

Original Research Article

Neuropsychiatric Symptoms in Elderly Inpatients: A Multicenter Cross-Sectional Study

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Key Words

Dementia and neuropsychology · Neuropsychiatric symptoms · Rehabilitation

Abstract

Background/Aims: We determined the prevalence of neuropsychiatric symptoms in geriatric rehabilitation patients to compare neuropsychiatric symptoms between patients with and without dementia, and to evaluate associations linking severity of cognitive impairment and neuropsychiatric symptoms. **Methods:** In February 2009, we studied patients aged 75 years or older who had been admitted to four geriatric rehabilitation units in the Paris area. The twelve Neuropsychiatric Inventory items and four neuropsychiatric subsyndromes defined by the European Alzheimer's Disease Consortium were evaluated. **Results:** Of the 194 patients, 149 (76.8%) had dementia, and 154 (79.4%) had exhibited at least one neuropsychiatric symptom during the past week. Agitation was the most common neuropsychiatric symptom in the group with dementia (36.9%) and depression in the group without dementia (35.6%). The dementia group had significantly higher prevalences of hyperactivity ($p < 0.001$) and delusions ($p = 0.01$) than the non-dementia group. In the dementia group, severity of cognitive impairment was associated with hyperactivity ($p = 0.01$) and psychosis ($p = 0.02$). **Conclusion:** The prevalence of neuropsychiatric symptoms among geriatric rehabilitation patients was high but not higher than in elderly outpatients.

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Introduction

A corollary to the current significant aging of the population is an increase in the number of patients with Alzheimer's disease and other forms of dementia. All forms of dementia manifest not only as cognitive impairments, but also as mental and behavioral disturbances [1]. Neuropsychiatric symptoms have been reported to occur at some point in 75% of patients with dementia [2]. Previously known as behavioral and psychological symptoms of dementia, neuropsychiatric symptoms include a broad range of psychological reactions, psychiatric symptoms, and behavioral disturbances. They constitute a major reason for hospital admission [3], are associated with a higher risk of death, and accelerate the cognitive decline [4, 5].

Neuropsychiatric symptoms of dementia are evaluated using standardized instruments such as the Neuropsychiatric Inventory (NPI) [6]. This widely used, retrospective, informant-based rating scale evaluates twelve mental and behavioral disturbances associated with cognitive impairment. This scale relies on the observations of caregivers. A task force of the European Alzheimer's Disease Consortium (EADC) identified four neuropsychiatric subsyndromes: hyperactivity (agitation, euphoria, disinhibition, irritability, and aberrant motor behavior), psychosis (delusions, hallucinations, and sleep disturbances), affective symptoms (depression and anxiety), and apathy (apathy and eating abnormalities). The EADC task force stressed the importance of viewing neuropsychiatric manifestations as syndromes rather than as isolated symptoms [7].

To our knowledge, no study of neuropsychiatric symptoms in elderly geriatric unit inpatients has been published to date.

We hypothesized that neuropsychiatric symptoms were more prevalent in elderly inpatients than in elderly outpatients as reported in previous studies. Thus, our objectives were to determine the prevalence of neuropsychiatric symptoms in geriatric rehabilitation patients, to compare neuropsychiatric symptoms in patients with and without dementia, to evaluate associations linking severity of cognitive impairment and neuropsychiatric symptoms, and to compare our results of inpatients with those of prior studies on outpatients.

Materials and Methods

The protocol for this cross-sectional observational study was approved by the Ile-de-France IX ethics committee, Paris, France (No. 2012-012), and oral informed consent was obtained from each patient before the study. Approval for data collection was obtained from each participating geriatric unit. The study complies with the Declaration of Helsinki.

Study Population

We studied all patients hospitalized in four geriatric rehabilitation units in the eastern metropolitan area of Paris: two (22 and 56 beds, respectively) at the Albert Chenevier Hospital in Créteil and two (52 and 71 beds, respectively) in the Emile Roux Hospital in Limeil-Brévannes. These rehabilitation units focus on minimizing dependency and enabling the return home and participation in community activities of patients with functional impairments that are expected to improve.

Data Collection

All data were collected by a geriatrician (S.T.) who visited the four units. The following information was abstracted from the medical chart: age, sex, living arrangements, circumstances of admission to the geriatric rehabilitation unit, time in the unit, and patient outcome (vital status and place of discharge for survivors).

