A 1-Year Follow-Up Study of Behavioral and Psychological Symptoms in Dementia Among People in Care Environments

Clive G. Ballard, M.R.C.Psych., M.D.; Marisa Margallo-Lana, M.R.C.Psych.; Jane Fossey, Ph.D.; Katharina Reichelt, M.Sc.; Pat Myint, M.R.C.Psych.; Dawn Potkins, M.R.C. Psych.; and John O'Brien, M.R.C.Psych., D.M.

Background: Behavioral and psychological symptoms in dementia (BPSD) are common and distressing for patients and caregivers, but little is known about the natural history of these symptoms, particularly among patients in care facilities. This information is essential for informed clinical management. We report a 1-year follow-up study of the prevalence, incidence, and outcome of the 3 main BPSD (agitation, depression, and psychosis) in care facilities.

Method: 136 elderly residents with dementia (29% living in social care facilities and 71% in nursing home care) were assessed longitudinally on 2 occasions a year apart using a range of standardized psychiatric schedules, including the Neuropsychiatric Inventory.

Results: The overall prevalence of BPSD was stable over the year (76% at baseline and 82% at follow-up). Subjects with subclinical symptoms at baseline were more likely to develop clinically significant BPSD during follow-up than those who were symptom free (83% vs. 52%; Mann-Whitney U test, $z = 2.36$, $p = .01$). Agitation was the most common individual syndrome (55%). Although overall BPSD were persistent, ≥ 45% of dementia patients with any of the major syndromes experienced resolution, indicating the development of different BPSD in many residents. There was no evidence that residents taking neuroleptics were more likely to experience resolution of BPSD than neuroleptic-free residents.

Conclusion: BPSD are highly frequent and persistent among residents of care facilities with dementia. This emphasizes the need for ongoing treatment trials. The pattern of resolution with the development of new symptoms indicates that short focused periods of treatment may be a more effective management approach. In addition, the potential value in treating patients with subclinical BPSD to prevent the development of full-blown syndromes needs to be investigated.

(J Clin Psychiatry 2001;62:631–636)

Received Sept. 13, 2000; accepted March 17, 2001. From the Institute for the Health of the Elderly, University of Newcastle (Drs. Ballard, Margallo-Lana, and O'Brien and Ms. Reichelt); Newcastle General Hospital (Drs. Margallo-Lana, Myint, and Potkins), Newcastle Upon Tyne; and Churchill Hospital (Dr. Fossey), Oxford, England.

In the spirit of full disclosure and in compliance with all ACCME Essential Areas and Policies, the faculty for this CME activity were asked to complete a full disclosure statement. The information received is as follows: Dr. Ballard has received research grant support from Lilly, Janssen, AstraZeneca, and Novartis; and has received honoraria from Shire Richwood, Janssen, AstraZeneca, and Novartis; Dr. O'Brien has received research grant support from Pfizer and Lilly, has received honoraria from Pfizer and Janssen, and is a member of the speakers bureau for Pfizer and Eisai; Drs. Fossey, Margallo-Lana, Myint, and Potkins, and Ms. Reichelt have no significant commercial relationships to disclose relative to the presentation.

Reprint requests to: Marisa Margallo-Lana, M.R.C.Psych., Institute for the Health of the Elderly, Wolfson Research Centre, Newcastle General Hospital, Westgate Rd., Newcastle Upon Tyne, United Kingdom NE4 6BE.

Behavioral and psychological symptoms in dementia (BPSD) are common, occurring in more than 50% of patients in clinical settings. They are distressing for the sufferers,[1] as well as their caregivers,[2] and frequently necessitate placement in care environments.[3] Paradoxically, research regarding the epidemiology of these symptoms in social and nursing home care is surprisingly sparse.[4]

BPSD is a generic term that encompasses a number of individual symptoms that can be grouped into 3 main clinically relevant syndromes: agitation, psychosis, and mood disorders.[5,6]

Preliminary studies indicate that psychosis has a mean frequency of 25%[7–9] among dementia patients in nursing home care, a prevalence recently confirmed in a larger study of more than 200 patients.[10] This frequency, while substantial, is slightly lower than the 30% overall prevalence of psychosis among dementia patients seen in specialist settings as indicated in a recent meta-analysis.[11] Making informed treatment decisions on the management of these problems requires an understanding of their natural course. To date, there are no longitudinal studies describing the course of psychotic symptoms over follow-up in nursing home patients.

