C-TOC (Cognitive Testing on Computer): investigating the usability and validity of a novel self-administered cognitive assessment tool in aging and early dementia

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Abstract

Introduction: Cognitive Testing on Computer (C-TOC) is a novel computer-based test battery developed to improve both usability and validity in the computerized assessment of cognitive function in older adults.

Methods: C-TOC's usability was evaluated concurrently with its iterative development to version 4 in subjects with and without cognitive impairment, and health professional advisors representing different ethnocultural groups. C-TOC version 4 was then validated against neuropsychological tests (NPTs), and by comparing performance scores of subjects with normal cognition, Cognitive Impairment Not Dementia (CIND) and Alzheimer disease. C-TOC's language tests were validated in subjects with aphasic disorders.

Results: The most important usability issue that emerged from consultations with 27 older adults and with 8 cultural advisors was the test-takers' understanding of the task, particularly executive function tasks. User interface features did not pose significant problems. C-TOC version 4 tests correlated with comparator NPT (r=0.4 to 0.7). C-TOC test scores were normal (n=16)>CIND (n=16)>Alzheimer disease (n=6). All normal/CIND NPT performance differences were detected on C-TOC. Low computer knowledge adversely affected test performance, particularly in CIND. C-TOC detected impairments in aphasic disorders (n=11).

Discussion: In general, C-TOC had good validity in detecting cognitive impairment. Ensuring test-takers' understanding of the tasks, and considering their computer knowledge appear important steps towards C-TOC's implementation.