

Behavioral and psychological symptoms and psychotropic drugs among people with cognitive impairment in nursing homes in 2007 and 2013

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Abstract

Purpose The use of psychotropic drugs to treat behavioral and psychological symptoms among people with dementia has been widely questioned because of its limited efficacy and risk of harmful side-effects. The objectives of this study was to compare the prevalence of behavioral and psychological symptoms and the use of psychotropic drug treatments among old people with cognitive impairment living in geriatric care units in 2007 and 2013.

Methods Two questionnaire surveys were performed in 2007 and 2013, comprising all those living in geriatric care units in the county of Västerbotten in northern Sweden. A comparison was made between 1971 people from 2007 and 1511 people from 2013. Data were collected concerning psychotropic and antidementia drug use, functioning in the activities of daily living (ADL), cognition, and behavioral and psychological symptoms, using the Multi-Dimensional Dementia Assessment Scale (MDDAS).

Results Between 2007 and 2013, the use of antipsychotic drugs declined from 25.4 to 18.9 %, and of anxiolytic, hypnotic, and sedative drugs from 35.5 to 29.4 %. The prevalence of people prescribed antidepressant drugs remained unchanged while antidementia drug prescription increased from 17.9 to 21.5 %. When controlled for demographic changes, 36 out of 39 behavioral and psychological symptoms showed no difference in prevalence between the years.

Conclusions The use of antipsychotic, anxiolytic, hypnotic, and sedative drugs declined considerably between 2007 and 2013 among old people with cognitive impairment living in geriatric care units. Despite this reduction, the prevalences of behavioral and psychological symptoms remained largely unchanged.

Keywords Dementia · Nursing home · Behavioral and psychological symptoms · Alzheimer's disease · Psychotropic drugs · Antipsychotics

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Introduction

Behavioral and psychological symptoms occur frequently among people with cognitive impairment, and prevalence rates of about 80 % have been reported in nursing home residents [1]. The symptoms, including, e.g., hallucinations, depressive symptoms, agitation, aggression, and wandering, can be difficult for relatives and care staff to manage, and the residents' quality of life might be severely affected [2].

Psychotropic drugs are frequently used to treat these behavioral and psychological symptoms despite their well-known side-effects [3, 4]. For example, antipsychotic use increases the risk of extrapyramidal and metabolic side-effects and has shown associations with an increased risk of cerebrovascular events and higher mortality among people with dementia [5].

Among anxiolytic, hypnotic, and sedative drugs, the use of benzodiazepines may also result in harmful adverse effects such as cognitive impairment [6]. Furthermore, antidepressant use has been associated with such side-effects as hyponatremia, falls, gastrointestinal reactions, and psychological reactions such as drowsiness and sedation [7, 8]. In a number of studies, a variety of behavioral and psychological symptoms are associated with the use of psychotropic drugs [4, 9, 10]. For example, the use of anxiolytics is associated with psychosis and agitation [4], and people exhibiting aggressive behavior are at increased risk of being prescribed antipsychotic drugs [9, 10]. However, psychotropic drugs are known to have a limited efficacy in this patient group [11] and, although antipsychotic drugs have been shown to have some efficacy in treating certain behavioral and psychological symptoms, such as aggression and psychosis [12], the treatment has been widely questioned because of the side-effects mentioned above. Studies of antipsychotics withdrawal have been performed and show that it is possible to withdraw antipsychotics from many older people with dementia living in nursing homes, without any detrimental effect on behavior, psychological, or cognitive outcomes. [13]. Despite this, long-term treatment with psychotropic drugs is common among old people with dementia [3].

Every 6 or 7 years since 1975, questionnaires have been sent out to all geriatric care settings in the county of Västerbotten in the northern part of Sweden. The trends in behavioral and psychological symptoms and psychotropic drug use between the years 1982, 2000, and 2007 have been described earlier [14–16]. The results show that between 1982 and 2000, the use of anxiolytic, hypnotic, and sedative drugs increased while that of antipsychotic drugs decreased slightly. The use of antidepressants increased sixfold between the 2 years. The prevalence of depressive symptoms, regressive symptoms, and resistance to care also decreased while the level of activity was shown to increase [14, 15]. Further, comparison between the years 2000 and 2007 show that 15 out of 39 behavioral and psychological symptoms became less common. Within the item aggressive behavior, four out of six symptoms declined significantly. The use of antidepressants and antidementia drugs increased from 2000 to 2007 in contrast to that of anxiolytic, hypnotic, sedative, and antipsychotic drugs, which remained largely unchanged between the 2 years [16]. Since treatment of people with dementia with psychotropic drugs has been highlighted in recent years and widely debated, the question is raised whether the use of these drugs has declined, and if so, whether the prevalence of behavioral and psychological symptoms has changed.