Few reported studies have used standardized criteria to evaluate depression in nursing home patients with dementia.[7–9] In these small preliminary studies, the prevalence of depression was surprisingly low, with fewer than 10% of dementia patients experiencing major depression. Again, there are no longitudinal studies to inform clinical management.

Among BPSD, agitation is probably the most important symptom in care environments, resulting in stress to both dementia patients and their professional caregivers, potentially affecting the quality of patient care through the poorly monitored use of pharmacologic or physical restraints.[12] Agitation has been defined by Cohen-Mansfield and Billing[13] as "inappropriate verbal, vocal or motor activity that is not explained by needs or confusion." Agitation is present in about 20% of patients with Alzheimer's disease in outpatient clinics,[14] but appears to have an elevated frequency of up to 50% among people with dementia residing in nursing homes.[15,16] Early reports indicate that verbal nonaggressive agitation tends to remain stable over time, but that other forms of agitation increase in frequency as dementia progresses.[17]

In a previous study,[18] we reported an overall cross-sectional prevalence of BPSD of 73% in patients suffering from dementia in 6 care environments. Agitation (40%), depression (25%), and delusions (20%) were all common. There is a clear need to research the natural course of BPSD in nursing home environments to inform treatment decisions. In this study, we report the results of a 1-year follow-up study of the persistence of key BPSD in this care facility cohort.

METHOD

All residents of 6 care facilities for the elderly (3 social care, 3 nursing care) from a geographical catchment area in Newcastle Upon Tyne, northeast England, were approached. Subjects were assessed on 2 occasions, a baseline evaluation in 1999 and a 1-year follow-up in 2000. None of the residents refused to take part in the study. The standardized psychiatric assessment included the organic section of the Geriatric Mental State Schedule (GMS),[19] the Mini-Mental State Examination (MMSE),[20] the Neuropsychiatric Inventory (NPI),[21] the Barthel Activities of Daily Living Index (ADL),[22] and the Clinical Dementia Rating scale (CDR).[23] An additional "information sheet" included information about medication and demographic details. The assessors interviewed each resident and their key worker (as an informant).

The diagnosis of dementia was based on the AGECAT,[24] using level 3 for organic disorders as a cut point, and the CDR (requiring at least minimal dementia). The diagnosis of clinically significant behavioral and psychiatric symptoms was based on the rating rules of the NPI, whereby a score > 3 was taken to indicate "clinically significant symptoms," scores 1–3 were reconsidered as "subclinical symptoms," and a score of 0 indicated "no symptom present" (for this evaluation, symptoms on all 10 "neuropsychiatric symptom" subscales [subscales 1–10] were considered). Subsequent analysis was focused on psychotic symptoms, depression, and agitation. Agitation was considered in the categories of aggression (NPI subscale 3) and aberrant motor behavior (NPI subscale 10). As these 2 subscales of the NPI include symptoms that have been described as different aspects of agitation,[13] we added a separate category for "overall agitation." This last category included residents scoring at the "clinically significant" level in either aggression or aberrant motor behavior. Information regarding depression and delusions and hallucinations was taken from the relevant NPI scales.

Statistical Methods

The chi-square test (and Fisher exact test when appropriate) was used for the analysis of frequency data. Comparison of proportions for the effect of medication on BPSD outcome was undertaken using corrected z scores. Mann-Whitney U test (MWU) was used to compare scores on BPSD between those who remained on medication during the study and those who were no longer on medication at follow-up. All significance tests were 2 tailed. Statistics utilized the SPSS (Chicago, Ill.) computerized statistics package.