Neuropsychiatric symptoms were identified using the French validated version of the NPI [8], which evaluates the same twelve items as the original version: delusions, hallucinations, agitation, depression, anxiety, apathy, irritability, euphoria, disinhibition, aberrant motor behavior, nighttime behavior disturbances, and appetite and eating disturbances. During the first 2 weeks of February 2009, the investigator (S.T.) performed structured interviews with the physicians (S.H., O.B., O.H., J.P.D.) and other health care professionals in charge of each patient treated in one of our four rehabilitation units. They determined whether each of the twelve NPI items was present during the past week. Symptom frequency was recorded with the following options: less than once a week, about once a week, several times a week, or daily.

The presence of dementia defined based on criteria of the Diagnostic and Statistical Manual of Mental Disorders IV was recorded, as well as the cause of dementia indicated in the medical chart. Severity of cognitive impairment in patients with dementia was evaluated by the investigator using the French version of the Mini-Mental State Examination (MMSE) [9, 10]. The MMSE score was used to distinguish three levels of dementia severity: 21–30, mild; 11–20, moderate, and 0–10, severe. The presence of pain and acute physical illnesses (e.g. infection and organ failure) during the past week was also recorded.

Statistics

Qualitative data were described as number (%) and quantitative data as mean (SD) or median (25th–75th percentile) as appropriate. Prevalences of neuropsychiatric symptoms or subsyndromes were described as percentage with 95% confidence intervals (95% CI) computed using an approximation to the normal distribution. Neuropsychiatric symptom prevalences were compared in the groups with and without dementia. Univariate analyses to assess associations linking dementia severity to neuropsychiatric subsyndromes were performed using the χ^2 test or the Fisher exact test as appropriate. All analyses were two-sided, and p values lower than 0.05 were considered statistically significant. All analyses were performed using Stata v11 (College Station, Tex., USA).

Results

Of the 201 initially included patients, 7 had no information on their dementia status. Therefore, only 194 patients were eligible for our study. Table 1 reports their main characteristics. In the 149 patients (76%) with dementia, the diagnoses were Alzheimer's disease (n = 71, 48%), vascular dementia (n = 14, 9%), mixed dementia (n = 47, 32%), dementia with Lewy bodies (n = 11, 7%), and frontotemporal dementia (n = 6, 4%).

Prevalence of Neuropsychiatric Symptoms

Of the 194 patients, 154 (79.4%; 95% CI 73.0–94.8) had exhibited at least one neuropsychiatric symptom during the past week, and this proportion was significantly higher in the group with than without dementia [127 (85.2%) vs. 27 (60%), p < 0.001]. Among patients with dementia, only 14.8% had no neuropsychiatric symptom during the past week.

Comparison of Patients with and without Dementia

Table 2 compares neuropsychiatric subsyndromes in the groups with and without dementia. The most common neuropsychiatric subsyndrome was hyperactivity in the group with dementia (53.7%) and affective symptoms in the group without dementia (46.7%). Compared to the group without dementia, the group with dementia had a significantly higher prevalence of hyperactivity. No significant difference was found for affective symptoms.

Table 1. Main characteristics of the 194 inpatients

	Overall (n = 194) ^a	Dementia (n = 149)	No dementia (n = 45)	p*
Women, n (%)	130 (67.0)	101 (67.8)	29 (64.4)	0.68
Mean age ± SD, years	84.6 ± 8.0	84.5 ± 8.6	84.7 ± 5.7	0.63
Living arrangements, n (%)				
Nursing home	18 (9.4)	16 (10.8)	2 (4.5)	
At home alone without help	34 (17.7)	26 (17.6)	8 (18.3)	0.74
At home alone with help	59 (30.7)	45 (30.4)	14 (31.8)	
Living with family	81 (42.2)	61 (41.2)	20 (45.4)	
Input mode to rehabilitation care, n (%)				
Acute geriatric unit	51 (26.4)	35 (23.5)	16 (36.4)	
Other acute units ^b	132 (68.4)	106 (71.1)	26 (59.1)	0.26
Home	10 (5.2)	8 (5.4)	2 (4.5)	
Median length of stay (25th–75th percentile), days	66.5 (19.5–229)	85 (25–241.5)	40.5 (16–122)	0.05
Patient outcome, n (%)				
Home	65 (36.1)	40 (29.2)	25 (58.2)	
Transfer to another unit	9 (5.0)	7 (5.1)	2 (4.6)	0.004
Death	21 (11.7)	16 (11.7)	5 (11.6)	
Nursing home	85 (47.2)	74 (54.0)	11 (25.6)	