The aim of this study was therefore to analyze the prevalence of behavioral and psychological symptoms and psychotropic drug treatments among old people with cognitive impairment living in geriatric care between 2007 and 2013.

Methods

Material

Two surveys in the form of a questionnaire were carried out in 2007 and 2013, respectively, including all those living in geriatric care units in the county of Västerbotten in northern Sweden.

The two surveys used the same methodology and the same questionnaire.

The total number of people living in geriatric care was 3578 in 2007 and 3210 in 2013. Information about 3070 persons was collected in 2007 and 2262 persons in 2013, giving response rates of 85.8 and 70.5 %, respectively. However, in 2007 unlike in 2013, the term geriatric care included nursing homes and geriatric and psychogeriatric hospital wards. Therefore, the people in hospital wards in 2007 (99 persons) were excluded from the analyses, leaving 2971 people living in nursing homes in 2007 and 2262 persons in 2013. Those under 65 years of age or for whom no age was registered were excluded from the analysis for both years. From the remaining 2820 and 2135 individuals respectively, those who had a cognitive impairment were selected. Thus, 1971 people from 2007 and 1511 from 2013 patients were selected for the current analysis.

The Regional Ethics Review Board in Umeå approved the study (registration number 07-028M (2007) and 2012-646-31M (2013)).

Procedures

The questionnaires were sent out to all geriatric care units in the county of Västerbotten. The member of staff who knew the resident best was asked to fill in the individual assessment scales based on observations of the resident's condition during the preceding week. Written instructions about how to carry out the assessments were included, and the staff was informed that members of the research team could be contacted by telephone to answer questions or provide additional guidance.

Assessments

The Multi-Dimensional Dementia Assessment Scale (MDDAS) [17] was used to make the assessments. The MDDAS measures cognition, motor functions, vision, hearing, speech, level of functioning in the activities of daily living (ADL), behavioral and psychological symptoms, etc. The items in the MDDAS were constructed to be easy to understand, formulated in everyday language, and should therefore probably not be so much affected by staff education level. The present study included assessments of ADL, cognition, and behavioral and psychological symptoms and also registration

of current drug prescriptions. The MDDAS has good inter- and intra-rater reliability [17].

Information pertaining to drug use was gathered as part of the MDDAS (by attaching of a copy of the drug list), and the drug data were subsequently grouped and coded by members of the research team. The WHO ATC drug classification was used to group the drugs. The following classes were included in this analysis: N05A (antipsychotics), N05B (anxiolytics), N05C (hypnotics and sedatives), N06A (antidepressants), and N06D (antidementia drugs). As no information about doses and pro re nata (“as needed”) medication was collected in the surveys of 2007 and 2013, only figures for ongoing medication were included in the analysis.

Cognitive impairment was measured using a scale developed by Gottfries and Gottfries [18], consisting of 27 items that measure a person’s level of cognitive function (Supplementary Table 1). A score of less than 24 is considered to indicate cognitive impairment, which correlates with a sensitivity of 90 % and a specificity of 91 % [17] to the usual 24/30 Mini Mental State Examination (MMSE) cutoff [19]. An ADL score was calculated based on the resident’s ability to cope with dressing, hygiene, eating, and bladder and bowel control (Supplementary Table 2). All ADL categories score 1–5, except that for bladder control, which scores 0–4. Hence, the ADL score ranges from 4 to 24, where a higher score indicates greater ADL independence.

