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Concordance between the Mini-Examen Cognoscitivo and the Mini-Mental State Examination in cognitive impairment screening

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Objectives. To compare the concordance between two cognitive impairment (CI) screening tests: the 30-point Folstein's Mini Mental State Examination (MMSE) and their validated and slightly modified spanish translation, the 35-point Lobo's Mini-Examen Cognoscitivo (MEC).
Design. Analytical cross-sectional multicenter study.
Setting. Primary care.
Patients. Randomized sample of subjects aged 65 years or more attended in 54 primary care centers in Catalonia. Inclusion of 3167 subjects. Institutionalized patients were excluded.
Measurements. After a training period, primary care doctors and nurses administered MMSE and MEC simultaneously to their own patients. Standardization of variables.
Results. Age 74 (6.1) years-old, 1611 (50.9%) women, 954 (30.1%) illiterate or without primary education. Prevalence of CI according to MMSE was 16.52% (n=449) and according to MEC 5,49% (n=165) (*P*<.001). Although intraclass correlation coeficient was 0,864 (95% CI, 0.855-0.873), the kappa index at score 24 for both tests was 0.468, but it increased up to 0.788 taking 20 and 23 scores for MMSE and MEC, respectively. At multivariate analysis, low educational level, and age more than 80 years-old predict a bad concordance among both tests.
Conclusions. In spite of good correlation between MMSE and MEC, both detect different CI prevalences with the cut-off point at 23/24. Their agreement is only moderated in practice, because we interpret tests in a dichotomic way (CI versus no-CI). In our experience, we cannot use them indistinctly with the cut-off point at 23/24, especially in subjects with low educational level or aged 80 or more years.

Key words: Cognitive impairment. Mini-Mental State Examination. Mini-Examen Cognoscitivo.

CONCORDANCIA ENTRE EL MINI-EXAMEN COGNOSCITIVO Y EL MINI-MENTAL STATE EXAMINATION EN EL CRIBADO DEL DÉFICIT COGNITIVO

Objetivo. Estimar la concordancia entre dos tests de cribado del déficit cognitivo (DC): el Mini-Mental State Examination (MMSE) y su adaptación española, el Mini-Examen Cognoscitivo (MEC).
Diseño. Estudio transversal multicéntrico en 53 centros de salud.
Emplazamiento. Atención primaria.
Participantes. En cada centro se realizó un muestreo aleatorio de pacientes adscritos mayores de 64 años. Inclusión total de 3.167 sujetos. Se excluye a los pacientes institucionalizados.
Mediciones. Tras recibir formación común, médicos y diplomados en enfermería administraron el MMSE y el MEC simultáneamente a los propios pacientes. Estandarización de variables.
Resultados. La edad media de los pacientes incluidos era de 74 (DE, ± 6,1) años; 1.611 (50,9%) eran mujeres, y 954 (30,1%), analfabetos o sin estudios primarios. La prevalencia de posible DC según el MMSE fue del 16,52% (n = 449) y según el MEC del 5,49 % (n = 165) (p < 0,001). El índice de correlación intraclase fue de 0,864 (intervalo de confianza [IC] del 95%, 0,855-0,873), el índice kappa en el corte de 24 para ambos tests fue de 0,468, y aumentó hasta 0,788 al tomar los puntos de corte 20 y 23 para el MMSE y MEC, respectivamente. En el modelo de regresión logística, la baja escolaridad y la edad ≥ 80 años fueron variables predictoras de mala concordancia.
Conclusiones. A pesar de la óptima correlación entre el MMSE y el MEC, ambos detectan diferentes prevalencias de posible DC para el punto de corte 23/24. Su concordancia es sólo moderada en la práctica, pues el clínico interpreta los tests de manera dicotómica (DC frente a no DC). En nuestro ámbito, no se pueden utilizar indistintamente para el punto de corte 23/24, especialmente en sujetos con baja escolaridad o mayores de 80 años.

Palabras clave: Déficit cognitivo. Mini-Mental State Examination. Mini-Examen Cognoscitivo.

