Received: 16 February 2017 | Accepted: 25 July 2017

DOI: 10.1002/gps.4781

WILEY International Journal of Geriatric Psychiatry

RESEARCH ARTICLE

Reliability and validity of the Spanish version of the IDEAL Schedule for assessing care needs in dementia: Cross-sectional, multicenter study

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Funding information
Spanish Ministry of Science and Innovation, Instituto de Salud Carlos III and Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM)

Objective: The IDEAL Schedule was developed for staging "care needs" in patients with dementia. We here aim to validate the Spanish version, further test its psychometric properties and explore a latent construct for "care needs".

Methods: A multicenter study was done in 8 dementia care facilities across Spain. Patients referred with a reliable ICD-10 diagnosis of dementia (n = 151) were assessed with the IDEAL Schedule by pairs of raters. Inter-rater reliability (intra-class correlation [ICC] coefficients), internal consistency (Cronbach's alpha), and factor analysis were calculated. Convergent validity for individual items was tested against validated Spanish versions of international instruments.

Results: Pilot testing with numerical scales supported the feasibility, face, and content validity of the schedule. The psychometric coefficients were good/clinically acceptable: inter-rater reliability (mean ICC = 0.861; 85% of the ICCs > 0.8), internal consistency (global alpha coefficient = 0.74 in 5 nuclear items), and concurrent validity (global score against the Clinical Dementia Rating schedule, r = 0.63; coefficients for individual items ranging from 0.40 to 0.84, all statistically significant, $p < 0.05$). Internal consistency was low for the "nonprofessional care" and "social support" dimensions. Factor analysis supported a unidimensional solution, suggesting a latent "care needs" construct.

Conclusion: The Spanish version of the IDEAL Schedule confirms the main psychometric properties of the original version and documents for the first time the convergent validity of individual items. Factor analysis identified a latent construct consistent with the concept "care needs" although 2 dimensions need further psychometric research.

KEYWORDS

assessment of health care needs, dementia, factor analysis, psychometrics, validation study

1 | INTRODUCTION

Dementia among older people has been considered a major public health problem,[1,2] and Alzheimer's disease, in particular, has triggered an increasing demand for care in both the health and the social care systems.[3]

While the present concepts of dementia are focused on the cognitive deterioration of individuals and the associated functional disability,[4] there is substantial evidence about the high prevalence of other problems requiring attention, namely the behavioral[5] and physical comorbidities,[6] as well as the patient's social circumstances[7] and the negative effect of dementia problems in the carers.[8] Therefore, professional care in dementia should be multifactorial, and this requires careful coordination.

In approaching the care of individuals with dementia, staging models in which the diseases or disorders are evaluated according to different levels of severity might be beneficial, because they have been shown to be successful in other clinical medicine areas (eg, cancer[9]) and more recently for several psychiatric conditions.[10] We have shown the validity and utility of a simple method of staging cognitive disturbance[11,12] and some staging models of dementia have also been designed, such as the model based in the Clinical Dementia Rating (CDR).[13,14] However, those models are focused on the cognitive deterioration and the associated disability but have not been extended until now to the needs of dementia care. A staging model assessing cases of dementia across multiple dimensions could provide a more accurate picture of care needs at different levels of disease severity, particularly if they included the perceived need of care by both professional and informal caregivers. Such an assessment would facilitate a more homogeneous communication and, eventually, could lead to a unification of interventions and more homogeneous care of dementia.

In the search for adequate instruments for the assessment of care needs in patients with dementia, the International Dementia Alliance (IDEAL) (previously called EDCON) conducted a systematic review of the literature, concluding that previous instruments were not fully validated, were not applicable throughout the course of dementia, and had not been standardized for use in different cultures.[15]

It was in this setting that the IDEAL group decided to develop an easy-to-use, staging instrument that could be applied to guide the clinical and social care of patients.[16] The IDEAL schedule fulfilled face and content validity criteria, had high inter-rater reliability, and also satisfied preliminary evidence of concurrent validity against the CDR. Nevertheless, it was also concluded that "further work is needed to test the psychometric properties of the schedule" and that it would be "important to test the schedule in other regions of the world, to ensure that the schedule is appropriate for use worldwide."[16(p150)].

