Cognitive Screening Revisited

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What am I screening for?

- Cognitive screens may be administered for a range of reasons, e.g.,:
  - To identify a dementia
  - To detect MCI / early cognitive decline
  - Differential diagnoses (e.g., MCI vs depression; FTD vs DAT)
  - To rate severity / monitor disease progression

Choosing the Screen: Some General Considerations

- Time to administer / tolerability
- Validity for your purpose
  - Screening for potential dementia?
    - Is the dementia subtype important?
  - Screening for mild cognitive change?
  - Tracking decline?
- Validity for your patient
  - Language/Cultural background?
  - Age/Education level?
  - Physical impairments/limitations
- NO ONE SCREEN DOES EVERYTHING!!!
- NO SCREEN CAN BE USED ALONE FOR DIAGNOSIS.

The role of screens in diagnosing dementia

- Screens can only identify patients with cognitive deficits that require further assessment before diagnosis.
- Diagnosis should only be made following comprehensive specialist assessment.
- Formal cognitive assessment should be undertaken alongside full history, collateral history, mental state and physical examination, medication review, laboratory investigations and brain imaging.
- NICE Guidelines 2018
- Health Pathways link

There is always a compromise

- Not only will no one screen cover all populations/purposes well but….
- There is always a big trade off between sensitivity and specificity
  - *Sensitivity - ability to detect cases (true positives)
  - *Specificity - ability to exclude non-cases (true negatives)

Thus: lowering the risk of missing people with impairment (increased sensitivity) increases the risk of false diagnoses of impairments (decreased specificity)

Other limitations

- All have cultural bias (to greater or lesser extent)
- Age affects scores
- Education affects scores
- Administration factors affect scores – e.g., noisy environments, time of day, state of health, mood, training of administrator (are they adhering to correct administration?)
- (limits of the see one, do one, teach one system!)

Screens tap only selected areas of cognition

- Be mindful of what you are screening for:
- Dementia subtypes may have very different symptoms
  - AD likely to be more amnestic
  - FT group and subcortical dementias more likely to have prominent executive deficits and relatively low memory problems.

They can only sample some Cognitive Domains

- 6 Key cognitive domains suggested in literature:
  - Attention / working memory
  - New verbal learning and recall
  - Expressive Language
  - Visual construction (visuospatial praxis)
  - Executive (frontal lobe) functions
  - Abstract reasoning

Cullen et al., 2007

The Common Screens in NZ

- 3 cognitive screens most commonly used by us are MoCA, ACE III, RUDAS
- All have a reasonable literature base
- There is one NZ study of these 3 Cheung et al.,2015
- Cochrane review of MoCA. ACE III [& subtest Mini ACE (or M-ACE)] in process.
- RUDAS developed Australia – to fill gap for a cross cultural screen that is useful for lower education/acculturation and translates well into other languages. (note: few of the overseas versions of MoCA/ACE III are validated)

Properties of the MoCA

- Developed 2005 in Canada memory clinic to detect MCI in normal population (MCI vs AD vs controls)

  Nasreddine et al.,2005

- Subsequently used as dementia screen in community & clinic/hospital settings; currently insufficient quality / quantity of research to determine utility for this

  Cochrane review, 2015

- Brief: 10 mins. Scored out of 30.
- Available in many languages (few validated)
- 3 English versions
- Recommended threshold (25-6/30) too high
- More "difficult" than ACE III – more exec. less memory

Properties of ACE III

ACE III (2013) improvement* on ACE (2000) and ACE R (2006) developed as a bedside cognitive screen to detect dementia and differentiate AD from FTD/Parkinsons (AD vs FTD vs controls)

- Longer: 12-20mins Scored out of 100
- 3 English versions were adapted for NZ by psychologists group. (included in NZ research)
- Several foreign versions developed (validation?)
- Aims to be sensitive to early dementias,
- Only test to providing profile to discriminate dementia subtypes
- Cut-points too high in many foreign studies (incl NZ)
- *ACE III better for cross-cultural translation

Introducing Mini ACE (MACE)

- Developed as a short-form of the ACE III in 2015 to facilitate referral for further cognitive assessment/neuropsychological assessment.
- Super-brief (5 mins). Scored out of 30.
- Covers 4/5 domains covered in ACE III and argued to retain ability to discriminate dementias.
- NZ versions derived from "Kiwi" ACE III.
- Early research suggests sensitivity high but specificity low – so would not be useful as an aid to diagnosis.

