are particularly related to cognition or confounded by cognition in patients with Alzheimer's disease. Clearly related to cognition is the BPRS item "disorientation." The BPRS item "conceptual disorganization" also is clearly confounded by cognition. Also problematic in the context of Alzheimer's disease is the BPRS item "emotional withdrawal," defined as a "deficiency in relating to others."

In summary, widely used predecessor scales were developed to assess conditions such as schizophrenia (BPRS), depression (Hamilton Rating Scale), the "geriatric syndrome" (SCAG), or dementia (Blessed Dementia Scale). All these scales have obvious deficiencies if used to assess behavioral symptoms in Alzheimer's disease. The most significant limitation of these earlier scales is the mixing together of assessments of mood and behavioral change with assessments of cognitive and cognition-related functional changes.

## DEVELOPMENT OF THE BEHAVE-AD RATING SCALE

Development of the BEHAVE-AD was motivated in part by the lack of a scale to measure behavioral disturbances in dementia separately from the cognitive and functional disturbances associated with this disorder. Separate assessment of each symptomatic domain is particularly important because behavioral

disturbances of dementia might be amenable to treatment with conventional and newer psychotropic medications or nonpharmacologic interventions. In investigating the possible therapeutic effects of psychotropic medications, researchers must keep in mind that neuroleptics, such as thioridazine, and the tricyclic antidepressants, have anticholinergic and sedative side effects that might decrease cognitive and functional symptoms while improving behavioral disturbances. Conversely, medications that might conceivably improve cognition could exacerbate behavioral disturbances.

Beginning in 1985, we began to identify specific types of behavioral disturbances that occurred in patients with Alzheimer's disease. In 1987, in the context of developing the BEHAVE-AD, we conducted a retrospective chart review in which we sought to identify the specific nature of behavioral disturbances in Alzheimer's disease. Our goal was to develop an instrument that could sensitively and reliably measure salient behavioral disturbances of dementia (especially those occurring in Alzheimer's disease). We sought to develop an assessment tool that would not include symptoms that primarily result from cognitive or functional impairments. We also wanted to identify and sensitively measure behavioral disturbances that would be potentially responsive to treatment with conventional psychotropic medications.

Our research resulted in the BEHAVE-AD, a 25-item scale that measures behavioral disturbances in seven major categories (Table 1). Each symptom is scored on a 4-point scale of severity, where 0 = not present, 1 = present, 2 = present, generally with an emotional component, and 3 = present, generally with an emotional and physical component. The BEHAVE-AD also contains a 4-point global assessment of the overall magnitude of the behavioral symptoms in terms of disturbance to the caregiver and/or dangerousness to the patient.

### FINDINGS BASED ON THE BEHAVE-AD

Subsequent work, first published by Reisberg and colleagues in 1989, indicated that many of the specific symptoms identified in the BEHAVE-AD and the SPAD were some of the most common behavioral symptoms occurring in patients with Alzheimer's disease. For example, the specific delusion that people are stealing things, separately and specifically assessed in the SPAD and the BEHAVE-AD, appears to be the most common delusion in Alzheimer's disease. This delusional symptom occurs in approximately 40% of patients with Alzheimer's disease who have progressed to stage 5 on the Global Deterioration Scale (GDS) (a scale developed in 1982 by Reisberg and colleagues). Similarly, approximately 40% of patients with Alzheimer's disease at GDS stage 5 manifest the characteristic symptom of depressed mood, as indicated by statements such as "I wish I were dead." Almost invariably, this affective symptom in Alzheimer's disease, first noted in the literature in the BEHAVE-AD by Reisberg and colleagues in 1987, occurs without any overt suicidal intent, but rather as a type of manneristic commentary by the patient. Similarly, anxiety regarding upcoming events, for which the term *Godot syndrome* was coined, and

