



## **Is Cognistat (Neuro-behavioural Cognitive Status Exam) a superior Cognitive screen than the Mini-Mental State Exam in adult patients?**

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## SUMMARY STATEMENT

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## REQUEST

Is Cognistat (Neuro-behavioural Cognitive Status Exam) a superior cognitive screen than the Mini-Mental State Exam in adult patients?

## REQUESTED BY

**Sheree Scott**, Occupational therapist, Department of Occupational Therapy, Monash Medical Centre, Clayton.

## METHODOLOGY

### Search Strategy

The Centre for Clinical Effectiveness defines the 'best available evidence' as that research we can identify that is least susceptible to bias.

First, we search for systematic reviews, evidence based clinical practice guidelines, health technology assessments. Then we identify diagnostic studies with independent blind comparison of an appropriate spectrum of consecutive patients, who have undergone both the diagnostic test and the reference standard. If we identify sound, relevant material of this type, the search stops. Otherwise, our search strategy broadens

to include studies that are more prone to bias, less generalisable, or have other methodologic difficulties. While we cite observational and case series studies, and narrative reviews and consensus statements, in our reports we do not critically appraise them. Some studies can produce accurate results but they are generally too prone to bias to allow determination of their validity beyond their immediate setting.

## **Details of Evidence Request**

Patients (Subjects): Cognition disorders

Screening test: Cognistat Neuro-behavioral Cognitive Status Exam, NCSE, Cognitive Status Exam

Reference test: Mini Mental State Examination, Modified Mini-Mental State Exam, 3MS, Mini-Mental Test, MMSE)

Outcomes: Sensitivity/specificity, predictive value of test, test validity, test reliability

## **Search terms**

(see Appendix 2 for exact search strategy)

Patients: Cognition disorders

Screening test: Neurobehavioral Cognitive Status Exam, Cognistat

Reference test: Mini Mental State Examinations

Outcomes: Sensitivity and specificity, predictive value, validity, reliability

## **Resources Searched**

We searched the following databases and Internet websites:

Medline (OVID)- 1966 to August Week 3 2002

All EBM Reviews (OVID)- Cochrane DSR, ACP Journal Club, DARE, and CCTR

CINAHL (OVID)- 1982 to July week 4 2002

Current Contents/All Editions (OVID)- 1993 Week 27 to 2002 Week 35

PREMEDLINE (OVID)- August 27,, 2002

Australasian Medical Index- August 2002

PsycINFO 1967 to August week 4 2002

## **Refinements, Searching & Reporting Constraints**

We included items of evidence that were available to us on 28 August 2002. The search was restricted to studies that compared Neuro-behavioral Cognitive Status Exam and Mini Mental State Exam (MMSE), and published in English the last 22 years (1980-2002).

## RESULTS:

From our sources we identified 3 articles related to the request and was categorised as follows:

**Table 1:** Study designs of articles retrieved

<b>Study Design</b>	<b>Number included</b>
Systematic reviews or meta-analyses	0
Evidence-based clinical practice guidelines	0
Randomised Controlled Trial	0
Comparative study	3
<b>Total</b>	<b>3</b>

One article was excluded from further appraisal as follows:

**Table 2:** Reason for exclusion of article

Reason for exclusion	Number
The study did not compare Neuro-behavioural Cognitive Status Exam and Mini-Mental State Exam	1

This left two comparative studies for appraisal. Based on our refinements, searching and reporting constraints we are reasonably confident these articles represent the most relevant findings published to date.

For screening (diagnostic) test the NHMRC level of evidence is not applicable.

## EVIDENCE SUMMARIES

### Format

Evidence summaries are presented as spreadsheets attached to this report. Each spreadsheet contains the article citation, details of the study design, patient description, scientific validity of the article, results, and pertinent remarks from the authors and Centre for Clinical Effectiveness reviewer.

## REFERENCES

### ARTICLES CRITICALLY APPRAISED FOR THIS REPORT

- Roper BL., Bieliauskas LA, et al. (1996). "Validity of the Mini-Mental State Examination and the neurobehavioral cognitive status examination in cognitive screening." Neuropsychiatry, Neuropsychology, & Behavioral Neurology **9**(1): 54-57.
- Schwamm LH, Dyke CV, et al (1987). "The Neurobehavioral Cognitive Status Examination: comparison with the Cognitive Capacity Screening Examination and the Mini-Mental State Examination in a neurosurgical population." Annals of Internal Medicine **107**(4): 486-91.