MINI – ADDENBROOKE'S COGNITIVE EXAMINATION

Version A (2014)

ATTENTION

Ask: What is the Day_____ Date_____ Month_____ Year_____ **Attention**

[Score 0-4]

MEMORY

Tell: "I'm going to give you a name and address and I'd like you to repeat the name and address after me. So you have a chance to learn, we'll be doing that 3 times. I'll ask you the name and address later." Score only the third trial.

[state name and address]

1st Trial ***2nd Trial*** ***3rd Trial***

Memory

[Score 0 – 7]

FLUENCY – ANIMALS

Say: "Now can you name as many animals as possible. It can begin with any letter."

Total correct:

≥ 22 **7** 17-21 **6** 14-16 **5** 11-13 4 9-10 **3** 7-8 **2** 5-6 1 < 5 **0**

Animals Fluency

[Score 0 – 7]

CLOCK DRAWING

Clock: Ask the subject to draw a clock face with numbers and the hands at ten past five. (Forscoring see instruction guide)

circle = 1, numbers = 2, hands = 2 if all correct).

Visuospatial

[Score 0-5]

MEMORY RECALL

Ask "Now tell me what you remember about that name and address we were repeating at the beginning"

Memory

[Score 0-7]

~~TOTAL SCORE / 30~~

Properties of RUDAS

- Developed in Australia in 2003/4 specifically to detect dementia in culturally diverse populations without the need to change its structure or format. Storey et al.2004
- Authors claim no significant effects of gender, language or education. Age effects unclear
- Brief (10 mins). Scored out of 30.
- Cut points found to be reasonably appropriate in diverse studies

Cut-points: MoCA

- These are not reliable.
- MoCA recommended 25 or 26. Cochrane review (2015) reported sensitivity 94% but 40% of those below cut-off did not have dementia (specificity poor at 60%)
- So no good as a dementia screen at a cut off of <26.
- Overseas studies have suggested **23.**
- NZ study recommended cut off of **20 or 21** to detect mild dementia .

Cut points: ACE-III

- Cut-off scores for ACE-R
  - Cut off 88/100 Sensitivity 94% specificity 89%
  - Cut off 82/100 Sensitivity 84% Specificity 100%
  - Note: research population young (mean 66) cut off scores lower with increasing age (e.g. 84 age 70-75)
- ACE III replaced the ACE-R late 2011. Relied largely on previous ACE-R research and recommended same cut-offs – small validation study of ACE III produced
  - Cut off 88/100 Sensitivity 100% specificity 96%
  - Cut off 82/100 Sensitivity 93% Specificity 100%
  - BUT very small, not representative? (high FTD pop'n)

More on ACE III Cut-points

- Validation studies cut-off = 82/100 (dementia vs controls)
- NZ study recommended 76-77/100 (mild dementia vs controls)
- Why so different?
  - Validation pop'n: UK 241 (64 AD, 55 FTD, 20 LBD, 36 MCI, 63 controls). Age range: 50-79 (mean 66 yrs) Mean education 12.4 years
  - NZ pop'n 84 (37 MCI, 47 controls) Age range: 65-80+ (mean 78 yrs) Mean education 12.3 years

Cut-points RUDAS:

- Initial validation study of 90 community dwellers referred to Sydney geriatric outpt clinic - 67% needing interpreter, av age late 70's-early 80's

  At c/o 23, sensitivity 89% and specificity 98% in detecting dementia (Storey et al., 2004)

- Further 2006 study 100+ community dwellers av ages as above (approx 30% with dementia). 34% born English-speaking countries, balance from range of origins/cultures (Rowland et al.)

  At cut-off <23 sensitivity = 81% specificity 96%

  Overseas studies generally support cut off of <23

RUDAS vs MoCA & ACE-III

- RUDAS –shows promise as relatively unaffected by gender, education, and preferred language.
- Doesn't cover the range of domains of MoCA/ACE III. Appears more comparable with MMSE – but more specific (96% as opposed to 79%) NOT suitable for MCI
- Unlikely to be useful for differential diagnosis
- RUDAS is relatively culturally neutral. Likely to be best for more poorly educated / less acculturated subjects and/or those more severe dementias.

