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ORIGINAL ARTICLE

The development of a valid and reliable scale for rating anxiety in dementia (RAID)

K. K. SHANKAR,¹ M. WALKER,¹ D. FROST² & M. W. ORRELL²

¹Mental Health Unit, Princess Alexandra Hospital, Harlow & ²University College London Medical School, Department of Psychiatry and Behavioural Sciences, London, UK

Abstract

A rating scale to measure anxiety in dementia sufferers was developed and evaluated in a sample of 51 inpatients and 32 day-hospital patients. Anxiety scores were not related to sex, age, accommodation or DSM-IV diagnosis of the type of dementia. However, both subjects with physical illnesses and subjects with insight into their memory problems had significantly higher anxiety scores. The kappa values for inter-rater reliability ranged from 0.51 to 1 and for test-retest reliability from 0.53 to 1, which indicates moderate to good reliability. The overall agreement on individual items ranged from 82–100% (inter-rater) and 84–100% (test-retest). The professionals working in the care of the elderly and carer groups felt that the scale was comprehensive and all the items in the scale were important, thereby confirming that it has good content validity. The scale significantly correlated with other anxiety scales and also with independent ratings both by a consultant psychiatrist and also nursing staff, indicating good concurrent validity. Anxiety scores were significantly higher in dementia patients who fulfilled modified DSM-IV criteria for anxiety and clinical diagnosis of anxiety disorder. This showed evidence of good criterion validity. Factor analysis showed five factors, including all items of the scale. Scores of 11 and above on the scale indicated significant clinical anxiety. Overall, the scale had good reliability and validity. It should be a useful clinical and research instrument for assessing anxiety in dementia sufferers.

Introduction

Anxiety symptoms are common in dementia (Absher & Cummings, 1994), with the prevalence varying from 12 to 50%. Many studies have focused on the important aspects of depression and psychotic symptoms in dementia sufferers (Burns, 1991; Ballard & Oyebode, 1995), but very few studies have focused on anxiety symptoms. However, anxiety substantially reduces the quality of life of those suffering from dementia and has also been found to be associated with increased mortality (Orrell, 1994).

Wands *et al.* (1990) compared 50 subjects with dementia with 134 control subjects. They used the Hospital Anxiety and Depression Scale and found that 16% of the dementia group had definite anxiety and a further 22% possible anxiety. There was no correlation between severity of dementia and anxiety scores, although this may be because their group had predominantly mild cognitive impairment. Using a questionnaire, Ballard *et al.* (1996) looked into anxiety symptoms of 158 consecutive patients attending a memory clinic. One-hundred-and-nine patients had

DSM-III-R dementia, of whom 22% had subjective anxiety, 11% autonomic anxiety, 38% tension, 13% situational anxiety and 1.8% panic attacks. Thirty-two (29.4%) had one or more anxiety symptoms. They found three main categories of anxiety symptoms: anxiety related to depression, anxiety related to psychosis and anxiety related to interpersonal situations.

Orrell and Bebbington (1996) found that anxiety in dementia patients was associated with very high levels of social contact, problems in the patient–carer relationship and high physical dependency. Independent severe threat life events were also associated with anxiety in dementia patients, but this was confounded by the relationship between depression and life events. Their results suggested that a number of social factors could lead to anxiety in dementia patients. Earlier studies used scales which were not developed for the use in those suffering from dementia; Konders *et al.* (1993) used the State-Trait Anxiety inventory and Wands *et al.* (1990) used the Hospital Anxiety and Depression Scale to measure anxiety. These earlier scales may be insensitive to changes in cognitive

Correspondence to: Dr M. W. Orrell, Reader in Psychiatry of the Ageing, University College London Medical School, Department of Psychiatry and Behavioural Sciences, Wolfson Building, 48 Riding House Street, London W1N 8AA, UK. E-mail: m.orrell@ucl.ac.uk

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impairments and may not be appropriate for the severely cognitively impaired population (Plutchick *et al.*, 1970). Further, the presentation of symptoms may be situation specific and may show fluctuations in the same day, so a cross-sectional assessment may not show a true picture. Impairments in concentration, memory, judgement and lack of insight into their illness affect the responses of dementia patients to the questionnaires and rating scales. Gottlieb *et al.* (1988) studied the reliability of psychiatric scales in patients with dementia of Alzheimer type. They found good correlation between self rating and that of a rater-administered depression scale in patients whose Alzheimer's disease was of low severity but not on those of high severity. Reisberg *et al.* (1987) developed BEHAVE-AD to measure the behavioural symptoms in patients suffering from Alzheimer's disease. It has seven sections and a total of 25 items. One section was devoted to anxiety and phobias and has four items: (1) anxiety regarding upcoming events, (2) other anxieties, (3) fear of being left alone and (4) other phobias. This scale is not specific for anxiety and not sufficient to cover the wide range of presentation of anxiety in this population.