RESULTS

Demographic Data

Two hundred eight subjects with dementia (CDR score ≥ 1 and AGECAT score ≥ 3) were assessed at baseline, 65% (N = 136) of which were also reassessed at follow-up a year later. Attrition was because of death or moving to higher levels of care; all patients still residing in the care facilities were evaluated. Comparison of symptom severity measured by total NPI scores between the residents who were followed-up and those who either died or moved to higher level of care shows no differences (mean ± SD = 15.9 ± 14.7 vs. 19.0 ± 16.90, respectively, MWU z = 1.2, p = .23). People who either died or moved to higher levels of care were, however, significantly more impaired on the Barthel ADL scale than those who remained in the same nursing home (mean ± SD = 11.6 ± 12.3 vs. 13.0 ± 5.6, respectively, MWU z = 2.6, p = .009). There were 31 men (23%) and 105 women (77%). The mean age at baseline was 83 ± 7 years (79 ± 8 years for men and 84 ± 6 years for women). Forty residents (29%) lived in social care and 96 (71%) lived in nursing care environments. The median MMSE score at baseline was 9 (range, 0–28) and at follow-up, 6 (range, 0–25). The mean ± SD score on the Barthel ADL scale was 13 ± 5 (range, 0–21) at baseline and 11 ± 6 (range, 0–20) at follow-up.

Table 1. Overall BPSD Severity at Baseline and Follow-Up[a]

	Follow-Up BPSD							
	No Symptoms (NPI score = 0)		Subclinical (NPI score = 1–3)		Clinically Significant (NPI score > 3)		Total BPSD at Baseline	
Baseline BPSD	N	%	N	%	N	%	N	%
No symptoms (NPI score = 0)	8	6	2	1	11	8	21	15
Subclinical symptoms (NPI score = 1–3)	0	0	2	1	10	7	12	8
Clinically significant symptoms (NPI score > 3)	7	5	6	4	90	67	103	76
Total BPSD at follow-up	15	11	10	7	111	82	136	100

[a]Abbreviations: BPSD = behavioral and psychological symptoms in dementia, NPI = Neuropsychiatric Inventory.

Table 2. BPSD Outcome at Follow-Up[a]

			Follow-Up BPSD (NPI score > 3)					
			Persistent Cases		Incidence			
	Baseline BPSD (NPI score > 3)			% Baseline Cases		% Baseline Noncases	Prevalence	
Symptom	N	% Total	N		N		N	% Total
Psychosis								
Delusions	21	15	9	43	12	10	21	15
Hallucinations	4	3	1	25	8	6	9	7
Agitation								
Aggression	54	40	22	41	18	22	40	29
Aberrant motor behavior	44	32	19	43	13	14	32	24
Overall agitation	74	54	35	47	22	35	57	42
Depression	25	18	8	33	12	11	20	15
Any BPSD	103	76	90	87	21	64	111	82

[a]Abbreviations: BPSD = behavioral and psychological symptoms in dementia, NPI = Neuropsychiatric Inventory. Some patients had more than 1 symptom.

Changes in the Overall Persistence of Any BPSD and Relationship to Medication

Table 1 describes changes in severity of BPSD from baseline to follow-up. The overall prevalence of any BPSD at the clinically significant level (NPI score > 3) increased between the 2 assessments ($\chi^2 = 9.39$, df = 1, p = .002). The proportion of subjects who developed clinically significant BPSD over the follow-up period was higher in the group with subclinical symptoms at baseline (NPI score = 1–3) compared with residents who were symptom free at baseline (NPI score = 0) (83% vs. 52%, MWU z = 2.36, p = .01).

The incidence of new BPSD during the year of follow-up was 64% (21 new cases of 33 who were subclinical or symptom free at baseline) (Table 2).

At baseline, 58% (N = 79) of the subjects were taking at least 1 psychotropic drug. At follow-up, 20 subjects (17 with clinically significant BPSD) had been discontinued from psychotropic medication and 10 subjects (8 with clinically significant BPSD) had been started on psychotropic agents. The overall proportion of subjects taking psychotropic medication at follow-up had decreased to 51% (N = 69) ($\chi^2 = 41.4$, df = 1, p < .0001). The proportion of subjects who had at least 1 clinically significant symptom and were taking medication remained very similar at both assessments (82% vs. 81%).