The MDDAS contains 25 items concerning behavioral symptoms and 14 items concerning psychological symptoms (Supplementary Table 3). Each item is rated on a three-point scale, indicating whether the symptom or behavior occurs at least once a day, at least once a week, or not at all during the 1-week observation period. The variables were dichotomized between at least once a week and less than once a week, and prevalence numbers, therefore, indicate 1-week prevalence. The items were grouped according to the factor analysis published in Gustafsson et al. [9].

Each item is presented, in Table 3, under the factor to which it most loaded.

Statistics

Statistical calculations were performed using the SPSS Statistics 22. Dichotomous variables were analyzed using the Pearson chi-square test and continuous variables using the independent sample *t* test. The use of psychotropic drugs/behavioral and psychological symptoms in 2007 and 2013 was compared, and a multiple logistic regression model was constructed to control for demographic differences between the two samples. The model had the psychotropic drug/behavioral and psychological symptom as the dependent variable and included sex, age, level of cognitive impairment, level of ADL dependency, and year of investigation (2007 or 2013) as independent variables. A *p* value of <0.05 was

considered statistically significant. Accounting for the multiple testing of 39 different behaviors and symptoms with Bonferroni correction would result in a significance level of $0.05/39 = 0.00128$.

Results

Basic characteristics of the study population in years 2007 and 2013 are shown in Table 1. The mean cognitive score was higher in 2013 than in 2007; otherwise, there were no significant differences between the 2 years. The use of psychotropic drugs is shown in Table 2. Corrected for sex, age, ADL performance, and level of cognitive impairment, the use of antipsychotics, anxiolytics, hypnotics, and sedatives is shown to have significantly decreased between 2007 and 2013. The use of antipsychotics declined from 25.4 % in 2007 to 18.9 % in 2013. Among those prescribed antipsychotics, 67.2 % (336/500) were given atypical antipsychotics in 2007, compared to 76.3 % (196/257) in 2013. The most commonly prescribed antipsychotics was risperidone, and the most commonly prescribed conventional antipsychotics was haloperidol; this applies to both years. The use of anxiolytics, hypnotics, and sedatives decreased from 35.5 % in 2007 to 29.4 % in 2013. The use of antidepressant drugs remained unchanged between the 2 years. Selective serotonin reuptake inhibitors (SSRI) accounted for the majority of the antidepressant prescriptions in both years. The use of any psychotropic drug declined from 71.1 to 67.5 % between the 2 years.

Further, antidementia drugs were used by 353 (17.9 %) individuals in 2007, compared to 293 (21.5 %) in 2013, comprising mainly cholinesterase inhibitors in both years (15.2 vs 14.8 %). Sixty-one individuals (3.1 %) took memantine in 2007, compared to 115 (8.4 %) in 2013.

From 2007 to 2013, 36 out of 39 behavioral and psychological symptoms showed no difference in prevalence (Table 3). The prevalence of three behavioral and psychological symptoms increased when controlled for demographic changes (age, sex, cognitive level, and ADL level). Among aggressive behaviors, one out of six symptoms, “hits patients/staff,” increased in prevalence. Further, within the item

Table 1 Basic characteristics of the studied samples of people with cognitive impairment

	2007	2013	<i>p</i> value
Total number of people, <i>n</i>	1971	1511	
Women, <i>n</i> (%)	1384 (70.4)	1032 (68.7)	0.271
Age, mean ± SD	84.7 ± 6.6	84.9 ± 6.9	0.460
Cognitive score (0–27), mean ± SD	11.8 ± 6.9	12.4 ± 6.6	0.013
ADL score (4–24), mean ± SD	13.7 ± 6.0	14.0 ± 6.1	0.135