Similar problems were encountered in rating depressive symptoms in dementia using questionnaires or patient interviews. For depression, however, scales such as the Cornell Scale (Alexopoulos *et al.*, 1988) have been developed which use a combination of clinical information from patient interview and other clinical information. This enables a global rating of depressive symptoms to be made. The Cornell Scale has been demonstrated to be valid, reliable and useful in clinical practice (Patterson *et al.*, 1990). The aim of this study was to develop a global rating scale to measure anxiety in dementia patients.

Method

Construction of the scale

The items of the scale were derived from the concepts of anxiety presented in the ICD-10 (World Health Organization 1992), DSM-III-R, DSM-IV (American Psychiatric Association, 1987; 1994), Present State Examination (PSE: Wing *et al.*, 1974), Geriatric Mental State (Copeland *et al.*, 1976), Generalized Anxiety Scale (Lindesay *et al.*, 1989) and the literature on the presentation of anxiety in the elderly and in dementia patients.

The items in the scale were rated according to the person's symptoms and signs of anxiety over the previous two weeks. This period was adequate enough for the ratings to be affected by day-to-day fluctuations and to pick up important behaviours. On the other hand, it was sufficiently short for the carers generally to be able to remember. Each item was rated according to four different grades: Absent, Mild or intermittent, Moderate, and Severe. The items were divided into six sub-groups.

Worry. Items on Worry were mainly taken from existing literature. Hypochondriasis has been identified as a feature of anxiety in the elderly (Bergmann, 1978). Lader (1982) suggested hypochondriacal anxiety could be classified as a separate nosological entity. In their study of physical health and psychiatric disorder in the urban elderly community (Guy's/Age Concern survey), Lindesay (1990) found that the highest rate of continuous worry was associated with generalized anxiety. Worrying about failing memory has also been recognized in dementia sufferers (Forsell *et al.*, 1993). Yesavage and Taylor (1991) stated that the concept of 'worry' or mental anxiety in the elderly must include ruminations about cognitive performance. Considering the psychiatric symptoms in dementia reported by physicians and carers, Forsell *et al.* (1993) identified worrying over trifles a component in the anxiety cluster of symptoms. Because they constantly seek the attention of the caregiver over trivial matters, this anxiety is readily observable.

Apprehension and vigilance. Sleep disturbances, included under non-specific symptoms in ICD-10, have been found to correlate with anxiety in the elderly. People who have sleep disturbance and presumably greater autonomic arousal tend to be more anxious, suggesting that sympathetic tone heightens in the evening hours (Davis *et al.*, 1982, Wagner & Lorion, 1984). Other symptoms of anxiety in the elderly include nervous tension, apprehension, irritability and petulant outbursts (Lader, 1982).

Motor tension. In their review of agitated behaviour in the elderly, Cohen-Mansfield and Billing (1986) state that the concept of agitated behaviour is linked to a variety of concepts by researchers in this area. Their work on such behaviours in a nursing home-based study failed to reveal an 'anxiety' factor linked to agitation. However, these concepts are inter-related (Yesavage & Taylor, 1991). Goudemand *et al.* (1994) state anxiety finds more expression with motor agitation than with speech.

Autonomic hyperactivity. Symptoms due to autonomic hyperactivity are core components of anxiety. In clinical practice it is recognized that these symptoms are time and again reported by dementia sufferers to their carers. These symptoms are grouped to involve the major systems: cardiovascular (palpitations), respiratory (shortness of breath), central nervous system (dizziness, light headedness) and others (sweating, flushes and chills, tingling and numbness of fingers). Care was taken to restrict the number of items in this sub-group in order to avoid bias of the scale towards this component of anxiety.

Phobias and panic attacks. In the Epidemiological Catchment Area study, Reiger *et al.* (1988) reported phobias to be common for people of all ages, including

the elderly. Phobias were the second most frequent psychiatric diagnosis, next to cognitive impairment for both men and women, 65 years of age or older. Panic disorder was the least common anxiety disorder in this age group. However, 11% of the sample on late onset agoraphobia had a history of panic attacks in Lindesay's study (1991).

Administration of the scale

The scale was scored based on all available sources of information. First, the clinician interviewed the patient's carer (usually a qualified nurse or close relative) and asked about the items in the scale. The carer was instructed to base their report on the observation of the patient's behaviour during two weeks prior to the interview. Explanations were given to the carer in order to understand the meaning of each item. This was followed by interviewing the patient. Any further information, including the patient's medical notes, were also examined. Symptoms that were likely to arise due to physical illness or medication were not scored. After this process, the scale was scored based on the clinician's final judgement. All the items in the scale were derived from the current concepts of anxiety, and little additional training was needed to administer the scale.