Cut Points: M-ACE

- A subscale drawn from ACE III derived using statistical method (Mokken Scaling analysis)
- Recommended cut-points for dementia
  - </= 25 85% sensitivity 93% specificity
  - </= 21 61% sensitivity 100% specificity
- 2018 study of 552 PD patients (Lucza et al. 2018)
  - Mild /major neurocog dis. cutoffs by ed'n
  - </= 23/17 79/72% sens. 71/79% spec (0-8y)
  - </= 24/20 85/83% sens. 51/75% spec (9-12y)
  - </= 25/21 72/90% sens. 80/91% spec (>12y)
  - **Might** be useful to screen out cog disorders?

Final Note on M-ACE

M-ACE compared with MoCA in Uk Cognitive Disorders clinic – 117 referrals 27-89 yrs (20 dementia, 34 MCI)

M-ACE c/off </= 25 and MoCA c/off <26 used

Both sensitive (>90%) but not specific (<60%)

M-ACE slightly better at detecting MCI than MoCA

MoCA slightly better at detecting dementia than M-ACE

Overall M-ACE and MoCA comparable Larner, 2016

Recommendations?

- Best all-round screen for possible cognitive issues / dementia and some useful qualitative information on specific deficits - ACE III
- BUT NOT
- If there is low education, low acculturation. If this is the case - RUDAS
- If suspecting predominant executive deficits add FAB.
- If no time, little patient tolerance, to screen for further follow up Mini ACE

ACE III because….

- Gives not only score but a profile in 5 domains (spreadsheet available)
- Recent Japanese memory clinic study of 249 subjects (94 MCI, 105 dementia) found ACE III effective in diagnosing MCI. It and M-ACE were superior to MoCA in distinguishing dementia from non-dementia also.
  Terada, 2019
- ACE III , MoCA and MMSE compared to everyday function assmt - ACE III score most associated with decline in function.

Giebel & Challis, 2016

Specific considerations

- When ***not*** to test:
  - Likely **delirium**
  - Excessive sedation
  - Refusal or distress
  - Known learning disability