### ARTICLES NOT CRITICALLY APPRAISED

- Marcotte TD, Gorp WV, Hinkin CH, et al. (1997). "Concurrent validity of the Neurobehavioral Cognitive Status Exam subtests." Journal of Clinical & Experimental Neuropsychology. **19**(3): 386-95

## APPENDIX 1

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## APPENDIX 2

### Search strategy

	Search terms for MEDLINE
1	cognistat.mp. or exp Neuropsychological Tests/
2	(Neuropsychological adj Test\$).mp.
3	(Neurobehavioral adj Cognitive adj Status adj Exam).mp.
4	NCSE.tw.
5	or/1-4
6	exp Neuropsychological Tests/
7	Mini Mental State exam\$.tw.
8	MiniMental State exam\$.tw.
9	Modified Mini-Mental State Exam\$.tw.
10	3MS.tw.
11	3 ms.tw.
12	Mini-Mental test\$.tw.
13	MiniMental test\$.tw
14	14. MMSE.tw.
15	or/6-14
16	16. 5 and 15
17	(Sensitivity or Specificity).tw.
18	exp "Sensitivity and Specificity"/
19	(predictive adj value\$).mp
20	validity.tw.
21	reliability.tw.
22	or/17-21
23	16 and 22
24	exp Cognition Disorders/
25	Cognition Disorder\$.tw.
26	Overinclusion.tw.
27	exp Cognition/
28	Cognit\$.tw.
29	or/24-28
30	23 and 29
31	exp Evaluation Studies/ or evaluation study.mp.
32	Comparative Study/
33	comparative study.tw.

34	or/31-33
35	30 and 34
36	limit 35 to (human and english language and all adult <19 plus years> and yr=1980-2002)

\$=Wildcard indicating truncation

<p>Evidence Summary</p> <p>Diagnosis</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Neuro-behavioural Cognitive Status Exam and Mini-Mental State Exam for cognitive screening</p> </div>	<p><b>Study 1</b></p> <p>Roper, BL., et al (1996). "Validity of the Mini-Mental State Examination and the neurobehavioral cognitive status examination in cognitive screening." <i>Neuropsychiatry, Neuropsychology, &amp; Behavioral Neurology</i> 9(1): 54-57.</p>	<p><b>Study 2</b></p> <p>Schwamm LH, et al (1987). "The Neurobehavioral Cognitive Status Examination: comparison with the Cognitive Capacity Screening Examination and the Mini-Mental State Examination in a neurosurgical population." <i>Annals of Internal Medicine</i> 107(4): 486-91.</p>
<p><b>STUDY DESIGN*</b></p>	<p>Comparative study</p>	<p>Comparative study</p>
<p><b>DESCRIPTION:</b> Patients (subjects), Diagnostic Test, Comparison, Outcomes</p>	<p><b>Setting:</b> USA [Veterans Administration Geriatric medicine and rehabilitation facility, Michigan]  <b>Patients:</b> Subjects (n=105, 96% males) were geriatric medical inpatients [mean (SD) age 66.3 (11.2) yrs, mean (SD) number of years of education 10.6(3.0)]  <b>Screening test:</b> Neurobehavioral Cognitive Status Exam (NCSE)  <b>Comparison:</b> Mini-Mental State Examination (MMSE)  <b>Outcome:</b> Validity, sensitivity, specificity, diagnostic accuracy</p>	<p><b>Setting:</b> USA [Veterans Administration Medical Centre, San Francisco]  <b>Patients:</b> Patients (n=30, 29 male) with documented brain lesions.  <b>Screening tests:</b> Neurobehavioral Cognitive Status Examination (NCSE), Cognitive Capacity Screening Examination (CCSE)  <b>Comparison:</b> Mini-Mental State Examination (MMSE)  <b>Outcome:</b> Sensitivity, Specificity</p>
<p><b>VALIDITY:</b> Methodology, rigour, selection</p>	<p><b>Reference test:</b> Mini-Mental State Examination (MMSE)  <b>Patient spectrum:</b> Subjects with (BD) and without diagnosed brain dysfunction (NBD) [no significant difference in age, education or Mini-Mult Depression Scale between those with and without diagnosed brain dysfunction].  <b>All patients tested with both tests:</b> Yes. Tests were administered in a non-random order with the NCSE usually administered first. The Mini-Mult Depression Scale was also administered to screen for depression and subsequently the sample was divided into two groups based on the presence or absence of independently (medically) diagnosed brain dysfunction [59 with and 46 without diagnosed brain dysfunction]  <b>Blinding of assessors:</b> Not clear</p>	<p><b>Reference test:</b> Mini-Mental State Examination (MMSE)  <b>Patient spectrum:</b> All had central nervous system lesions confirmed by computed tomography, MRI or biopsy (for tumors). Patients who had surgery within the last 6 months, conspicuously demented or delirious were excluded.  <b>All patients tested with reference test:</b> Yes. The three tests were administered consecutively in a single session (sequence of the three tests was counterbalanced). All patients were tested within the first 5 days of hospitalisation and before surgery.  <b>Blinding of assessors:</b> Not clear but all tests were scored by one investigator</p>
<p><b>RESULTS:</b> Generally favourable or unfavourable, specific outcomes of interest, estimate of experimental effect and precision if appropriate</p>	<p>The BD group scored significantly lower than the NBD group on MMSC and all NCSE ability areas, but BD subjects had significantly more NCSE areas in the impaired range.  <b>Sensitivity:</b> The NCSE was more sensitive (86%) than the MMSE (53%) only when traditional cut-off criteria for impairment were employed, consisting of a raw score of &lt;23 on the MMSE and one or more scales impaired on the NCSE. When the MMSE's criterion score was increased, the more lengthy NCSE was no more sensitive to brain dysfunction.</p>	<p>The NCSE identified cognitive impairments in 28 patients; MMSE in 16; and CCSE in 13 patients. The CCSE had a false-negative rate of 53%; the MMSE 43%; and the NCSE 7%. The sensitivity of the NCSE is derived from two features of its design: the use of independent tests to assess skills within five major areas of cognitive functioning, and the use of graded tasks within each of these cognitive domains.</p>