Clinically significant BPSD were still present at follow-up in 94% (45 of 48) of subjects who had had significant symptoms at baseline and had been continuously taking neuroleptics. In comparison, 72% (21 of 29) of those with clinically significant symptoms at baseline but who had remained free of psychotropic agents continued to experience clinically significant BPSD (comparison of change in NPI scores: MWU z = 2.21, p = .03). In addition, 87% (7 of 8) of residents with NPI score > 3 at baseline who had been started on neuroleptic medication treatment during follow-up had significant features of BPSD.

However, patients taking neuroleptics at baseline had significantly more severe BPSD than did neuroleptic-free patients at baseline (total mean NPI score: 16.9 ± 13.5 vs. 11.8 ± 12.8, MWU z = 2.60, p = .009). As this is clearly a confounding factor when interpreting the impact of neuroleptic treatment on BPSD, a further post hoc analysis was undertaken on 2 matched groups of patients (N = 18) with scores of at least 15 on the total NPI. At baseline, as would be expected, the total NPI scores were similar (28.5 ± 14.0 vs. 28.1 ± 12.8). At annual follow-up, patients from this group who took neuroleptics continuously over the follow-up year (N = 16) had a mean NPI score of 22.6 ± 14.0 compared with a mean score of 16.1 ± 11.7 in patients who remained neuroleptic free (N = 16) (MWU z = 1.30, p = .16).

Changes in Symptoms of Agitation

Aberrant motor behavior. 1. Persistence of symptoms. At baseline, a third of the residents (N = 44, 33%) experienced clinically significant aberrant motor behavior. Forty-three percent of residents (19 of 44) in this group remained symptomatic at follow-up, the same proportion (43%) became asymptomatic, and 36% (16 of 44) improved to a subclinical level.

Two residents who had a subclinical level of aberrant motor behavior at baseline became asymptomatic at follow-up. Of those with no aberrant motor behavior at

Table 3. Outcome of Clinically Significant BPSD (NPI score > 3) According to Medication[a]

	Follow-Up NPI Score > 3 at Baseline and Always on Medication				Follow-Up NPI Score > 3 at Baseline and Never on Medication			
	On Medication		Persistent Cases		Never on Medication		Persistent Cases	
Baseline	N	% of Those With Symptoms	N	% of Those on Medication	N	% of Those With Symptoms	N	% of Those Never on Medication
Psychosis								
Delusions (N = 21)	10	48	5	50	7	33	2	28
Hallucinations (N = 4)	2	50	1	50	2	50	0	0
Agitation								
Aggression (N = 54)	19	35	10	53	25	46	6	24[b]
Aberrant motor behavior (N = 44)	17	39	8	47	16	36	4	25
Overall agitation (N = 74)	23	31	14	61	34	46	10	29
Depression (N = 24)	8	33	3	37	11	46	2	18
Any BPSD (N = 103)	48	47	45	94	29	28	21	72

[a]Abbreviations: BPSD = behavioral and psychological symptoms in dementia, NPI = Neuropsychiatric Inventory.
[b]p = .05.

baseline, 73% (66 of 90) remained asymptomatic at follow-up, 14% (13 of 90) developed clinically significant symptoms, and a similar proportion (12%, 11 of 90) developed symptoms at a subclinical level.

2. Incidence at follow-up. Thirteen new cases (14%) developed clinically significant aberrant motor behavior at follow-up.

3. Relationship with medication. More than half of the residents with clinically significant aberrant motor behavior at baseline (59%, 26 of 44) were taking neuroleptics. Sixty-five percent of residents (17 of 26) in this group were also on neuroleptic therapy at follow-up, 8 (47%) of whom continued to experience clinically significant symptoms. Only a quarter of those residents with significant aberrant motor behavior at baseline who had not been taking neuroleptics (4 of 16) were still symptomatic (comparison of change in NPI scores: MWU z =1.03, NS).

Aggression. 1. Persistence of symptoms. Aggression was the most common single BPSD present at baseline (40%, N = 54) and follow-up (29%, N = 40) (Fisher exact test, p = .02). A quarter (13 of 54) of those with clinically significant symptoms at baseline became symptom free at follow-up, 41% (22 of 54) continued to experience clinically significant aggression, and in 35% (19 of 54), the symptoms became subclinical symptoms.