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A commentary follow this article (pág. 14)

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Introduction

Most clinical guidelines and consensus documents do not recommend systematic screening for dementia in the general population.[1-3] However, when caregivers or physicians suspect cognitive impairment, the patient should be examined and followed.[4] Several validated instruments have been available for years to detect possible cognitive impairment.[5] The Folstein Mini-Mental State Examination (MMSE),[6] which dates from 1975, is one of the most widely used tests world wide, and validated translations have been produced in several languages including Spanish.[7,8] Despite the low specificity of the MMSE, different studies have shown good interobserver agreement and short-term test-retest agreement. Accordingly, the NINCDS-ADRDA recommends this test as a screening instrument to detect possible cognitive impairment.[9]

In 1979 Lobo et al.[10] adapted the MMSE for the Spanish-speaking population, naming the instrument the Mini-Examen Cognoscitivo (MEC) and modifying some of the items such that the total score obtainable on the MEC is 35 points rather than 30 points, as in the MMSE. Since then both tests have been used interchangeably in primary care for the early detection of cognitive impairment. However, studies done in recent years have tended to favor the Spanish translation of the MMSE, possibly with the legitimate aim of comparing studies in Spain with other international studies. Such comparisons have been facilitated by the 30-point version of the MEC,[11] in which the items involving abstract thinking (2 point) and digits (3 points) have been deleted.

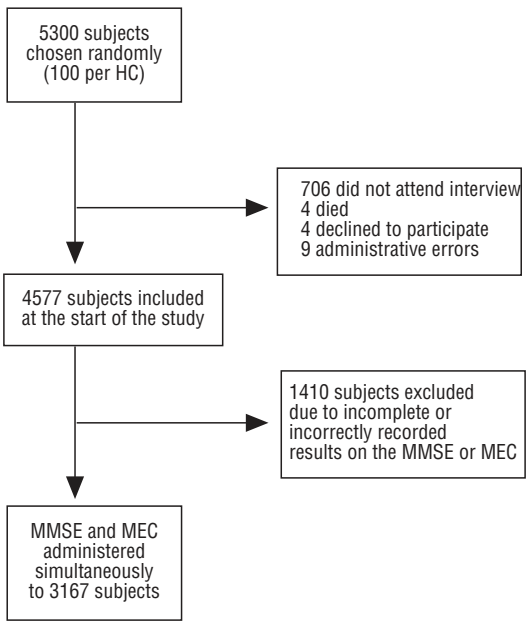
Our hypothesis was that the classic 35-point MEC and the Spanish version of the MMSE could not be used interchangeably to screen for cognitive impairment.[12] The aim of the present study was therefore to compare agreement between the MMSE and the MEC in daily clinical practice.

Material and methods

This study was done within the framework of the *Cuida'l* project, a multicenter, controlled randomized clinical trial in process at the time of writing, which was designed –as reported previously–[13] to determine the effectiveness of a specific intervention aimed at caregivers for patients diagnosed as having dementia. In the first phase of the project a cross-sectional study was done with a random sample of persons older than 64 years who were served by 53 primary care centers in Catalonia (northeastern Spain). One hundred patients were chosen at random from each primary care center, for a total of 5300 patients. At the discretion of each patient´s family physician and licensed nurse, these persons were recruited by telephone and in writing, or when they visited their center for any reason other than to seek medical care. We excluded institutionalized patients, itinerant patients living at a temporary address (and planning to remain at this address for less than 6 months), and patients with a chronic illness and extreme cognitive impairment that prevented them from taking part in the interview. Participation in a home care program was not an exclusion criterion.

After a training period the primary care team responsible for the patient (physician or licensed nurse) administered the MMSE and the MEC simultaneously to all selected patients in the course of a scheduled, 20-30 min visit to the health center. Items common to both tests were presented only once, and the response was considered valid for scoring both instruments. For example, the questions «What day of the week is it?», «What is today´s date?», «What month is it?» and «What year is it?» were presented only once, and the responses were considered valid for both the MMSE and the MEC. In contrast, items that differed in each of the two tests were presented alternately. When the researcher considered it appropriate, the interview took place at the patient´s home. All subjects (n=3167) belonged to a subsample of the participants in the *Cuida'l* program. Analysis of the data was based on all patients who satisfied the inclusion criteria and for whom complete and correctly recorded results for both the MMSE and MEC were available.