ADL activities of daily living, SD standard deviation

Table 2 Psychotropic drug use in 2007 and 2013

	2007	2013	Odds ratio ^a	95 % confidence interval ^a	<i>p</i> value ^a
Number of people ^b , <i>n</i>	1971	1362			
Antidepressants (N06 A), <i>n</i> (%)	964 (48.9)	674 (49.5)	0.982	0.843–1.144	0.814
Tricyclic antidepressants, <i>n</i> (%)	38 (1.9)	19 (1.4)			
Presynaptic α_2 -antagonists, <i>n</i> (%)	300 (15.2)	243 (17.8)			
SSRI, <i>n</i> (%)	755 (38.3)	508 (37.3)			
SNRI, <i>n</i> (%)	32 (1.6)	13 (1.0)			
MAO inhibitors, <i>n</i> (%)	0 (0)	0 (0)			
Antipsychotics (N05A), <i>n</i> (%)	500 (25.4)	257 (18.9)	0.705	0.585–0.849	<0.001
Conventional antipsychotics, <i>n</i> (%)	171 (8.7)	69 (5.1)			
Atypical antipsychotics, <i>n</i> (%)	336 (17.0)	196 (14.4)			
Anxiolytics, hypnotics and sedatives (N05B, N05C), <i>n</i> (%)	700 (35.5)	400 (29.4)	0.757	0.644–0.890	0.001
Anxiolytics, <i>n</i> (%)	254 (12.9)	156 (11.5)			
Hypnotics and sedatives, <i>n</i> (%)	543 (27.5)	289 (21.2)			
Any psychotropic drug ^c , <i>n</i> (%)	1402 (71.1)	920 (67.5)	0.834	0.708–0.983	0.030
Antidementia drugs (N06D), <i>n</i> (%)	353 (17.9)	293 (21.5)	1.246	1.025–1.515	0.027
Cholinesterase inhibitors, <i>n</i> (%)	299 (15.2)	202 (14.8)			
Memantine, <i>n</i> (%)	61 (3.1)	115 (8.4)			

^a Corrected for sex, age, ADL performance, and level of cognitive impairment

^b The number of people with complete medication list

^c ATC classes: N05A, N05B, N05C, or N06A

restless behavior, one out of six symptoms had increased, “piles up chairs/pushes tables/upends furniture,” and finally, among hallucinatory symptoms, one out of three symptoms had increased—“hallucinates visually.”

Among the other items—wandering behavior, verbally disruptive/attention-seeking behavior, passiveness, depressive symptoms, disoriented symptoms, and regressive/inappropriate behavior—the prevalences did not change significantly.

Discussion

From 2007 to 2013, the use of any psychotropic drug declined from 71.1 to 67.5 % among people with cognitive impairment living in geriatric care units. The use of antipsychotics declined from 25.4 to 18.9 % between the 2 years. The use of anxiolytic, hypnotic, and sedative drugs also declined, but antidepressant drug use remained unchanged. In contrast, the use of antidementia drugs increased from 17.9 to 21.5 %.

The reason for the considerable decline in the use of antipsychotics in the county of Västerbotten, Sweden, may be a result of the increasing concern about antipsychotic drug use in old people. The problems have been targeted in several ways; for example, in 2003, new quality indicators concerning antipsychotics and other inappropriate drugs were developed by the Swedish National Board of Health and Welfare, and

these were updated in 2010 [20]. In 2008, guidelines were developed by the Swedish Medical Products Agency concerning the appropriate use of antipsychotics among people with behavioral and psychological symptoms [21]. Outside Sweden, safety data from various studies have led regulatory agencies worldwide, such as the Food and Drug Administration (FDA) and the European Medicines Agency (EMA), to issue warnings concerning the risk of increased mortality in patients with dementia using both atypical and conventional antipsychotics [22, 23]. However, few studies have investigated trends in the prescribing of antipsychotic drugs for old people with dementia in recent years, and when our results are compared with those of other studies reported in the literature, the findings are conflicting. For example, in Germany, there was no significant decline in the prevalence of antipsychotic drug use among old people with dementia between 2004 and 2009 [24], but in France, there was a reduction in antipsychotic drug use in this patient group from 14.2 % in 2003 to 10.2 % in 2011 [25]. However, the population in both of these studies was not restricted to nursing homes and different criteria were used. The shift from conventional towards atypical antipsychotics seen in the present study seems to be more general [24, 25]. This is a positive move for the patient, since atypical drugs have a better tolerability profile than conventional drugs, which makes their use more advantageous in old people. Regarding anxiolytic, hypnotic, and sedative drugs, use of these drugs decreased from

