

## **Dementia screening tools in General Practice**

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### **ABSTRACT**

#### **Introduction**

Global and local societies experience problem of changes in demographic structure. The demographic transformation will be associated with increasing number of health, social and economic problems. One of them is dementia, commonly diagnosed among people over 65 years of age. Screening for dementia allows earlier diagnosis and treatment of disease, providing better long-time effects. General practitioner is one of the healthcare professionals most commonly seen by patients with their everyday health problems. Thus, doctors from this branch of medicine are mostly entitled to perform screening for many diseases including dementia. There are many dementia screening tools available.

#### **Objective**

The objective of this work is to present dementia screening tool suitable to use in general practice environment.

#### **Results**

The most widely used is Mini Mental State Examination test. It is used both for initial assessment and for tracking the dynamics of changes over time. Other test as Montreal Cognitive Assessments test or Clock Drawing Test, Short Test of Mental Status are screening tools for detecting mild cognitive impairment. In general practices some other tools as GPCOG,

Mini-Cog and MIS can be used. They are recommended due to simplicity of performance and short time required to perform examination.

### **Conclusions**

Many tests are recently developed to perform screening for dementia. In general practice environment only tests with high reliability and short time of performance can be implemented. MMSE is the most widely used questionnaire in clinical setting. Apart from this tool, it is suggested to use GPCOG, Mini-Cog, MIS as time of their application is highly adjusted to conditions of general practice and have high sensitivity and specificity.

**Keyword:** Dementia, Cognition, General Practice, Prevention and Control

### **INTRODUCTION**

The demographic situation in Poland places our country in the group of aging societies.

The Central Statistical Office estimates that the number of elderly people will gradually increase, so that in 2050 almost every third Pole will be after 65 years of age. The forecasts presented in the Demographic Yearbook of Poland, 2016 predict that in 2050 there will be 11 097 000 elderly people per 33 951 000 of the entire Polish population (vs 6 071 000 elderly people per 38 419 000 Poles) [1]. Such changes in the population structure may be described as rapid. The demographic transformation will be associated with increasing number of health, social and economic problems. One of them is dementia, commonly diagnosed among people over 65 years of age.

The basis of dementia diagnosis in Europe are ICD-10 criteria. Dementia diagnosis can be made when there is:

- (1) presence of: a) memory dysfunction ("the clearest in the learning of new information"), b) disorders of other cognitive functions (judgment, thinking, planning, organizing, general information processing), which have deteriorated in relation to the previous, higher level; in both cases to the extent that it causes dysfunctions in everyday life functioning; the existence of these disorders has been documented in a reliable interview with people from the close environment of the patient and, if possible, in the results of a neuropsychological examination or "quantitative methods for the assessment of cognitive processes";
- (2) "environmental consciousness" preserved, i.e. lack of fogging of consciousness (defined as "reduced brightness" of recognizing the environment, with less ability to concentrate, maintain and shift attention), at least for the time necessary to identify cognitive dysfunctions;

(3) reduction of emotional control over motivation or change in social behaviors manifested in at least one of the following symptoms: a) emotional instability, b) irritability, c) apathy, d) primitivisation of social behavior;

(4) occurrence of memory disorders and other cognitive functions for at least 6 months;

(5) additionally, the diagnosis can be strengthened by the occurrence of dysfunctions of other higher cortical functions in the form of aphasia, agnosia and apraxia.

Screening for dementia allows earlier diagnosis and treatment of disease, producing better long-time effects of treatment.

## **RESULTS**

### **MMSE Test**

The most widespread test used in the diagnosis of dementia is Mini Mental State Examination (MMSE) test [3]. The MMSE scale is used both for initial assessment and for tracking the dynamics of changes over time and for assessing the potential effects of therapy as well.

The whole procedure takes about 5 minutes, which is its considerable advantage.

The scale consists of elements evaluating allopsychic orientation (10 points), remembering words (memorizing 3 words – 3 points), attention and counting (5 points), reminding after deferring (3 points), naming simple objects (2 points), executing commands (4 points), writing and constructive praxis (1point). The maximum possible result is 30 points. The result of 28 points and above is considered to be normal outcome [3]. The result below 24 points suggests the presence of a dementia process, the result in the range of 24-27 points indicates cognitive impairment without dementia. In everyday practice, the value of 24 points was considered to be the limit of the "normal" MMSE test, which indicates the need for further diagnostic tests.

The test result depends, among others, on the age, education, environment and emotional state of the subject. The most important limitations of MMSE can be compensated by making calculations based on the formula [4]:

MMSE adjusted result = MMSE result –  $[0,471 \times (\text{years of education} - 12) + (0,31 \times (70 - \text{age}))]$ .

In the clinical setting simple table can be used [4]:

Age (years)	Years of education					
	0	4	8	12	16	20
60	4	2	0	-1	-3	-5
65	4	3	1	0	-2	-4
70	5	3	1	0	-1	-3
75	6	4	2	0	-1	-3
80	6	5	3	1	0	-2
85	7	5	3	1	0	-1
90	8	6	4	2	0	-1

### MoCA Test

The Montreal Cognitive Assessments test is a screening tool for detecting mild cognitive impairment.

The whole procedure of using MoCA lasts about 10 minutes. This is 30 points test.

This tool is commonly used to assess such functions as: short-term memory (learning of five nouns and delayed recall after 5 minutes), visuospatial abilities (clock-drawing test, three-dimensional cube copy), executive functions (alternation task, phonemic fluency task, verbal abstraction task) attention, concentration, and working memory (sustained attention task, serial subtraction task and digits forward and backward), language (confrontation naming task, repetition of two syntactically complex sentences) and orientation to time and place [5].