^a Seven patients had no information on their dementia status. ^b Orthopedics, cardiology, internal medicine, neurology, rheumatology, oncology, or hematology. * p values were estimated using the Pearson χ^2 test or Fisher exact test or Student t test or Wilcoxon Mann-Whitney test.

Table 2. Prevalences of neuropsychiatric subsyndromes in the 194 inpatients

	Overall (n = 194)	Percent (95% CI)	Dementia (n = 149)	Percent (95% CI)	No dementia (n = 45)	Percent (95% CI)	p*
Psychosis	56	28.9 (22–35.6)	47	31.5 (24.0–39.1)	9	20.0 (7.8–32.1)	0.13
Affective symptoms	89	45.9 (38.7–53.1)	68	45.6 (37.5–53.7)	21	46.7 (31.5–61.8)	0.90
Hyperactivity	88	45.4 (38.2–52.6)	80	53.7 (45.6–61.8)	8	17.8 (6.2–29.4)	<0.001
Apathy	87	44.8 (37.7–52.1)	71	47.6 (39.5–55.8)	16	35.6 (21.0–50.1)	0.15

* p values were estimated using the Pearson χ^2 test.

Table 3. Univariate analysis of association linking cognitive impairment severity and neuropsychiatric subsyndromes

	Affective symptoms (n = 89)			Psychosis (n = 56)			Hyperactivity (n = 88)			Apathy (n = 87)		
	yes (n = 68)	no	p*	yes (n = 47)	no	p*	yes (n = 80)	no	p*	yes (n = 71)	no	p*
<i>Severity of cognitive impairment</i>												
MMSE 21–30	28.8%	18.2%	0.30	37.8%	16.1%	0.02	20.9%	25.5%	0.01	22.6%	23.1%	0.97
MMSE 11–20	42.3%	42.4%		29.7%	48.1%		32.8%	54.9%		41.5%	43.1%	
MMSE 0–10	28.8%	39.4%		32.4%	35.8%		46.3%	19.6%		35.8%	33.8%	

* p values were estimated using the Pearson χ^2 test or Fisher exact test.