Table 3 Behavioral and psychological symptoms in 2007 and 2013

BPSD item	2007 n/n _{total} (%) ^a	2013 n/n _{total} (%) ^a	Odds ratio ^b	95 % confidence interval ^b	p value ^b
<i>Wandering behavior</i>					
Packs up his/her things, is often on the way home	270/1958 (13.8)	231/1503 (15.4)	1.047	0.840–1.304	0.683
Often stands at the outer door wanting to go out	294/1958 (15.0)	224/1501 (14.9)	0.892	0.717–1.111	0.309
Wanders back and forth alone or with other patients	548/1956 (28.0)	464/1502 (30.9)	1.141	0.959–1.359	0.137
Hides things	398/1959 (20.3)	355/1496 (23.7)	1.193	0.985–1.444	0.071
Does not want to go to bed	475/1955 (24.3)	369/1497 (24.6)	1.032	0.868–1.227	0.720
Overactive/manic	309/1951 (15.8)	261/1493 (17.5)	1.114	0.913–1.360	0.287
<i>Aggressive behavior</i>					
<i>Hits patients/staff</i>	249/1955 (12.7)	222/1497 (14.8)	1.300	1.040–1.625	0.021
Aggressive threats (words or gestures) to patients/staff	632/1955 (32.3)	511/1495 (34.2)	1.109	0.946–1.300	0.202
Resists being dressed and undressed	610/1955 (31.2)	476/1501 (31.7)	1.175	0.978–1.413	0.085
Easily annoyed	864/1948 (44.4)	702/1486 (47.2)	1.109	0.956–1.288	0.173
Suspicious	705/1953 (36.1)	575/1488 (38.6)	1.071	0.917–1.251	0.389
Spits out drugs	328/1953 (16.8)	236/1501 (15.7)	0.942	0.763–1.164	0.582
<i>Restless behavior</i>					
Mixes up food	343/1943 (17.7)	239/1490 (16.0)	0.956	0.781–1.171	0.663
Eats soil from potted plants, cigarette ends, etc.	30/1962 (1.5)	25/1508 (1.7)	1.015	0.554–1.858	0.962
Eats others' food	123/1960 (6.3)	82/1497 (5.5)	0.884	0.636–1.229	0.463
Tears up newspaper, etc.	173/1958 (8.8)	135/1500 (9.0)	1.104	0.848–1.436	0.462
Rolls up tablecloths	341/1959 (17.4)	265/1495 (17.7)	1.034	0.845–1.266	0.744
<i>Piles up chairs, pushes tables, upends furniture</i>	135/1962 (6.9)	134/1501 (8.9)	1.388	1.046–1.842	0.023
<i>Verbally disruptive/attention-seeking behavior</i>					
Shrieks and shouts continuously	389/1959 (19.9)	307/1498 (20.5)	1.103	0.913–1.332	0.309
Constantly seeks attention of the staff	1026/1955 (52.5)	805/1490 (54.0)	0.978	0.841–1.136	0.768
Interrupted night-time sleep	1125/1944 (57.9)	907/1486 (61.0)	1.123	0.965–1.306	0.135
Seeks help	1083/1945 (55.7)	871/1489 (58.5)	1.012	0.866–1.183	0.878
Disturbed and restless	1139/1952 (58.4)	897/1486 (60.4)	1.025	0.880–1.194	0.754
Complains	787/1950 (40.4)	643/1495 (43.0)	1.144	0.984–1.330	0.081
<i>Passiveness</i>					
Does not talk spontaneously with patients/staff	829/1950 (42.5)	615/1494 (41.2)	1.067	0.898–1.268	0.461
Lacks initiative	1469/1950 (75.3)	1133/1485 (76.3)	1.139	0.941–1.377	0.181
Does not cooperate	897/1947 (46.1)	648/1484 (43.7)	1.001	0.844–1.188	0.986
<i>Hallucinatory symptoms</i>					
<i>Hallucinates visually</i>	422/1942 (21.7)	378/1489 (25.4)	1.255	1.055–1.493	0.010
Hallucinates auditorially	284/1936 (14.7)	244/1480 (16.5)	1.174	0.959–1.438	0.120
Talks to her/himself	766/1957 (39.1)	595/1486 (40.0)	1.067	0.914–1.245	0.412
<i>Depressive symptoms</i>					
Sad	935/1945 (48.1)	710/1490 (47.7)	0.937	0.807–1.088	0.395
Crying	485/1952 (24.8)	392/1490 (26.3)	1.046	0.882–1.240	0.608
Anxious and fearful	763/1943 (39.3)	548/1485 (36.9)	0.907	0.777–1.059	0.218
<i>Disoriented symptoms</i>					
Lies in other patients' beds	86/1960 (4.4)	59/1502 (3.9)	0.863	0.587–1.267	0.452
Take things from other patients' boxes and closets	170/1956 (8.7)	144/1501 (9.6)	1.166	0.893–1.523	0.259
Undresses in the dayroom	117/1959 (6.0)	103/1507 (6.8)	1.073	0.791–1.456	0.649
<i>Regressive/inappropriate behavior</i>					
Unruly in bed, throws bedclothes on the floor	332/1958 (17.0)	263/1500 (17.5)	1.042	0.853–1.272	0.686
Urinate in wastepaper baskets, wash-basins, or on the floor	168/1963 (8.6)	132/1501 (8.8)	0.957	0.724–1.264	0.756
Smears feces on clothes, furniture, etc.	207/1959 (10.6)	164/1504 (10.9)	0.968	0.756–1.240	0.796

