

Assessment of Activities of Daily Living in Dementia: Development of the Bristol Activities of Daily Living Scale

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Summary

A new assessment of Activities of Daily Living has been developed specifically for use with people with dementia. The assessment is a carer rated instrument consisting of 20 daily-living abilities. The scale has 'face validity', assessing items rated as important by and using levels of ability generated by carers. It has 'construct' validity as demonstrated by principal components analysis. It has 'concurrent' validity in that it correlates well with observed task performance. It has good 'test-retest' reliability as measured by Cohen's Kappa and it correlates well with the Mini-Mental State Examination. Carers report that it is easy to use and it is relatively short. The authors believe the scale will be useful when assessing demented patients in the community or as part of clinical research trials.

Introduction

Establishing a diagnosis of dementia requires not only decline in cognitive performance, but also that this decline significantly interferes with the affected person's work, usual social activities or relationships with others [1]. Knowledge about a person's ability to undertake normal Activities of Daily Living (ADL) is an essential part of the overall assessment of a person with dementia and is important in determining the diagnosis and in evaluating change. Although there has been considerable investment in developing assessment scales to measure cognitive change in people with dementia, there are fewer protocols specifically designed to assess change in non-cognitive variables, and many authors have commented on the need for the development of such scales [2-5]. Apart from diagnosis, the measurement of ADL performance allows the assessment of treatment effects, care-giver burden, the targeting of interventions and care packages and the elucidation of the link between cognition and everyday functional ability [4, 6, 7].

Many activities of daily living scales have proved to be insensitive to change in people with dementia [4, 7]. This is because they were designed for use with other groups, such as normal older adults or those with physical disabilities. The Barthel ADL Index [8] for example was developed for use with stroke patients, and the NOSGER [9], despite its frequent use in treatment trials, was developed as an observational scale for use by professional nursing staff in a hospital setting [10-13]. Others are hierarchical in nature, classifying patients on the basis of whether or not they can carry out a series of

increasingly difficult activities, without being sensitive to change in individual skills [7, 14]. Those that have been developed for assessment in dementia, such as the Blessed-Roth Dementia Scale (DS) [2] or the Functional Activities Questionnaire (FAQ) [15] have been designed to distinguish between normal and abnormal ageing, and therefore do not assess the wide range of ADL skills present in different stages of the dementing process [4, 14, 16]. Furthermore, in our experience, carers frequently comment that the individual items in a questionnaire do not accurately reflect the problems as they identify them. For example, questions about driving or managing finances are not appropriate for everyone.

In a review of measures to determine the outcome of community care for people with dementia [17], the reviewers found that of 81 scales reviewed only eight measured functional ability. Of these eight only two were designed for community use; the Cleveland Scale of Activities of Daily Living (CSADL) [7] and the Functional Assessment Staging Test (FAST) [18]. The CSADL was designed to cover the range of ADL abilities in dementia and, in addition, takes into account the nature of premorbid performance. It does so by asking carers to decide if the patient actually does the activity and, in cases where they do not (for reasons of expectation or habit), then asks the carer to estimate whether the patient would be able to perform the activity if given the opportunity. Each activity is then rated on a four-point scale. It seems somewhat arbitrary to estimate a person's ability to perform a skill which they have never undertaken. In addition, the CSADL is

lengthy and the scoring system potentially confusing. The FAST has not been assessed for its sensitivity to change and is clinician rated.

Other scales developed for use in dementia, such as the Direct Assessment of Functional Status (DAFS) [3] and that developed by Skurla *et al.* [19], assess ADL ability by rating the patient's performance on a series of tasks observed by the rater. However, the majority of dementia sufferers live in the community and it is seldom practicable to have trained observers assessing in community care settings. In addition, the tasks do not take into account the heterogeneous nature of peoples' homes, and the effect this may have on their ability to perform ADL tasks. The patient's own kitchen, for example, is a familiar environment which may contain cues to prompt over-learned behaviours; their own kettle, taps, refrigerator or cooker. The unfamiliar stimuli and the pressure of performing tasks also adds to anxiety and lack of co-operation so representing a potential source of distress to subjects and to carers [4].