Since then, an Irish study has provided data in support of the reliability and validity of the IDEAL Schedule, including the validation of the caregiver support dimension.[17] However, further testing of the psychometric properties of the schedule is required, in particular the testing of internal consistency, in view of limited coefficients reported in the original schedule. In addition, the validity of individual items in the IDEAL Schedule remains to be tested, as well as the unidimensionality of the schedule, which could provide support for the construct "care needs", which was the focus in developing the schedule.

Against this background, the aims of this study were to document for the first time the reliability, including specifically the internal consistency, and the validity of the Spanish version of the IDEAL Schedule, and to explore the possibility that a latent construct for "care needs" in dementia patients could be identified.

2 | MATERIALS AND METHODS

2.1 | Design

Cross-sectional, analytical, multicenter study.

2.2 | Participants

The participating patients were recruited in the period 1 November 2014 through 15 March 2015, from referrals to dementia facilities in 8 health care centers across Spain, predominantly in Geriatric Psychiatry Units and Nursing institutions. All participating hospitals cover an official health area in their city/region.

It was required that (1) at the time of referral, all participating patients had a previous, reliable, ICD-10 diagnosis of dementia done by specialists (categories F00, F01, F02); and (2) a relative and/or formal caregiver was available at the time of recruitment. Patients were excluded if: (1) they declined to participate; (2) contact between the caregiver and the patient was insufficient (defined as less than once a week); (3) the patient was not fluent in Spanish language; and (4) the cognitive impairment at the time of recruitment was considered to be caused by another condition (eg, delirium).

All protocols adhered to the Declaration of Helsinki, and the study was approved by the ethics committee of each participating hospital. At the time of recruitment, informed written consent was obtained from both the participating patients (unless they were incapable) and their relatives.

2.3 | Instruments

The patient's assessment at the time of recruitment included a comprehensive clinical, neuropsychological, and functional evaluation. For the purpose of this study, a structured interview was built, which includes (1) sociodemographic data for both the patient and the caregiver, (2) the IDEAL Schedule, and (3) validated Spanish versions of international instruments to be used for the assessment of convergent validity.

The IDEAL Schedule as described in the original paper[16] is a 10-item instrument which can be used to assess the care needs of the individual, corresponding to the following 7 dimensions: activities of daily living, physical health, cognitive functioning, behavioral and psychological symptoms, social support, nonprofessional care, and professional care. Most dimensions in the scale are scored with only 1 item, the exceptions being the nonprofessional care (2 items: time spent on care by nonprofessional carer and carer distress) and professional care (3 items: total number of hours of professional care received, total number of hours of professional care needed, and type of dementia-related care needed). Each item is rated 0 to 5 on a 6-point scale, with anchor points. The principal investigators in this study (RLA and AL) did the translation into Spanish of the IDEAL Schedule and the accompanying glossary. Because they also participated in the construction and validation of the original schedule, no back-translation process was considered to be necessary.

To study the convergent validity of individual items, the following instruments were used as reference standard:

The Mini-Mental State Examination (MMSE),[18,19] which is used extensively in clinical and research settings to measure cognitive impairment.

The Clinical Global Impression—Severity scale (CGI-S)[20] requires the clinician to rate the severity of the patient's illness at the time of assessment. In this particular study, interviewers were instructed to score the patient's behavioural disturbance severity.

The Barthel Scale[21,22] has been used to measure performance in ADLs. A higher score is associated with a greater likelihood of being independent.

The Functional Activities Questionnaire (FAQ),[23,24] a screening tool for evaluating ADLs. The relative and formal caregiver in this study must provide the information. It contains a number of items pertaining to daily tasks needed when living independently.

The Zarit Burden Interview (ZBI),[25-27] an instrument developed to measure subjective burden among caregivers of adults with dementia. High scores are associated with higher burden.

Cumulative Illness Rating Scale (CIRS),[28,29] an instrument designed to assess severity of physical diseases. It evaluates 13 categories or systems (heart, vascular, respiratory systems, etc.) each one scored from 0 (no impairment) to 4 (highest possible impairment).

The CDR[14] is a numeric schedule used to quantify the severity of symptoms of dementia (ie, its "stage"). The interviewer assesses a patient's cognitive and functional performance in 6 different areas. Scores in each of these areas are combined to obtain a composite score ranging from 0 through 3.

