The prevalence and the course of neuropsychiatric symptoms in patients with dementia

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ABSTRACT

Dementia is prevalent in Norway and other countries and is hallmarked by a decline in memory and other cognitive abilities. In addition to cognitive decline, the vast majority of patients with dementia experience neuropsychiatric symptoms (NPS) such as depression, agitation, psychosis, apathy, or irritability. In this review, we describe the prevalence and the course of NPS in patients with dementia, referring to results of population-based studies, studies of outpatients, and studies of patients in long-term care. For a better comparison of the included studies and for clarification, we have included studies that have assessed NPS with the Neuropsychiatric Inventory (NPI). Overall, we found a high prevalence rate of NPS. At least one NPS (NPI > 0) was present in 56% to 98% of the patients and 62% to 84% of the patients had at least one clinically significant NPS (NPI > 3). The NPS with the highest prevalence rate were apathy, irritability, agitation, depression and anxiety; while delusion, hallucination, disinhibition, aberrant motor behavior and euphoria were the least frequent NPS.

INTRODUCTION

Dementia is a syndrome consisting of several symptoms and hallmarked by a decline in cognition that leads to functional impairment. In order to diagnose dementia by the ICD-10 criteria, a decline in memory, a decline in other cognitive abilities, a decline in emotional control or motivation, or a change in social behaviour should be present. The patient's awareness should be preserved, and the symptoms should be present for more than six months. Dementia is progressive and can be caused by several different diseases, such as Alzheimer's disease, Lewy Body dementia, Parkinson's disease, frontotemporal dementia, cerebrovascular diseases, and dementia due to excessive alcohol use. The impact of dementia on quality of life, on caregiver burden, and on the use of resources is substantial (1,2).

The hallmark of dementia is cognitive decline, but accompanying neuropsychiatric symptoms (NPS) of dementia, such as apathy, depression, agitation and delusion, are prevalent. NPS are often more devastating and create more discomfort for patients and their caregivers than do the cognitive deficits, and studies have shown an inverse relationship between NPS, especially depression, and quality of life (3,4). NPS are often treated with psychotropic drugs, in spite of limited evidence for efficacy and a considerable risk of adverse events (5).

In this article, we will refer to studies on the prevalence and the course of NPS in patients with dementia. We will include population-based studies, studies describing NPS in outpatients, and studies of patients living in long-term care. To be able to compare prevalence rates of NPS across studies, we have focused on studies assessing NPS with the 10-item version of the Neuropsychiatric Inventory (NPI-10). We present prevalence rates of individual neuropsychiatric symptoms according to four sub-syndromes; agitation, affective symptoms, psychosis, and apathy.

METHOD

Search strategy

We have searched the electronic databases of MEDLINE from inception to June 2011. We used the following medical subject headings (MeSH-terms) and free-text words to identify articles on the prevalence and the course of neuropsychiatric symptoms in population-based studies, studies of outpatients, and patients in long-term care: "dementia" combined with "neuropsychiatric inventory" or "NPI" combined with "neuropsychiatric symptoms" or "behavioral and psychological symptoms of dementia" combined with "prevalence" or "course" combined with "population-based studies" or "outpatients" or "nursing homes" or "long-term care". We included only articles in English. In total 108 citations was retrieved, and the abstracts were reviewed by the two authors. We also searched the reference lists of the retrieved articles for other relevant articles. The search resulted in four population based studies, 10 studies including out-patients and five studies including nursing home patients that are presented in this paper.

Assessment scales for NPS

Due to the cognitive decline in patients with dementia, loss of insight, and language and communication impairments, most of the patients, particularly at severe

Table 1. Prevalence rates (%) of neuropsychiatric symptoms in studies with population based samples assessed by the neuropsychiatric inventory.

	Tatsch, 2006 n=60	Ikeda, 2004 n=60	Lyketsos, 2002 n=362		Lyketsos, 2000 n=329
Age, mean (SD)	80.1 (8.9)	81.8 (7.3)	77.0 (5.0)		84.2 (7.0)
MMSE score, mean (SD)	15.5 (4.9)	16.4 (6.8)			
Symptoms	Alzheimer's disease[1]	Dementia[2]	Dementia[1]		Dementia[1]
Delusion	12	27	18	11	19
Hallucination	8	15	11	5	14
Agitation/aggression	20	35	30	15	24
Depression	38	22	32	16	24
Anxiety	25	23	22	10	17
Euphoria	5	8	3	1	1
Apathy	53	57	36	27	27
Disinhibition	17	8	13	7	9
Irritability	23	31	27	12	20
Abberant motor behaviour	10	32	16	12	14
Night time behaviour	28		27	20	
Eating change	23		20	16	
At least one CS-NPS*	78	88	75	62	56
	NPI>0	NPI>0	NPI>0	NPI>3	NPI>0