Subjects

Eighty-three patients who qualified for the diagnosis of dementia based on the DSM-IV (American Psychiatric Association, 1994) were included in the study. In order to get a representative sample of the elderly dementia population, patients were recruited from acute inpatient, day hospital and day centre patients and patients in the long-stay continuing care wards. Subjects who had acute medical illness and were too ill to sit through the interview were not included. Subjects with chronic medical conditions like long-standing diabetes mellitus, hypertension, etc. were included. Subjects' insight into their illness was assessed by asking the question, 'Do you have any problems with your memory?' Those who did not acknowledge their memory problems were noted as lacking in insight.

Instruments

Three other standardized instruments were administered along with the RAID scale for the purpose of validation. The Clinical Anxiety Scale (Snaith *et al.*, 1982) and Anxiety Status Inventory (Zung, 1971) are observer-rated anxiety scales. They were administered to compare the performance of the RAID scale in relation to them. Since it was expected that an overlap in the presentations of anxiety and depression exists, the

Cornell Scale for Depression in Dementia (Alexopoulos *et al.*, 1988) was also administered. Further, the Clinical Dementia Rating scale (Hughes *et al.*, 1982) and the Mini-Mental State Examination (MMSE: Folstein *et al.*, 1975) were administered to assess how the scale functioned across the range of dementia severity.

Reliability methods

Inter-rater reliability. This was tested by two raters on 33 patients. Two raters were present during the same interview, which was conducted by one of the raters. The other rater was allowed to ask questions for clarification regarding the patients' symptoms. Following the interview with the carer and the patient, the raters scored the scale independently without any further consultation among them. *Test-retest reliability* was tested by one rater repeating the interview with 25 patients within one week to ten days of the first interview. *Internal consistency* of the scale was tested, including all the items of the scale except phobias and panic attacks. The internal consistency was also tested for the sub-groups.

Validity methods

Content validity. This was assessed by sending the scale for comments to consultants in old age psychiatry, senior registrars in old age psychiatry and experienced professionals working with elderly in the fields of: social work; nursing; clinical psychology; occupational therapy. The opinions of carer and user groups including the Alzheimer's Disease Society, the Council of Relatives to Assist in the Care of Dementia (CRAC Dementia), Dementia Relief Trust and the individual carers of the patients were also sought. These people were given a copy of the information sheet about the scale, the RAID scale (see Appendix 1) and a questionnaire to complete. The information sheet provided information on reasons for developing the scale, how the items in the scale were selected and the way it was administered and scored. The questionnaire consisted of five questions: (1) Are there any additional topics which you feel should be included in the scale? (2) Do any of the topics need more explanation? (3) Do you foresee any specific difficulties in using the scale? (4) Do you think all topics are important? (5) Do you have any additional comments?

Concurrent validity. The performance of RAID was compared with the anxiety scales CAS and ASI. The performance of RAID was also compared with the Cornell Scale for Depression in Dementia. Further tests of validation were carried out by comparing the RAID's score with the following two measures: (1) The carer's rating of anxiety. This involved the carers

rating the level of anxiety on the visual analogue scale below.

Not at all anxious ————— Extremely anxious
0 100

(2) Anxiety rating by a consultant psychiatrist: this involved the consultant in old age psychiatry (MO) independently rating the patient's anxiety using the same visual analogue scale.

Criterion validity. There was no 'gold standard' for diagnosing anxiety in dementia sufferers. The widely used classificatory systems, ICD-10 and DSM-IV, did not allow for diagnosing anxiety disorder in the presence of an organic condition. This issue was addressed in the following ways: (1) the consultant psychiatrist was asked to complete a questionnaire based on his clinical assessment to answer the following two questions: Is anxiety a significant clinical feature of this patient? Yes/No. Would it affect the management of this patient? Yes/No; and (2) the consultant was also asked whether the patient satisfied the *modified* DSM-IV criteria for Generalized Anxiety Disorder. This was based on the DSM-IV criteria for generalized anxiety disorder, where the restriction criteria of anxiety and worry due to other axis I disorder (criterion D) and due to direct effect of a substance or a general medical condition (criterion F) were not applied. This was done to diagnose anxiety based on the 'concept' rather than the 'criteria' as presented in DSM-IV.

Construct validity. A principle component analysis was performed to explore the factor structure and construct validity. The 18 items of the RAID scale were included. Eigenvalues and the percentage of variances explained by each of the factors were determined.