Material y métodos
Cuadro resumen



General scheme of the study

Cross-sectional multicenter study at health centers to assess concordance between two screening tesrs for connitive impairiment.

Measures

The Spanish version of the MMSE consists of 30 items, and each correct answer is scored as 1 point. It evaluates six cognitive abilities (Annex 1), and takes 5-10 minutes to administer. Suitably trained health care personnel can administer the test.

The MEC is analogous to the MMSE and conserves the same structure based on six cognitive abilities, but incorporates 5 additional items, 3 referring to attention and concentration, and 2 dealing with language (Annex 2). The subtraction item is not based on a series of sevens, but asks the subject instead to perform five successive subtractions of 3 units from 30, which is much easier. In contrast to the MMSE, the highest possible score on the MEC is 35 points. In both tests the item that asks «What hospital are we in?» was replaced with the question «Whose doctor´s office are we in?» (The physician´s or nurse's name was taken as the correct answer.) If the tests were given at the patient´s home, this item was replaced with the question «Whose home are we in?». The name of the district was accepted as correct in place of the province or region of Catalonia.[5] To facilitate the simultaneous administration of the two tests, the language item «There were five dogs in a field of wheat» (originally «No ifs, ands or buts» in the English version of the MMSE) was repeated.

Statistical analysis

Because this was an analysis of a subsample from the *Cuida'l* trial, sample size was calculated on the basis of the primary aims of the main study.[13] We assumed a prevalence of dementia among persons older than 64 years of 5%, and a nonresponse rate of 10%. This meant that 4750 persons older than 64 years needed to be screened; the final number was 5300. McNemar´s test was used to compare the number of positive findings of cognitive impairment (ie, a score ≤24) obtained with the two tests.

The intraclass correlation coefficient was calculated for fixed effects of the score on the MMSE and MEC. Because the maximum MEC score (35 points) was higher than the maximum score for the MMSE (30 points), these variables were standardized before the analysis.

Different cut-off scores for the two tests were identified as indicating a positive finding of cognitive impairment, and agreement between the two results was calculated as the kappa index. Logistic regression was used for the variables age, sex and educational level as predictors of good agreement (cut-off point ≤24 points).

All analyses were done with version 10.0 of the Statistical Package for Social Sciences (SPSS-Win).

Results

Description of the population

Of the 5300 subjects initially selected, 706 did not attend the interview or could not be located; 4 had died; 4 declined to participate; and 9 were included because of an administrative error. Of the 4577 eligible participants, 1410 (30.8%) were excluded because one or both tests could not be given correctly or completely (Figure 1). The final sample comprised a total of 3167 patients for whom complete, correct data were obtained. Mean age and standard deviation (SD) was 74 (6.1) years; 17.5% of the participants (n=554) were 80 years old or more. Slightly more than half (n=1611, 50.9%) were women. The number of patients who could not read or write or who were functionally illiterate was 954 (30.1%). Most were married (n=2080, 65.9%), 874 (27.7%) were widows or widowers, and the

TABLE 1 **Kappa index for different cut-off points on the Mini-Mental State Examination (MMSE) and the Mini-Examen Cognoscitivo (MEC)**

