Cognitive Assessments and Screening Tests

One of the key features of dementia is cognitive impairment, which usually occurs progressively. In light of the progressive nature of dementia, cognitive assessment and screening tools are used not only to identify individuals who are showing signs and symptoms of dementia, but also to monitor the progress of cognitive deterioration.

The MOH Clinical Practice Guidelines for Dementia recommends the following instruments for screening a person's cognitive status. Many of these instruments are used in clinical or research settings. They are not too time-consuming (can be completed under 30 minutes), are used by healthcare professionals, and have been reviewed and validated in several settings.[1] However, it should be noted that these tools are not sufficient to diagnose dementia. To obtain a definitive diagnosis, a person should still be required to be referred to memory clinics and medical professionals for further evaluation.

ACT on Alzheimer's® has created a series of videos to guide healthcare professionals on screening, assessment, delivery of diagnosis of dementia, and care coordination. They include an explanation on the usage of the Mini-Cog, SLUMS and MoCA assessments.[2] Click here to watch the videos.

The strengths and weaknesses, diagnostic accuracy, and psychometric properties for each instrument are summarised in the table below.

Tool	No. of Items	Strengths & Limitations	Diagnostic Accuracy and/or Psychometric Properties	Permission to Use
Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE)[3]	26	**Strengths:** ● Relatively unaffected by education and pre-morbid abilities or by proficiency in the culture's dominant language.[4] **Limitations:** ● As it is completed by an 'informant' who knows the subject, the scores can be affected by informant characteristics such as the mental health of the informant and the quality of the relationship between the informant and the subject.[4]	Multiple studies have established: **Good reliability:** ● High internal consistency, with Cronbach's α ranging from .93 to .97;[4] and ● Good inter-rater reliability with retest kappa at .96 over three days and .75 over one year.[4] **Good validity:** ● Factor analysis results suggested that the scale measures a broad, single factor of cognitive decline.[4] ● The scale validity reflects past cognitive decline, performs as well as a screening test for dementia as other conventional cognitive screening tests, predicts incident dementia, and correlates with a wide range of cognitive tests, particularly those measuring the impaired range of ability and those measuring skills that deteriorate with aging and dementia (episodic memory and mental speed).[4]	Cite the developers to use the scale. The developers also appreciate being kept informed of research projects which make use of it. No other permissions are required.

Tool	No. of Items	Strengths & Limitations	Diagnostic Accuracy and/or Psychometric Properties	Permission to Use
Brief Informant Screening Test[5] (A single-item informant report of memory problem [IRMP] and a 4-item Instrumental Activities of Daily Living [4IADL])	5	**Strengths:** ● Simple, easy to use, and can be completed quickly; and ● Useful in screening for Mild Cognitive Impairment (MCI) and early Alzheimer's disease (MCI-AD).[5] **Limitations:** ● Limited research that studied the psychometric properties of the test.	**Test sensitivity and specificity:** On elderly Chinese Singaporeans, the Brief Informant Screening Test (combining the IRMP and 4IADL) could correctly identify: ● 86.5% and 85.7% of people with MCI and MCI-AD, respectively (test sensitivity); and ● 79.5% and 85.2% of those tested as not having MCI and MCI-AD, respectively (test specificity).[5]	Cite the developers to use the scale. No other permissions are required.
Elderly Cognitive Assessment Questionnaire (ECAQ)[6]	10	**Strengths:** ● Can be completed in a short period of time (less than 10 minutes); and ● Less bias for educational level, literacy and culture – satisfactory scale for elderly people living in developing countries.[6] **Limitations:** ● Could not distinguish between the depressed or anxious elderly and those with mild depression;[7] and ● Limited research that studied the psychometric properties of the test on other settings and populations.	**Diagnostic Accuracy:** For the elderly living in developing countries, aged 65 years old and above, the 10-item ECAQ was shown to: ● Correctly identify 85.3% of people with cognitive impairment (test sensitivity); ● Correctly identify 91.5% of those tested as not having cognitive impairment (test specificity); and ● Have an overall miscalculation rate of 10.5%.[6]	Cite the developers to use the scale. No other permissions are required.

Tool	No. of Items	Strengths & Limitations	Diagnostic Accuracy and/or Psychometric Properties	Permission to Use
Singapore Version of Abbreviated Mental Test (AMT)[8] Click here and refer to page 87 of the document to access the AMT.	10	For all adaptations of the AMT: **Strengths:** ● Simple, can be administered quickly (approximately 3-4 minutes) and scored quickly;[9] and ● Useful initial screening tool, with high sensitivity, to identify older adults with cognitive impairment (e.g. delirium or dementia).[10] **Limitations:** ● For the Singapore version of the AMT, it appears to reach a ceiling effect in the more educated cohorts;[8] and ● Though there are numerous adaptations of the AMT, there is very limited validity data for each adaptation.	**Diagnostic Accuracy:** Among the elderly Chinese subjects, aged 60 years old and above, with varying years of education, the Singapore version of the 10-item AMT could correctly identify: ● 80% to 97% of people with dementia (test sensitivity), and ● 83% to 100% of those tested as not having dementia (test specificity).[8] Adjustment of cut-off scores to individuals' education level and age is important – higher cut-off values are necessary for the younger and more educated cohort, while lower values are adequate for the older and less educated cohort.[8]	Cite the developers to use the scale. No other permissions are required.

