VALUE OF SCREENING COGNITIVE ASSESSMENT INSTRUMENTS IN AGE-RELATED COGNITIVE DECLINE

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ABSTRACT

The aim of our paper is to offer an informed synthesis of practice-based evidence on the utility and efficacy of some brief cognition screening instruments.

METHOD: Clinical evaluation of the most commonly used brief screening methods in our clinical setting.

RESULTS AND DISCUSSION: Due to limited clinicians' time in intensive gerontopsychiatric setting we need sensitive screening instruments which cover the six key neuropsychological abilities, impaired in different kinds of neurocognitive disorders (NCD).

Cognition oriented clinical interview and a set of brief screening cognitive tests provide valuable information on cognitive impairment, abilities, motivation, and potential for future outcomes. When we discuss the qualities and application of the cognitive screen tests we prefer to put an accent on their application as brief assessment tools at the doctor's office.

CONCLUSION: Subtypes of neurocognitive disorders are characterised by different patterns of impairment. Clinicians should receive training and use in everyday practice reliable, valid and stable cognitive screening tools to determine cognitive impairment, level of impairment or changes in level of cognitive status.

Keywords: *cognitive impairment, screening instruments, dementia, neuropsychological assessment*

The increasing number of older population will lead to a considerable rise in the number of population with cognitive impairment, dementia and disabilities.

Neuropsychological evaluation, including cognitive assessment, is not only a requirement of all

diagnostic classifications for confirming different types of cognitive disorders, but also plays an important role in distinguishing age-related cognitive decline from mild cognitive disorder, dementia, late depression and other related disorders.

Neuropsychological assessment plays an important role in the diagnostic and therapeutic plan of elderly patients with cognitive decline. As it is known, a broad range of psychological and medical conditions can affect an individual's cognitive state. For that reason neuropsychologists should have competence and much knowledge about the prevailing diagnostic classifications and diagnostic criteria. Guidelines developed by the American Psychological Association (1998, 2011) for the evaluation of dementia and age-related cognitive decline put an accent on

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Received: October 2, 2013

Accepted: February 11, 2014

the important role of neuropsychological assessment to determine onset, development, functional capacity, rate of decline and response to therapy (1, 2).

Neuropsychological testing to confirm the presence of cognitive deficits is required in ICD-10, DSM-IV and recently in DSM-5.

In DSM-5, a new category of Major and Mild Neurocognitive Disorders is introduced. They exist in a spectrum of cognitive and functional impairment. These subtypes are distinguished on the basis of a combination of time course, characteristic domains affected and capacity for independence in everyday activities.

The primary deficits of NCD are in cognition-cognitive decline in one or more cognitive domains and these deficits represent a decline from a previous level of performance in one or more cognitive domains.

The threshold for Major NCD has a greater degree of cognitive impairment (significant decline) that interfere with independence in everyday activity. Major NCD corresponds to dementia in DSM-IV.

Mild NCD presents with modest cognitive decline that do not interfere with capacity for independence in everyday activities, but greater efforts, compensatory strategies or accommodation may be required.

DSM-5 offers diagnostic criteria for several major causes of late-life NCD. All diagnostic criteria require confirmation of cognitive decline by clinical examination, knowledgeable informant and preferably documented by standardized neuropsychological testing with the exclusion of other explanations for the cognitive decline (3).

A number of cognitive domains should be examined for impairment. Except objective assessment, that quantifies the degree of impairment, data from a reliable informant and observation during the clinical interview is needed.

The aim of our paper is to offer an informed synthesis of practice-based evidence on the utility and efficacy of some brief cognition screening instruments.

MATERIAL AND METHOD

Clinical evaluation of the most commonly used brief screening methods in our clinical setting.

RESULTS AND DISCUSSION

The assessment of cognition begins during the clinical interview. In our practice, (hospital setting), during the psychiatric interview and mental status examination the clinician gets oriented about the cognitive and functional status. **A cognitive concern** is elicited by questioning and evaluation of complex attention, executive functioning, perceptual motor cognition, social cognition, learning and memory, language.

Some simple questions, asked during the initial clinical interview at doctor's office can help determine if a person might have a memory loss or other cognitive problems.

At first the open-ended conversation makes a formal assessment of language i.e. comprehension, word finding difficulty and spoken language ability, followed by a cognition oriented clinical interview.

Orientation Questions For Memory Loss- Large errors (such as guessing the incorrect year or season) may suggest cognitive impairment.

Word Repetition Test for Memory Loss (Word recall) - An inability to recall usually 3 common nouns such as apple, table, or coin indicates that the person may have problems with language, attention, or working memory.

Language Test for Memory Loss (Verbal fluency) - Naming as many items as possible in a given category (for example, "animals" or "vegetables"). Naming fewer than 10 items in one minute is a sign of decreased mental function. An inability to name a familiar object, or the use of an incorrect name indicates a language and memory problem.

Test receptive language - the ability to carry out 5 separate commands.