At baseline, 22 subjects had a subclinical level of aggression (NPI score = 1–3). At follow-up, nearly a quarter (N = 6) had developed clinically significant aggression, nearly a third (N = 8) were symptom free, and the same proportion (N = 8) remained subclinical.

2. Incidence at follow-up. An incidence of 22% was identified for new clinically significant symptoms of aggression (18 new cases among the 82 subjects who had no clinically significant symptoms at baseline).

3. Relationship with medication. Of those with clinically significant aggression at baseline, 10 (53%) of the 19 subjects taking neuroleptics for the duration of the study and 6 (24%) of 25 subjects who had been drug free continued to experience clinically significant levels of aggression at follow-up (comparison of change in NPI scores: MWU z =1.90, NS) (Table 3).

Overall agitation. 1. Persistence of symptoms. Over half of the sample (N = 74, 54%) had clinically significant symptoms of aggression or aberrant motor behavior at baseline. Almost half of the residents in this group (N = 35, 47%) continued to experience significant agitation at follow-up (37% [N = 13] had both symptoms, 34% [N = 12] had significant aggression only, and 29% [N = 10] had significant aberrant motor behavior on its own).

2. Incidence. More than a third of those with no agitation at baseline developed clinically significant symptoms at follow-up (35%, 22 of 62).

3. Relationship with medication. Half (51%, 38 of 74) of residents with significant symptoms at baseline were taking neuroleptics. At follow-up, 14 (61%) of the 23 residents who had been taking neuroleptics at baseline and follow-up and 10 (29%) of the 34 of those neuroleptic free in both assessments had significant overall agitation (comparison of change in NPI scores: MWU z = 0.70, p = .4).

Changes in Psychotic Symptoms

Delusions. 1. Persistence of symptoms. The number of subjects with clinically significant delusions remained constant during the study (15%, N = 21 at baseline and follow-up). Forty-three percent (9 of 21) of those with clinically significant delusions at baseline were still experiencing delusions at follow-up, 57% (12 of 21) had become symptom free, and 14% (3 of 21) became subclinical.

Of the 8 subjects who had subclinical delusions at baseline, half (N = 4) developed clinically significant delusions during follow-up, but less than a third (N = 3) were symptom free. One patient remained subclinical.

2. Incidence. At follow-up, there was an incidence of 10% (12 of 115) for the onset of delusions in people who were free of delusions at baseline.

3. Relationship with medication. Half (5 of 10) of the subjects who had symptoms at baseline and had been on neuroleptic therapy during the whole study had clinically significant symptoms at follow-up, whereas only 2 of 7 with clinically significant symptoms at baseline who had never been on neuroleptic therapy remained with symptoms at follow-up (comparison of change in NPI scores: MWU z = 0.30, p = .7).

Hallucinations. Only 4 (3%) of the sample were identified as having clinically significant hallucinations at the time of the baseline evaluation, 1 (25%) of whom was still experiencing the hallucinations at follow-up. One of the 2 patients taking neuroleptics and both neuroleptic-free patients experienced resolution. Eight (6%) of the patients developed hallucinations over the year of follow-up.

Changes in Depression

Persistence of symptoms. Eighteen percent (N = 25) of the sample had clinically significant symptoms of depression at baseline. Nearly a third (8 of 25) remained significantly depressed at follow-up. The same proportion (N = 8) experienced symptom resolution (NPI score = 0) and over a third became subclinical (N = 9).

Nearly half of those with subclinical symptoms at baseline became symptom free (6 of 13), almost a third developed clinically significant symptoms during follow-up (N = 4), and nearly a quarter remained subclinical (N = 3). Overall 15% (N = 20) of subjects had significant depression at follow-up.

Incidence. The incidence for new clinically significant symptoms of depression at follow-up was 11% (12 new cases among the 112 with no clinically significant symptoms at baseline).