The most practical solution for community-based assessment of ADL functioning is an informant-based scale. Whilst this has the potential disadvantage of introducing bias in scoring, perhaps because of the informant's own memory or motives (e.g. to present the sufferer in the best possible light, or the worst), it has the advantage of allowing patients to be evaluated over the full range of their abilities, despite communication difficulties, and it allows evaluation of change over time. Any informant-based scale which hopes to be both sensitive to change and reliable must be clearly worded, unambiguous and directly relevant to the behaviours observed by carers. It must include rating levels which allow for partial changes in performance so as to be sensitive to improvement or decline. Ideally, it must also be brief in order not to overtax the carers.

This paper describes the development and preliminary evaluation of an ADL scale, the Bristol Activities of Daily Living Scale (BADLS). This scale was designed to provide a baseline assessment of ability of demented subjects and to be sensitive to change. It was also designed to be brief enough to be used in the same way as the MMSE [20], as a short assessment of functional ability. The report evaluates the usefulness of the resultant scale in a sample of older adults with dementia or memory loss living in the community.

Methods

The development process was undertaken in three phases: in Phase 1, possible scale items were identified, on which carers then commented; in Phase 2, the revised scale was validated against observed task performance and test-retest reliability was established; in Phase 3, the final scale was readministered and validity established by principal components analysis and correlation with cognitive test performance.

Subjects: Subjects were patients who had attended the Bristol Memory Disorders Clinic complaining of memory or other cognitive impairment. Each underwent screening, including physical examination, medical interview, laboratory and radiological investigations, neuropsychological assessment, and where appropriate psychiatric interview.

Table I. Areas of daily living ability included in Phase 1

Eating/Drinking	Speech/Comprehension
Dressing/Selection of clothing	Housework/Shopping
Personal hygiene	Preparation of food
Transfers/Mobility	Finances
Orientation	Games/Hobbies
Taking of medication	Transportation
Use of telephone	

All diagnoses were made using accepted criteria, e.g. DSM-III-R diagnostic criteria for dementia [1] and NINCDS-ADRDA criteria for probable Alzheimer's disease [21].

Phase 1: Six widely used ADL assessment scales [3, 11, 15, 22–24] were used as a basis for identifying potential items. Any item which was included in two or more of the six scales was selected as a possible candidate for inclusion; of which there were 22. Table I shows those areas of daily living ability included.

Eighty-one carers of dementia sufferers attending the Bristol Memory Disorders Clinic (BMDC) were then consulted by postal questionnaire and requested to rate their relative's ability on the tasks identified; indicating whether the person with dementia was independent, required some assistance, or was totally dependent. They were also asked to comment about the items and the type of assistance required by the person they were looking after. Each carer was asked to list the five functions that they would most like to see improved or maintained in their relative. All questionnaires were returned anonymously.

Phase 2: A draft scale was designed from the responses to the postal questionnaire. Using the carers' comments, severity statements were devised for each item. In addition, a 'not applicable' response choice was added. For an example of an ADL item see the Appendix.

The draft scale was administered at home by a nurse researcher, along with a series of ADL tasks, rated on an observational scale described below. If carers were unable to choose between options, they were allowed to tick more than one for each task, the most dependent of which was used for scoring the questionnaires later on.

In order to validate the carers' ratings of sufferers' actual ability, an observational scale was designed. The subjects were required to carry out tasks which corresponded as closely as possible to those on the ADL questionnaire. Their ability to undertake these tasks was rated by one of the researchers. A small number of the tasks could not be directly observed unless they occurred spontaneously, e.g. using the toilet. In addition to carrying out the tasks in the subject's own home, each task was designed to be as naturalistic as

Table II. Example item from observational scale and scores used

Nurse to take a small cake to the participant's home to be cut and served by the participant and to say 'Would you like to slice the cake that I have brought with me'.		
a. Able (no instructions given)	[]	0
b. Able with instructions/prompts	[]	1
c. Not able even with instructions	[]	2
d. Not observable	[]	0

possible, so reducing the subject's awareness of being assessed. For an example of an item from the observational scale see Table II.

Each subject was visited twice. At visit 1, the carer was asked to complete the questionnaire and the subject was assessed with the Mini-Mental State Examination (MMSE). At visit 2, a different research nurse asked the carer to complete the questionnaire a second time, but without reviewing the original, and the subject was observed undertaking the tasks on the observational scale.