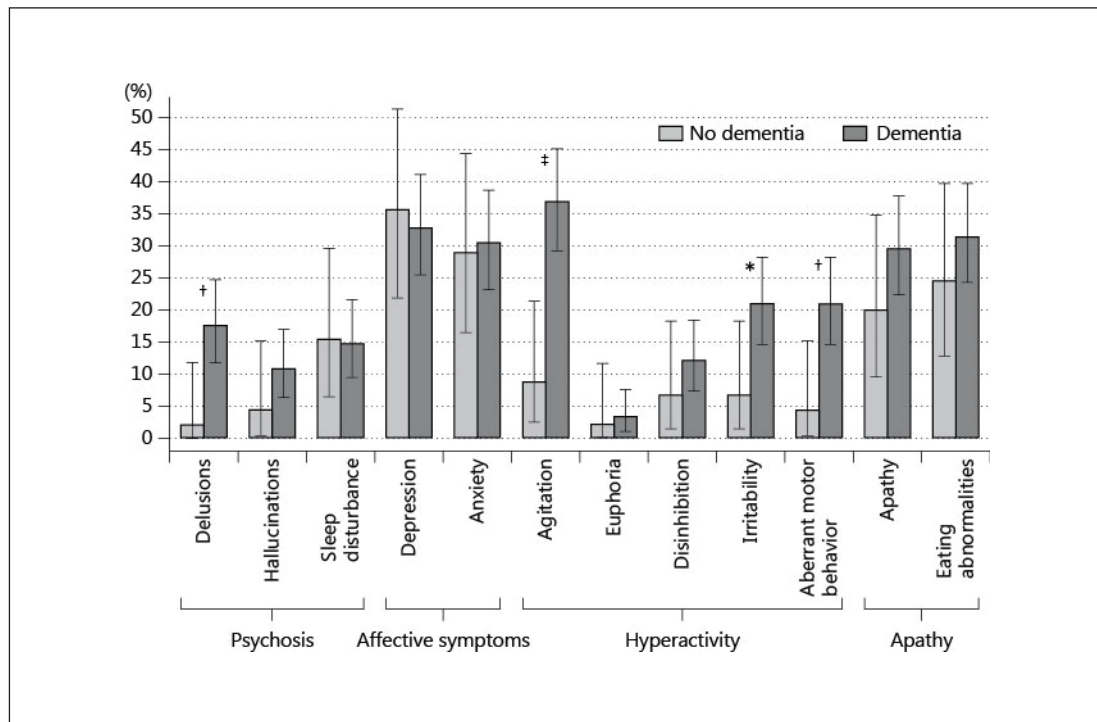


Fig. 1. Comparison of neuropsychiatric symptom frequencies in inpatients with and without dementia. * $p = 0.05$; † $p = 0.01$; ‡ $p = 0.001$. p values were estimated using the Pearson χ^2 test.

Figure 1 compares the prevalence of each neuropsychiatric symptom in the groups with and without dementia. In both groups, depression, anxiety, and eating disturbances were present in at least 25% of patients, with no significant between-group differences. However, the group with dementia had significantly higher prevalences of delusions and of the following three symptoms of the hyperactivity subsyndrome: agitation, irritability, and aberrant motor behavior. The median frequency of neuropsychiatric symptoms per week was significantly higher in the group with dementia than in the group without dementia (3.3 vs. 1.9, $p = 0.001$).

Associations with Severity of Cognitive Impairment and Selected Health Conditions

In the group with dementia, severity of cognitive impairment was significantly associated with hyperactivity and psychosis subsyndromes but not with affective or apathy subsyndromes (table 3). Pain was associated with affective symptoms and psychosis ($p = 0.004$ and $p = 0.01$, respectively) and was related to osteoarthritis ($n = 15/28$) and pressure ulcers ($n = 6/28$). Acute physical illness was associated with apathy ($p = 0.049$). The most common acute physical illnesses were acute cardiovascular diseases ($n = 22/42$) and infections ($n = 10/42$).

Comparison of Our Inpatients' Data with Previous Studies of Outpatients

The prevalences of neuropsychiatric symptoms were close to those in the American and European studies performed in outpatients (table 4) [2, 11–13]. Agitation and eating abnormalities were more prevalent in our study than in previous studies, the only exception being the REAL.FR (Réseau français sur la maladie d'Alzheimer) study. Depression was noted in about one third of our patients and of outpatients in earlier studies. Similarly, in both inpatients and outpatients, the three least common neuropsychiatric symptoms were disinhibition, hallucinations, and euphoria.

Table 4. Comparison of our data of elderly inpatients to data of elderly outpatients in previous American and European studies

	Our study	CHS	MAASBED	REAL1.FR/ REAL2.FR	EADC
Study population, n	194	1,508	199	255/244	2,808
Patients with dementia, n	149	682	199	499	2,354
Mean age, years	84.6	76	77.6	77.6/77.2	76.5
Mean MMSE score (/30)	13.4	–	18.1	16.7/23.4	17.6
At least one neuropsychiatric symptom, %	79.4	75	95	92.5/84.0	–
Delusions, %	17.5	18	21.6	24.7/10.2	19.4
Hallucinations, %	10.7	10.5	9.5	7.8/5.7	9.1
Agitation, %	36.9	30.3	18.6	44.3/32.8	31.1
Depression, %	32.9	32.3	35.2	42.7/36.9	36.7
Anxiety, %	30.4	21.5	21.1	46.3/44.3	37
Euphoria, %	3.4	3.1	3.5	9.8/4.5	4.9
Disinhibition, %	12.1	12.7	6	13.3/10.2	9.5
Irritability, %	20.9	27	23.6	25/28.3	32.1
Apathy, %	29.5	35.9	40.2	63.5/48.9	55.2
Aberrant motor behavior, %	20.8	16	25.6	29.8/14.7	27.5
Sleep disturbances, %	14.8	27	13.1	12.9/13.5	19.5
Eating disturbances, %	31.5	19.6	22	24.3/20.5	22

CHS = Cardiovascular Health Study; MAASBED = Maastricht Study of Behaviour in Dementia; REAL.FR = Réseau français sur la maladie d'Alzheimer.