Relationship with medication. At follow-up, 3 of the 8 subjects who had clinically significant symptoms at baseline and had been taking antidepressants for the whole study and 2 of the 11 with symptoms at baseline who had not taken antidepressants continued to experience clinically significant symptoms of depression (comparison of change in NPI scores: MWU z = 0.4, p = .68).

DISCUSSION

Although the majority of residents with clinically significant BPSD continued to have some form of clinically significant BPSD at follow-up, each of the 3 main syndromes (agitation, psychosis, depression) had resolved in at least 45% of residents. This finding indicates a tendency for resolution of specific BPSD symptoms, but with the development of alternative symptoms in their place.

The overall prevalence of BPSD was 76% at baseline and 82% at follow-up, clearly indicating the importance of these symptoms. The prevalence, incidence, and persistence rates of delusions and depression are similar to those reported in other clinical settings.[25,26] The rates of hallucinations were substantially lower than expected. This is probably because hallucinations, especially those that do not result in disruption or distress, may be difficult for professional caregivers to identify. It may therefore be that different evaluation methods are required to examine hallucinations within care settings.

BPSD are prevalent and therefore of clinical importance. However, 45% of agitation, nearly 60% of delusions, and more than 60% of depression resolved over the year of follow-up independently of pharmacologic treatment. These high rates of spontaneous resolution need to be taken into consideration when making clinical management decisions. For example, unless symptoms are very severe or persistent, conservative approaches to treatment, focusing on monitoring in conjunction with psychosocial and environmental interventions, may be preferable. In addition, given the tendency for different BPSD to emerge, if pharmacologic management is indicated, relatively short periods of intervention that are targeted for the particular symptoms being experienced at a particular point in time may be more effective than protracted periods of psychotropic administration.

Overall agitation (55%) is clearly more frequent in care environments than other clinical settings, confirming that it is probably the most clinically relevant BPSD symptom in residential and nursing home care settings. Specific studies addressing the clinical treatment of agitation, rather than broader trials encompassing a wider range of BPSD symptoms, are essential, and the possibility of prevention by the early identification and management of subclinical agitation is an important area for future studies.

During the year of follow-up, the overall proportion of subjects on neuroleptic therapy decreased from baseline, but the majority of those with significant BPSD remained on medication at follow-up. In this naturalistic study, there was no evidence that psychotropic medication improved the outcome of subjects who had clinically significant BPSD. Although patients continuously taking psychotropic medication had had more severe symptoms at baseline and issues regarding optimal doses and compliance were not addressed, a post hoc comparison of groups matched for severity gave no indication of benefit from neuroleptic treatment. This aspect of the study needs to be interpreted with caution. Nevertheless, questions are raised about the long-term efficacy of neuroleptic treatment in this patient group, particularly as the majority of double-blind placebo-controlled trials have been conducted over a 6- to 12-week period. Therapeutic trials over a longer duration, with placebo-controlled discontinuation arms, are needed to address these key clinical issues.

The main methodological issue relates to potential differences between those residents who did not complete the follow-up and those who were seen at both baseline and follow-up assessments. There were no statistically significant differences in severity based on total NPI

scores between these 2 groups, although patients who did not complete follow-up had significantly higher levels of dependency. This indicates that the severity of behavioral problems was not a major confounding factor influencing "noncompletion" in the current cohort.

Disclosure of off-label usage: The authors have determined that, to the best of their knowledge, no investigational information about pharmaceutical agents has been presented in this article that is outside U.S. Food and Drug Administration–approved labeling.