Test of Attention and Working Memory - This test involves spelling a word, such as "world" (or some equivalent five-letter word) forwards and backwards, or by serial 7s or serial 3s of five subtractions or the months of the year backwards. Omitting or transposing letters or months, as well as adding extra ones, may indicate memory or attention deficiencies.

Memory (Delayed word recall) - includes recalling the list of words used earlier in the repetition test. The inability to remember at least two of three words suggests memory impairment.

Judgement and problem solving questions-

A few questions to explain similarities and differences. Inability to answer these questions suggests that the person's ability to reason is impaired.

Meanwhile, the patient is observed and circumstantial information is collected about his ability to function in everyday life.

Complex issues arise during the evaluation of suspected cognitive decline. Major concerns are patients with poor insight, low education, living alone, because of lack of reliable data.

For a precise evaluation a neuropsychological assessment is recommended. The recognition of impairment in specific cognitive domains is critical for the differentiation of different subtypes of NCD. At this time, neuropsychological assessment has many uses and adds critical information to psychological, neurological, and neuroimaging assessments (4).

Some limitations of the objective tests are connected with the baseline lifelong performance pattern of high- or low educated individuals, current medical status, some drugs.

In such cases the competence of neuropsychologists in conducting clinical interviews, selecting the appropriate tests, administering, scoring and interpreting the results is of great importance. A critical concept in neuropsychological assessment is normative comparison.

Objective performance should be interpreted either based on prior performance or on the norms appropriate to individual's age, education and occupation. It should be known that neuropsychological tests are a part of a diagnostic work. Neuropsychological testing does not provide differential diagnostic information for neuropsychiatric disorders but it provides valuable information on abilities, motivation, and potential for future outcomes. Demographic, cultural, educational, medical and socio-economic factors may interfere with an evaluation (4).

Measures of mood and personality may be relevant in many cases, as cognitive impairment symptoms may also accompany depression and anxiety disorders.

What should be known about psychological assessment? Psychological testing is based on the presumption that variability from person to person can be measured. The psychometric properties of a psy-

chological test relate to the data that has been collected on the test to determine how well it measures the construct of interest. There are two broad types of psychometric properties that a test must have in order to be considered a good measure of a particular construct. **Reliability** refers to the consistency of a measure. Tests with less reliability produce more variable scores at both single assessment and a retest. **Validity** is the consistency with which a test fulfills its purpose of prediction, selection and classification.

When evaluating a clinical test, the terms **sensitivity** and **specificity** are used.

The sensitivity of a clinical test refers to the ability of the test to correctly identify those patients with the disease.

The specificity of a clinical test refers to the ability of the test to correctly identify those patients without the disease.

Psychologists should be familiar with the positive and negative predictive values of these tools. The terms positive predictive value (PPV) and negative predictive value (NPV) are used when considering the value of a test to a clinician and are dependent on the prevalence of the disease in the population of interest.

Positive predictive value is the probability that subjects with a positive screening test truly have the disease. **Negative predictive value** is the probability that subjects with a negative screening test truly don't have the disease (5).

The basic purpose of cognitive screening tests is to indicate cognitive impairment. The success of a particular screening tool for this purpose will lie in its statistical robustness (6).

Brief cognitive assessment tools should be standardized and have good positive predictive values for identifying possible cognitive impairment. Common cut scores for brief mental status examinations generate adequate sensitivity to dementia but have poor sensitivity for preclinical detection of dementia. For these reasons, there may be poor concordance between a brief mental status score and functional status or clinical concern. Thus, both positive and negative results on brief mental status testing may require follow-up with more in-depth neuropsychological testing.

Cognitive screen tests of increased sensitivity, specificity, positive predictive value, and negative predictive value that can be easily and quickly administered in a variety of clinical settings and are economically viable must be developed. According to some authors these might include, for example, cognitive screening examinations rather than expensive neuroimaging or serum analysis (7).

It should be known that subtypes of neurocognitive disorders are characterised by different patterns of impairment.

Neurocognitive disorder due to Alzheimer's disease is characterised by initial impairment of episodic memory (verbal and non-verbal), followed by dysfunction in judgement and abstract reasoning, visual construction, verbal fluency and naming.

Patients with vascular neurocognitive disorder tend to be significantly more impaired on tests of executive function such as verbal fluency.

In frontotemporal neurocognitive disorder, letter fluency and executive function are usually initially impaired.

Lewy body is characterised by dysfunction in attention, visuospatial tasks, letter fluency, mental tracking and abstract reasoning.

Based on established neuropsychological profiles in different dementias, there are six core domains or abilities that should be covered by a comprehensive screening instrument: attention/working memory, new verbal learning and recall, expressive language, visual construction, executive function and abstract reasoning.

Tools for cognitive screening should have some characteristics - short administration time, appropriate sensitivity and specificity for different patient demographics and for different cognitive disorders and cover the six key neuropsychological abilities (6,8).

A screening test used worldwide is **MMSE** (Folstein et al., 1975). It is included in our clinic as a routine test to check for any basic cognitive impairment, although it does not cover all key abilities. The Mini-Mental State Examination (MMSE) is a measure of cognitive function which was originally designed as a screening tool. It could be used to track changes in cognitive functioning over time and to assess therapeutic effects (9).