Discussion

Prevalence of neuropsychiatric symptoms in geriatric rehabilitation patients was about 80%. The most common neuropsychiatric symptoms were agitation in patients with dementia (36.9%) and depression in those without dementia (35.6%). Inpatients with dementia constituted the majority of the study population (76.8%) and had significantly higher prevalences of hyperactivity and delusions compared to those without dementia. In patients with dementia, severe cognitive impairment was associated with hyperactivity and psychosis. Pain was associated with affective symptoms and psychosis, whereas acute physical illness was associated with apathy in patients with dementia.

Unexpectedly, the prevalences of neuropsychiatric symptoms in our inpatients were close to those in the main American and European studies performed in outpatients (table 4) [2, 11–13]. Among outpatients, 61–95% exhibited at least one neuropsychiatric symptom over a variable period of time [2, 11–13]. We expected to find higher rates of neuropsychiatric symptoms in our inpatients, since they were older and had greater dementia severity compared to outpatients. Several factors may explain these results. In our study, data were collected from the physician and other health care professionals in charge of each patient, whereas the outpatient studies probably relied heavily on data provided by the family and other usual caregivers. Furthermore, patients in rehabilitation units are in a stable medical condition and may therefore not markedly differ from outpatients. However, our population had higher prevalences of agitation and eating abnormalities compared to the outpatient populations, the only exception being the REAL.FR study [12]. The higher rate of agitation may be due to the greater severity of dementia in our study. The higher rate of eating abnormalities was probably due to the fact that patients found the hospital food unpalatable and

unfamiliar, as well as to anorexia in the aftermath of the acute event that resulted in the need for rehabilitation.

In our patients with dementia, severity of cognitive dysfunction was significantly associated only with hyperactivity and psychosis. Similarly, in a study of elderly community residents, agitation and aberrant motor behavior, two components of the hyperactivity subsyndrome, were more common in advanced dementia [14]. In contrast, Hollingworth et al. [15] reported that all of the twelve NPI items were associated with severity of cognitive impairment.

In our patients without dementia, the prevalence of neuropsychiatric symptoms was higher than in the only previous study comparing patients with and without dementia, which was conducted in community residents [14]. Thus, hospital admission may be associated with an increased risk of neuropsychiatric symptoms in patients without dementia. This effect might be mediated by pain, acute illnesses and/or exposure to medications. Moreover, dementia may have remained unrecognized in some of our patients.

Our study has several limitations. Instead of the original version of the NPI, we used a version that measures item prevalences without assigning scores. Moreover, we were not able to use the NPI Nursing Home in our inpatients because it has no validated French version. Our data were obtained by interviewing the physician and other health care professionals, who had only limited caring experience with our study patients, and not the patients' usual caregivers. Last, the number of non-events was too small for a robust multivariate analysis designed to identify factors associated with neuropsychiatric subsyndromes. Our study also has several strengths. It was a multicenter study involving geriatric units. The only previous study of neuropsychiatric symptoms in inpatients was performed in psychiatric units [16]. To our knowledge, our study is the first to assess prevalence of neuropsychiatric symptoms in elderly inpatients.

Our data suggest that an assessment of the burden on other patients and health care professionals created by the high rate of neuropsychiatric symptoms in geriatric rehabilitation patients may be useful, as well as the development of interventions to limit this burden.

In conclusion, the prevalence of neuropsychiatric symptoms in geriatric rehabilitation patients was high at 80%. In inpatients, neuropsychiatric symptoms were not more frequent than in previously studied outpatients but different showing more agitation and eating disturbances. Three quarters of inpatients had dementia and exhibited more hyperactivity and delusions than those without dementia. Dementia severity was associated with hyperactivity and psychosis.

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Disclosure Statement

None of the authors has any conflicts of interest to disclose in relation with the study material. All authors reported no conflicts of interest regarding employment/affiliation, grant/funds, honoraria, speaker form, consultant, stocks, royalties, expert testimony, board member, patents, and personal relationship.

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