Statistical analyses

The inter-rater reliability and test-retest reliability were calculated using the kappa statistics (Cohen, 1960) and overall agreement (OAG). Overall agree-

ment was calculated by the percentage of agreement, where the raters agreed on a score of zero or a positive score (score of 1, 2 or 3). Cronbach's alpha was calculated to assess internal consistency. Nonparametric analyses were selected because rating scales yielded ordinal data (Siegel, 1956). Spearman correlation coefficients were calculated between RAID and the carer rating, consultant's rating and the other scales. The Mann-Whitney U test was used as a test of significance where there were two groups and Kruskal-Wallis Anova was calculated when there were more than two groups. The statistical analyses were carried out using the SPSS software package (Version 6.1.3).

Results

Performance of RAID

The scale was user-friendly and no significant difficulties arose in administering it. The total time for administration of RAID was approximately 20 minutes (approximately ten minutes with the carer and ten minutes interview with the patient). It was anticipated that in usual clinical practice, staff who are familiar with the patient would be able to complete the scale within five to ten minutes. Amongst the 83 patients on whom RAID was completed, the mean total score was 9.3 (SD = 7.1; range 0 to 39). Figure 1 gives the distribution of RAID scores. Table 1 gives the frequency of individual item scores. The item 'restlessness' in the scale scored most frequently (71.1%). The items in the sub-scale 'autonomic hyperactivity', and those of phobias and panic attacks tended to score less frequently.

Clinical profile

The mean age in the population studied was 79.1 years (SD = 7, range 62 to 97) and the majority (62%) were women. Fifty-one (61.4%) were in-patients and 32 (38.6%) were day hospital/day centre patients. Information on physical health was available for 77 people. Physical illness included: Parkinson's disease, ischaemic heart disease, hypertension,

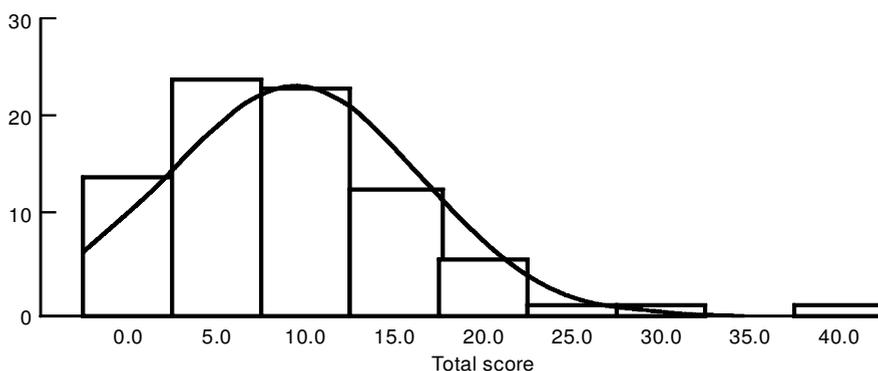


FIG. 1. Histogram of RAID total score ($n = 83$, mean = 9.3, SD = 7.1).

TABLE 1. Frequency of individual item scores

Item	% scoring 1	% scoring 2	% scoring 3	% scoring 1 or more
1. Worry about physical health	15.7	8.4	1.2	25.3
2. Worry about cognitive performance	18.1	16.9	2.4	37.3
3. Worry over finances, family problems	18.1	22.9	7.2	48.2
4. Worry associated with false belief and/or perception	8.4	12.0	1.2	21.6
5. Worry over trifles	12.0	9.6	3.6	25.3
6. Frightened and anxious	22.9	24.1	9.6	56.6
7. Sensitivity to noise	18.1	15.7	2.4	36.1
8. Sleep disturbance	10.8	19.3	2.4	32.5
9. Irritability	47.0	15.7	2.4	65.1
10. Trembling	14.5	9.6	0.0	24.1
11. Motor tension	24.1	3.6	2.4	30.1
12. Restlessness	30.1	31.3	9.6	71.1
13. Fatigueability	28.9	13.3	0.0	42.2
14. Palpitations	10.8	0.0	0.0	10.8
15. Dry mouth, sinking feeling in the stomach	8.4	2.4	1.2	12.0
16. Shortness of breath	10.8	1.2	0.0	12.0
17. Dizziness	15.7	3.6	0.0	19.3
18. Sweating, flushes and chills	13.3	1.2	1.2	15.7
19. Phobias	8.4	1.2	1.2	10.8
20. Panic attacks	8.4	2.4	1.2	12.0

chronic obstructive airway disease and osteoarthritis. Forty-four subjects (52%) suffered from one or more physical illnesses. Based on the DSM-IV, subjects fell into three diagnostic categories of Alzheimer's dementia (66.3%), vascular dementia (13.3%) and other dementias (20.5%).