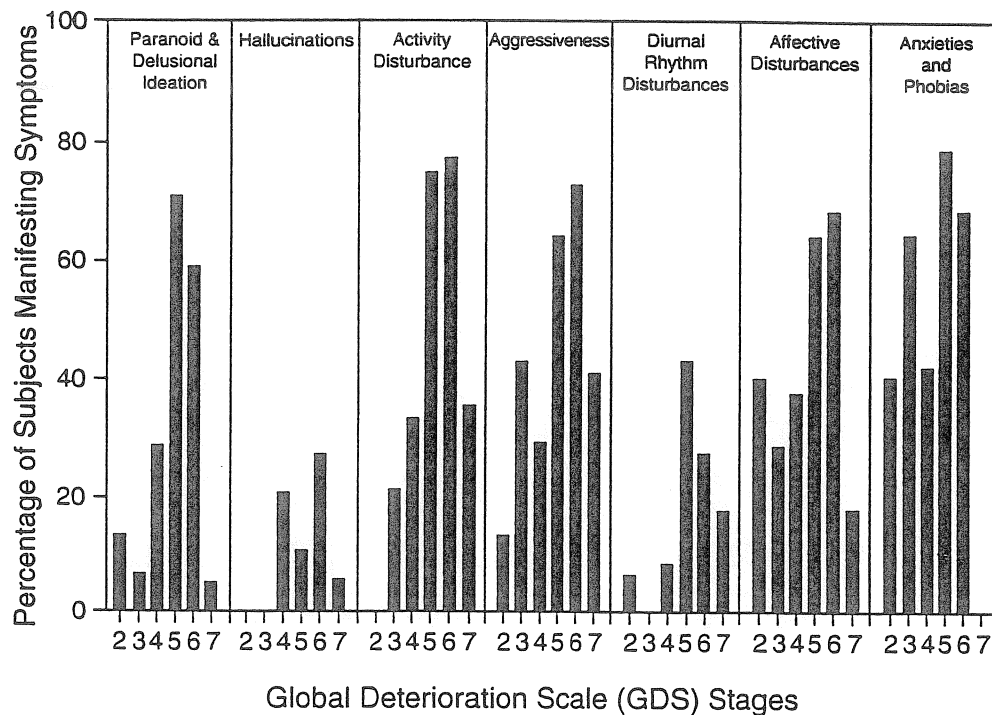
**TABLE 1. Behavioral Symptoms on the Behavioral Pathology  
in Alzheimer's Disease (BEHAVE-AD) Rating Scale<sup>©</sup>**

- 
- Paranoid and delusional ideation
    - “People are stealing things” delusion
    - “One’s house is not one’s home” delusion
    - “Spouse (or other caregiver) is an imposter” delusion
    - Delusion of abandonment (e.g., to an institution)
    - Delusion of infidelity
    - Other suspiciousness or paranoia
    - Other delusions
  - Hallucinations
    - Visual
    - Auditory
    - Olfactory
    - Haptic
    - Other
  - Activity disturbances
    - Wandering
    - Purposeless activity (e.g., opening and closing pocketbook, asking same question over and over)
    - Inappropriate activity (e.g., hiding objects)
  - Aggressiveness
    - Verbal outbursts
    - Physical threats and violence
    - Agitation (e.g., nonverbal anger, negativity)
  - Diurnal rhythm disturbances
    - Day-night disturbances (e.g., repetitive awakenings at night)
  - Affective disturbances
    - Tearfulness
    - Depressed mood (e.g., stating “I wish I were dead”)
  - Anxieties and phobias
    - Anxiety about upcoming events
    - Other anxieties (e.g., regarding money or memory)
    - Fear of being left alone
    - Other phobias (e.g., fear of bathing)
- 

© Copyright 1986 and 1997 by Barry Reisberg, M.D. All rights reserved.

the characteristic fear of being left alone, first described in Alzheimer's patients by Reisberg and colleagues in 1986, are apparently the most commonly occurring anxieties and phobias, respectively, in patients with Alzheimer's disease.

As shown in Figure 1, behavioral symptoms and symptomatic categories do not occur universally in all patients with Alzheimer's disease. In this respect, behavioral symptoms in Alzheimer's disease are strikingly different from cognitive and functional symptoms, which do occur universally and invariably with continued disease progression. The incidence and severity of behavioral



**Figure 1.** Percentage of subjects with normal aging or progressive Alzheimer's disease experiencing behavioral disturbances at each Global Deterioration Scale (GDS) stage. Subjects studied were initial or follow-up participants in an outpatient study at the New York University Medical Center, Aging and Dementia Research Center. Follow-up was conducted in residential homes and nursing homes as well as in the research center clinic. All subjects with sufficient impairment fulfilled criteria for a diagnosis of probable Alzheimer's disease before evaluation. The 120 subjects (38 men, 82 women; mean age,  $73.1 \pm 8.3$  years) had the following severity distribution: GDS stage 2 (normal aging),  $n = 15$ ; GDS stage 3 (mild memory impairment),  $n = 14$ ; GDS stage 4 (mild Alzheimer's disease),  $n = 24$ ; GDS stage 5 (moderate Alzheimer's disease),  $n = 28$ ; GDS stage 6 (moderately severe Alzheimer's disease),  $n = 22$ ; and GDS stage 7 (severe Alzheimer's disease),  $n = 17$ . Adapted from Reisberg et al. (1989). *Bulletin of Clinical Neurosciences*, 54, 95-112.

symptoms also tend to peak before the final stage of Alzheimer's disease, i.e., before stage 7 on the GDS. In contrast, cognitive and functional disturbances occur in all patients with Alzheimer's disease and progressively worsen throughout the course of the disease.