		MMSE score (Folstein et al[6])									
	≤	20	21	22	23	24	25	26	27	28	29
MEC score (Lobo et al[10])	20	0.631	0.505	0.402	0.310	0.247	0.176	0.092	0.056	0.031	0.016
	21	0.687	0.562	0.451	0.350	0.280	0.201	0.106	0.064	0.036	0.018
	22	0.753	0.645	0.536	0.421	0.340	0.250	0.133	0.081	0.045	0.023
	23	0.788	0.701	0.620	0.503	0.411	0.305	0.168	0.103	0.058	0.030
	24	0.744	0.681	0.642	0.554	0.468	0.358	0.200	0.127	0.072	0.037
	25	0.710	0.697	0.685	0.627	0.540	0.420	0.246	0.162	0.091	0.048
	26	0.623	0.664	0.675	0.638	0.582	0.477	0.298	0.119	0.063	0.540
	27	0.540	0.603	0.631	0.625	0.612	0.534	0.363	0.252	0.152	0.082
	28	0.453	0.530	0.578	0.601	0.606	0.556	0.415	0.301	0.191	0.107
	29	0.354	0.433	0.505	0.549	0.581	0.573	0.483	0.373	0.245	0.144
	30	0.267	0.341	0.416	0.468	0.518	0.554	0.531	0.447	0.319	0.195
	31	0.193	0.254	0.320	0.385	0.448	0.506	0.550	0.507	0.404	0.256
	32	0.123	0.164	0.214	0.275	0.311	0.405	0.513	0.566	0.505	0.363
	33	0.070	0.094	0.125	0.167	0.211	0.273	0.398	0.501	0.609	0.502
	34	0.038	0.051	0.068	0.092	0.117	0.156	0.253	0.356	0.500	0.614

TABLE 2 **Variables that predicted agreement (cut-off score ≤24)**

	Odds ratio	95% IC Lower	95% IC Higher
Education[a]			
Primary	1.96	1.52	2.54
Past primary	3.14	1.93	5.13
Men	0.89	0.69	1.14
Age (years)b			
70-74	0.93	0.65	1.33
75-79	0.78	0.54	1.13
≥ 80	0.47	0.33	0.66

[a]Reference category: unable to read or write, or functional illiteracy.
[b]Reference category: age 65-69 years.

TABLE 3 **Characteristics of the patients according to agreement between the two test scores**

	No agreementa	Agreement	*P*
Education			
Illiterate	122 (43.0%)	832 (28.9%)	
Primary	143 (50.4%)	1,644 (57.0%)	
Past primary	19 (6.7%)	407 (14.1%)	<.001
Men	126 (44.4%)	1,430 (49.6%)	0.092
Age, years			
65-69	60 (21.1%)	803 (27.9%)	
70-74	76 (26.8%)	918 (31.8%)	
75-79	66 (23.2%)	690 (23.9%)	
≥ 80	82 (28.9%)	472 (16.4%)	<.001
Marital status			
Married	157 (55.5%)	1,923 (66.9%)	
Widow/Widower	100 (35.3%)	774 (26.9%)	
Single, separated or divorced	26 (9.2%)	176 (6.1%)	<.001

remaining participants were unmarried, separated or divorced.

Estimate of prevalence

With a cut-off score in both tests of ≤24 as a screen for a positive result, the prevalence of suspected cognitive impairment was 16.52% (n=449) according to the MMSE and 5.49% (n=165) according to the MEC (*P*<.001).

Estimate of agreement

The overall intraclass correlation coefficient for the two standardized scores was 0.864 (95% CI, 0.855-0.873). By age group, the intraclass correlation index was 0.76 (65-69 years), 0.77 (70-74 years), 0.83 (75-79 years) and 0.91 (older than 79 years). With a cut-off score of ≤24, the MEC results tended to identify fewer subjects as having suspected cognitive impairment (Figure 1). We used the method proposed by Bland et al.[14] to calculate the difference between the standardized MEC and MMSE scores, and these differences were in turn standardized. Numbers below − 1.96 or above 1.96 were the extreme values (Figure 2): with a MMSE score close to 24 but below 25, a large positive difference was seen (the MEC tended to yield higher scores than the MMSE), whereas beyond this cut-off score the opposite occurred.

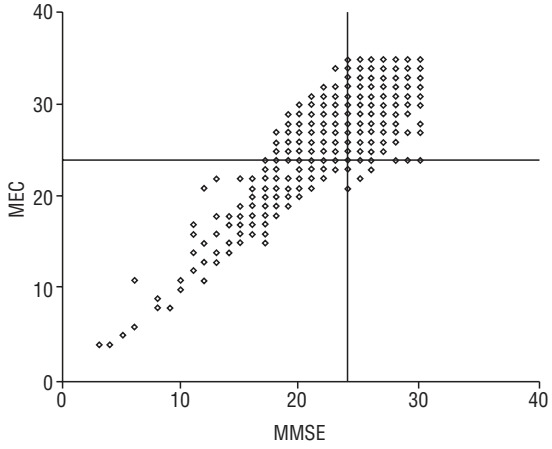


FIGURE 1 Scatterplot showing the scores on the MMSE and MEC. To facilitate comprehension of the graph, lines along each axis indicate a score of 24.