It consists of 11 items designed to evaluate orientation, registration (immediate memory), short-term memory (but not long-term memory), attention, language and motor skills. The MMSE is easy to administer and only takes about 5 to 10 minutes to complete. The examination has been validated in a number of populations. Scores of 25-30 out of 30 are considered normal; NICE classify 21-24 as mild, 10-20 as moderate and <10 as severe impairment. The MMSE may not be an appropriate assessment if the patient has depression, learning, linguistic/communication or other disabilities (e.g. sensory impairments). This may vary slightly depending on the patient's level of education.

O' Bryant et al. (2008) suggest that a more stringent cut-score of 27 yields greater clinical utility with regard to identifying dementia in well-educated individuals. They put an accent on benefit, identifying a considerably larger number of individuals who are in the earliest stages of dementia, early interventions against larger initial costs, connected with further assessment for such individuals (10). If length is not a major consideration, the MMSE may remain the best tool for primary care clinicians who want to rule in and rule out a diagnosis (11).

The Clock Drawing Test (CDT) (Sunderland et al., 1989) is a useful adjunct to the MMSE test in cognitive screening – tests primarily the executive function, has a widespread clinical use, takes less than a minute to perform, reflects change in cognition over time, is quick and easy to administer and the score is with excellent acceptability by subjects. The CDT can complement other screening tests, especially those, which do not include an item to assess frontal lobe impairment (12). A study (Shulman, 2000) reports a mean sensitivity (85%) and specificity (85%), high levels of inter-rater and test-re-test reliability and positive predictive value (13). Patients are asked to draw a clock with the hands pointing to a specific time of day. The results are influenced by age, education and language. But in studies that included patients with mild or questionable dementia, the CDT had a low sensitivity and variable specificity (14). It has remained unclear whether it is a suitable method to identify mild cognitive impairment (MCI), too (15).

Our screening battery consists of another cognitive screening test for verbal fluency- Isaac's Set Test (Isaacs, Kennie, 1973). This test is mainly used with people over 65 years. The patient is asked to name as many items as they can (to a maximum of 10) from each of 4 categories (colours, animals, fruits, towns) (16).

Zazzo's Cancellation Task (ZCT) (Zazzo, 1974) – a short form of 4 lines, examines the characteristics of attention. Results depend on patient's education level. It takes 3-4 minutes. (17).

The Katz Index of Independence in Activities of Daily Living, commonly referred to as the **Katz ADL (1983)**, assesses basic activities of daily living i.e. *bathing, dressing, toileting, transferring, continence, and feeding*. Clients are scored yes/no for independence in each of the six functions. A score of 6 indicates full function, 4 indicates moderate impairment, and 2 or less indicates severe functional impairment (18).

In the **Wechsler Similarities Test (WST)** (Wechsler, 1981) the subject must explain in what way two things are alike. For brief cognitive assess-

Table 1. Brief cognitive screening tools

Test name	Cognitive domain	Time to administer	Comments
MMSE (Folstein, 1975)	Expressive language Visual construction Immediate free verbal recall Delayed free verbal recall Calculation Attention Receptive language Temporal orientation Spatial orientation Constructional praxis	8-10 min	Consider ❖ Educational level ❖ Neurological level ❖ Depression ❖ Disabilities ❖ Does not examine long-term memory
CDT (Sunderland et al., 1989) Useful adjunct to MMSE	Executive function-constructive praxis Reflects change in cognition Complements other screening tests to assess frontal lobe impairment.	2 min	Consider ❖ Age ❖ Education ❖ Low sensitivity for mild dementia
VFC Isaac's Set Test (Isaacs and Kennie, 1973)	Verbal fluency Could be shorten to 10 items in category	2 min	Consider ❖ Age- better for > 65
Similarities subtest of the Wechsler Adult Intelligence Scale (WST) (Wechsler, 1981)	Abstract thinking	3-4 min	Consider ❖ the first five pairs of the subtest
Zazzo Cancellation Test (ZCT)–short form- (Zazzo, 1974)	Attention	3-4 min	Consider ❖ Education level
Activities of Daily Living ADL (Katz, 1983)	Functional status	8 min	Consider ❖ assesses basic activities of daily living. ❖ limited in its ability to measure small increments of change

ment we could use only the first five pairs of the WAIS (Wechsler Adult Intelligence Scale) similarities subtest. A score of two points is given for an abstract generalization, and one point if a response is a specific concrete likeness. Possible scores range from 0 to 10 (19).

According to Mitchell and Malladi (2010) brief single-domain tests may be an efficient first step in identifying cognitive impairment (11).

Some characteristics of the brief screening tests are shown in Table 1.

CONCLUSION

A variety of different tests can help identify the specific areas of the brain affected. We strongly support the opinion that neuropsychological assessment technology should be developed towards validly deliverable remote assessments and increased ease of administration of assessment tools.

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