### RELIABILITY AND VALIDITY OF THE BEHAVE-AD

Three separate studies—one published by Patterson and colleagues in 1990 and two published by Sclan and colleagues in 1996—evaluated the reliability of the BEHAVE-AD. Sclan and colleagues conducted one study in an outpatient setting in the United States and another study in a nursing home in Paris, France.

In the first study of Sclan and associates, the reliability of the BEHAVE-AD was examined in 18 outpatients in GDS stages 3 to 6. In this study, the intraclass correlation coefficient for the mean total BEHAVE-AD score was .96 ( $p < .01$ ) for both rater agreement and rater consistency. In the second study of Sclan and associates, 20 nursing home patients at GDS stages 4 to 7 were evaluated. The intraclass correlation coefficients obtained with the French version of the BEHAVE-AD were .95 and .96 ( $p < .01$ ) for rater agreement and rater consistency, respectively, for the mean total BEHAVE-AD score. Thus the reliability of the BEHAVE-AD is comparable to that of widely used measures of cognition in dementing disorders, such as, for example, the Mini-Mental State Examination of Folstein and associates.

Construct validity of the BEHAVE-AD is supported by the differences between the nature and course of behavioral symptoms of Alzheimer's disease and those of the cognitive and functional symptoms. All of the BEHAVE-AD symptoms peak in occurrence and magnitude at stages before the final (GDS 7) stage of Alzheimer's disease. In contrast, all cognition- and function-related symptoms in Alzheimer's disease continue to worsen in magnitude throughout the course of the disease, including GDS stage 7. The frequent occurrence of many of the specific symptoms identified by the BEHAVE-AD further supports the construct validity of this scale.

#### DEVELOPMENT OF THE EMPIRICAL BEHAVIORAL PATHOLOGY IN ALZHEIMER'S RATING SCALE

Scores on the BEHAVE-AD are based on caregiver reports of symptoms occurring generally within the preceding 2 weeks. However, for various reasons, caregivers may overreport or underreport symptoms. Family caregivers may exaggerate symptoms because of the stress they cause. Professional caregivers, on the other hand, may downplay symptoms in an attempt to demonstrate their competence in caring for the patient. To overcome the possible bias of caregivers, Auer and colleagues developed an observer-rated instrument called the Empirical Behavioral Pathology in Alzheimer's Disease Rating Scale (E-BEHAVE-AD).

The E-BEHAVE-AD consists of 12 items in the following six categories: paranoid and delusional ideation, hallucinations, activity disturbances, agitation, affective disturbances, and anxieties and phobias. Consequently, six of the seven BEHAVE-AD categories are assessed with the E-BEHAVE-AD. The only BEHAVE-AD category not assessed by the E-BEHAVE-AD is diurnal rhythm (sleep) disturbance. Each behavior is rated by an observer during a clinical interview with the patient apart from the caregiver.

Reliability of the E-BEHAVE-AD is similar to that for the BEHAVE-AD, with a Pearson correlation coefficient of  $r = .97$  ( $p < .001$ ) in a study of 20 patients. The utility, construct validity, and responsivity of this rating scale in evaluations of psychotropic treatment intervention are supported by several

studies. For example, overall, an intraclass correlation coefficient of .54 between the informant-based BEHAVE-AD and the observer-based E-BEHAVE-AD was observed. This correlation was highly significant ( $p < .001$ ). However, most of the variance between these scales does not overlap, and the scales appear to be assessing complementary and related, but somewhat disparate, phenomena. Consequently, we believe the E-BEHAVE-AD is a useful companion scale to the BEHAVE-AD for researchers investigating the treatment of behavioral symptoms.