Because clinicians do not use these scores on a continuous scale but rather use a cut-off score to categorize a given subject as having a positive or negative screening result, we calculated the kappa index for different cut-off scores on both tests to try to determine where agreement was greatest. As shown in table 1, when a cut-off score on both tests of ≤24 points was used (as is customary in clinical practice), the kappa index was 0.468, whereas with a cut-off score of ≤20 for the MMSE and ≤23 for the MEC, the kappa index increased to 0.788.

The results obtained with the logistic regression model for predicting good agreement between the two tests (cut-off at ≤24) are shown in table 2. The variables educational level and age #>80 years were statistically significant; the former as a predictor of good agreement, the latter as a predictor of poor agreement. Table 3 shows how agreement between the two scores varied across different subgroups.

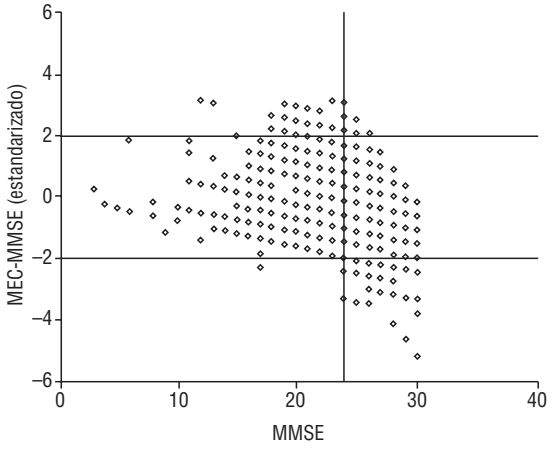


FIGURE 2 Scores on the MMSE plotted on the horizontal axis, versus the standardized differences between standardized scores on the MEC and MMSE, plotted on the vertical axis. Values lower than –1.96 (MMSE>MEC) and higher than +1.96 (MEC>MMSE) represent extreme values. .

Discussion

For a cut-off score of 23/24, the sensitivity and specificity for detecting dementia were reportedly 87% and 82%, respectively, for the MMSE,[15,16] and 89.8% and 83.9%, respectively, for the MEC.[10] Some authors have reported a higher sensitivity for the MEC (93.5%).[17] Although the sensitivity in detecting dementia was similar in both tests, in the present study the prevalence of suspected cognitive impairment, identified with a cut-off score of 24/23, varied significantly between the two under conditions similar to those encountered in every-day clinical practice. Under these conditions, when clinicians use the MMSE they probably need to make a greater number of diagnostic decisions afterwards, such as the indication for complementary tests (laboratory tests, psychiatric examination, imaging tests, etc.). In contrast, if the MEC is used fewer of these complementary tests will be needed. However, the present study was not designed to determine which of the two tests is better at screening for cognitive impairment, hence we cannot say whether either of the two is the more effective or efficient. The results do suggest that they cannot be used interchangeably in the primary care setting as if each were a substitute for the other, at least when a cut-off score of 24/23 is used. Their agreement in practice is only moderate, as clinicians do not interpret the test scores on a continuous scale but rather as a dichotomous result: above or below the cut-off score. Under these conditions it seems prudent to consider these tests as not equivalent or interchangeable, especially for certain population groups. According to our results the discrepancy widens in patients with a low educational level and in those older than 80 years; in these subgroups the two instruments should not be used interchangeably. Our data favor the use different cut-off scores depending on the patient´s educational level, as proposed by Escribano et al.[7] for the MMSE.

Comparison with other studies

Lobo et al.[10] recently showed a cut-off score of 23/24 on the MEC to be valid for older patients, and proposed a 30-point version of the MEC to facilitate comparisons with other international studies based on the MMSE.

