TITLE: Screening Tools to Identify Adults with Cognitive Impairment Associated with a Neurological Impairment: Diagnostic Accuracy

DATE: 7 November 2014

RESEARCH QUESTION

What is the diagnostic accuracy of screening tools to identify adults with cognitive impairment associated with a neurological impairment?

KEY FINDINGS

Two systematic reviews, one randomized controlled trial, and 25 non-randomized studies were identified regarding diagnostic accuracy of screening tools to identify adults with cognitive impairment associated with a neurological impairment.

METHODS

A limited literature search was conducted on key resources including PubMed, The Cochrane Library (2014, Issue 10), University of York Centre for Reviews and Dissemination (CRD), Pubmed, Medline (OVID), Canadian and major international health technology agencies, as well as a focused Internet search. Methodological filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, and diagnostic test accuracy. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2010 and October 16, 2014. Internet links were provided, where available.

The summary of findings was prepared from the abstracts of the relevant information. Please note that data contained in abstracts may not always be an accurate reflection of the data contained within the full article.

SELECTION CRITERIA

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

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Table 1: Selection Criteria	
Population	Adults with possible cognitive impairment associated with a neurological impairment (excluding cerebrovascular accident, traumatic brain injury, or dementia)
Intervention	Screening tools to identify cognitive impairment
Comparator	Screening tools compared with each other, clinician diagnosis
Outcomes	Diagnostic accuracy (e.g., sensitivity, specificity, area under the receiver operator curve, successful diagnosis)
Study Designs	Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies

RESULTS

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, and non-randomized studies.

Two systematic reviews, one randomized controlled trial, and 25 non-randomized studies were identified regarding diagnostic accuracy of screening tools to identify adults with cognitive impairment associated with a neurological impairment. No health technology assessments were identified.

Additional references of potential interest are provided in the appendix.

OVERALL SUMMARY OF FINDINGS

One systematic review[1] compared tests for cognitive impairment in patients with human immunodeficiency virus (HIV). The HIV Dementia Scale had poor sensitivity to detect cognitive impairment, as compared to the International HIV Dementia Scale which provided moderate sensitivity.[1] Another systematic review[2] examined the Clock Drawing Test and found it had poor sensitivity for detecting mild cognitive impairment.

The randomized controlled trial[3] compared the Brief Interview for Mental Status (BIMS) with the Minimum Data Set 3.0 Cognitive Performance Scale (CPS) as screening tools in a nursing home population. Based on the area under the receiver operator curve, the BIMS performed better than the CPS for identifying severe impairment (0.960 and 0.857, respectively) and for identifying any impairment (0.930 and 0.824, respectively).[3]

The 25 non-randomized studies examined various cognitive screening instruments for several different patient groups. The results of these studies are summarized in Table 2.

Table 2: Summary of Included Non-Randomized Studies			
Author and Year	**Patient Population**	**Tests Used**	**Findings**
HIV			
Brouillette, 2014[4]	HIV (N = 200)	MoCA	Sensitivity = 0.74; Specificity = 0.68; Overall Accuracy = 0.79

Table 2: Summary of Included Non-Randomized Studies			
Author and Year	**Patient Population**	**Tests Used**	**Findings**
Munoz-Moreno, 2013[5]	HIV (N = 106)	3 measure test	Sensitivity = 74.5%; Specificity = 81.8%
		7 measure test	Sensitivity = 100%; Specificity = 96.3%
Blackstone, 2012[6]	HIV (N = 674)	Self-Report measures, Performance-Based measures, Dual-method	Dual-method classified most HAND, compared to either single method
Moore, 2012[7]	HIV (N = 200)	Stroop Colour Test and the Hopkins Verbal Learning Test-Revised (2-test screener)	Sensitivity = 73%; Specificity = 83%
		2-test screener plus Paced Auditory Serial Addition Test (3-test screener)	Sensitivity = 86%; Specificity = 75%
		3-test screener plus Action Fluency	Sensitivity = 86%; Specificity = 87%
Koski, 2011[8]	HIV (N = 75)	MoCA, battery of neuropsychological tests, and computerized tasks	Combined tests had better precision for identifying patients of higher ability than MoCA alone
Parkinson's Disease			
Hobson, 2014[9]	PD (N = 50)	Weigel Token Test	Sensitivity = 88%; Specificity = 89%; AUROC = 0.83
Isella, 2013[10]	PD cognitively intact (N = 69) cognitively impaired (N = 52)	MiniMental Parkinson	May be preferable to MMSE but no clear superiority was demonstrated
Karlawish, 2013[11]	PD (N = 90)	MoCA and MMSE	MoCA had greater sensitivity than MMSE
Marras, 2013[12]	PD (N = 139)	MoCA	Sensitivity = 80%; Specificity = 44%
		Scales for Outcomes in Parkinson's Disease-Cognition	Sensitivity = 80%; Specificty = 33%
		MMSE	Sensitivity <80%
Lessig, 2012[13]	PD (N = 98)	MMSE and MoCA	MoCA was more sensitive, but MMSE may better track cognitive change over time
Komadina, 2011[14]	Not specified	ACE-R	Sensitivity = 61%; Specificity = 64%; Superior to MMSE in this study