	<p><b>Specificity:</b> For MMSE 78% and 37% for NCSE</p> <p><b>Accuracy:</b> The highest accuracy was 70% for the MMSE at a cut-off score of 26 and 69% for the NCSE at a cut-off of 2 impaired scales.</p>	
<p><b>AUTHOR(S) CONCLUSIONS:</b> Limitations, implications for practice and research</p>	<p>"Receiver operating characteristic analysis (ROC) suggests that the MMSE and NCSE perform similarly but that neither instrument yields an acceptable balance between sensitivity and specificity for use as a stand-alone screening measure in geriatric patients.....it is clear that adequate screening of such patients would require the use of additional instruments."</p>	<p>"...the NCSE assesses multiple cognitive domains and thereby encourages clinicians to develop a more sophisticated appreciation of cognitive function. The test's greater sensitivity provides a basis for the rational management of confusional states, dementia syndromes, and isolated cognitive deficits."</p>
<p><b>OUR COMMENTS:</b> Opportunities for bias, weakness and strength</p>	<p><b>Weakness/es:</b></p> <ul style="list-style-type: none"> <li>• Not clear if the study was approved by the ethics committee</li> <li>• Not clear if assessors were blinded</li> <li>• Authors did not acknowledge the limitation of the study</li> </ul> <p><b>Strength/s:</b></p> <ul style="list-style-type: none"> <li>• Study subjects were adequately described</li> <li>• Resident physicians under the supervision of experienced geriatrician made medical diagnoses.</li> <li>• Both screening tests were applied to study subjects</li> <li>• Operating characteristics for both tests at various cut-offs were evaluated</li> </ul>	<p><b>Weakness/es:</b></p> <ul style="list-style-type: none"> <li>• Small study</li> <li>• The age of study subjects is unknown/unreported</li> <li>• Not clear if assessors were blinded.</li> <li>• Authors didn't acknowledge the study limitation</li> </ul> <p><b>Strength/s:</b></p> <ul style="list-style-type: none"> <li>• Inclusion and exclusion criteria were stated</li> <li>• Examiners were trained and supervised by a staff neuropsychologist.</li> </ul>