RAID score was not related to age (correlation 0.05, $p < 0.67$), sex of the individual ($p < 0.52$), inpatient status ($p < 0.62$), type of dementia ($p < 0.4$), level of cognitive impairment (MMSE score) (correlation = 0.18, $p < 0.1$) or dementia severity on the Clinical Dementia Rating Scale ($p < 0.53$). However, subjects with physical illness had higher scores (Mann-Whitney U = 518, $p < 0.05$). Patients with insight into their illness also had higher anxiety (M = 14, SD = 9) compared with those without insight (M = 7, SD = 5) (Mann-Whitney U = 343, $p < 0.0004$).

Reliability analyses

Internal consistency of RAID. Cronbach's alpha was 0.83, suggesting that RAID has a high level of internal consistency. Alpha was calculated for each sub-group of the scale to consider whether the items within a sub-group were equally affected by the patient's anxiety status. The alpha values for the sub-scales ranged from moderate to high: Worry (alpha = 0.65); Apprehension and vigilance (alpha = 0.67); Motor tension (alpha = 0.51); Autonomic hyperactivity (alpha = 0.74).

Inter-rater reliability and test-retest reliability of RAID. Among the 33 subjects who participated in inter-rater reliability, the kappa value for the individual items ranged from 0.51 to 1 and the OAG ranged

from 82 to 100%. In the majority of items both interviewers gave a score of zero. The kappa values ranged from 0.53 to 1 and OAG ranged from 84 to 100% for the test-retest reliability. Table 2 shows the kappa and OAG values of individual items for both the reliability analyses.

Validity analyses

Content validity of RAID. A total of 24 persons returned their questionnaire to give their opinion on the scale. It included five psychiatrists, one clinical psychologist, three community psychiatric nurses, five carers and nine staff nurses working with the elderly in wards and day hospitals and one occupational therapist. Fourteen of them thought that all the items in the scale were important. One suggested that sleep disturbance may not be an important item in the scale. One individual suggested inclusion of each of the additional symptoms like loss of appetite, aggression, obsessive-compulsive symptoms as an expression of anxiety, difficulty in coping with unfamiliar surroundings and a separate section for the signs and symptoms of anxiety that do not fit into a specific category were suggested. The explanation given of phobias and panic attacks were considered unsatisfactory by seven individuals.

The overlap of symptoms of sleep disturbance, trembling and restlessness with other medical and psychiatric conditions were mentioned by four individuals. Unreliability of the carer's account was mentioned by one CPN and one staff nurse. Three individuals questioned the reliability of assessing autonomic hypersensitivity symptoms and panic attacks. The clinical psychologist and two psychiatrists pointed out that scores of phobias and panic attacks

TABLE 2. Inter-rater and test-retest reliability

Scale	Inter-rater reliability N = 33		Test-retest reliability N = 25	
	kappa	OAG%	kappa	OAG%
1. Worry about physical health	0.71	85	0.81	96
2. Worry about cognitive performance	0.54	88	0.53	84
3. Worry over finances, family problems	0.68	94	0.84	92
4. Worry associated with false belief and/or perception	0.69	97	0.68	96
5. Worry over trifles	0.81	100	0.72	88
6. Frightened and anxious	0.58	82	0.62	80
7. Sensitivity to noise	0.52	82	0.53	84
8. Sleep disturbance	0.59	94	0.71	88
9. Irritability	0.53	85	0.69	88
10. Trembling	0.71	94	0.64	92
11. Motor tension	0.58	82	0.91	96
12. Restlessness	0.53	85	0.83	92
13. Fatigueability	0.51	87	0.58	84
14. Palpitations	0.78	97	1.00	100
15. Dry mouth, sinking feeling in the stomach	0.84	97	1.00	100
16. Shortness of breath	0.81	94	0.78	96
17. Dizziness	0.71	94	0.58	92
18. Sweating, flushes and chills	0.88	97	0.78	96
19. Phobias	1.00	100	1.00	100
20. Panic attacks	0.65	97	0.57	96

could not be added to the total score as they formed a separate diagnostic category. Three individuals felt that the scale could only be used by professionals working in the field and training would be required for more general use. There was also a request for more guidelines.

Concurrent validity of RAID. The Spearman's correlation coefficient was calculated between RAID and the carer's rating (83 subjects) of the subject's anxiety and the consultant's rating of anxiety (24 subjects). Only 38 subjects were able to complete the ASI and CAS. The Spearman's correlation coefficient was also calculated between RAID and ASI, CAS and the Cornell Scale for Depression in Dementia. These correlations are given in Table 3. Since seven items in RAID and the Cornell Scale for Depression in Dementia are similar, those items in both the scales were deleted to get Modified RAID (MRAID) and Modified Cornell Scale (MCornell). The Spearman's correlation between MRAID and MCornell was 0.2. This indicates that RAID measures symptoms other than depression.