Phase 3: Following two further modifications made to the scale after Phase 2, the final version of the Bristol Activities of Daily Living Scale (BADLS) was completed by the carers of 59 subjects suffering from dementia or isolated memory loss (see Appendix for BADLS). Each subject was visited in his or her own home at which time the nurse also assessed the subject with the MMSE.

Analysis: Statistical analysis was performed using the SPSS package [25]. BADLS data are nominal in nature. Analysis of the distribution of the data suggested that they were generally normally distributed but where possible non-parametric statistical analyses were employed. Spearman's rank coefficient of correlation was used, except where partial correlation was required when, owing to the lack of a non-parametric alternative, Pearson's correlation coefficient was used. To establish the content validity of the BADLS, a principal components analysis was carried out (principal components analysis with varimax rotation, eigenvalues greater than 1) [26]. For convenience, mean values and standard deviations have been reported.

Results

Phase 1: Eighty-one carers were sent the postal questionnaire and 50 (62%) were returned. From the carers' choice of priority areas, and their unstructured comments, a number of changes were made to the questionnaire; the shaving item was abandoned and

other items such as dressing and clothing were combined into a single task. A new item assessing dental hygiene was added.

Phase 2: Twenty-seven subjects, 12 (44.4%) men and 15 (55.6%) women, aged 61–91 years (mean 76.4, SD 6.9), were assessed with the revised ADL scale. The sufferers had a mean MMSE score of 18.2 (SD 6.0) but their severity of dementia ranged from severe, i.e. untestable on the MMSE, to the earliest stages of cognitive decline (29/30 in a premorbidly highly intelligent individual, in whom there was clear evidence of dementia). Twenty-two of the subjects had a diagnosis of probable Alzheimer's disease (pAD) and the other five either multiple infarct dementia (MID) or mixed Alzheimer's disease and multi-infarct dementia (pAD/MID). Subjects were visited twice and the mean number of days between visits 1 and 2 was 8.6 (SD 5.5, range 4–19).

Test-retest reliability was assessed by comparing questionnaire scores at visit 1 with those from visit 2. The Figure shows a scatterplot of visit 1 against visit 2 total scores (visit 1 mean 26.6, SD 12.7, range 6–56; visit 2 mean 27.4, SD 12.0, range 5–52).

Whilst the correlation between revised ADL scale scores at visit 1 and visit 2 was good ($r = 0.95$, $p < 0.001$, 89.4% of the variance explained), a more informative way of evaluating test-retest reliability is Cohen's Kappa [27]. Cohen's Kappa measures the degree of agreement between scores at visit 1 and visit 2 for each item. Table III contains the Kappa scores for each ADL item; the closer to 1.0 the greater the agreement. According to criteria described by Altman [28], the Kappa scores of the 22 items can be divided into the following categories: three have 'fair' Kappa scores (0.21 to 0.40); five have 'moderate' Kappa scores (0.41