To test the feasibility of the IDEAL Schedule, a simple, 2-question process was devised. First, using a numerical, 10-point scale (range 1, "not at all–10, "very much"), the researchers were expected to score the answer to the following question: "Is the IDEAL Schedule easy to complete?" and, second, to answer the following question: "How much time does it take to complete the IDEAL Schedule?"

Face and content validity were also explored by means of the following 3 questions, with a similar scoring system: (1) Does the IDEAL Schedule cover all the different clinical aspects of care needs of dementia patients?; (2) To what extent does the item (number 10) in the IDEAL Schedule reflect global care needs?; and (3) Do you consider the IDEAL Schedule useful for determining care needs of dementia patients?

Key points

- The Spanish version of the IDEAL Schedule confirms the main psychometric properties of the original version, the inter-rater reliability coefficients being quite acceptable (mean ICC = 0.861).
- The convergent validity of individual items of IDEAL is also acceptable and is reported for the first time.
- The internal consistency was good for 5 nuclear items but was low for the "nonprofessional care" and "social support" dimensions.
- A latent construct, "care needs", is supported by factor analysis, although these 2 dimensions need further psychometric research.

2.4 | Procedure

In each center, a clinical researcher selected the participants prospectively among patients referred for follow-up in a dementia facility, according to a systematic, predetermined protocol: Each participant was chosen on the basis of being the first patient seen by the clinician on any given day and fulfilling the inclusion and exclusion criteria. Interviews were conducted in each center with patients and their caregivers, as part of the routine examination of patients referred. Following the selection, the full structured interview was rated by 2 researchers (1 interviewer and 1 silent observer, blind to each other), the requirement being that at least 1 of them had to be an M.D. Interviewers and silent raters rotated their role. Because the IDEAL Schedule has been developed to be used by different health professionals, general practitioners, and psychiatric nurses were included in the study among the interviewers/raters.

Following the assessment of all patients, the researchers were expected to score the questions related to the feasibility and to the face and content validity of IDEAL.

2.5 | Statistical analysis

Quantitative data analyses from the field studies were carried out in SPSS 20 (*IBM Corp*, *Armonk*, *NY*). Means and standard deviations were calculated for continuous demographic data of participants, as well as for mean scores on the IDEAL Schedule, and counts.

Intra-class correlation (ICC) (using a 2-way random, absolute agreement, single measures model) was calculated to assess inter-rater reliability of the IDEAL instrument. As secondary measures, correlations were calculated between the total sum score of the IDEAL Schedule and selected instruments. We computed Pearson's correlations for the variables except for the CDR, where Spearman correlations were calculated. Cronbach's alpha was computed to indicate internal consistency of the schedule. Convergent validity was evaluated by Person's correlation between specific IDEAL items and the appropriate external instruments considered to be the reference standard.

For the analysis of IDEAL data, and following instructions in the original study,[16] a sum score was calculated by adding up the individual scores of the 7 dimensions; for the 2 dimensions with more than 1 item ("professional care" and "nonprofessional care"), the average score of the items was calculated first before adding them to the total score.

The internal structure and the possibility of finding a latent factor in the IDEAL Schedule were assessed by means of factor analysis. The number of items to be retained was determined with the inspection of the scree plot and parallel analysis. The factoring method was principal axis.

3 | RESULTS

3.1 | Sample overview

One hundred and fifty one participants were enrolled. The distribution by dementia diagnosis was as follows: 94 (62%), Alzheimer's disease; 35 (23%) vascular dementia; and 22 (15%) other neurodegenerative dementias. Detailed demographic information is shown in Table 1. Women predominated in this sample (68.9%), the mean age being 80.6 years (s.d. = 8.1). More than half the patients were "married" (54.3%), and almost half were relatively "independent" and living in their homes (45.1% with others), but 16.6% were living in a nursing home. Regarding the caregivers, more than two thirds were women (72.2%), and more than half were the patients' children (54.9%), the mean age being 58.8 (s.d. = 13.9) years. Clinical characteristics (mean scores) of patients were as follows: MMSE (mean = 13.5, s.d. = 8); Barthel's index (mean = 66.1, s.d. = 33.7); Pfeffer's FAQ (mean = 26.4, s.d. = 7.5), and CIRS (mean = 8.8, s.d. = 4.9).

