Self-reported memory fails to substitute for objective memory measures

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ABSTRACT

Background: Cognitive assessment of geriatric patients is now widely recognized as necessary to improve safety and medication compliance. Physicians prefer cognitive assessment methods that are fast and inexpensive. Doctors sometimes just ask patients to assess their own cognition. How accurate are self-reports of cognitive abilities when compared to objective measures obtained by computerized testing?

Methods: We examined the relationships between objective memory and executive function measures and three subjective patient questions concerning mental clarity, concentration and memory. 7778 subjects were tested in US medical facilities (6/22/2011-2/15/2012) with the CANS-MCI, a computer-administered cognitive examination designed for the earliest detection of MCI. The sample included normal, mildly impaired and demented patients: Age=67.9 (SD=15), 59% female. The median test time was 34 minutes, including answers to depression, cognitive ability, pain and head injury questions. In a subset, CANS-MCI measures were also validated against more traditional measures administered within an independent full neuropsychological evaluation.

Results: Patients self-reporting problems with mental clarity and concentration actually performed better on immediate, delayed and cued recall (all $p<.0001$, all $F>25$). Regression found the most powerful predictor of self-reported cognitive symptoms was age, with younger people unexpectedly reporting more symptoms than 65+ patients. Analyses restricted to age $\geq$ 65 found that those patients who report problems with their mental clarity and concentration perform better on objective memory tests than do patients who do not report those problems. In all age groups, subjective memory symptoms were not significantly correlated with objective memory measures. In the $\geq$ 65 cohort, the strongest predictors of self-reported cognitive symptoms were depression, pain, and head injury history. In the validation subset (N=169), the CANS-MCI factor scores were as accurate at detecting impairment as full neuropsychological examinations when Mattis, WMS1 and WMS2 are considered the criterion standards.

Conclusions: Self-reported cognitive problems do not match objective memory measures and may deceive medical professionals, since age, depression and pain all affect cognitive complaints. While the utility of caregiver/family assessment is well-established, asking patients to self-identify memory problems is not. The failure to obtain positive results in this very large data set suggests that clinicians using subjective patient memory concerns as substitutes for objective testing are often misguided. The CANS-MCI is a valid screening measure to determine longitudinal changes and the need for further assessment.

INTRODUCTION

The CANS-MCI is a self-administered instrument which measures change over time and the need for full diagnostic evaluations for MCI and dementia. Three cognitive domains are tested: Memory, Executive Function and Fluency. The internal consistency, test-retest reliability, concurrent validity, global sensitivity/specificity and usability of the CANS-MCI by elderly subjects were all previously established.[1-4]

Physicians prefer cognitive assessment methods that are fast and inexpensive. Doctors sometimes just ask patients to assess their own cognition. How accurate are self-reports when they are compared to self-administered computerized tests? This study performs such a comparison with a large sample of

clinical cases. This study also extends the validation research about the predictive validity of the Computer-Administered Neuropsychological Screen for Mild Cognitive Impairment (CANS-MCI), comparing it with the Mattis memory test and the WMS 2 Delayed. The CANS-MCI is used widely in primary care to detect the onset of MCI with the highest level of sensitivity and specificity.[5]

METHODS developed through earlier CANS-MCI research, the sample was characterized as 44% cognitively normal, 30% mildly impaired, and 26% moderately impaired.

Subjects Data from 7778 unidentified patients with CANS-MCI results were collected by Screen, Inc. over 7 months (6/22/2011-2/15/2012). Mean age was 67.9 (SD=15), mean education was 12.7 years (SD=3.4), and 59.4% were women. 5041 of the patients were 65+ years of age. Using criteria

Self-Reported Cognitive Problems: We examined relationships between cognitive ability and three items built into the 10 item CANS-MCI depression scale that assessed self-reported cognitive function. The 3 questions were:
Memory– "Do you feel you have more problems with memory than most?";
Concentration– "Do you have trouble concentrating?"; and
Mental Clarity– "Is your mind as clear as it used to be?".
The seven additional depression questions were combined as a non-cognitive depressed mood scale.

Pain and Head Injury Problems: The CANS-MCI battery asks about four aspects of pain medication: medication ineffectiveness; overuse; withdrawal symptoms and preoccupation with medication. These questions were combined to form a pain medication problem index. Lifetime occurrence of head injuries sufficient to cause unconsciousness was also evaluated.

Cognitive Measures: The Memory factor score was comprised of scores on immediate memory, delayed recall, and the number of incorrect category-guided items. An Executive Function Factor score was comprised of design matching, picture matching latency, and a Stroop test. All of the individual subtests of Memory and the complete Executive function score were compared to the self-reports derived from the 10-question Depression Scale. Additionally, in a subset of 169 subjects, Mattis Memory and Initiation, and WMS1 and WMS were collected for comparison purposes.