* Present neuropsychiatric symptom = NPI > 0, Clinically significant neuropsychiatric symptoms = NPI > 3
[1] DSM-IV
[2] DSM-III-R

stages of the disease are unable to rate their own symptoms. Hence, several assessment scales for NPS are based on observations of the patients by caregivers or relatives. *The Neuropsychiatric Inventory (NPI)* is a well-known global assessment scale widely used in research and clinical practice (6). The NPI originally consisted of 10 items (NPI-10): delusions, hallucinations, depression/dysphoria, anxiety, agitation/aggression, euphoria, disinhibition, irritability/lability, apathy and aberrant motor activity. Later, two neurovegetative items were added to the NPI (NPI-12): sleep and nighttime behaviour disorders, and appetite and eating disorders (7). Individual symptoms are rated as present or not during the last four weeks; subsequently, the frequency (1-4) and the severity (1-3) of the symptoms are rated. The frequency score and the severity score are multiplied into a sub-score (0 to 12 points, with the higher score indicating more severe symptoms), and the 12 sub-scores are added (min 0, max 144 points). Sub-scores above 3 on an individual item are regarded as clinically significant symptoms (8).

Based on factor analyses of the NPI, four clusters have been identified; agitation (agitation/aggression, disinhibition, and irritability), affective symptoms (depression and anxiety), psychosis (delusion and hallucination), and apathy (9,10). In patients with Parkinson's disease dementia (PDD) four clusters have been identified (11); mood (depression, anxiety and apathy), psychosis (delusions and hallucinations), agitation (agitation) and apathy (apathy). In studies with longitudinal design, authors have described persistence and resolution of NPS. "Persistence" is defined as the ratio of patients with Clinically Significant NPS (CS-NPS) at follow-up to patients with CS-NPS at the previous assessment, and "resolution" is the ratio of patients without CS-NPS at follow-up to the patients with CS-NPS at the previous assessment.

RESULTS

NPS in persons with dementia, population-based studies

We identified four cross-sectional studies reporting prevalence rates for NPS assessed by the NPI (12-15), which are summarized in table 1. The studies by Tatsch et al. included patients with Alzheimer's disease (n = 60), while Lyketsos et al. (2000) (n = 329), Lyketsos et al. (2002) (n = 362), and Ikeda et al. (n = 60) included patients with dementia independent of etiology. All studies presented prevalence rates for NPS, defined as an individual NPI score > 0, while the study by Lyketsos et al. from 2002 also describes the prevalence of a clinically significant NPS (NPI > 3). To be able to compare the results between studies, we will refer to the prevalence rates for NPS defined as an NPI score > 0. The prevalence rates of at least one NPS ranged from 56% to 88%, (12-15). Most of the studies reported an increase in prevalence rates as the dementia becomes more severe (14).

Psychosis

Prevalence: The prevalence rates for symptoms of psychosis differed among the four studies, and ranges of prevalence rates were 12% to 27% (median 18.5%) for delusion and 8% to 15% (median 12.5%) for hallucination.

Course: Only one population-based study has investigated the course of NPS in patients with dementia. In

Table 2. Prevalence rates (%) of neuropsychiatric symptoms in clinical out-patients with dementia, assessed by the neuropsychiatric inventory.