Tool	No. of Items	Strengths & Limitations	Diagnostic Accuracy and/or Psychometric Properties	Permission to Use
Ascertain Dementia 8 (AD8®) Questionnaire[11] Click here to access the AD8 questionnaire.	8	**Strengths:** ● Can be completed in a short period of time (approximately 2-3 minutes); ● Simple scoring system, with minimal training required; ● Can be self-administered by informant without the assistance of a health professional; and ● Less prone to bias from different cultures and education level.[12-14] **Limitations:** ● Test/diagnostic performance varies due to differences in the clinical setting, severity of disease, reference standards and cut-off points.[15-17]	A local study has shown that AD8 has good reliability and validity to detect cognitive dysfunction in government subsidised primary healthcare centres in Singapore:[18] **Reliability:** ● Good internal consistency (Cronbach's α = .85); ● Good Inter-rater reliability (Intraclass Correlation Coefficient (ICC) = .85); and ● Good test–retest reliability (weighted κ = .80).[18] **Validity:** ● Good concurrent validity; and ○ Correlation between total AD8 scores and Clinical Dementia Rating (CDR) global (R = 0.65, p < 0.001), ○ CDR sum of boxes (R = 0.60, p < 0.001), ○ MMSE (R = −0.39, p < 0.001), ○ MoCA (R = −0.41, p < 0.001), and ○ Formal neuropsychological battery (R = −0.46, p < 0.001). ● Good construct validity.[18]	The AD8 is a copyrighted instrument of Washington University in St. Louis. Obtain the permission and license to use AD8® here.

Tool	No. of Items	Strengths & Limitations	Diagnostic Accuracy and/or Psychometric Properties	Permission to Use
Mini Mental State Examination (MMSE)[19]	11	**Strengths:** ● One of the oldest and best-known cognitive assessments; ● Widely used in research and clinical practice; ● Can be completed in a short period of time (approximately 10 minutes); ● Sensitive to age and education level;[20] and ● Available in 73 other foreign language translations. **Limitations:** ● May lack sensitivity to early signs of dementia and present ceiling effects, resulting in false-negative diagnosis; ● May not detect subtle memory losses well; ● May also present floor effects in advanced stages of Alzheimer's disease; ● Limited measures of memory functions in the MMSE; and ● Lack of tasks to assess executive function. [20]	**Diagnostic Accuracy:** A systematic review of 317 full-text articles provides evidence that for people aged 65 and above in community and primary care, the 11-item MMSE is able to correctly identify: ● 85% of people with dementia (test sensitivity), and ● 90% of those tested as not having dementia (test specificity).[21] **Psychometric Properties:** Numerous studies have studied and reviewed the psychometric properties of the MMSE: **Reliability:** Studies examining the internal consistency, test-retest and inter-rater reliabilities of the MMSE yielded mixed results: ● Poor to excellent internal consistency; ● Poor to excellent test-retest; and ● Adequate and excellent inter-rater.[22,23] **Validity:** Studies have shown: ● Evidence for criterion validity: The MMSE can discriminate between Alzheimer's disease and frontotemporal dementia. ● Mixed findings for concurrent validity: ○ Poor correlation with the Mattis	To use the test in its entirety, the published version of the test has to be purchased from the Psychological Assessment Resources (PAR) here. To modify or use only part of the test, written permission is required prior to using it. Download the Permission Request Form, and learn more about the test's copyright, trademark and permissions here.

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			Dementia Rating Scale; ○ Poor to excellent correlations with the Wechsler Adult Intelligence Test; ○ Adequate correlation with the Functional Independence Measure; and ○ Significant correlations with the Montgomery Asberg Depression Rating Scale and the Zung Depression Scale. ● Evidence for predictive validity: ○ MMSE scores were found to predict the length of hospital stay for patients with moderate dementia.[23]	