MoCA test has good positive and negative predictive values for mild cognitive impairment and Alzheimer disease [5]. It is sensitive to the presence of mild cognitive impairment and is viable to use in a general practitioner setting, where time for single patient is often terse.

### STMS test

One of the other tools used for screening for mild cognitive deficits is the Short Test of Mental Status (STMS) [6].

Individual tests in STMS evaluate, like MMSE, the orientation in time and space (8 points), attention (7 points), arithmetic calculation (4 points), abstraction (3 points), information (4 points), construction (4 points), reminding after deferring, recall (4 points).

The maximum result in this test is 38 points. Suspicion of the dementia syndrome is justified in people who obtained less than 30 points

The sensitivity of the STMS test in diagnosing dementia is estimated at 95% in people over 60 years of age [6]. STMS can be characterized by higher sensitivity in the detection of discrete cognitive deficits, including mild cognitive impairment and early dementia as compared to MMSE [7].

## **CDT**

The Clock Drawing Test (CDT) is a widely used tool for screening the efficiency of cognitive functions. It is emphasized that CDT is not only used for the study of visuospatial orientation, construction skills, but allows for a more comprehensive assessment of mental performance as understanding time belongs to the sphere of abstract thinking [8]. Certain subjectivity in the classification of errors, despite the existing scales of their evaluation and the lack of unanimity as to the possible types of errors is a limitation of CDT value.

There are many modifications to the method of conducting the test, as well as methods for assessing the correctness of task performance.

Shulman et al. [8], proposed that the subject is tasked with inserting hands of the clock in the empty dial in such a way that they indicate the third hour. The assessment includes five levels, where level I means mild disorder, and level V - deep disorder.

According to the proposals of Sunderland et al. [9], patient performs the whole task by himself: first he draws a circle symbolizing the clock face, then places the numbers representing the next hours on it and finally puts the hands of the clock so that they show the hour 2.45. The obtained figures are qualified for one of 10 categories, where 10 means a correct execution, and 1 - the worst way of performing.

One of the simplest, so far, CDT variant is the version proposed by Watson et al. [10]. The examined subject is presented with a drawing of a circle and then asked to enter the numbers in a circle (hours) so that it looks like a clock face. Authors named their CDT variant as Clock Completion Test (CCT).

The most commonly used version of the Clock Drawing Test in Poland is a set of three tests. The first of these is to enter numbers in the empty dial indicating the next hours. In the second part, the examined person is asked to draw clock hands in such a way that they show the 3:00, and in the third one – 11:10.

## **Mini-Cog**

One of the simplest and the shortest tests (duration of the test about 3 minutes) is the Mini-Cog test. It consists of two components, a 3-item recall test for memory after a short  $\leq 3$ -minute deferring, and a simply scored [11]. The use of scale involves the 5-point rating, where 0-2 points. can be obtained in CDT, (2 points for a normal clock with all numbers placed in the correct sequence and approximately correct position, with no missing or duplicate numbers; hands pointing to the 11 and 2 (11:10)) and 0-3 when trying to recall 3 words. The number 3 was considered the cut-off threshold, however a cut point of  $<4$  is considered to have greater sensitivity [12,13].

Mini-Cog assesses memory, attention, visual-spatial processes, construction praxis, recall, and verbal skills. The highest practical advantages of this method is short time of performance and relative independence from the level of education.

### **GPCOG test**

The General Practitioner Assessment of Cognition (GPCOG) was designed especially for family physician setting. This screening tool is intended for basic healthcare, thus have short time of realization. It takes about 4 minutes to perform patient examination and approximately 2 minutes to obtain information from close relative [14].

The first part of the test includes 5 activities: giving current date (1point); CDT performance (2 points; marking in all the numbers to indicate the hours of a clock in blank circle and marking in hands to show 10 minutes past eleven o'clock); telling about events that occurred during the last week (1 point) and recall of previously given name, surname and address (5 points). The maximum 9 point score indicates good cognitive performance. Scoring 4 or less points indicates cognitive impairment, however, GPCOG is only screening tool and patient should be referred to additional diagnostic tests. Scoring 5-8 points, suggests possible cognitive problems. In this condition it is recommended to conduct the second part of the study.

The second part involves close relative asked about memorizing current events, remembering the content of conversations from the last days, difficulties with using the right words, difficulties in managing finances, dependence in taking drugs and moving around in comparison with state from 5-10 years ago (6 points). Scoring 3 or less points indicates cognitive deficits that should be diagnosed [15].

Main advantages of this tool are short time of administration, validation in a primary care setting, obtaining information from informer and good psychometrical performance (even better as a screening instrument than MMSE) [14].

### **MIS**

Memory Impairment Screen (MIS) evaluates episodic memory of an elderly person [16]. This is a short four-item test (4 words are presented to a patient then matched to different semantic categories). The next step is performing an interference task, lasting 2-3 minutes and recalling the previously shown words ('free recalling'). If some words are not freely recalled, the examiner presents their semantic categories ('cued recalling'). Total score = [(2 x free) + cued] remembered words. The maximum score for the MIS is 8 points. If patient receive 5-8 points, there is no cognitive impairment, scoring 4 or less points indicates for possibility of cognitive impairment.

This tool also have short time of administration – less than 5 minutes. The results of the test are not significantly affected by age and level of education. However the MIS, does not assess visuospatial skills or executive function, it was evaluated as useful in family physician practice by Brodaty et al. [17].

## **CONCLUSIONS**

Many screening tests are recently developed to perform screening for dementia. In general practice environment only tests with high sensitivity, reliability and short time of performance can be implemented. MMSE is the most widely used tool in clinical setting. Apart from this tool, family doctors can use GPCOG, Mini-Cog, MIS as time of their application is highly adjusted to conditions of general practice and sensitivity to early stages of dementia in some cases is considered to be even higher than for most popular MMSE.

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