Criterion validity of RAID. Ten subjects (of 24 rated by the consultant psychiatrist) fulfilled the modified

TABLE 3. Correlation between RAID and other measures

Measure	Spearman coefficient*
Consultant's rating (n = 24)	0.66
Carer's rating (n = 83)	0.73
Clinical Anxiety Scale (n = 38)	0.54
Anxiety Status Inventory (n = 38)	0.62
Cornell Scale (n = 83)	0.69

*All significant ($p < 0.001$).

DSM-IV criteria for generalized anxiety disorder. Thirteen were considered by the consultant psychiatrist to have clinical features of anxiety that required treatment. The mean RAID score for those who fulfilled DSM-IV criteria of generalized anxiety disorder ($M = 16.9$, $SD = 7.9$) was higher than those who did not ($M = 7.9$, $SD = 0.5$). Similarly, the mean score was higher in those who were assigned by the consultant psychiatrist to have clinically significant anxiety ($M = 15.07$, $SD = 8.9$) compared to those without having significant clinical anxiety ($M = 7.55$, $SD = 5.5$). Mann-Whitney U was calculated for independent samples based on modified DSM-IV diagnosis and the consultant's clinical impression. It showed RAID was able to significantly distinguish between groups of low anxiety and high anxiety when modified DSM-IV criteria was applied ($U = 22.5$, $p < 0.006$) and also based on the consultant's clinical impression ($U = 31.5$, $p = 0.03$). A cut-off score of 11 and above had the best fit for sensitivity and specificity of the scale. According to modified DSM-IV criteria for anxiety, at the score of 11 or more the sensitivity of the scale was 90% and specificity 78.5%. The same cut-off point had sensitivity of 76.8% and specificity of 81.8% when the consultant's clinical impression was used to discriminate.

Construct validity of RAID. All 18 items of the RAID scale were entered into the factor analysis. A five-factor structure was derived which included all 18 items of the scale and accounted for 63.8% of the variance. The content of the factor structure is shown in Table 4. In addition, Bartlett's test of sphericity rejected the null hypothesis of an identity matrix (chi square = 54.63, $p = 0.0000$). The Kaiser Meyer Olkin test of sampling adequacy was appropriate at 0.768.

TABLE 4. Factor analysis of RAID items

Factor 1: Eigenvalue 5.16; 28.7% variance	Q1 Worry over physical health Q2 Worry about cognitive performance Q3 Worry about family problems/finances Q6 Frightened and anxious Q7 Sensitivity to noise Q10 Trembling Q11 Tension Q15 Dry mouth/sinking feeling Q17 Dizziness Q18 Sweating flushes
Factor 2: Eigenvalue 2.39; 13.3% variance	Q9 Irritability Q12 Restlessness Q14 Palpitations
Factor 3: Eigenvalue 1.45; 8.0% variance	Q8 Sleeplessness Q13 Fatigueability
Factor 4: Eigenvalue 1.31; 7.3% variance	Q5 Worry over trifles Q16 Shortness of breath
Factor 5: Eigenvalue 1.18; 6.5% variance	Q4 Worry associated with false beliefs/perceptions

Discussion

RAID was easy to use, acceptable to the patients and popular with the carers. Many of the severely disabled patients were not able to communicate their symptoms reliably ($n = 45$; 54%). However the carers were able to give a detailed account of their behaviour. Interviewing the carer first also helped to inform questioning about certain symptoms in the patient interview. For example, when patients had a particular delusion it could be enquired about later on in the interview after getting other relevant information. It was also important to interview the patients later as they were able to describe their symptoms which the carer failed to notice (this was especially true for the physical symptoms).

Though the autonomic symptoms form a core component of anxiety, the items of the sub-scale 'autonomic hyperactivity' tended to be less frequently scored than the other items. This may be due to coexisting physical illness and medication taken by the subjects overlapping with the symptoms due to anxiety. Since the RAID scale does not allow for rating symptoms related to physical illness or side effects of medication, they might have scored less. Since many of the severely disabled patients were also not able to communicate their symptoms clearly and as many of these symptoms may not be readily observable by the caregivers they tended to score less.

The scores of phobias and panic attack were not added to the total score. The concept of phobia included simple phobia, social phobia and agoraphobia. This was considered to be too extensive to be covered fully in the scale. The various presentation of phobias were covered by a standardized phobic disorder screen in the Guy's/Age Concern survey (Lindesay *et al.*, 1989). The issue of panic attacks and

severity of anxiety remains unclear. Panic attack that occurs in an established phobic situation is regarded as an expression of the severity of phobia (ICD-10: World Health Organization, 1992).