Table 2: Summary of Included Non-Randomized Studies			
Author and Year	**Patient Population**	**Tests Used**	**Findings**
Dalrymple, 2010[15]	PD (N = 114); Controls (N = 47)	MoCA	For dementia: Sensitivity = 81%; Specificity = 95%; NPV = 92%) For MCI: Sensitivity = 90%; Specificity = 75%; NPV = 95% Volume under ROC surface = 79%
		Scales for Outcomes in Parkinson's Disease-Cognition	Volume under ROC surface = 74%
		MMSE-Sevens item	Volume under ROC surface = 56%
		MMSE-World item	Volume under ROC surface = 62%
Mental Illness			
Musso, 2014[16]	Severe mental illness (N = 28); Controls (N = 18)	MoCA	Sensitivity = 89% Specificity = 61%
Fisekovic, 2012[17]	Schizophrenia (N = 30)	MoCA (compared to MMSE)	Sensitivity = 41.7%; Specificity = 66.7%; PPV = 83.3%; NPV = 22.2%
Aging Related Cognitive Impairment			
Ahmed, 2012[18]	MCI (N = 15); Controls (N = 20)	ACE-R and MoCA	Sensitivity = 90%
		ACE-R, MoCA, Computer-Administered Neuropsychological Screen for MCI	AUROC able to distinguish between controls and cases for all screening tests
Markwick, 2012[19]	N = 107	MoCA	MoCA more sensitive than MMSE
Ehreke, 2011[20]	N = 428	Clock Drawing Test	Not suitably reliable for screening for MCI
Duff, 2010[21]	MCI (N = 72); Controls (N = 71)	Repeatable Battery for the Assessment of Neuropsychological Status	The test showed good specificity, poor to moderate sensitivity, and AUROC was adequate for detecting MCI
Other Cognitive Impairment			
Cercy, 2012[22]	Known or suspected cognitive disorders (N =	MMSE	Sensitivity = 34.8% AUROC = 0.862

Table 2: Summary of Included Non-Randomized Studies			
Author and Year	**Patient Population**	**Tests Used**	**Findings**
	308)	Brief Cognitive Screen	AUROC = 0.950
Julian, 2012[23]	Systemic lupus erythematosus (N = 139); Rheumatoid arthritis (N = 82)	Hopkins Verbal Learning Test-Revised	Sensitivity = 81%
		Perceived Deficits Questionnaire-Short Form	Sensitivity = 52%
Villeneuve, 2012[24]	Chronic obstructive pulmonary disease (N = 45); Controls (N = 50)	MoCA	Sensitivity = 81%; Specificity = 72%; Correctly diagnosed = 76%
		MMSE	Validity not acceptable at any cutoff
Whitney, 2012[25]	Neuropsychological outpatients (N = 82)	MoCA	Sensitivity = 0.72; Specificity = 0.75
		MMSE	Sensitivity = 0.52; Specificity = 0.77
Chen, 2011[26]	Obstructive sleep apnoea hypopnoea syndrome (N = 394)	MoCA	MoCA more sensitive (more often detected neurocognitive impairment, and differences between patient groups) than MMSE
Olson, 2011[27]	Brain tumour (N = 58)	MoCA	Sensitivity = 61.9%; Specificity = 94.4%; AUROC = 0.606
		MMSE	Sensitivity = 19.0%; Specificity = 55.6%; AUROC = 0.615
Videnovic, 2010[28]	Huntington's disease (N = 53)	MoCA	More sensitive screening for cognitive impairments than MMSE

MoCA = Montreal Cognitive Assessment; HAND = HIV-associated neurocognitive disorders; PD = Parkinson's disease; AUROC = area under the receiver operator curve; ROC = receiver operator curve; MMSE = MiniMental State Examination; ACE-R = Addenbrooke's Cognitive Examination-Revised; MCI = mild cognitive impairment; NPV = negative predictive value; PPV = positive predictive value

REFERENCES SUMMARIZED

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-analyses

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Non-Randomized Studies

Human Immunodeficiency Virus (HIV)

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APPENDIX – FURTHER INFORMATION:

Non-Randomized Studies – No Comparator

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