ELSEVIER

Alzheimer's & Dementia: Diagnosis, Assessment & Disease Monitoring 1 (2015) 249-259

Alzheimer's & Dementia

The Quick Dementia Rating System (QDRS): A rapid dementia staging tool

James E. Galvin*

Departments of Neurology, Psychiatry, and Population Health, Center for Cognitive Neurology, NYU Langone Medical Center, New York, NY, USA

Abstract

Introduction: Test the validity and reliability of the Quick Dementia Rating System (QDRS), a rapid dementia staging tool.

Methods: The QDRS was tested in 267 patient-caregiver dyads compared with Clinical Dementia Ratings (CDR), neuropsychological testing, and gold standard measures of function, mood, and behavior. Psychometric properties including, item variability, floor and ceiling effects, concurrent and construct validity, and internal consistency were determined. The QDRS was used to derive an independent CDR and sum-of-boxes (SB). Interscale reliability between QDRS and CDR was tested using intraclass correlation coefficients (ICC). Area under the receiver operator characteristic curves (AUC) tested discrimination properties of QDRS across CDR stages.

Results: QDRS scores increased with higher CDR staging and poorer neuropsychological performance (*P*s $<$ .001). The QDRS demonstrated low floor and ceiling effects; excellent known-groups validity across CDR stages (*P*s $<$ .001); construct validity against cognitive, behavioral, and functional measures (*P*s 0.004 to $<$0.001); and reliability (Cronbach α: 0.86–0.93). The QDRS demonstrated differential scores across different dementia etiologies. The AUC for the QDRS was 0.911 (95% confidence interval or CI 0.86–0.96) and for the CDR-SB was 0.996 (95% CI 0.99–1.0) demonstrating comparable ability to discriminate normal controls from dementia. The QDRS-generated CDR demonstrated excellent correspondence with the CDR (ICC = 0.90) and SB (ICC = 0.92).

Discussion: The QDRS validly and reliably differentiates individuals with and without dementia and accurately stages dementia without extensive training or clinician input, and is highly correlated with our gold standard measures. The QDRS provides a rapid method to determine study eligibility, stage patients in clinical practice, and improve case ascertainment in population studies.

Keywords: Dementia; Neurocognitive disorders; Clinical dementia rating; Staging; Clinical trials

1. Background

Detection of mild cognitive impairment (MCI) [1,2] and mild Alzheimer's disease (AD) [3] in community samples of older adults may be limited in part due to the lack of brief tests that capture and characterize the earliest signs of impairment and monitor response to therapies and interventions [4,5]. This may affect eligibility determination for care and services, impede case ascertainment in epidemiologic studies, and inhibit the ability to identify eligible individuals for clinical trial recruitment. Informant-based assessments of intraindividual change such as the AD8 [4,6] may be more sensitive to identify individuals with mild impairments and better detect functional interference than brief performance-based measures that rely on interindividual norms [7,8]. However, all brief screening methods, whether informant-based (i.e., the AD8 [4,9]) or performance-based (i.e., the Mini-Cog [10]), have limited

*Corresponding author. Dr. Galvin is now located at Charles E. Schmidt College of Medicine, Florida Atlantic University, Tel +1-561-297-4793.

E-mail address: galvinj@health.fau.edu

http://dx.doi.org/10.1016/j.dadm.2015.03.003

ability to stage individuals. Gold standard evaluations (i.e., Clinical Dementia Rating or CDR [11]) used in many clinical, translational, and health services research projects require a trained clinician to administer, interpret, and score; and an extended period of time with the patient and informant. Although feasible in the setting of a clinical trial, the CDR is more difficult to apply in screening procedures for inclusion/exclusion criteria or for case ascertainment in community-based research, and is impractical in most clinical practices. We developed the Quick Dementia Rating System (QDRS)—a rapid dementia staging tool to meet these needs.