## CONCLUSION

Behavioral symptoms of dementia clearly differ from the cognitive and functional impairment associated with this disease. Whereas cognitive and functional symptoms progressively worsen over the course of Alzheimer's disease, behavioral symptoms peak in occurrence and magnitude before the final stage of the disease. Until the development of the BEHAVE-AD, no rating scale was available to specifically measure the occurrence and severity of behavioral problems in patients with Alzheimer's disease. The BEHAVE-AD, a caregiver-rated instrument, and its companion scale, the E-BEHAVE-AD, an observer-rated instrument, are useful not only for identifying behavioral problems in specific patients, but also for evaluating the efficacy of pharmacologic and nonpharmacologic treatments for the behavioral disturbances of dementia.

## SUGGESTED READING

- Auer, S. R., Monteiro, I. M., & Reisberg, B. (1996). The Empirical Behavioral Pathology in Alzheimer's Disease (E-BEHAVE-AD) Rating Scale. *International Psychogeriatrics*, 8, 247-266.
- Blessed, G., Tomlinson, B. E., & Roth, M. (1968). The association between quantitative measures of dementia and senile change in the cerebral gray matter of elderly subjects. *British Journal of Psychiatry*, 114, 797-811.
- Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). Mini-mental state: A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatry Research*, 12, 189-198.
- Hamilton, M. (1960). A rating scale for depression. *Journal of Neurology, Neurosurgery and Psychiatry*, 23, 56-62.
- McKhann, G., Drachman, D., Folstein, M., Katzman, R., Price, D., et al. (1984). Clinical diagnosis of Alzheimer's disease: Report of the NINCDS-ADRDA work group under the auspices of Department of Health & Human Services Task Force on Alzheimer's disease. *Neurology*, 34, 939-944.
- Patterson, M. B., Schnell, A. H., Martin, R. J., Mendez, M. F., Smyth, K. A., et al. (1990). Assessment of behavioral and affective symptoms in Alzheimer's disease. *Journal of Geriatric Psychiatry and Neurology*, 3, 21-30.
- Reisberg, B., Borenstein, J., Franssen, E., Shulman, E., Steinberg, G., et al. (1986). Remediable behavioral symptomatology in Alzheimer's disease. *Hospital and Community Psychiatry*, 37, 1199-1201.

- Reisberg, B., Borenstein, J., Salob, S. P., Ferris, S. H., Franssen, E., et al. (1987). Behavioral symptoms in Alzheimer's disease: Phenomenology and treatment. *Journal of Clinical Psychiatry*, 48(Suppl.), 9-15.
- Reisberg, B., & Ferris, S. (1985). A clinical rating scale for symptoms of psychosis in Alzheimer's disease. *Psychopharmacology Bulletin*, 21, 101-104.
- Reisberg, B., Ferris, S. H., de Leon, M. J., & Crook, T. (1982). The global deterioration scale for assessment of primary degenerative dementia. *American Journal of Psychiatry*, 139, 1136-1139.
- Reisberg, B., Ferris, S. H., Torossian, C., Kluger, A., & Monteiro, I. (1992). Pharmacologic treatment of Alzheimer's disease: A methodologic critique based upon current knowledge of symptomatology and relevance for drug trials. *International Psychogeriatrics*, 4(Suppl. 1), 9-42.
- Reisberg, B., Franssen, E., Sclan, S. G., Kluger, A., & Ferris, S. H. (1989). Stage specific incidence of potentially remediable behavioral symptoms in aging and Alzheimer's disease: A study of 120 patients using the BEHAVE-AD. *Bulletin of Clinical Neurosciences*, 54, 95-112.
- Sclan, S. G., Saillon, A., Franssen, E., Hugonot-Diener, L., Saillon, A., et al. (1996). The Behavioral Pathology in Alzheimer's Disease Rating Scale (BEHAVE-AD): Reliability and analysis of symptom category scores. *International Journal of Geriatric Psychiatry*, 11, 819-830.
- Shader, R. I., Harmatz, J. S., & Salzman, C. (1974). A new scale for clinical assessment in geriatric populations: Sandoz Clinical Assessment-Geriatric (SCAG). *Journal of the American Geriatrics Society*, 22, 107-113.

*Acknowledgments.* This work was supported in part by USDHHS Grants AG09127, AG03051, and AG08051 from the National Institute on Aging of the United States National Institutes of Health. Additional support was provided by the Zachary and Elizabeth M. Fisher Alzheimer's Disease Education and Resources Program at the New York University Medical Center.

*Offprints.* Requests for offprints should be directed to Barry Reisberg, MD, Aging and Dementia Research Center, New York University Medical Center, 550 First Avenue, New York, NY, 10016, U.S.A.