3.2 | Feasibility, face, and content validity

No missing values were observed in the 151 IDEAL interviews completed by both the interviewer and the silent rater. Mean score for the feasibility question was 7.7 (s.d. = 1.4), and mean time to complete IDEAL was 12.5 minutes (s.d. = 2.2). Mean scores in the 3 questions related to face and content validity were 8.0 (s.d. = 0.9), 7.8 (s.d. = 1.1), and 7.7 (s.d. = 1.0), respectively.

3.3 | Psychometric properties of the IDEAL, Spanish version

3.3.1 | Inter-rater reliability

Table 2 shows ICC coefficients (interviewer vs silent rater). Briefly, the mean ICC was 0.86 (range 0.69–0.95), and 85% of the ICC's were higher than 0.8.

TABLE 1 Demographic characteristics of the participating patients

	N = 151
Gender (N, %)	
Male	47, 31.1%
Female	104, 68.8%
Age, mean in years (s.d.)	81, (8.14)
Marital status (N, %)	
Married	82, 54.3%
Co-habiting	1, 0.6%
Divorced	2, 1.3%
Widowed/partner deceased	61, 40.4%
Single/unmarried	5, 3.3%
Living arrangements (N, %)	
Independent, alone, no day care	1, 0.7%
Independent, alone with day care	4, 2.6%
Independent, with others, no day care	22, 14.5%
Independent, with others, with day care	46, 30.5%
Care/residential home	51, 33.8%
Nursing home	25, 16.6%
Other	2, 1.3%
Educational level (N, %)	
Primary, incomplete	75, 50.7%
Primary, complete	53, 35.8%
Secondary or vocational school	10, 6.7%
University	10, 6.8%
Other	3, 1,2%

TABLE 2 Intraclass correlation coefficients (ICC) in the IDEAL Schedule, Spanish version (inter-rater reliability)

IDEAL items	ICC [95% CI]
Activities of daily living	0.90 [0.86, 0.92]
Physical health	0.77 [0.68, 0.83]
Cognitive functioning	0.84 [0.79, 0.88]
Behavioural disturbance	0.83 [0.77, 0.87]
Social support	0.70 [0.60, 0.77]
Time spent on care by carer	0.81 [0.75, 0.86]
Carer distress	0.91 [0.88, 0.94]
Amount of dementia-related care needed	0.95 [0.93, 0.96]
Number of hours needed for nondementia care	0.88 [0.83, 0.91]
Type of care needed overall	0.85 [0.80, 0.89]
Non professional care (mean)	0.91 [0.87, 0.93]
Professional care (mean)	0.94 [0.91, 0.95]
IDEAL total score	0.87 [0.82, 0.91]

3.3.2 | Internal consistency.

For the full, "7-item" schedule, the internal consistency, global alpha coefficient was 0.68. Table 3 shows correlation coefficients between individual items and the total IDEAL score, as well as the Cronbach's alpha coefficients. The correlation coefficients were good for most individual items (over 0.30), but were low for the items belonging to the dimension "nonprofessional care" and particularly for the item "social support". The table also shows (last 2 columns) the results in

TABLE 3 Correlations of item scores for different dimensions in the IDEAL Schedule with the sum score and Cronbach's alpha coefficients (internal consistency)

IDEAL dimensions	IDEAL 7 items		IDEAL 5 items	
	Correlation item score vs sum score	Cronbach's alpha after elimination of the item	Correlation item score vs sum score	Cronbach's alpha after elimination of the item
Activities of daily living	0.70	0.55	0.76	0.68
Physical health	0.37	0.65	0.37	0.81
Cognitive functioning	0.57	0.60	0.65	0.73
Behavioural disturbance	0.51	0.60	0.46	0.79
Social support	0.01	0.74	––	––
Non professional care (mean)	0.12	0.71	––	––
Professional care (mean)	0.55	0.60	0.64	0.72

the "5-item" schedule, when both items with low correlation coefficients were removed: all individual item increased substantially in relation to the "7-item" schedule, ranging from 0.68 to 0.81. Similarly, the global alpha increased to 0.74.

3.3.3 | Factor analysis

Both the scree plot and the parallel analysis indicated the convenience of retaining a single factor (Figure 1). The inter-item correlations could be explained by a unidimensional solution. Table 4 (first column) shows the loadings for the "7-item" schedule, the pattern clearly resembling the results of the internal consistency, because most loadings, and particularly the ADLs loading were high, but were low for the ones related to "social support" and "nonprofessional care" (≤ 0.17). The second column represents the factor loadings after eliminating both "social support" and "nonprofessional care," and the results remained essentially unchanged.