	Garcia-Alberca, 2011	Aalten, 2007	Toyota, 2007	Peters, 2006	Senanarong, 2005	Piccinini, 2005	Fuh, 2005	Aalten, 2003	Benoit, 2003	Mega, 1996
	n=125	n=2354	n=261	n=576	n=73	n=50	n=320	n=199	n=499	n=50
Age, mean (SD)	76.4 (6.1)	76.7 (7.8)	78.5 (5.1)	73.0 (8.5)	70.3 (8.1)	69.3 (7.5)	75.2 (7.2)	76.4 (8.0)	77.5 (7.1)	75.0 (6.6)
MMSE score, mean (SD)	14.5 (4.8)	17.8 (5.9)	19.0 (6.0)	20.7 (5.6)	18.4 (6.6)	16.8 (5.6)	17.1 (6.8)	18.1 (4.7)	19.7 (4.3)	16.2 (7.5)
Symptoms	AD[1]	AD[4]	AD[1]	Dementia[2]	AD[1]	AD[1]	AD[1]	Dementia[3]	AD[1]	AD[1]
Delusion	38	19	51	26	27	30	31	35	18	22
Hallucination	20	9	23	13	18	12	24	13	7	10
Agitation/aggression	55	31	45	36	36	32	39	29	39	60
Depression	60	37	39	49	30	68	47	57	40	38
Anxiety	54	37	39	36	43	54	37	39	45	48
Euphoria	4	5	7	9	7	24	8	7	7	8
Apathy	74	55	64	59	45	74	42	59	56	72
Disinhibition	30	10	17	27	30	24	21	13	12	36
Irritability	66	32	25	43	48	32	42	40	37	42
Ab. motor behaviour	47	28	44	36	43	46	31	35	22	38
Night time behaviour	36	20		26	38		42	18		
Eating change	28	22		32	27		36	25		
At least one CS-NPS*	98			89				92	88	88
	NPI>0	NPI>3	NPI>0	NPI>0	NPI>0	NPI>0	NPI>0	NPI>0	NPI>3	NPI>0

[1] NINCDS-ADRDA
[2] DSM-III-R
[3] DSM-IV
[4] Clinical dementia diagnosis

the Cache County study by Lyketsos et al., the patients were assessed four times over five years (16). Results are presented as prevalence rates for the remaining patients in the cohort at each assessment, showing an increasing prevalence rate for both delusion (18% to 38%) and hallucination (10% to 24%) (16).

Affective symptoms
Prevalence: Prevalence rates for depression ranged from 22% to 38% (median 28%). Prevalence rates for anxiety ranged from 17% to 25% (median 22.5%).
Course: In the Cache County study, there was an increase in the prevalence rates of affective symptoms in the remaining patients during the five-year follow-up period: anxiety (14% to 32%) and depression (29% to 47%) (16).

Agitation
Prevalence: The individual symptom in the agitation sub-syndrome with the highest prevalence rate was agitation/aggression (range 20% to 35%; median 27%), followed by irritability (range 20% to 27%; median 25%), aberrant motor behavior (range 10% to 32%; median 15%) and disinhibition (range 8% to 17%; median 15%).
Course: In the Cache County study, the prevalence rates for the agitation sub-syndrome were fluctuating, but did not show an increase over the five-year follow-up; irritability fluctuated between 17% and 27% and disinhibition between 2% and 15% (16).

Apathy
Prevalence: The prevalence rates of apathy in the five samples ranged from 27% to 57% (median 44.5%).
Course: There was an increase in the prevalence rate of apathy in the Cache County study from 20% at baseline to 51% after 5 years (16).

NPS in persons with dementia attending outpatient clinics

Results from studies assessing the prevalence rates of NPS in outpatient samples applying the NPI are summarized in table 2 (9,17-25). Four studies (9,17,23,24) presented the proportion of patients who experienced at least one NPI symptom (> 0), which ranged from 88% to 98%. Correspondingly, Benoit et al. found that 88% of the patients experienced at least one clinically significant NPI symptom (> 3) (25). The study of Aalten et al., in which one of the inclusion criteria was having at least one clinically significant (> 3) NPI symptom, pooled several datasets, and some of the participants in other studies noted in the table may have been included in this study (18). Toyota et al. compared patients with early-onset dementia to patients with late-onset dementia and found that delusions, hallucinations, agitation/aggression, disinhibition, and aberrant motor behavior were more common in late-onset dementia (19). Longitudinal studies indicate that virtually all persons with dementia experienced NPS during the follow-up. One French study demonstrated that the prevalence of NPS overall increased over a four-year follow-up (26). Longitudinal studies using assessment scales other than the NPI demonstrate heterogeneity in the course of symptoms and that NPS may arise at any stage of dementia. However, agitation seems to be the most persistent symptom and shows an increasing severity with disease progression in a majo-

rity of the studies, whereas the persistence of psychosis and depression shows greater variability (27-30). It should be noted that apathy was investigated rarely in these studies.