Bermejo et al. compared the diagnostic effectiveness of the MEC with that of two versions of the MMSE: that containing the «serial sevens» subtraction, and that containing the request to spell *mundo* (world) backwards.[18] In this study the diagnostic performance of the Spanish translation of the MMSE that contains the «serial sevens» item was similar to that of the MEC. These authors suggested that the Spanish version of the MMSE could be improved.

Bermejo et al.[18] also found that with a cut-off score of 21/22, the sensitivity of the version of the MMSE with the «serial sevens» item was 1.0. If this result is accurate, a cut-off score of 24 or lower would be expected to diminish the specificity of this test without increasing its sensitivity; this would therefore decrease its positive predictive value. In the same study[18] the ideal cut-off for the MEC was set at 25/26, which yielded a sensitivity of 1.0 and a specificity of 0.84. Thus the overall effects of the MEC are the opposite of those of the MMSE: if the cut-off score is 24 or lower, sensitivity is reduced somewhat and specificity is increased. This affects the agreement between tests: with the cut-off score suggested by Bermejo et al., agreement between the tests according to table 1 would increase significantly to 0.675.

Limitations of the study

One of the limitations of our study is that we gave the two tests simultaneously. This lengthens the time needed to administer them, and some patients may have become tired, especially when asked questions that required more concentration. However, this has been a relatively common practice in a number of studies, and the fact that most items overlapped exactly in the two tests and were thus presented only once reduced the total time needed, and hence minimized the effects of this factor. Another source of bias may have been the large number of researchers and interobserver variability, although we tried to minimize this by training all participating researchers in the administration of the MMSE and the MEC. In addition, we excluded from the study all test results that were complete or incorrectly recorded.

Discussion
Key points

What is known about the subject

- Several validated tests have been available for years to screen for possible cognitive impairment. Among the most widely used are the Folstein Mini-Mental State Examination (MMSE) and the Lobo Mini-Examen Cognoscitivo (MEC).
- In the primary care setting these tests are often used interchangeably in clinical practice, depending on the clinician´s preference and habits.
- However, when a cut-off score of 24/23 is used with the classical versions of these tests, each instrument detects different prevalences of possible cognitive impairment.

What this study contributes

- Although the global intraclass correlation coefficient between the standardized scores for the two tests is 0.864 (95% CI, 0.855-0.873), in practice, the kappa index is only 0.468 when a cut-off score of 24/23 points is used.
- If the classical cut-off score of 24/23 is used for the MEC, the cut-off score for the MMSE which in our experience offers the best agreement is 20/19.
- The classical versions of these tests appear not to be interchangeable for screening for cognitive impairment, especially in subjects with a low educational level or older than 80 years.

On the other hand, we consider the fact that the patient´s regular physician or nurse administered the tests personally an additional advantage which may have contributed toward a favorable interview climate. In addition, this provided information on the effectiveness of these screening instruments under conditions that approximated those of actual clinical practice. The present study can therefore be considered an analysis of agreement applied to the actual primary care setting.

Practical applicability

Although age and educational level are known to influence the results of both tests,[19-21] the MMSE appeared to be more sensitive to the influence of these variables in the present study. However, as noted above, this study did not set out to evaluate the diagnostic efficacy of the instruments, but only to discover to what extent their results were in agreement.

We conclude that in a large sample of patients served by primary care centers in Catalonia, and under conditions of actual clinical practice, the MMSE and the MEC detected very different prevalences of suspected cognitive impairment when a cut-off score of 24/23 was used. The classical versions of these tests therefore do not appear to be interchangeable for screening for cognitive impairment, especially in subjects with a low educational level or those older than 80 years. Scores higher than 24 points are unlikely to rule out the absence of cognitive impairment reliably.

Changing the cut-off scores for both tests can improve their agreement. In the light of these findings, and because of the good intraclass correlation coefficient between the MMSE and the MEC, a change in the cut-off score for both tests seems necessary to improve their agreement in practice. When the classical cut-off of 24/23 points is used for the MEC, the best agreement with the MMSE is obtained with a cut-off score for this test of 20/19.