Statistical Analyses: All analyses were done with SPSS 18. Point biserial correlations between self-reported cognitive problems and all other measures comprised our first analysis. Logistic regressions were then performed, in which the three self-reported cognitive problems were used as dependent measures, and Memory, Executive Functions, pain, depression and head injury measures were used as potential predictors, in a stepwise fashion. Significance criteria: The sample, even when restricted to patients 65+ years of age, is very large (n=5011) and the power is markedly enhanced. Accordingly, rather than use conventional $p<.05$ as our significance criterion, we used two criteria, $p<.001$ and variance accounted for $\geq 1/2$ of 1%. This reduced chances of a Type I statistical error from 1/20 to 1/1000, and required any significant bivariate correlation to be $\geq .071$; and any significant regression predictor to add $\geq .5\%$ of variance.

RESULTS

Patientsreporting problems with mental clarity and concentration actually performed better on immediate, delayed and cued recall (all $p<.0001$, all $F>25$). Logistic regression found the most powerful predictor of self-reported cognitive symptoms was age, with younger people unexpectedly reporting more symptoms than patients 65+ years old. Analyses restricted to $\geq$ 65 years old found that those patients who report problems with their mental clarity and concentration perform better on objective memory tests than do patients who do not report problems. In all age groups, subjective memory symptoms were not significantly correlated with objective memory measures.
In the $\geq$ 65 cohort, the strongest predictors of self-reported cognitive symptoms were depressed mood, pain and head injury history.

Table 1: Point Bi-serial Correlations of Cognitive complaint

Table 2: Logistic Regression Results Summary
(all patients 65+, N=4511)

	Predictor	Nagelkerke R2	Chi Square	p value
Memory Problems	Depressed mood	13	465	0.00000001
Trouble Concentrating	Depressed mood	20	1024	0.00000001
Lack of Mental Clarity	Depressed mood	15	510	0.00000001

Depressed mood was the only significant predictor of self-reported cognitive problems, accounting for 13-20% of variance.

Table 3: Mattis and Wechsler Immediate/Delayed
(Impaired vs. Detection Screens (n=169)

	Neuropsych. Exam	CANS-MCI Memory alone	3-factor CANS-M
Mattis Impaired (Memory & Initiation)	89%	93%	100%
Wechsler Impaired (WMS1 & WMS2)	79%	80%	95%

DISCUSSION AND CONCLUSIONS

In this large sample, self-reported memory problems were unrelated to objective memory measures.

Simple correlations showing relationships between self-reported cognitive problems and pain medication, head injury, and executive function were not maintained in regression analyses. Depressed mood was the only significant predictor of self-reported cognitive problems. This result, along with the unexpected finding that cognitive complaints were actually more frequent in younger patients, is consistent with the notion that cognitive complaints often result from anxiety or "worried wellness" rather than an objective self-assessment of cognitive dysfunction. Alternatively, it may be that truly impaired patients typically lack awareness about their own impairment. Additionally, elderly patients who perceive their own cognitive decline may minimize such symptoms because of fear of losing independence.

Self-reported cognitive problems do not match objective memory measures and may be entirely caused by depressed mood. While the utility of caregiver/family assessment is well-established, asking patients to self-identify memory problems is not. These results indicate that clinicians using subjective patient memory concerns as substitutes for objective testing will frequently be misguided. Additionally, applying a questionnaire designed for caregivers directly to patients is contra-indicated.

Finally, our on-going validation research finds good agreement between the CANS-MCI measures and well known standards (Table 3). An optimal cognitive screen would be expected to detect all of the patients indicated as demented by the DRS2 and those judged to have MCI by the WMS1/WMS2. By those criteria, the CANS-MCI (typically completed within 35 minutes) appears as sensitive to dementia and MCI detection as a full neuropsychological examination (typically completed in 2.5 hours).

DISCLOSURE: Funded by Screen, Inc. All authors are presently associated with Screen, Inc, the commercial owner and distributor of the CANS-MCI.

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Appendix

Sensitivity and Specificity of computerized cognitive tests *				
(Discrimination of healthy controls from MCI)				
	CANS-MCI	CST	CAMCI	CNS Vital signs
Sensitivity	100%	96%	86%	54-90%
Specificity	85-100%	94%	94%	65-85%

"The Computer-Administered Neuropsychological Screen for Mild Cognitive Impairment (CANS-MCI; Screen, Inc. Seattle, WA) was developed specifically to meet the needs of primary care physicians, and it includes an assessment of cognition, mood, health history and risk factors, substance use and driving capabilities. The assessment of cognition includes measures of free and guided recall, delayed free and guided recognition, primed picture naming, word-to-picture matching, design matching, clock hand placement and the Stroop Test. For individuals with a high school education or less, the CANS-MCI showed sensitivity of 100% and specificity of 100%, indicating that it correctly identified all participants as either meeting criteria for MCI or as a healthy control. For individuals with 13 or more years of education, the CANS-MCI showed sensitivity of 100% and specificity of 84.8%, with an AUC of 0.96."

*Source: Snyder, PJ, Jackson, CE, Petersen, RC, Khachaturian, AS, Kaye, Albert, MS, and Weintraub, S Assessment of cognition in mild cognitive impairment: A comparative study. Alzheimer's & Dementia, 7, 338-355, 2011.