Chapter 19
Low education

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Key points

- The diagnosis of cognitive impairment and dementia can be challenging but the circumstances of low-educated individuals amplifies the difficulties.
- A modified, patient-centric approach to the assessment is needed among such populations.
- A variety of specific cognitive tests have been developed and are available to assist clinicians in the diagnosis of dementia.

This is a chapter of the *World Alzheimer Report 2021, Journey to a Diagnosis of Dementia* which can be accessed in full at: https://www.alzint.org/resource/world-alzheimer-report-2021/

General background

Cognitive impairment and dementia are on the rise due largely to the ageing of the population. Among the most consistent factors associated with the maintenance of cognitive function is education, likely through an effect of increased cognitive reserve. This refers to the actual differences in cognition that may increase one's tolerance of age-related changes and disease related to pathology. In this regard, all efforts should be made to encourage young generations to continue their education for the longest time possible. The reality is that low education and illiteracy are very prevalent global issues, especially in low- and middle-income countries. This poses specific challenges when assessing the possibility of cognitive impairment.

As examined in the essay below by Nitrini and Brucki, many adjustments and considerations would need to be made to the current standard assessment tools, including developing and defining the psychometrics of some specific ones.

Expert essay

How to assess the possibility of dementia in people with low education or illiteracy

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Low education is still a widespread condition in less developed countries and among immigrants in developed countries. Low education is one of the main non-genetic risk factors for dementia, mainly due to low cognitive reserve.

There are still 781 million illiterate adults in the world (1). Many other individuals have learned to read or write but cannot use these abilities to follow a written command or write a simple message. In a Brazilian study, when using the short version of the Test of Functional Health Literacy in Adults, functional illiteracy was detected in 92.5% of the individuals who completed three years of schooling or less, whereas 54.7% of those with 4 to 7 years of education had an inadequate performance (2).

First attempts to diagnose dementia in low-educated individuals

The initial efforts involved decreasing the cut-off score of the usual tests, such as the Mini-Mental State Exam (MMSE) (3). This test is still widely used globally, but the MMSE has several hindrances for low-educated individuals including counting or spelling backwards as well as writing and reading. The now widely used MoCA test is considered even more inappropriate for low-educated individuals.

Other test batteries were designed for diagnosing dementia in low-educated individuals. Two of the most well-known are the RUDAS (Rowland Universal Dementia Assessment Scale) (4) and CASI-S (Cognitive Abilities Screening Instrument-Short Form) (5).

The RUDAS has been used in a variety of sociocultural backgrounds and translated into many languages. It consists of six items: body orientation, praxis, drawing, judgment, memory, and language. The pooled sensitivity was 82% and specificity of 83% for dementia detection, with low or no influence of educational level (4).

The CASI-S is a short test developed to evaluate low-educated individuals. It includes the following subtests: registration of three words, temporal orientation, verbal fluency (four-legged animals in 30 seconds) and recall of the three words. It was influenced by the education level in Brazil, although it does not require reading, writing, drawing, or calculating. But it is easy and brief to use in clinical settings (5).

The main limitation of these tests is a unique score, with no division by domains with differentiated scores.

Diagnosis of dementia at any educational level

The diagnosis of all-cause dementia is characterised by a decline in at least two domains in the cognitive or behavioural (neuropsychiatric) function that interferes with functional activities and is not explained by major psychiatric disorder or delirium (6). Both history-taking from the individual and a knowledgeable informant as well as an objective cognitive assessment should be used (6).

Personal experience with a test designed for low-educated individuals

In the early 1990s, we realised that the tests used in centres from the developed world were not appropriate for the population of older adults that came to our hospital. We designed the Brief Cognitive Screening Battery (7,8), which contains the Figure Memory Test (FMT), (link available in reference 8).

A sheet of paper with ten black and white drawings of simple objects is presented to the individual, who should identify and name the objects (without having been told that they needed to be memorised). Then the sheet of paper is removed from view, and the individual is asked to remember the figures. Two other similar attempts are done, but in these instances, the person is asked to memorise the figures. The last recall is a measure

of encoding or learning. After two interference tests, semantic verbal fluency (animals in one minute) and clock-drawing test (CDT), delayed recall (without cues) is evaluated. Finally, the ability to recognise the ten previously shown figures among 20 figures (with ten distractors) is assessed.

This test takes about 8 minutes to be administered to a healthy volunteer and does not have a total score, but it can diagnose impairments of memory, language, executive functions, and visuospatial abilities.

The delayed recall of the Figure Memory Test showed the highest accuracy for the diagnosis of dementia in several studies, with the same cut-off score (≤5) for all education levels. That is especially important as an impairment of delayed recall is one of the first and most frequently seen signs of the most common form of dementia: amnestic Alzheimer's disease. A coloured version of this battery has been used together with other tests for diagnosing dementia in immigrants or low-educated individuals living in European countries. The delayed recall subtest, with the same cut-off score (≤5), showed the highest accuracy among other tests included in that battery (9).

Alzheimer's disease usually progresses to affect executive functions, language, or behaviour. Semantic verbal fluency, an executive test based on lexical-semantic information, is one of the best tests for assessing executive function in low-educated individuals. Cut-offs should be adapted according to years of schooling: ≤9 for individuals who are illiterate, ≤12 for individuals with 1–7 years, and ≤13 for those with 8 or more years of education (8).

The naming of the drawings and semantic verbal fluency can detect language impairment

The clock drawing test is not a good model for diagnosing dementia in low-educated individuals, although it is important for the interference phase of Figure Memory Test. The use of the clock drawing test in the Brief Cognitive Screening Battery is partially justified because in Brazil, as well as in many other countries, there is heterogeneous educational background in the population, and the clock drawing test may help when examining individuals with higher education. Healthy individuals who are illiterate or low-educated usually draw the circle, but numbers may be missing or placed outside of the clock circle (score ≥4) (8).

Together with the Brief Cognitive Screening Battery, we use the Functional Activity Questionnaire (FAQ) (10), with ten simple questions, with the cut-off of ≥5 for the diagnosis of dementia. The Functional Activity Questionnaire is even more reliable when the informant has a high education. As the Functional Activity Questionnaire is being completed while the Brief Cognitive Screening Battery is being administered, it does not add any additional time to the evaluation.

We and others have performed studies with the Brief Cognitive Screening Battery and Functional Activity Questionnaire in Brazil for years. We always found them easy to use and well-received by the individuals being examined in urban epidemiological studies and remote rural areas of the Amazon basin.

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Conclusions

Individuals of any age bring with them their own personalised conditions. Consequently, the diagnosis of cognitive impairment and dementia, especially at the earliest onset, may be challenging. These difficulties are compounded for low-educated or illiterate individuals.

A modified, patient-centric approach in the assessment process is needed, as are sensitivity, understanding and expertise on behalf of the healthcare professionals when working with these populations.

Specific tests have been developed (Rowland Universal Dementia Assessment Scale, Cognitive Abilities Screening Instrument – Short version, Brief Cognitive Screening Battery with Figure Memory Test and the Functional Activity Questionnaire) and are available to assist clinicians in their diagnostic process. The Figure Memory Test component of the Brief Cognitive Screening Battery 1 was shown to be useful in diverse cultures, thus showing promise for its general use.