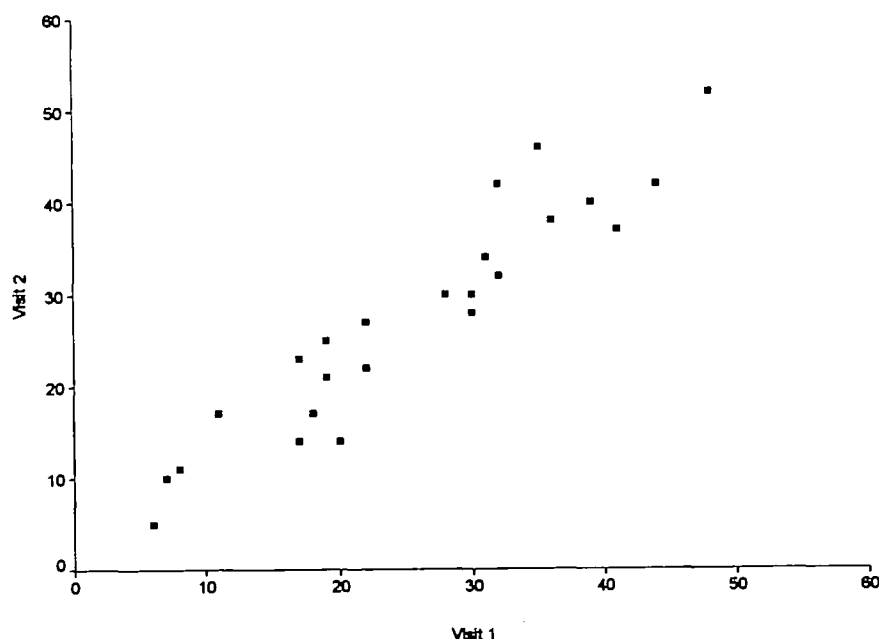


Figure. Scatterplot of Visit 1 and Visit 2 total scores, 0 = totally independent; 60 = totally dependent.

Table III. Kappa scores for each activity of daily living item, in descending order

Item	Kappa score	Item	Kappa score
Dressing	0.94	Finances	0.64
Games/hobbies	0.90	Drinking	0.63
Drink preparation	0.78	Shopping	0.62
Transfers to bed	0.78	Toilet/commode	0.59
Teeth	0.77	Telephone	0.59
Mobility	0.70	Housework	0.50
Transport	0.70	Food preparation	0.47
Eating	0.67	Communication	0.42
Medication	0.66	Time	0.31
Hygiene	0.65	Space	0.30
Bath/shower	0.64	Transfers to chair	0.27

to 0.60); 12 have 'good' Kappa scores (0.61 to 0.80); and two have 'very good' Kappa scores (0.81–1.0). Despite the use of carer ratings, therefore, the test-retest reliability of the ADL scale was good.

In order to establish ADL scale validity, ADL scale scores were correlated both with MMSE and with

Table IV. Frequency of use of 'not applicable' scores, items and explanations given by carers

Item	Frequency	Explanation
Food preparation	8	Never prepared food even before demented
Games/hobbies	4	Never engaged in games or hobbies
Transport	4	Never drove or took public transport, always driven around by spouse
Shopping	3	Never did shopping, wife's role
Bath/shower	2	Never took baths or showers because they did not have either, washed in sink
Drink preparation	2	Never prepared drinks, wife always did
Telephone	1	Had no telephone, did not use one
Teeth	1	Had no teeth or dentures
Orientation to space	1	'Never verbalizes, or shows difficulty', carer felt unable to choose an option
Use of toilet	1	Unclear why carer chose this one, may have been a mistake in completing the questionnaire since her husband was relatively independent on most other tasks
Finances	1	Husband always handled finances

Table V. BADLS principal components: item number, description and percentage variance explained

<i>Component 1, Instrumental Activities of Daily Living</i> (40.3% of the variance)	<i>Component 2, Self Care</i> (10.3% of the variance)
3. Drink preparation	7. Dental care
15. Use of the telephone	6. Hygiene
1. Food preparation	8. Bathing
16. Housework	5. Dressing
14. Communication	9. Using the toilet
17. Shopping	4. Drinking
2. Eating	
<i>Component 3, Orientation</i> (7.5% of the variance)	<i>Component 4, Mobility</i> (7% of the variance)
13. Orientation to space	10. Transferring
19. Games and hobbies	11. Mobility
12. Orientation to time	
20. Driving, using public transport	
18. Managing finances	

observed task performance on the Observational Scale. At visit 1, subjects were assessed with the revised ADL scale and the MMSE. The correlation between these two measures was $r = -0.55$ ($p = 0.01$, 30.3% variance explained). At visit 2 subjects were reassessed with the revised ADL scale and with the Observational scale. The correlation between observed ADL task performance and carer-rated task performance was $r = 0.65$ ($p = 0.004$, 42.3% variance explained).

Analysis of variability in responses led to the removal of two items from the scale. The first, 'Medication', was removed because the majority of the subjects were considered by their carers to be unable to manage their own medication. The second, 'Transferring to bed', was removed because the majority of the subjects were rated as being able to carry out this task independently.

Phase 3: Following the final modifications to the BADLS in Phase 2, 59 carers and sufferers were seen. Twenty-five (42.4%) sufferers were men, 34 (57.6%) women, aged 55–91 years (mean 73, SD 7.4). Thirty-five had probable Alzheimer's disease (pAD), six MID, nine pAD/MID, and nine isolated memory impairment. Their MMSE scores ranged from untestable, the subjects refused to be assessed ($n = 4$), to 30 (mean 17.6, SD 6.3). Their carers were husbands (27, 45.8%), wives (25, 42.4%), daughters (5, 8.5%), a son-in-law (1.7%) and a daughter-in-law (1.7%).