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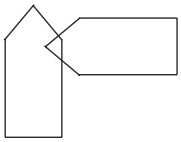
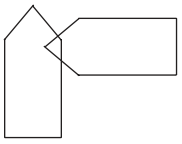
ANNEX 1 **Mini-Examen Cognoscitivo (Lobo et al[10]).**

	Puntuación
Orientation	
«What day of the week, date, month, season is it?»	5
«Whose doctor´s (or nurse´s) office are we in? What floor are we on? What city, province, country are we in?»	5
Registration	
«Repeat these three words: peseta, caballo, manzana.» (peseta, horse, apple)	3
«Now try to memorize them.»	
Attention and concentration	
«If you had 30 pesetas and you gave me 3, how many would you have left?	
How many after you gave me another 3 pesetas?» (Five subtractions)	5
«Repeat the numbers 5, 9, 2 several times until you memorize them.	
Now say them backwards.»	3
Short-term memory	
«Do you remember the three words I asked you to memorize earlier?»	3
Language	
Show the patient a ball-point pen and ask him or her «What is this?» Repeat with a watch.	2
Ask the patient to repeat the sentence «There were five dogs in a field of wheat.»	1
«An apple and a pear are fruits, aren´t they?»	
«What are red and green?»	1
«What are dogs and cats?»	1
«Pick up this sheet of paper in your right hand, fold it in half and put it on the table.»	3
The tester writes the words «Close your eyes» on a piece of paper,	
shows the message to the patient, and says to him or her «Do this».	1
«Write a sentence». (The sentence should have a subject and a predicate.)	1
«Copy this figure». (All angles should be preserved.)	1
	35



ANNEX 2 **Mini (Mental State Examination (Folstein et al[6]).**

	Puntuación
Orientación	
Dígame el día de la semana, el número de día, el mes, la estación y el año	5
Dígame el nombre de la consulta (médico-enfermera), la planta en la que estamos, la ciudad, provincia y nación	5
Fijación	
Repita estas 3 palabras: «peseta-caballo-manzana»	3
(Intente, ahora, memorizarlas)	
Concentración y cálculo	
Si tiene 100 ptas. y me va dando de 7 en 7,	
¿cuántas le van quedando? (Alternativa: deletree la palabra «mundo» de atrás hacia adelante)	5
Memoria	
¿Recuerda las 3 palabras que le he dicho antes?	3
Lenguaje y construcción	
Mostrar un bolígrafo. «¿Qué es esto?» Repetirlo con el reloj	2
Repita esta frase: «En un trigal había cinco perros»	1
«Coja este papel con la mano derecha, dóblelo por la mitad y póngalo encima la mesa»	3
Escribir en un papel la frase «Cierre los ojos». Mostrarla al paciente y decirle: «¡Hágalo!»	1
«Escriba una frase» (ha de tener sujeto y predicado)	1
«Copie este dibujo» (deben conservarse los ángulos)	1
	30



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COMMENTARY

Diagnosis of cognitive impairment: methodological problems at the frontier of cognitive normality

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- Optimizing the early diagnosis of dementia makes it possible to begin interventions that can improve the circumstances of the patient and his or her caregivers.
- Psychometric tests used for brief neuropsychological evaluation do not all have the same sensitivity or specificity, and the diagnosis of cognitive impairment should therefore be based on the patient´s clinical history and examination.
- The cut-off scores used to establish normality with the Mini-Mental State Examination and Mini-Examen Cognoscitivo should be modified if the two tests are to be used interchangeably.