Tool	No. of Items	Strengths & Limitations	Diagnostic Accuracy and/or Psychometric Properties	Permission to Use
Chinese Mini Mental State Examination (CMMSE)[24]	18	**Strengths:** ● One of the oldest and best-known cognitive assessments; ● Widely used in research and clinical practice; ● Can be completed in a short period of time (approximately 10 minutes); ● Sensitive to age and education level;[20] and ● Available in 73 other foreign language translations. **Limitations:** ● May lack sensitivity to early signs of dementia and present ceiling effects, resulting in false-negative diagnosis; ● May not detect subtle memory losses well; ● May also present floor effects in advanced stages of Alzheimer's disease; ● Limited measures of memory functions in the MMSE; and ● Lacks tasks for assessing executive function. [20]	**Diagnostic Accuracy:** Among the elderly Chinese subjects, aged 60 years old and above, with varying years of education, the CMMSE could correctly identify: ● 93% to 100% of people with dementia (test sensitivity), and ● 87% to 93% of those tested as not having dementia (test specificity).[8] Adjustment of cut-off scores to individuals' education level and age is important – higher cut-off values are necessary for the younger and more educated cohort, while lower values are adequate for the older and less educated cohort.[8]	The Chinese version of the MMSE has to be purchased from the PAR here as well.

Tool	No. of Items	Strengths & Limitations	Diagnostic Accuracy and/or Psychometric Properties	Permission to Use
Frontal Assessment Battery[25]	6	**Strengths:** ● Easy to administer and can be completed in a short period of time (approximately 10 minutes) at bedside;[25] ● Sensitive to frontal lobe dysfunction;[25] ● An objective measure to distinguish Frontotemporal Dementia from Alzheimer's Disease in mildly demented patients;[26] ● An appropriate tool for the differential diagnosis in neurological diseases;[26] and ● Widely used in research and clinical settings.[27]	**Psychometric Properties:** ● Able to discriminate between patients with different types of frontal damage and healthy participants 89.1% of the time; and ● The FAB correlates highly with the Mattis Dementia Rating Scale, and with 2 items from the Wisconsin Card Sorting Test (number of categories completed and perseverative errors).[27]	Cite the developers to use the scale. No other permissions are required.

Tool	No. of Items	Strengths & Limitations	Diagnostic Accuracy and/or Psychometric Properties	Permission to Use
Singapore Version of Montreal Cognitive Assessment (MoCA)[28] Click here to access the MoCA.	8 domains	**Strengths:** ● More sensitive to detect mild cognitive impairment in a variety of settings and conditions than other screening tools, like the MMSE;[29] ● Widely used in clinical and research settings;[30,31] ● Simple & fast to administer (approximately 10 minutes);[32] and ● Available in 56 languages and dialects.[32] **Limitations:** ● No clear agreement on the most appropriate cut-point;[29] ● Performance can be influenced by educational attainment, age and gender;[33] and ● May be too difficult for moderate to severe stages of dementia.	**Diagnostic Accuracy (Test Sensitivity):** On a Singapore population: ● A MoCA score of 26/27 could correctly identify at least 94% of patients who have a diagnosis of amnestic Mild Cognitive Impairment; and ● A MoCA score of 24/25 could correctly identify at least 85% of patients who have a diagnosis of mild Alzheimer's disease.[28] ● *Note: The higher cut-off score is for patients with more than 10 years of education.* **Reliability:** Mixed findings on its reliability: ● Test-retest reliability for the various versions of MoCA ranged from .42 to .81[33] ● Inter-rater reliability of the items – Kappa coefficients ranged from .46 to .94[33]	From September 2020 onwards, health professionals must be trained and certified to administer, score and interpret the MoCA assessment.

On top of the above brief screening tools measuring general cognitive functioning, a variety of domain-specific neuropsychological tests are available to assess different cognitive domains, such as the Five Digit Test for attention and the Clock Drawing Test for construction and perception.[34] Examples of the cognitive domains measured include (but not limited to):

- Attention;
- Construction and Perception;
- Executive Functions;
- Language; and
- Memory.[34,35]

These domain-specific neuropsychological tests are useful in detecting subtle cognitive impairments which are not picked up by the brief screening instruments; but some cognitive domains are underrepresented, particularly those involving high-level cognitive skills and social skills.[36] A systematic review evaluated the use of these domain-specific neuropsychological tests on persons living with dementia from populations who are non-Western and have a lower level of educational attainment. The more promising tests for this population are the Stick Design Test, Five Digit Test, and verbal fluency test.[34] Another review studied the predictive accuracy of cognitive domains on the progression from mild cognitive impairment (MCI) to Alzheimer's disease (AD) in older adults through the use of domain-specific neuropsychological tests.[37] Many domains yielded very good predictive accuracy with high sensitivity and specificity, with the verbal memory tests and majority of the language tests yielding very high predictive accuracy. Some domains, such as executive functions and visual memory, showed better specificity than sensitivity.[37] Predictive accuracy was the highest when multiple measures that cover a wide range of cognitive domains were combined.[37]

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