The QDRS (Table 1) is a 10-item questionnaire completed by an informant without the need for a trained clinician or rater, and takes 3 to 5 minutes to complete. Scores range from 0 to 30 with higher scores representing greater cognitive impairment. Ten domains, derived from an empiric review of the literature and the clinical experience of the author caring for patients at memory disorder clinics, cover (1) memory and recall, (2) orientation, (3) decision-making and problem-solving abilities, (4) activities outside the home, (5) function at home and hobbies, (6) toileting and personal hygiene, (7) behavior and personality changes, (8) language and communication abilities, (9) mood, and (10) attention and concentration. These domains capture prominent symptoms of MCI, AD, and non-Alzheimer neurocognitive disorders including Lewy body dementia, frontotemporal degeneration, vascular dementia, chronic traumatic encephalopathy, and depression. Each domain has five possible answers increasing in severity of symptoms. A particular advantage of the QDRS is the rapid and accurate generation a valid (CDR) and its sum-of-boxes (SB) [11]. Here we present the psychometric evaluation of the QDRS.

2. Methods

2.1. Formative development of the QDRS

The QDRS (Table 1) was first developed in a sample of 50 patients-caregiver dyads coming to evaluation at the Pearl I Barlow Center for Memory Evaluation and Treatment, a dementia specialty practice. The QDRS was collected independent of the clinical evaluation conducted by the author and compared with the CDR and CDR-SB. Questions were checked for the ease of understanding by the caregivers and revised accordingly. We then conducted an Internet survey of 736 dementia caregivers comparing QDRS to other validated dementia scales including Revised Memory-Behavior Problem Checklist (RMBP) [12], patient- and caregiver-reported Quality of Life (QoL) [13], and the Zarit Burden Inventory (ZBI) [14]. QDRS scores increased with dementia severity corresponding with increases in reporting of increasing memory and behavior problems by RMBP, increased caregiver burden by ZBI, and decreases in patient- and caregiver-reported QoL (all $Ps < .001$). Principle component analysis using Varimax rotation of the QDRS from this sample revealed two domains: Cognitive (Eigenvalue 4.8; 48.4% variance) and Behavioral (Eigenvalue 1.6; 15.9% variance). This final version of the QDRS was used in this study.

2.2. Study participants

Participants were drawn from a consecutive series of 239 new patient referrals from September 2013 to November 2014. An additional cohort of 28 healthy controls and their informants was recruited from the community during this same time period and underwent identical assessments as the cases. Assessments were completed by a transdisciplinary team of a neurologist, geriatric nurse practitioner, social worker, and psychometrician. The QDRS was completed by the caregiver before the visit. During the visit, the patient and caregiver underwent a comprehensive evaluation including the CDR-SB [11], mood, neuropsychological testing, caregiver ratings of behavior and function, and caregiver burden and depression. All components of the assessment were part of standard of care at our center [15]. The study was approved by the NYU Langone Medical Center Institutional Review Board.

2.3. Administration of the QDRS

Before the office visit, a welcome packet was mailed to the patient and caregiver to collect demographics. The caregiver was asked to complete the QDRS and bring it with them to the office visit. The study team was blinded to the QDRS, and it was not considered during the clinical assessment, diagnosis, or staging. The QDRS total score is derived by summing up the 10 domains. Two subdomains cognitive (questions 1, 2, 3, and 8) and behavioral (questions 4, 5, 6, 7, 9, and 10) were derived from the formative work. The first six domains of the QDRS were used to generate a QDRS-derived global CDR and CDR-SB using the published CDR scoring rules [11].

2.4. Clinical assessment

The neurologist conducted independent semistructured interviews with the patient and a collateral source. The CDR [11] was used to determine the presence or absence of dementia and to stage its severity. The CDR rates cognitive function in six categories (memory, orientation, judgment and problem solving, and performance in community affairs, home and hobbies, and personal care); a global CDR 0 indicates no dementia; CDR 0.5 represents MCI or very mild dementia; CDR 1, 2, or 3 corresponds to mild, moderate, or severe dementia. Diagnoses were determined using standard criteria for MCI due to AD [1], MCI possibly due to other disorders [2], AD [3], dementia with Lewy Bodies (DLB) [16], frontotemporal degeneration (FTD) [17,18], and vascular dementia (VaD) [19]. In addition to the CDR, the Global Deterioration Scale (GDS) [20] was