UK PARKINSON'S Excellence Network

Which assessments can be used to evaluate the functional impact of Parkinson's mild cognitive impairment (PD-MCI) in clinical practice?

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Clinical bottom line

Evidence of moderate strength was found in support of the Parkinson's Disease Cognitive Functional Rating Scale (PD-CFRS).[1] It is rapidly administered, and measures the functional impact of PD-MCI, and of change over time. It can be repeated after six months, at which time an increase of two points is associated with a clinically significant worsening of the cognitive functional status. It is not subject to confounding by motor disability, age, education, anxiety or depression. It is valid, reliable, and offers a sensitivity of 84% and a specificity of 69% to detect functional impairment in PD-MCI. Of the assessments currently available, the PD-CFRS appears to possess the greatest utility as a diagnostic tool in a busy clinical setting. Further study is recommended to confirm this, using a larger battery of assessments for the initial classification of subjects, based on Movement Disorder Society criteria.[2]

Background

The severity of cognitive impairment among individuals with Parkinson's follows a continuum.[3] It is putatively divided however, into two categories – mild cognitive impairment (PD-MCI) and dementia (PDD) – based on whether the impairment interferes with activities of daily living (ADL).[4] However, patients with PD-MCI may also experience limitations in their high-level (instrumental) ADL.[5] It is recommended, therefore, that patients are assessed to determine whether cognitive impairment affects function in day-to-day activities, using combined measures of cognition and function.[3,6] Suitable assessment instruments should cover the major domains of cognition typically affected in Parkinson's; they should assess function independent of motor symptoms; and they should detect a decline in function over time.[3] The International Parkinson and Movement Disorder Society (MDS) commissioned a review of the clinimetric properties of cognitive rating scales measuring global cognitive performance in Parkinson's.[7] Published in February 2018, the review recommended three scales: the Montreal Cognitive Assessment (MoCA), the Mattis Dementia Rating Scale Second Edition (DRS-2) and the Parkinson's Disease Cognitive Rating Scale (PD-CRS). However, none of these tools assesses functional impairment as a result of cognitive decline. A search was undertaken, therefore, for a tool that assesses cognitive domains that are relevant in Parkinson's and captures the functional impact of cognitive decline over time, without confounding by motor symptoms.

Search terms

(Parkinson Disease/ OR Parkinson$) AND (Cognitive Dysfunction/ OR mild cognitive impairment OR PD-MCI OR MCI) AND (Sensitivity and Specificity/ OR sensitivity OR specificity OR accuracy OR utility)

Search strategy

Ovid Medline, and adapted for Cochrane Library, and CINAHL. All searches were conducted up to February 2017.

Evidence

From 140 articles, only those fulfilling the following criteria were included: (1) assessed relevant cognitive domains; (2) could be used to monitor change over time; and (3) captured the functional impact of cognitive decline independent of motor symptoms. One article fulfilled these criteria, describing the evaluation of the Parkinson's Disease Cognitive Functional Rating Scale (PD-CFRS).[1]

Kulisevsky J, Fernandez de Bobadilla R, Pagonabarraga J, et al. Measuring functional impact of cognitive impairment: validation of the Parkinson's disease cognitive functional rating scale. Parkinsonism & Related Disorders 2013;19(9):812-7.

Summary

This investigation comprised two studies: (1) a clinimetric study validated the PD-CFRS as a measure of the functional impact of impaired cognition against the Older Americans Resource Survey (OARS-ADL), among 53 non-demented Parkinson's patients and 53 matched controls; and (2) a prospective, six-month, multicentre 'responsiveness' study was conducted among 120 non-demented Parkinson's patients, to explore the sensitivity of the PD-CFRS to changes in function over time. In the clinimetric study the PD-CFRS showed intermediate concurrent validity (ICC = 0.50), high test-retest reliability (ICC = 0.82), inter-rater reliability (ICC = 0.80) and internal consistency (Cronbach's α = 0.79), and higher coefficient of variation to detect impaired function among non-demented Parkinson's patients (PD-CFRS 86.6% vs. OARS-IADL 8.1%). There was a strong relationship between the PD-CFRS and global cognitive status determined with the PD-Cognitive Rating Scale ($r = -0.72$, $p < 0.0001$). The relationship persisted after adjustment for age, education, anxiety, depression and motor status ($r = -0.557$, $p < 0.0001$). The responsiveness study recruited 63 patients with normal cognition and 57 with mild cognitive impairment (MCI). An increase of two points in the PD-CFRS after six months was associated with a clinically significant worsening of the cognitive functional status. A PD-CFRS cut-off score of >2 was found to be optimal in screening for functional changes in PD-MCI (sensitivity 84% and specificity 69%). The authors concluded that the PD-CFRS is a clinically useful, valid and reliable measure of the impact of cognitive impairment on daily function among Parkinson's patients who have not progressed to dementia.

The following points should be noted from a critical appraisal of this study:

- Convenience sampling was used, rendering the study susceptible to selection bias.
- Detail on the conduct of the index and reference tests was sparse. Initial classification of patients as "normal cognition" and "MCI" may have been more accurate if a more extensive battery of assessments were used, based on Movement Disorder Society criteria.
- There was no indication of intended sample size.
- Assessments were conducted blind to the categorization of cognitive status.
- No confidence intervals were calculated for sensitivity and specificity.
- Concurrent validity with OARS-IDL was intermediate (ICC = 0.5), but a large difference in the coefficient of variation indicated that the PD-CFRS gathered a broader range of data. Both showed a prominent floor effect (reduced ability to discriminate at lower scores).

- At an optimal screening cut-off score of >2, the assessment offers sensitivity of 84% and specificity of 69% for detection of functional impairment related to cognitive decline. This compares well with the widely used MoCA at an optimal screening cut-off of 26/27 for detection of PD-MCI (sensitivity 83%, specificity 53%).[8]
- Clinimetric properties compare well with those of the commonly used MoCA: (1) internal consistency: Cronbach's α 0.79 versus 0.66 to 0.79 for the MoCA in various populations;[9,10] (2) interrater reliability: ICC 0.8 versus Cronbach's α 0.81 for the MoCA;[11] and (3) test-retest reliability: ICC 0.82 versus Cronbach's α 0.79 for the MoCA.[11]
- PD-CFRS is rapidly administered, and it is a reliable measure of the functional impact of PD-MCI, and of change over time. It is not subject to confounding by motor disability, age, education, anxiety or depression. It is therefore likely to have high clinical utility.

Strength of evidence*: level 2
(1=strongest; 5=weakest)

* OCEBM Levels of Evidence Working Group. "The Oxford 2011 Levels of Evidence". Oxford Centre for Evidence-Based Medicine. http://www.cebm.net/index.aspx?o=5653

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