Psychosis
Prevalence: The prevalence rates for symptoms of psychosis differed among the eight studies (NPI>0) and ranged between 22% and 51% (median 30.5%) for delusion and 10% and 24% (median 15.5%) for hallucination. Aalten (2007) and Benoit (2003) found lower prevalence applying NPI>3 as a threshold value. A higher prevalence of both delusions and hallucinations was associated with increasing severity of dementia (22,23).
Course: Studies applying the NPI have reported minor changes in psychosis during up to two-year follow-ups (31). However, a French study reported decreased severity of delusions (32). A later French study, where 151 patients were followed for four years, showed that the prevalence of hallucinations, but not delusions, increased over the follow-up period (26).

Affective symptoms
Prevalence: For the affective symptoms of depression and anxiety, the prevalence rates (NPI>0) ranged between 30% and 68% (median 48%) and 36% and 54% (median 41%), respectively. In the studies applying NPI>3 as a threshold value Aalten (2007) found that prevalence rates of 37% for both depression and anxiety, whereas Benoit (2003) found that 40% experienced depression, whereas 37% had anxiety symptoms. Mega et al. found that increased severity of depression and anxiety was associated with increasing dementia severity (24).
Course: Aalten et al. found a decrease in severity of depressive symptoms over a two-year follow-up (31).

Agitation
Prevalence: The prevalence rates of the individual symptoms in the agitation sub-syndrome (NPI>0), presented in decreasing order, were irritability (range 25% to 66%; median 42%), aberrant motor behavior (range 31% to 47%; median 40.5%), agitation/aggression (range 29% to 60%; median 37.5%), and disinhibition (range 13% to 36%; median 25.5%). Using NPI>3 as a threshold value Aalten (2007) and Benoit (2003) found that the figures of irritability and agitation/aggression were inside the range of the other studies, whereas the figures for aberrant motor behavior and disinhibition were lower than the range in the other studies. More severe agitation/aggression, disinhibition, and aberrant motor behavior were associated with increasing severity of the dementia (20,22-24).
Course: Agitation symptoms were among the most persistent and aberrant motor behavior, and disinhibition increased during follow-up (31,32). Gonfrier et al. reported that the prevalence of aberrant motor activity, agitation/aggression, and disinhibition increased over a four-year follow-up (26).

Apathy
Prevalence: Apathy showed the highest prevalence in six of the eight studies (NPI>0), ranging from 42% to 74% with a median of 61.5%. The studies that failed to find apathy as the most common symptom were conducted in Asia. Correspondingly, apathy was the most common symptom in the two studies using NPI>3 as a threshold value. The severity of apathy was associated with increasing severity of dementia (20,23,24).
Course: Apathy was among the most persistent symptoms and showed increasing severity during the follow-up (26,31,32).

NPS in persons with dementia living in long-term care

The prevalence rates of clinically significant NPS, defined as a score > 3 on an individual NPI item, for patients in long-term care settings have been presented in several studies in recent years (see table 3) (33-37). The proportion of patients with at least one NPI item score > 3, was 68% to 84% (median 72%), depending on the severity of the dementia and the etiologic diagnosis. A large study in Norwegian nursing homes reported an overall prevalence of NPS of 55% in mild dementia (CDR = 1), 70% in moderate dementia (CDR = 2) and 84% in severe dementia (CDR = 3) (34). Several studies report the course of NPS in patients in nursing homes, but the studies show heterogeneity in the course of the symptoms as well as the symptoms showed intermittent courses. Psychotic symptoms remained constant over time, while the prevalence rates of aberrant motor behavior, depression, anxiety, and euphoria declined and apathy, agitation/aggression, irritability, and disinhibition increased over time (38).

Psychosis
Prevalence: The prevalence rates of delusion vary across the different studies, with a range of 9% to 26% (median 16%). Hallucination was approximately half as frequent as delusion, with prevalence rates ranging between 3% and 14%, and a median of 8%.
Course: The course of the psychotic symptoms over one year was described in two studies (39,40). In one of the studies, a significant increase in the prevalence rates of delusion and hallucination was found over the one-year follow-up (39), while there was no change in psychotic symptoms in the other study (40). Wetzels et al. described a resolution rate over a six-month period of 50% for hallucination and 64% to 88% for delusion, indicating that psychotic symptoms have a fluctuating course (35). The same pattern was described by Bergh et al., who found a resolution rate close to 40% for delusion and hallucination over a four-month period (36).

Affective symptoms
Prevalence: Prevalence rates of affective symptoms were comparable across the seven studies: depression 8% to 22% (median 20%) and anxiety 17% to 26% (median 22%).