The BADLS has a minimum possible score of 0 (totally independent) and a maximum score of 60 (totally dependent). BADLS scores ranged from 0 to 42 with a mean of 19.2 and SD 11.2, skewness 0.198. BADLS correlated ($r = -0.67$, $p < 0.001$, 44.9% variance explained) with the MMSE. There were no differences in total BADLS score between men and women ($t = 1.1$, $df = 57$, $p = 0.30$), and no relationship with years of education ($r = -0.04$, $p = 0.75$). As would be predicted, there was a small but significant

correlation of BADLS score with age ($r=0.32$, $p=0.013$, 10.4% of the variance explained). Partial correlation between MMSE and BADLS score, controlling for age, still yielded a good relationship between cognitive test performance and carer-rated ADL ability (Pearson's $r = -0.72$, $p < 0.001$, 52.3% variance explained).

Of the 1180 possible scores (59 subjects by 20 items) only 28 (2.4%) were marked as not applicable. Eleven ADL skills were given 'not applicable' scores by the 59 carers. Table IV shows the items, the frequency with which the 'not applicable' option was chosen, and the explanations given by the carers of this choice. In these cases subjects were given a score of independence because it was felt that it would be inappropriate to make assumptions about their level of dependency on these tasks.

Four principal components had eigenvalues greater than or equal to 1, explaining 65% of the variance. These have good face validity and, based on their component items, tentative titles were given to each. Table V summarizes the principal components, their titles and descriptions of their tasks or skills.

Discussion

The aim of this study was to design a brief, easily administered activities of daily living scale which could be completed by carers. Previous researchers have opted for direct assessments using observational scales, or scales administered by trained professionals. Though these are sensible solutions to the problem of reliability, they do not deal with the very real difficulty of assessing in the community. For example, it would be very difficult to standardize all tasks in an observational scale in the community; the assessor might be inadvertently asking the sufferer to carry out an unfamiliar task, e.g. to make a hot drink when they only ever drink cold, or to use unfamiliar utensils or materials. In addition, it would not be appropriate for a stranger to observe activities such as bathing, dressing and toileting, yet difficulties with these form an important part of the breakdown associated with dementia and must be assessed if change is to be measured. Since the majority of dementia sufferers live in their own homes, and this is especially true of those involved in clinical trials, the most immediately practical and cost-effective solution is to design a carer-rated assessment scale.

The difficulty with designing an ADL scale which relies on third-person rating by carers, however, is that the accuracy of the scale is dependent on many factors: the clarity with which the scale is worded, the extent to which it applies to all carers and sufferers equally, and the degree to which carers are reluctant to record the truth about their relative, or have begun to help sufferers carry out tasks which the sufferer could complete but which time does not allow. Perhaps the most important factor is that the nature of dementing disorders makes daily fluctuations almost inevitable, thus rendering a

single choice from a rating scale difficult to make. Carers do, however, have prior knowledge of the sufferer's ability, so ensuring that their judgements of current skill level will be in the context of previous functioning. In the case of tasks such as cooking or managing the finances, only a carer would know whether these were tasks in which the sufferer had previously engaged.

We have attempted to overcome these potential weaknesses by involving carers in the design of the scale (so as to make it relevant), by allowing a choice of 'not applicable' (so as to make it flexible), and by designing clear, and unambiguous severity statements for each item from carers' own words.

The BADLS, despite being a carer-rating scale, appears to have both good test-retest reliability and good content validity. The BADLS is easy to complete, as demonstrated by the fact that the 'not applicable' option was used on only 28 (2.4%) occasions over 11 items. Eight of these occasions were for sufferers who had never been involved in 'food preparation' before, and could therefore not be graded on this skill. Despite giving ratings of independence on a task when the 'not applicable' option was chosen, the test-retest reliability, as measured by the correlation obtained, was high. Additionally, for 19 of 22 items Kappa was 0.41 or more (moderate, good or very good), and there was a good correlation with cognitive function as assessed by MMSE. In terms of content validity, the principal components analysis supports the view that the scale is tapping into meaningful constructs of activities of daily living: instrumental activities of daily living, self care, orientation and mobility. The high correlation between BADLS score and observed ability to carry out ADL tasks suggests that carers can be relied upon to provide accurate information about the ability of their relative.