Subjects with one or more physical illnesses scored higher compared with those without physical illness. This was consistent with the study of Lindesay (1990), who found that the presence of physical health problems was associated with generalized anxiety disorder and agoraphobia. Subjects who retained insight into their memory problems were significantly more anxious as measured by the scale, and this finding was consistent with the study of Ballard *et al.* (1994).

The studies of Reisberg *et al.* (1985) and Ballard *et al.* (1994) suggested that anxiety symptoms are more common in mild dementia sufferers. However, in a population with mild dementia, Wands *et al.* (1990) found a slight increase in anxiety as cognitive function declined. Forsell *et al.* (1993) found variations in the physician's rating of anxiety and the informant's rating. The physicians noted a decline in level of anxiety with severity of dementia, while the informant's rating showed a linear increase with severity. However, in this study level of anxiety was not associated with either level of cognitive impairment on the MMSE score or the stage of dementia based on the Clinical Dementia Rating Scale. Earlier studies may have had difficulty in rating anxiety in the most impaired due to the lack of adequate scales.

The internal consistency of RAID was high, suggesting that RAID functions as a scale. The alpha values of the sub-scales worry, apprehension and vigilance and autonomic hypersensitivity were also high. The sub-scale of motor tension had a lower alpha value perhaps because the item 'restlessness' in the sub-scale motor tension scored more frequently

than the other items in that sub-scale. Cohen-Mansfield (1986), in a study of agitated behaviour of the elderly in a nursing home, failed to reveal an 'anxiety' factor linked to the concept. However, in this study restlessness was shown to be a useful and observable sign of anxiety in dementia sufferers. For example, in two patients whose test-retest score changed, it was associated with change in the level of restlessness. A subject who was calm and relaxed during the first interview was noted to be more anxious during the second interview and his restless pacing around the ward was a readily observable behavioural change in him. Another patient who was extremely restless during the initial interview was subsequently presented by his wife with an electronic organ which he used to play. This reduced his restlessness and also his level of anxiety.

RAID had moderate to high levels of both inter-rater reliability and test-retest reliability. The possible explanations for changes in the test-retest reliability may be due to the fact that there was a genuine change in some patients during the time interval (of up to ten days) in repeating the scale. This could also be due to the inconsistencies in the carer's report during the first and the second interviews. Hope and Fairburn (1992), in their study to develop the Present Behavioural Examination (PBE), an investigator-based interview to measure behavioural abnormalities in demented subjects after listening a second time to audio-tapes of interviews, found a number of instances where the carers had given different answers on two occasions to exactly the same questions.

Among the range of professionals working with the elderly and carers who gave their opinion on the scale, the scale was felt to be comprehensive and all the items were considered important. Clearer guidelines were needed, including better explanation for phobias and panic attack items. However, the current explanations were taken from the PSE, which is a standardized instrument. Since many staff noted that phobias and panic attacks were distinct syndromes the scale has since been modified with additional instruction stating that the scores of phobias and panic attacks were not to be added to the total score. Clear descriptions for phobias and panic attacks were also added.

RAID significantly correlated with the visual analogue scale of the carer's rating of anxiety in the patient, and the independent rating by the consultant on the level of anxiety. It also correlated well with both CAS and ASI scores. The Spearman correlation of RAID and the Cornell Depression Scale were higher than the anxiety scales. The correlation of MRAID and M-Cornell, however, was low. This suggests that RAID measures certain items which are specific for anxiety and other items which have some overlap with depression items on the Cornell Scale. Conceptually, these items could not be separated from the RAID scale as it would make RAID an incomplete

anxiety scale. Also clinically, there was known to be a significant comorbidity between anxiety and depression. In the Guy's/Age Concern survey, Lindsay *et al.* (1989) found considerable comorbidity of depression with phobias and anxiety. Nearly 40% of phobic subjects also had depression and were about three-and-a-half times more likely to have depression than the non-phobic subjects. Also, 91% of persons with generalized anxiety disorder also had depressive symptomatology. Alexopoulos (1990) found in a series of elderly outpatients with major depression that 38% of them also met the DSM-III criteria for anxiety disorder.

The mean RAID score was higher in those who fulfilled the modified DSM-IV diagnosis of generalized anxiety disorder and the consultant's clinical diagnosis. This was expected as the DSM-IV criteria was taken into consideration when designing the RAID scale. The consultant's clinical impression was taken as a 'gold standard' in this study. Spitzer (1983) described a similar procedure which could be used as an ultimate criterion or 'gold standard' for evaluating the validity of a structured diagnostic assessment instrument. He described it with the acronym 'LEAD standard'. It involved three essential concepts: Longitudinal, Expert, and All Data. Longitudinal: this meant that the diagnostic evaluation was not limited to a single examination done at one point in the evolution of the illness. Expert: the criterion diagnoses were made by expert clinicians who have demonstrated their ability to make expert diagnoses. All Data: the expert clinician not only systematically evaluates the subjects, but will interview other informants, such as family members, and will have access to data provided by other professionals, such as ward staff and previous therapist. The patients in the study were mostly under the care of the consultant psychiatrist who rated them. Hence, this study managed to achieve the above criteria highlighted by the LEAD standard. It is a valid procedure which could be taken as a 'gold standard'.