Table 3. Prevalence rates (%) of clinically significant neuropsychiatric symptoms in nursing home patients assessed by the neuropsychiatric inventory.

	Bergh, 2011 n=169	Wetzels, 2010 n=290	Zuidema, 2007 n=1322	Selbaek, 2007 n=993	Margallo-Lana, 2001 n=137
Age , mean (SD)	84.9 (6.7)	81.7 (7.4)†	83.0 (8.1)	84.4 (7.9)	85 (7)
MMSE score, mean (SD)	14.5 (6.0)	7.6 (7.1)†			11 (9)
Symptoms	Dementia[3]	Dementia[1]	Dementia[1]	Dementia[3]	Dementia[2]
Delusion	26	9	15	24	16
Hallucination	12	3	8	14	5
Agitation/aggression	32	21	31	27	48
Depression	20	9	20	22	20
Anxiety	20	17	21	22	22
Euphoria	5	4	7	6	7
Apathy	26	19	34	29	23
Disinhibition	17	13	20	21	18
Irritability	35	28	34	29	31
Ab motor behaviour	24	23	29	21	39
Night time behaviour	14	6	12		
Eating change	13	14	24		
At least one CS-NPS*	70	68	81	72	84
	NPI > 3	NPI > 3	NPI > 3	NPI > 3	NPI > 3

* Clinically Significant Neuropsychiatric Symptoms = NPI > 3
[1] DSM-IV
[2] Clinical dementia diagnosis
[3] With Clinical Dementia Rating scale (CDR) ≥ 1
† In patients completing follow-up

Course: The resolution rates for depression in the four studies reporting the course of NPS in nursing home patients were extremely divergent, ranging from 30% to 100% depending on the cohort, the severity of the dementia, and the time interval between the assessments, making a summary of the results difficult (35, 36,39,40). The resolution rates of anxiety were slightly more consistent, ranging from 33% to 75%.

Agitation

Prevalence: The most prevalent NPS in the agitation sub-syndrome was irritability (28% to 35%; median 31%), followed by agitation/aggression (20% to 48%; median 27%), aberrant motor behaviour (20% to 39%; median 24%), and disinhibition (13% to 21%; median 18%).

Course: One study reported that approximately half of the patients with symptoms of agitation at inclusion were symptom-free after one year (39). As the time interval between the assessments decreased, the resolution rates for symptoms of agitation/aggression decreased as well, being approximately 35% in a study with assessments every fourth month (36).

Apathy

Prevalence: Six of the seven studies reported prevalence rates for apathy, which is a frequent symptom in persons with dementia, ranging from 19% to 34% and a median of 26%.

Course: In the largest Norwegian nursing home study, there was a resolution rate for apathy of 47% over 1 year (40), while studies with assessments of apathy every fourth or sixth month reported a resolution rate of 30% to 47% and 45% to 64%, respectively (35,36).

DISCUSSION

In this review, we have described the prevalence and the course of neuropsychiatric symptoms (NPS) in patients with dementia, based on population-based studies, studies of outpatients, and studies of patients in long-term care. We found a high prevalence rate of NPS in patients with dementia; 56% to 88% of patients in population-based studies had at least one NPS (NPI > 0) and 74% to 95% of outpatients had at least one NPS (NPI > 0), while 68% to 84% of nursing home patients had at least one clinically significant NPS (NPI > 3). Overall, it has been estimated that up to 90% of patients with dementia will experience at least one clinically significant NPS through the course of the disease (41). The NPS with the highest prevalence rates at all three levels of care was apathy, while irritability, agitation/aggression, depression, and anxiety were slightly less frequent than apathy. Delusion, hallucination, disinhibition, aberrant motor behavior, and euphoria were the least frequent NPS in patients, independent of the level of care received by the patients who were recruited to the study. Delusions were considerably more frequent than hallucinations.

Although we have reviewed several studies and summarized the prevalence rates in them as medians and ranges, there are differences between individual studies with the same inclusion criteria. Further, comparison of prevalence rates between different levels of care is difficult. Nevertheless there are some trends. Patients in nursing homes have higher prevalence rates of all NPS, except for apathy, than patients in population-based cohorts. One explanation for this could be

due to better treatment of apathy in nursing homes. The differences in severity of dementia between different levels of care may also explain differences in NPS prevalence rates between the cohorts, as there are increasing prevalence rates of NPS with increased severity of the dementia (34). Nevertheless, a recent review focusing on depression in dementia concluded that the prevalence rates of depression did not change across different stages of dementia (42). For psychotic symptoms, the prevalence rates of the patient's symptoms increase during the first three years of the disease, but later they don't change (43).