The BADLS is sensitive to a wide range of ADL performance, from individuals who require assistance or are totally dependent on most tasks, to individuals who are completely independent on all tasks. The BADLS is also short (20 items) which compares favourably with the 21 items (30 points) of the MMSE. Carers report finding it easy to complete, in particular because it allows them to rate their relative's typical ability over the previous two weeks.

In addition, though there is a small relationship between age and BADLS score, there is no difference between men and women sufferers. The BADLS correlates well with MMSE performance. While the MMSE has been shown to correlate significantly with education [29], the BADLS does not. It would seem likely that some of the proportion of the variance not explained in the correlation between MMSE and BADLS (55.1%) is a consequence of years of education. Because assessment of activities of daily living is not associated with education it can therefore add power to the diagnosis of a dementing disorder.

Dementing disorders produce heterogeneous patterns of impairment. Any ADL scale, therefore, must be sensitive to a range of different levels of ADL

Appendix. The Bristol Activities of Daily Living Scale (BADLS)

This questionnaire is designed to reveal the everyday ability of people who have memory difficulties of one form or another.

For each activity (Nos. 1–20), statements a–e refer to a different level of ability. Thinking of the last 2 weeks, tick the box that represents your relative's/friend's ability.

Only 1 box should be ticked for each activity.

(If in doubt about which box to tick, choose the level of ability which represents their *average* performance over the last 2 weeks)

	Scoring		
1. FOOD		b. Cleans teeth/dentures if given appropriate items	[]
a. Selects and prepares food as required	[] 0	c. Requires some assistance, toothpaste on brush, brush to mouth, etc.	[]
b. Able to prepare food if ingredients set out	[] 1	d. Full assistance given	[]
c. Can prepare food if prompted step by step	[] 2	e. Not applicable	[]
d. Unable to prepare food even with prompting and supervision	[] 3		
e. Not applicable	[] 0	8. BATH/SHOWER	
2. EATING		a. Bathes regularly and independently	[]
a. Eats appropriately using correct cutlery	[]	b. Needs bath to be drawn/shower turned on but washes independently	[]
b. Eats appropriately if food made manageable and/or uses spoon	[]	c. Needs supervision and prompting to wash	[]
c. Uses fingers to eat food	[]	d. Totally dependent, needs full assistance	[]
d. Needs to be fed	[]	e. Not applicable	[]
e. Not applicable	[]	9. TOILET/COMMODE	
3. DRINK		a. Uses toilet appropriately when required	[]
a. Selects and prepares drinks as required	[]	b. Needs to be taken to the toilet and given assistance	[]
b. Can prepare drinks if ingredients left available	[]	c. Incontinent of urine or faeces	[]
c. Can prepare drinks if prompted step by step	[]	d. Incontinent of urine and faeces	[]
d. Unable to make a drink even with prompting and supervision	[]	e. Not applicable	[]
e. Not applicable	[]	10. TRANSFERS	
4. DRINKING		a. Can get in/out of chair unaided	[]
a. Drinks appropriately	[]	b. Can get into a chair but needs help to get out	[]
b. Drinks appropriately with aids, beaker/straw etc.	[]	c. Needs help getting in and out of a chair	[]
c. Does not drink appropriately even with aids but attempts to	[]	d. Totally dependent on being put into and lifted from chair	[]
d. Has to have drinks administered (fed)	[]	e. Not applicable	[]
e. Not applicable	[]	11. MOBILITY	
5. DRESSING		a. Walks independently	[]
a. Selects appropriate clothing and dresses self	[]	b. Walks with assistance, i.e. furniture, arm for support	[]
b. Puts clothes on in wrong order and/or back to front and/or dirty clothing	[]	c. Uses aids to mobilize, i.e. frame, sticks etc.	[]
c. Unable to dress self but moves limbs to assist	[]	d. Unable to walk	[]
d. Unable to assist and requires total dressing	[]	e. Not applicable	[]
e. Not applicable	[]	12. ORIENTATION—TIME	
6. HYGIENE		a. Fully orientated to time/day/date etc.	[]
a. Washes regularly and independently	[]	b. Unaware of time/day etc but seems unconcerned	[]
b. Can wash self if given soap, flannel, towel, etc.	[]	c. Repeatedly asks the time/day/date	[]
c. Can wash self if prompted and supervised	[]	d. Mixes up night and day	[]
d. Unable to wash self and needs full assistance	[]	e. Not applicable	[]
e. Not applicable	[]	13. ORIENTATION—SPACE	
7. TEETH		a. Fully orientated to surroundings	[]
a. Cleans own teeth/dentures regularly and independently	[]	b. Orientated to familiar surroundings only	[]
		c. Gets lost in home, needs reminding where bathroom is, etc.	[]
		d. Does not recognize home as own and attempts to leave	[]
		e. Not applicable	[]