3.3.4 | Convergent validity

Table 5 shows Pearson's correlation coefficients of the IDEAL schedule against validated, standard instruments. When the schedule was scored by the interviewer, the correlation between the global IDEAL item and the CDR score was 0.63, and the coefficients for individual items ranged from 0.40 to 0.84, all of them being statistically significant ($p < 0.05$). The coefficients were particularly good for cognitive functioning, carer's distress and ADLs. Small differences were observed when Pearson's coefficients were calculated for the silent rater's scores, and the differences with interviewers' coefficients were statistically nonsignificant.

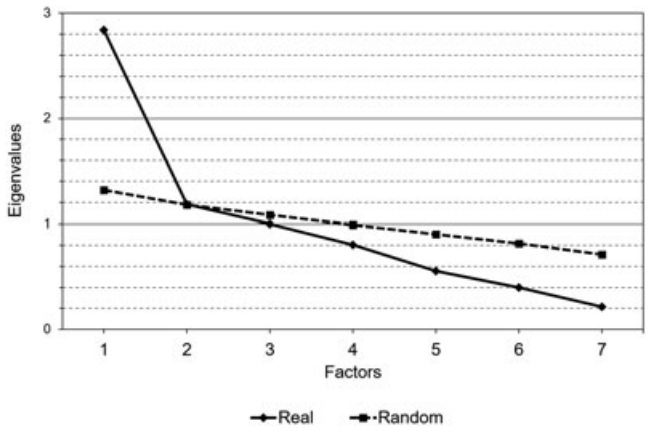

FIGURE 1 Parallel analysis showing the final factor solution for the IDEAL schedule

TABLE 4 Results of the factor analysis, IDEAL Schedule, Spanish version

IDEAL dimensions	IDEAL 7 items[a]	IDEAL 5 items[a]
Activities of daily living	0.94	0.93
Physical health	0.40	0.39
Cognitive functioning	0.77	0.77
Behavioural disturbance	0.51	0.50
Social support	0.00	––
Nonprofessional care (mean)	0.17	––
Professional care (mean)	0.71	0.73

[a]*Numbers in the table represent the factorial loads in the single factor obtained.*

4 | DISCUSSION

This is the first study about the reliability and validity of the Spanish version of the IDEAL Schedule. In support of the contention in the original version, face and content validity of this instrument were judged to be adequate, as shown by the high median scores given by the Spanish researchers in the simple, specific process devised. While this simple feasibility test is preliminary, the results support the idea that, similarly to the original version,[16] the instrument was operational in the clinical practice of a range of professionals in different Spanish clinical settings.

In relation to the psychometric properties, the Spanish version also proved to be adequate. In particular, the results of the inter-rater reliability were considered to be excellent according to international standards, as shown by more than 85% of the ICCs > 0.8.[30] The internal consistency coefficients reported here similarly support the reliability of the Spanish version. The global alpha coefficient for the full, "7-item" version of the schedule was clinically acceptable (0.68), and increased to 0.74 when the dimensions with items having low correlation coefficients ("nonprofessional care" and particularly "social support") were suppressed. Moreover, the internal consistency of the schedule is also supported by the results of factor analysis, pointing to 1 single latent factor, in particular when the items belonging to

TABLE 5 Pearson's correlation of individual items in IDEAL, Spanish version, against validated standard instruments (convergent validity)

IDEAL items	Comparison schedules	Interviewer	Silent rater
Activities of daily living	Barthel Scale	−0.69	−0.69
Activities of daily living	Functional Activities Questionnaire (FAQ)	0.75	0.72
Physical health	Cumulative Illness Rating Scale (CIRS)	0.65	0.51
Cognitive functioning	Mini-Mental State Examination (MMSE)	−0.84	−0.82
Behavioural disturbance	Clinical Global Impression-Severity Scale (CGI-S)	0.40	0.32
Time spent on care by carer	Time (direct question)	0.47	0.50
Carer distress	Zarit Burden Interview (ZBI)	0.81	0.81
Total ideal	Clinical Dementia Rating (CDR)	0.63	0.62

the dimensions "social support" and "nonprofessional care", which had low loadings, were removed.