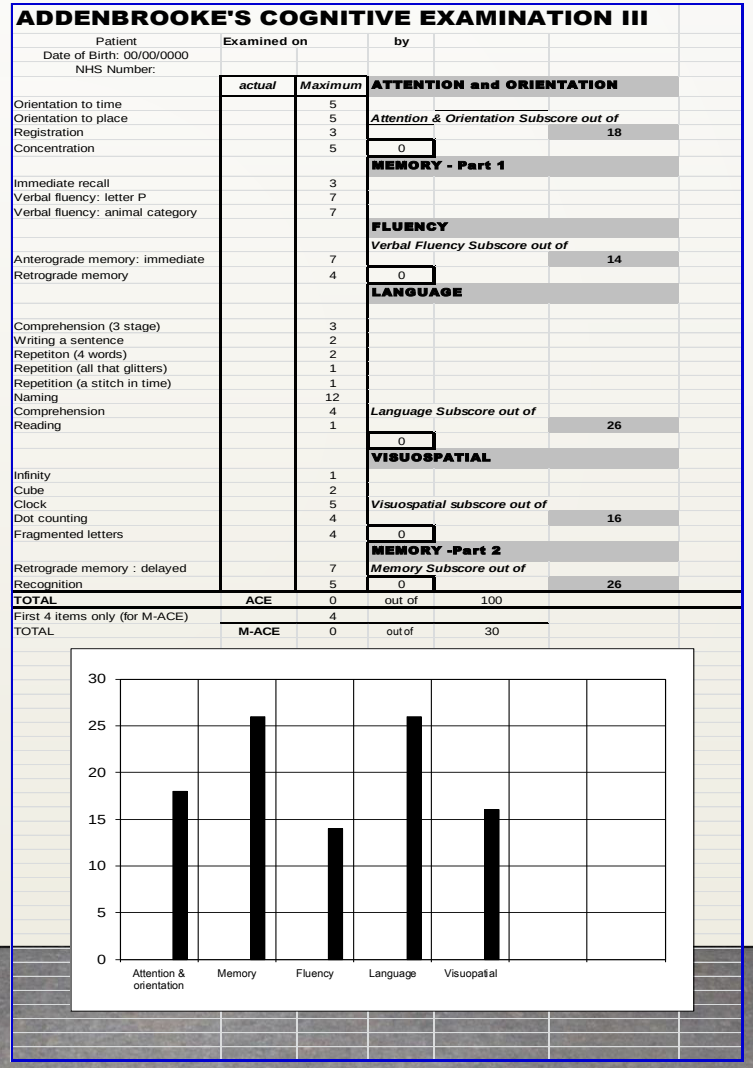
Administration and Scoring

W drive:
AT&R Service –
Psychology Resources –
Cognitive Screens

Contains

- Up to date versions of tests
- Administration and scoring guides
- ACE-III spread sheet →

https://www.nes.scot.nhs.uk/education-and-training/by-discipline/psychology/multiprofessional-psychology/psychology-and-psychological-interventions-in-dementia/ace-iii-trainer.aspx

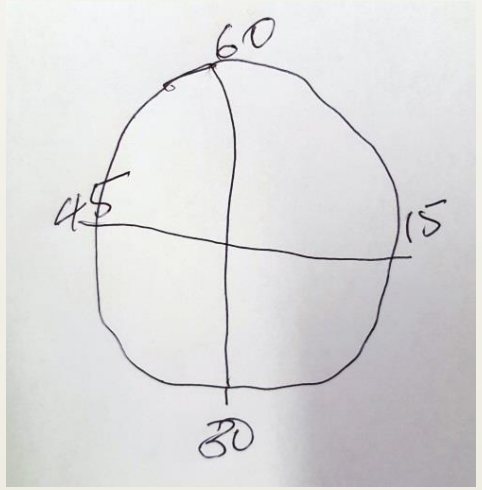


ADDENBROOKE'S COGNITIVE EXAMINATION III

Patient	Examined on		by		
Date of Birth: 00/00/0000					
NHS Number:					
	actual	*Maximum*	**ATTENTION and ORIENTATION**		
Orientation to time		5			
Orientation to place		5	*Attention & Orientation Subscore out of*		
Registration		3			18
Concentration		5	0		
			MEMORY - Part 1		
Immediate recall		3			
Verbal fluency: letter P		7			
Verbal fluency: animal category		7			
			FLUENCY		
			Verbal Fluency Subscore out of		
Anterograde memory: immediate		7			14
Retrograde memory		4	0		
			LANGUAGE		
Comprehension (3 stage)		3			
Writing a sentence		2			
Repetiton (4 words)		2			
Repetition (all that glitters)		1			
Repetition (a stitch in time)		1			
Naming		12			
Comprehension		4	*Language Subscore out of*		
Reading		1			26
			0		
			VISUOSPATIAL		
Infinity		1			
Cube		2			
Clock		5	*Visuospatial subscore out of*		
Dot counting		4			16
Fragmented letters		4	0		
			MEMORY -Part 2		
Retrograde memory : delayed		7	*Memory Subscore out of*		
Recognition		5	0		26
TOTAL	**ACE**	0	out of	100	
First 4 items only (for M-ACE)		4			
TOTAL	**M-ACE**	0	out of	30	

Interpretation

- Cognitive screens add information to a broader process of forming and refining hypotheses.
- The qualitative information is at least as important as the “score”.



Reporting

- Date, test, qualitative information, conditions, score, insight, interpretation, and recommendations/follow-up.
- For example:

  Mr Smith is a 72-year-old retired high school principal. He was fully independent prior to admission but commented that he had been increasingly forgetful over the last year.

  "The ACE-III was administered on 14/11/19 and Mr Smith scored 88/100. Although this is within normal limits, there appeared to be a marked deficit in memory specifically (lost 9 points out of total 26). He appeared distressed when unable to recall information after a delay, which he said was unusual for him. He was agreeable to referral to the Memory Team for follow-up upon discharge."

Providing feedback to patient and recommendations

- Explain that a cognitive screen has been administered and what their performance might mean.
  - Avoid giving a "score"
  - Avoid implying pass or fail – e.g., "below the cut-off"
- Poor insight may accompany cognitive impairment
  - It is helpful to have a significant other present when providing feedback

The End