14. COMMUNICATION		Scoring	
a.	Able to hold appropriate conversation	[]	d. Unable to participate in shopping even when accompanied []
b.	Shows understanding and attempts to respond verbally with gestures	[]	e. Not applicable []
c.	Can make self understood but difficulty understanding others	[]	18. FINANCES
d.	Does not respond to or communicate with others	[]	a. Responsible for own finances at previous level []
e.	Not applicable	[]	b. Unable to write cheque but can sign name and recognizes money values []
15. TELEPHONE			c. Can sign name but unable to recognize money values []
a.	Uses telephone appropriately, including obtaining correct number	[]	d. Unable to sign name or recognize money values []
b.	Uses telephone if number given verbally/visually or predialled	[]	e. Not applicable []
c.	Answers telephone but does not make calls	[]	19. GAMES/HOBBIES
d.	Unable/unwilling to use telephone at all	[]	a. Participates in pastimes/activities to previous standard []
e.	Not applicable	[]	b. Participates but needs instruction/supervision []
16. HOUSEWORK/GARDENING			c. Reluctant to join in, very slow, needs coaxing []
a.	Able to do housework/gardening to previous standard	[]	d. No longer able or willing to join in []
b.	Able to do housework/gardening but not to previous standard	[]	e. Not applicable []
c.	Limited participation even with a lot of supervision	[]	20. TRANSPORT
d.	Unwilling/unable to participate in previous activities	[]	a. Able to drive, cycle or use public transport independently []
e.	Not applicable	[]	b. Unable to drive but uses public transport or bike etc []
17. SHOPPING			c. Unable to use public transport alone []
a.	Shops to previous standard	[]	d. Unable/unwilling to use transport even when accompanied []
b.	Only able to shop for 1 or 2 items with or without a list	[]	e. Not applicable []
c.	Unable to shop alone, but participates when accompanied	[]	Thank you for taking the time to complete this questionnaire.

performance. The BADLS is capable of detecting minimal to severe levels of dependence in ADL ability, and correlates well with different levels of cognitive performance. This sensitivity to levels of dependence and independence is a very positive feature of this new scale, and suggests that it will also be sensitive to change over time. Further evaluation of the scale, already under way, includes comparison with the NOSGER [9], an ADL scale much used in treatment trials, and analysis of the sensitivity of the BADLS to longitudinal change.

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References

1. *Diagnostic and statistical manual of mental disorders*, edn. 3, revised. Washington, DC: American Psychiatric Association, 1987.
2. Blessed G, Tomlinson BE, Roth M. The association between quantitative measures of dementia and of senile change in the cerebral grey matter of elderly subjects. *Br J Psychiatry* 1968;114:797-811.
3. Loewenstein DA, Amigo E, Duara R, *et al.* A new scale for the assessment of functional status in Alzheimer's disease and similar disorders. *J Gerontol* 1989;44(4):114-21.
4. Woods RT. Activities of daily living in dementia. In: Gottfries CG, Levy R, Clincke G, Tritsmans L, eds. *Diagnostic and therapeutic assessments in Alzheimer's disease*. London: Wrightson Biomedical, 1991;71-80.
5. Barberger-Gateau P, Commenges D, Gagnon M, Letenneur L, Sauvel C, Dartigues J. Instrumental activities of daily living as a screening tool for cognitive impairment and dementia in elderly community dwellers. *J Am Geriatr Soc* 1992;40:1129-34.
6. Manning FC. Tacrine therapy for the dementia of Alzheimer's disease. *Am Fam Physician* 1994;50:819-23.
7. Patterson MB, Mack JL, Neundorfer MM, Martin RJ, Smyth KA, Whitehouse PJ. Assessment of functional

