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Video teleconference-based neurocognitive screening in geropsychiatry

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Abstract

Validation of remote video teleconference (VTC)-based procedures for geropsychiatry applications is essential to ensure validity and reliability of diagnostic procedures. The current study demonstrates the similarity of scores obtained from several brief neurocognitive screening measures in an outpatient VA geropsychiatry clinic population when participants were tested in-person and via VTC. Results revealed similar mean scores and moderate to good consistency among our mixed geropsychiatric sample on brief measures of global cognition, attention, and visuospatial function.

Keywords

Telemedicine; Neuropsychology; Assessment

1. Introduction

Cognitive screening is important in the detection, documentation, and tracking of impaired cognition among elderly patients (Cullum and Lacritz, 2009) and will become more critical in view of the diagnostic criteria for major and minor cognitive disorders as part of DSM-V. Despite the growing use of telemental health applications in the VA system in particular, less is known about the reliability and validity of telehealth-based neurocognitive screening tests within general geropsychiatry outpatient clinic settings. A growing literature suggests that video teleconferencing (VTC) technology can help extend neuropsychological assessment to rural and elderly populations, (Ball and Puffett, 1998; Hildebrand et al., 2004;

Vestal et al., 2006) with generally good agreement across tests studied to date among healthy older individuals and those with a diagnosis of dementia (Cullum et al., 2006; Cullum and Grosch, 2012). VTC-based clinical interviews have also been shown to be valid for the remote diagnosis of dementia in telegeriatric settings (Martin-Khan et al., 2012), although less is known about the reliability of individual brief cognitive screening tools among mixed geriatric samples.

We hypothesized that VTC-based neurocognitive screening would be feasible and yield results similar to traditional face-to-face examination within a mixed geropsychiatric sample. To explore these issues in a preliminary fashion in an outpatient VA geropsychiatry clinic, we recruited 8 individuals (7 men, 1 woman) ranging in age from 67 to 85. Education ranged from 10 to 16 years. Clinical diagnoses included depression ($n = 7$), anxiety disorder ($n = 1$), schizophrenia ($n = 1$) and PTSD ($n = 1$). Individuals who were illiterate or had profound hearing loss or visual impairment were excluded, as were persons judged unable to give informed consent. All subjects were fluent in English. Participants were assigned either to initial face-to-face or VTC testing, and test condition was counterbalanced across subjects. Different examiners tested subjects in each condition using alternate test forms.

2. Method

Written consent was obtained using forms approved by the Institutional Review Boards of University of Texas (UT) Southwestern Medical Center and the Dallas VA Medical Center (VAMC). Face-to-face testing was done at the Dallas VAMC, and VTC-based testing was conducted from the UT Southwestern Medical Center, approximately 10 miles away. Testing took place in two 35–45 min consecutive sessions, with a short break (5–10 min) between sessions. An H.323 PC-based Videoconferencing System was used at UT Southwestern for VTC administration, and a Tandberg 1000 videoconferencing system was used at the VAMC, with sites being linked by a standard 384 kbs connection. Sound volume was adjusted to accommodate for minor hearing difficulties, and no subject reported difficulty hearing or seeing the examiner.

Three brief neurocognitive tests were used to assess global cognition, attention, and visuospatial function, selected on the basis of frequency of use in geropsychiatry settings, brevity, ease of scoring, and availability of alternate forms. Tests included the Mini-Mental State Examination (MMSE) (Folstein et al., 1975), Clock Drawing Test (Goodglass and Kaplan, 1993), and Digit Span (Randolph, 1998). For the MMSE, we used a different set of words on the MMSE three-word recall task to reduce practice effects. Alternate clock settings (11:10 and 2:05) and digit span sequences (Randolph, 1998) were used according to standard administration procedures. Standard and alternate test forms were counterbalanced across subjects by administering the standard forms first to one subject, followed by the alternate form, then reversing the order for the next subject, etc. After completing the MMSE pentagons and Clock Drawings, subjects were asked to hold their paper in front of the camera so as to allow scoring by the examiner via television monitor. Means and standard deviations (S.D.) were calculated for all tests. Agreement between scores from the two test conditions was examined using the intraclass correlation coefficient (ICC) and the

Bradley–Blackwood procedure (Bartko, 1991). Analyses were performed using SPSS version 17 with significance level set at .05.

3. Results

All subjects completed testing, and none had obvious difficulty adapting to the testing environment or procedures. Brief exit interviews with participants reflected satisfaction with the VTC testing procedure, consistent with a recent report (Parikh et al., 2013). Cognitive screening measures demonstrated similar mean performance levels across VTC-based and face-to-face test conditions (see Table 1). The measure with the highest ICC was Digit Span, with lower ICC values for the MMSE and Clock Drawing. The MMSE and Clock Drawing ICCs were lower than in previous reports in more homogeneous populations (Cullum and Grosch, 2012). This could be the result of wider variability across subjects in this mixed neuropsychiatric sample and/or the effect of the use of alternate test forms. ICC values for the MMSE and Clock Drawing measures were modest and non-significant, although the means were similar, and the Bradley–Blackwood procedure was non-significant for all measures, indicating that the means and variances were similar for all test scores and that there was no bias seen between test conditions.

4. Discussion

Our findings suggest that brief telecognitive screening is feasible in an outpatient geropsychiatry clinic and produces similar and generally reliable results for these brief measures of global cognitive functioning, attention, and visuospatial ability in older patients with mixed diagnoses. Study limitations include small sample size, high level of education, diagnostic heterogeneity, and back-to-back test administration. These findings add to the growing literature supporting the use of VTC-based remote neurocognitive assessment (Cullum et al., 2014). Future investigations with additional screening tests in larger, mixed diagnostic samples are needed to ensure validity of procedures and establish limitations of the VTC testing medium in different settings.

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Table 1

Comparison of test results for VTC and face-to-face test administration.

	<u>VTC testing</u>		<u>Face-to-face</u>		<u>Intraclass correlation</u>		<u>Bradley-Blackwood procedure</u>
	Mean	S.D.	Mean	SD	ICC	<i>p</i> -value	<i>p</i> -value
MMSE	28.00	1.31	27.38	2.39	0.42	0.128	0.202
Clock drawing	2.25	0.46	2.63	0.52	0.44	0.115	0.233
Digit span total	9.63	2.77	9.88	2.70	0.72	0.015	0.946