The interesting study by Vinyoles Bargalló and colleagues in this issue illustrates the problems in establishing a diagnosis of cognitive impairment and dementia on the basis of psychometric instruments alone. The difficulties are greater for patients whose cognitive functioning is at the frontier between normality and pathologic function, and when brief tests that explore cognitive functioning are used to screen for cognitive impairment. It should not be difficult to diagnose dementia when the patient´s clinical signs have been well established. The diagnosis can be based on the DSM IV or CIE 10 criteria; both note that the essential clinical features of dementia are impaired memory associated with impairments in abstract thinking and judgement, and other disorders of higher intellectual functions or personality not caused by altered consciousness. The degree of impairment is severe enough to interfere with work, social activity and relations with others. This description, and hence its diagnostic criteria, should be used as a standard to diagnose dementia, according to an expert panel of the American Academy of Neurology.[1] When a patient presents with the characteristics listed above, examination of his or her cognitive status with brief psychometric instruments such as the Mini-Examen Cognoscitivo (MEC) or the Spanish version of the Mini-Mental State Examination (MMSE)can increase or confirm suspicions of cognitive impairment raised by information provided by the family and by the physician´s initial examination. Confirmation of cognitive impairment in such patients is straightforward when the scores on the brief tests are far below the cut-off score (for example, lower than 18 on the MEC and MMSE), regardless of which test is used. Under these circumstances agreement between the results of different instruments can be expected to be high, although the study by Vinyoles and colleagues provides no data regarding this situation. In this case agreement is good because the scores on brief neuropsychological screening instruments are interpreted in a dichotomous fashion as either the presence or absence of cognitive impairment. In contrast, when the patients fulfils some of the criteria for dementia but obtains scores close to the cut-off point on brief psychometric tests, the information provided by the tests cannot be used uncritically. The low agreement between test results, and differences in sensitivity and specificity, can modify the diagnosis depending on which test is used. This situation is especially relevant for older persons and those with little formal education. For these persons all brief tests may have a «diagnostic ceiling» that makes it necessary to resort to fuller neuropsychological testing to reach a diagnosis.[2] Although screening or the early diagnosis of dementia have not been recommended,[3,4] brief neuropsychological instruments are often used as diagnostic tests for cognitive impairment or dementia in international epidemiological studies. In clinical practice they are also used to confirm previously suspected cognitive impairment. The results of the study by Vinyoles and colleagues are thus important for clinical and research practice whenever brief neuropsychological tests are used to screen for or to reach a rapid diagnosis of cognitive impairment. Their findings show that in their setting, the two instruments are not interchangeable if the cut-off scores used to diagnose cognitive impairment are not modified. In other words, the same patient might be labeled as demented on the basis of

the score on one test, but not demented on the basis of the score on the other.

The importance of having reliable instruments to establish an early diagnosis of suspected or confirmed cognitive impairment or dementia (if impairment persists for long) lies in the need to optimize the detection of this clinical problem to improve patient care. Often, older patients are taken by their relatives to different doctors because of mild disorders in personality, behavior or memory that go undiagnosed, leaving the patients´ symptoms unexplained. In such cases family members are condemned to facing delays in the correct diagnosis, and to living with a parent who has ceased to be the person they once were, although nobody can explain why. The time lost in reaching a diagnosis leads to a burden of care that can have significant effects on the caregivers. With an early diagnosis, appropriate interventions can be initiated to improve family dynamics.

If the promising results of anticholinesterase drug treatment are confirmed, early detection of dementia will be crucial to ensure that treatment is begun when it is most likely to be most beneficial, ie, in the early stages, to delay the rapid progression cognitive impairment.

The American Academy of Neurology expert group has noted that the use of brief psychometric instruments such as the MMSE should be considered appropriate clinical practice for the detection of dementia in those patients for whom there is a clinically-based suspicion of cognitive impairment.[3] As regards the Spanish population, additional data are needed to determine how this and other tests perform in the diagnosis of cognitive impairment, and to develop concrete guidelines to standardize results depending on individual characteristics.

When the results of neuropsychological tests are interpreted, the following points should be kept in mind: 1) the diagnosis of suspected impairment should be based on the patient´s clinical history and on a brief neuropsychological examination with the test, and 2) the sensitivity and specificity of each test offer information that implies that dementia cannot be entirely confirmed or ruled out on the basis of the results. Therefore, when there is doubt, monitoring the patient´s clinical course and cognitive function (with follow-up visits every 3 to 6 months, for example) can help to establish a diagnosis of impaired intellectual functioning. Referral to specialized services where fuller neuropsychological examination can be done will improve diagnostic procedures for more complex cases.

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