Studies from nursing homes in Norway generally report higher prevalence rates of psychotic symptoms than studies from nursing homes in other European countries. There are several possible explanations for this: 1) there are differences between the prevalence rates of psychosis in Norway and the rest of Europe; 2) the concept of delusion and hallucination is interpreted differently in the Norwegian version of the NPI compared to other versions of the NPI; and 3) the treatment of psychosis is less effective in Norway, resulting in higher prevalence rates. When looking at the prescription rates of antipsychotics in Norway and in the Netherlands, they are comparable (33,35,36,44). On the other hand environmental aspects and how nursing homes are organized in the two countries differ, which may explain the differences in prevalence rates of psychotic symptoms. Also, patients in Dutch nursing homes have more severe dementia compared to patients in Norwegian nursing homes (33,35,36,44).

The studies included in our review have different inclusion criteria. Ten studies have included patients independently of etiology of dementia diagnosis, and nine studies have included only those patients with a diagnosis of Alzheimer's disease. Generally, studies including only patients with Alzheimer's disease report higher prevalence rates of depression, anxiety, and apathy than studies that include patients independently of etiological dementia diagnosis. Psychotic symptoms seem to be less prevalent in patients with Alzheimer's disease than in patients with other etiologies of dementia. Previous studies have shown that as many as 50 to 80% of patients with Lewy Body dementia (LBD) or Parkinson's disease with dementia have visual hallucinations (45,46). Disinhibition is also frequent in LBD, found in 65% of the patients (47). Depression, emotional lability and apathy is common in vascular dementia (VaD), especially depression, while psychosis is less prevalent in VaD than in other types of dementia (48). Depression and anxiety are found to be equally common in VaD as in AD (49). In patients with frontotemporal dementia (FTD), NPS such as apathy, disinhibition, irritability and aberrant social behaviour dominate their dementia while psychotic symptoms are very rare in patients with FTD (47). The differences in the prevalence of NPS in different types of dementia may be explained by underlying biological mechanisms. Low levels of serotonin in the CNS are known to be associated with depression or anxiety. Studies with functional neuroimaging demonstrate serotonergic dysfunction both in patients with AD and FTD, but the location of the serotonergic dysfunction in the brain varies between studies (50). In patients with Parkinson's disease and LBD, psychosis is thought to be a result from overstimulation of dopaminerigic receptors as well as an imbalance of serotonin and acetylcholine (51).

The presented review has some limitations. We have included only studies where the NPS is assessed by the NPI, which limits the number of included studies. The majority of the studies included in our review were from settings in North America and Europe, which is a paradox, as the majority of patients with dementia are living in countries in other parts of the world. There is a trend that studies from Asian countries report lower prevalence rates for symptoms of apathy and affective symptoms than studies from other countries (21,23). There are differences in the criteria of a presenting NPS, which contributes to differences in the prevalence rates between the studies. It may also preclude the possibility of following the disease trajectory, in terms of prevalence rates, in patients with dementia in population-based samples through outpatients with dementia to patients with dementia in nursing homes.

What kinds of studies are needed in order to further increase our understanding of NPS in patients with dementia? More knowledge on the course of NPS is needed, and large, longitudinal cohort studies following patients with dementia from the beginning of their dementia disease until end-stage dementia should be planned. As most previous studies are on patients with Alzheimer's disease, future studies should be large enough to allow analyses of subgroups of dementia diagnoses as vascular dementia, Parkinson's disease with dementia, Lewy Body dementia, and frontotemporal dementia. The prevalence and course of NPS are influenced by the treatment given to the patients, and data on pharmacological treatment should be collected to allow for adjustments in the statistical analyses.

CONCLUSION

Neuropsychiatric symptoms (NPS) are prevalent in patients with dementia, and the prevalence rates increases with increasing severity of the dementia. There is also evidence that the prevalence rates of NPS are higher in nursing-home populations than in population-based samples. The most prevalent NPS are apathy, irritability, agitation/aggression, depression, and anxiety. Although NPS are prevalent, the patient's individual symptoms show a fluctuating course. Policy-makers and clinicians should be aware of the high prevalence rates of NPS and the fluctuating course of individual symptoms to better plan for further treatment and care of the elderly patients with dementia.

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