The factor analysis indicated that the RAID scale comprised five factors all of which made a contribution to the variance. Each of the 18 items on the RAID scale was a component of the five factors. This suggests that all items were necessary and the scale covers a good range of anxiety symptoms and signs and has good construct validity.

RAID was not a diagnostic scale. But in this study it was found that a score of 11 and above had good sensitivity and specificity. The sensitivity scores were lower when the consultant's clinical opinion was taken into consideration. RAID does not replace the need for proper clinical assessment. However, the score could be a helpful guide in assessment and management of individual patients.

There appear to be no other psychometrically validated rating scales specifically designed for clinical

assessment of anxiety in dementia. Previous scales had severe clinical and methodological limitations when used in dementia populations. The observer-rated Clinical Anxiety Scale and the Anxiety Status Inventory which were used in this study could only be completed in a minority (38 of 83) of subjects interviewed. These scales rely on the information given by the subjects and involve an understanding of their subjective symptoms. The subjects also need to have sufficient comprehension and judgement to answer questions related to affect and ideation. Valid information about fluctuating symptoms can be obtained only from subjects with intact memory. In the experience of administering them in this study the subjects tended to get confused when symptoms were probed into. In addition, certain symptoms that were specific to the elderly and patients with dementia (like worry over cognitive performance, repeatedly calling for attention of caregivers over trivial matters, etc.) were not included.

There is a paucity of research on anxiety in dementia and most of the existing literature discusses anxiety symptoms along with other cognitive, affective and behavioural symptoms. Part of this problem is due to lack of a valid and reliable scale for use in the elderly cognitively impaired population. It is hoped that the RAID scale will be a useful instrument in clinical practice to identify and measure anxiety. It may highlight the need for treatment to reduce distress and measure response to therapeutic interventions. We also hope it will be useful in research studies, to study the prevalence of anxiety in dementia, the course of anxiety symptoms, the risk factors associated with anxiety, and the evaluation of treatments for anxiety in dementia.

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Appendix 1

Rating Anxiety In Dementia—RAID

Patient's Name:

DOB:

Hospital no:

Rater's Name:

Occupation:

Patient's status at evaluation:

1. Inpatient. 2. outpatient. 3. day hospital/day centre patient. 4. Other (specify)

Scoring system:

U. unable to evaluate. 0. absent. 1. mild or intermittent. 2. moderate. 3. severe

Rating should be based on symptoms and signs occurring during two weeks prior to the interview.

No score should be given if symptoms result from physical disability or illness.

Total score is the sum of items 1 to 18. A score of 11 or more suggests significant clinical anxiety.

			Score
<i>Worry</i>	1.	Worry about physical health.	
	2.	Worry about cognitive performance (failing memory, getting lost when goes out, not able to following conversation).	
	3.	Worry over finances, family problems, physical health of relatives.	
	4.	Worry associated with false belief and/or perception.	
	5.	Worry over trifles (repeatedly calling for attention over trivial matters).	
<i>Apprehension and vigilance</i>	6.	Frightened and anxious (keyed up and on the edge).	
	7.	Sensitivity to noise (exaggerated startle response).	
	8.	Sleep disturbance (trouble falling or staying asleep).	
	9.	Irritability (more easily annoyed than usual, short tempered and angry outbursts).	
<i>Motor tension</i>	10.	Trembling.	
	11.	Motor tension (complain of headache, other body aches and pains).	
	12.	Restlessness (fidgeting, cannot sit still, pacing, wringing hands, picking clothes).	
	13.	Fatigueability, tiredness.	
<i>Autonomic hypersensitivity</i>	14.	Palpitations (complains of heart racing or thumping).	
	15.	Dry mouth (not due to medication), sinking feeling in the stomach.	
	16.	Hyperventilating, shortness of breath (even when not exerting).	
	17.	Dizziness or light-headedness (complains as if going to faint).	
	18.	Sweating, flushes or chills, tingling or numbness of fingers and toes.	
<i>Phobias:</i> (fears which are excessive, that do not make sense and tend to avoid—like afraid of crowds, going out alone, being in a small room, or being frightened by some kind of animals, heights, etc.) <i>Describe.</i>			
<i>Panic attacks:</i> (Feelings of anxiety or dread that are so strong that think they are going to die or have a heart attack and they simply have to do something to stop them, like immediately leaving the place, phoning relatives, etc.) <i>Describe.</i>			