- ability in Alzheimer's disease: a review and preliminary report on the Cleveland Scale for Activities of Daily Living. *Alzheimer Dis Assoc Disord* 1992;6:145-63.
8. Wade DT, Collin C. The Barthel ADL Index: a standard measure of physical disability? *Int Disabil Stud* 1988;10:64-7.
 9. Spiegel R, Brunner C, Remini-Funfschilling D, et al. A new behavioural assessment scale for geriatric out- and in- patients: the NOSGER (Nurses' Observation Scale for Geriatric Patients). *J Am Geriatr Soc* 1991;39:339-47.
 10. Oakley F, Sunderland T, Hill JL, Phillips SL, Makahon R, Ebner JD. The Daily Activities Questionnaire: a functional assessment for people with Alzheimer's disease. *Phys Occup Ther Geriatrics* 1991;10:67-81.
 11. Lawton MP, Brody EM. Assessment of older people: self-maintaining and instrumental activities of daily living. *Gerontologist* 1969;9:179-86.
 12. Warren J, Grek A, Conn D, et al. A correlation between cognitive performance and daily functioning in elderly people. *J Geriatr Psychiatry Neurol* 1989;2:96-100.
 13. Kuriensky J, Gurland B. The performance test of activities of daily living. *Int J Aging Hum Dev* 1976;7:343-52.
 14. Lawton MP. Scales to measure competence in everyday activities. *Psychopharmacol Bull* 1988;24:609-13.
 15. Pfeffer RI, Kurosaki TT, Harrah CH, et al. Measurement of functional activities in older adults in the community. *J Gerontol* 1982;3:323-9.
 16. Spector WD, Katz S, Murphy JB, Fufton JP. The hierarchical relationship between activities of daily living and instrumental activities of daily living. *J Chron Dis* 1987;40:481-9.
 17. Ramsay M, Winget C, Higginson I. Review: Measures to determine the outcome of community services for people with dementia. *Age Ageing* 1995;24:73-83.
 18. Scian SG, Reisberg B. Functional assessment staging test (FAST) in Alzheimer's disease: reliability, validity and ordinality. *Int Psychogeriatr* 1992;S5:55-69.
 19. Skurla E, Rogers J, Sunderland T. Direct assessment of activities of daily living in Alzheimer's disease. *J Am Geriatr Soc* 1988;36:97-103.
 20. Folstein MF, Folstein SE. A practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res* 1975;21:189-98.
 21. McKhann G, Drachman D, Folstein MF, Katzman R, Price D, Stadlan EM. Clinical diagnosis of Alzheimer's disease: Report of the NINCDS-ADRDA Work Group under the auspices of Department of Health and Human Services Task Force on Alzheimer's Disease. *Neurology* 1984;34:939-44.
 22. Samo JE, Samo MT, Levita E. The functional life scale. *Arch Phys Med Rehabil* 1973;54:214-20.
 23. Katz S. Assessing self-maintenance: activities of daily living, mobility, and instrumental activities of daily living. *J Am Geriatr Soc* 1983;31:721-7.
 24. Mahurin RK, DeBettignies BH, Pirozzolo FJ. Structured assessment of independent living skills: preliminary report of a performance measure of functional abilities in dementia. *J Gerontol* 1991;46:P58-66.
 25. Norusis MJ. *SPSS for windows*. Chicago, Illinois: SPSS Inc., 1992.
 26. Chatfield, C, Collins AJ. Introduction to multivariate analysis. London: Chapman & Hall, 1980.
 27. Cohen J. A coefficient of agreement for nominal scales. *Educ Psychol Meas* 1960;20:37-46.
 28. Altman DG. *Practical statistics for medical research*. London: Chapman & Hall, 1991.
 29. Tombaugh TN, McIntyre NJ. The mini-mental state examination: a comprehensive review. *J Am Geriatr Soc* 1992;40:922-35.

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