REFERENCES

1. Gilley DW, Whalen ME, Wilson RS, et al. Hallucinations and associated factors in Alzheimer's disease. J Neuropsychiatry Clin Neurosci 1991;3: 371–376
2. Rabins PV, Mace NL, Lucas MJ. The impact of dementia on the family. JAMA 1982;248:333–335
3. Stoppe G, Brandt CA, Staedt JH. Behavioural problems associated with dementia: the role of newer antipsychotic. Drugs Aging 1999;14:41–54
4. Ballard CG, Saad K, Patel A, et al. The prevalence and phenomenology of psychotic symptoms in dementia sufferers. Int J Geriatr Psychiatry 1995; 10:477–485
5. Hope T, Keen J, Fairburn C, et al. Behavior changes in dementia, 2: are there behavioural syndromes? Int J Geriatr Psychiatry 1997;12: 1074–1078
6. McShane R, Keene J, Fairburn C, et al. Psychiatric symptoms in patients with dementia predict the later development of behavior abnormalities. Psychol Med 1998;28:1119–1127
7. Morris RT, Rovner BW, Folstein MF, et al. Delusions in newly admitted residents of nursing homes. Am J Psychiatry 1990;147:229–302
8. Chandler JD, Chandler JE. The prevalence of neuropsychiatric disorders in a nursing home population. J Geriatr Psychiatry Neurol 1988;1:71–76
9. Rovner BW, Broadhead J, Spencer M, et al. Prevalence of mental illness in a community nursing home. Am J Psychiatry 1986;143:1446–1449
10. Cohen-Mansfield, Taylor L, Werner P. Delusions and hallucinations in adult day care population. Am J Geriatr Psychiatry 1998;6:105–121
11. Ballard C, Gray A, Ayre G. Psychotic symptoms, aggression and restlessness in dementia. Rev Neurol (Paris) 1999;155(suppl 4):44–52
12. Cohen-Mansfield J, Werner P, Marx MS, et al. Assessment and management of behavioural problems in the nursing home setting. In: Rubenstein LZ, Wieland D, eds. Improving Care in the Nursing Home (NH): Comprehensive Reviews of Clinical Research. Newbury Park, Calif: Sage Publication; 1993:275–313
13. Cohen-Mansfield J, Billing N. Agitated behaviours in the elderly, 1: a conceptual review. J Am Geriatr Soc 1986;34:711–721
14. Teri L, Larson EB, Reifler BV. Behavioural disturbances in dementia of the Alzheimer's type. J Am Geriatr Soc 1998;36:1–6
15. Cohen-Mansfield J, Marx MS, Rosenthal AS. A description of agitation in nursing homes. J Gerontol Med Sci 1989;44:M77–M84
16. Chandler JD, Chandler JE. The prevalence of neuropsychiatric disorders in a nursing home population. J Geriatr Psychiatry Neurol 1988;1:71–76
17. Cohen-Mansfield J, Werner P. Longitudinal changes in behavioral problems in old age: a study in an adult day care population. J Geront A Biol Sci Med Sci 1998;53:M65–M71
18. Margallo-Lana M, Swann A, O'Brien J, et al. Prevalence and pharmacological management of behavioural and psychological symptoms amongst dementia sufferers living in care environments. Int J Geriatr Psychiatry 2001;16:39–44
19. Copeland JR, Kelleher MJ, Kellet JM, et al. A semi-structured clinical interview for the management of diagnosis and mental state in the elderly: the Geriatric Mental State Schedule, 1: development and reliability. Psychol Med 1976;6:439–449
20. Folstein MF, Folstein SE, McHugh PR. Mini-Mental State: a practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res 1995;12:189–198
21. Cummings JL, Mega M, Gray K, et al. The Neuropsychiatric Inventory: comprehensive assessment of psychopathology in dementia. Neurology 1994;44:2308–2314
22. Mahoney FI, Barthel DW. Functional evaluation: the Barthel Index. Md Med J 1965;14:61–65
23. Hughes CP, Berg L, Danziger WL, et al. A new clinical scale for the staging of dementia. Br J Psychiatry 1982;140:566–572
24. Copeland JR, Dewey ME, Griffiths-Jones HM. A computerized psychiatric diagnostic system and case nomenclature for elderly subjects: GMS and AGECAT. Psychol Med 1986;16:89–99
25. Devanand DP, Jacobs DM, Tang M-X, et al. The course of psychopathologic features in mild to moderate Alzheimer disease. Arch Gen Psychiatry 1997;54:257–263
26. Ballard C, Gray A. Psychotic symptoms in Alzheimer's disease: a review. In: Research and Practice in Alzheimer's Disease, vol 2. Paris, France: Serdi Publisher; 1999:230–236

For the CME Posttest for this article, see pages 663–664.