The inclusion of the dimensions "social support" and "nonprofessional care", which may be quite useful in clinical settings, seem to be out of the nuclear construct from the psychometric perspective. Therefore, the use of a total score of the IDEAL Schedule as the sum of the 7 dimensions would require further empirical support. The possibility of improving the operational definition of the "social support" and "nonprofessional care" dimensions should be considered. In the meantime, if the purpose is to provide a global picture, it would be possible to use, twin schedules in dependence of the clinical objectives, the "5-item" schedule and the other 2 dimensions separately. However, because care in dementia should be multifactorial, the schedule can also be used to provide the full description by documenting the scores in the different dimensions.

The concurrent validity of the global IDEAL score when compared with the CDR is similarly considered to be adequate. Furthermore, while the concurrent validity of the item "carer distress" has been reported in an Irish study,[17] we show here for the first time convergent validity coefficients of all individual items in IDEAL, when compared with the reference standard of established international instruments. For the items such as "behavioral disturbance" and "time spent on care by nonprofessional carer" the comparator was not the best possible one, and the coefficients were not particularly high (0.4 and 0.47, respectively, for the interviewer), but they still were statistically significant.

Comparison of our results with previous studies is difficult, because the "care needs" construct has not been tested before. Fair to good reliability coefficients have been shown in previous staging schedules for dementia, with a range of inter-rater reliability for the sum score between 0.89 and 0.99, the results being similar to ours, as shown in the review by Rikkert et al.[15] Adequate concurrent validity coefficients have likewise been reported in some of the studies reviewed, but the risk of "circular reasoning" may be apparent in some, when tested against instruments not well validated. An exception to this may be the concurrent validity against biomarkers (PET scan) provided for the GDS in a very small sample.[31] The convergent validity of the item "carer distress" in IDEAL was tested against the Zarit Burden Interview in a previous, Irish study. The correlation coefficient they reported (Spearman's $\rho = 0.56$) was lower than in our Spanish study ($r = 0.8$), but comparisons are difficult because in the Irish study, the IDEAL was only assessed by the carers.[17]

Finally, the results of factor analysis, pointing to 1 single latent factor, provide further support to the validity of the IDEAL: this instrument was developed as a multidimensional one, but trying to assess a nuclear construct, namely "care needs".

This study has implications for clinical practice in the area of dementia care, as shown in the original study,[16] and gives further support for eventually using this schedule worldwide. Among the strengths of the study, the sample, of considerable size, came from a range of dementia facilities across Spain, all the participating hospitals covering a wide catchment area. Moreover, the "quota sampling" done for recruitment, following the model in the original study, assures the balanced inclusion of the different stages of dementia. Among the limitations, because of the protocol characteristics and inclusion criteria, very few consecutive patients referred could not be recruited for the study, but we have no specific data. We trust this has not influenced importantly the main results. The instruments used to test the concurrent validity, with the exception of the cognitive and the dependence/disability dimensions, could not be considered the best possible ones, but there was a lack of more adequate instruments. It has also been discussed previously that the use of a silent observer to rate the IDEAL instrument may overestimate inter-rater reliability.[15] However, we trust the risks have been minimized by rotating the roles of interviewer and observer.

In conclusion, the Spanish version of the IDEAL Schedule confirms the main psychometric properties of the original version and provides new support for its international use. The reliability and validity coefficients reported are considered to be adequate, and the convergent validity of individual items is reported here for the first time. A latent construct has also been identified by factor analysis, consistent with the concept "care needs" in dementia. The inclusion of the dimensions "social support" and "nonprofessional care" in the total sum score schedule, which may have clinical usefulness, needs further research from the psychometric perspective.

Financial Disclosure

None.

ACKNOWLEDGEMENTS

The following members of the IDEAL Spanish Working Group have participated in the study as coauthors: Clara Bibián, Antonio Callén, Carlota Canet, Patricia Gracia-García, María Pilar Lahera, Raimundo Mateos, and Esther Parra. The authors of this report would like to

thank the support of the Spanish Ministry of Science and Innovation, Instituto de Salud Carlos III and the Mental Health and Disability Instrument Library Platform (CIBERSAM).

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How to cite this article: López-Antón R, Barrada JR, Santabárbara J, et al. Reliability and validity of the Spanish version of the IDEAL Schedule for assessing care needs in dementia: Cross-sectional, multicenter study. *Int J Geriatr Psychiatry*. 2017;1–7. https://doi.org/10.1002/gps.4781