^a For each item, the number of affirmative answers is given first, then the total number of answers to the specific question, then the percentage. Prevalences correspond to people having exhibited the behavior or symptom at least once during the 1-week observation time

^b Corrected for sex, age, ADL performance, and level of cognitive impairment

35.5 % in 2007 to 29.4 % in 2013. These results agree with those from another Swedish study where the use of long-acting benzodiazepines and propiomazine among old people decreased significantly from 2006 to 2013 [26]. However, this

study was not restricted to people with dementia. Similarly, the use of long-acting benzodiazepines, propiomazine, tramadol, antipsychotics, and anticholinergic drugs declined between 2007 and 2013 according to a recently published study

[27]. That study used the material from the same questionnaires as was used in the present study, but did not exclude those with no cognitive impairment. The use of potentially inappropriate drugs, according to six quality indicators developed by the Swedish National Board of Health and Welfare, were compared between the 2 years [20].

From 2007 to 2013, 36 out of 39 behavioral and psychological symptoms showed no change in prevalence when controlling for demographic characteristics (age, sex, cognitive level, and ADL level). The results are interesting, as the reduction in the use of psychotropic drugs was not accompanied by any concomitant large change in behavioral and psychological symptoms.

Three out of the 39 symptoms increased significantly (“hits patients/staff,” “piles up chairs/pushes tables/upends furniture,” and “hallucinates visually”). It cannot be ruled out that these changes have to do with the decrease in the use of psychotropic drugs, as well as possible changes in the threshold for initiating, e.g., antipsychotic treatment to people with cognitive impairment having visual hallucinations. However, each of these symptoms was a single item within a cluster where no other symptoms or behaviors changed significantly (for example, in the cluster of aggressive behaviors, only one out of six symptoms, “hits patients/staff,” increased in prevalence). Also, in a previous study comparing the year 2000 with year 2007, these three symptoms showed a decrease in prevalence, although not significantly for all [16]. Hence, the results should be interpreted with caution, also taking into account the risk of type 1 errors with multiple comparisons.

Because of the limited efficacy and harmful adverse effects associated with antipsychotics, anxiolytic, hypnotic, and sedative drugs, other pharmacological treatment strategies for behavioral and psychological symptoms among people with dementia have been suggested. For example, memantine, cholinesterase inhibitors, and SSRI have been shown to have positive efficacy in various studies [28, 29]. Memantine is recommended in Sweden as treatment for agitation and aggression among persons with dementia [21]. Its use increased from 3.1 % in 2007 to 8.4 % in 2013 in the present study. This might possibly indicate that memantine, instead of psychotropic drugs, is sometimes prescribed to treat behavioral and psychological symptoms. Another reason for the increase is probably that memantine was new and expensive in 2007. The increased use of memantine, however, was not accompanied by any decrease in behavioral and psychological symptoms, possibly due to its limited use. The use of cholinesterase inhibitors did not change considerably during the study time period.

In Sweden, SSRI is recommended as the first line treatment for irritability, agitation, and anxiety among individuals with dementia [21]. In our study, antidepressant drug use remained unchanged; however, there was a considerable increase between 2000 and 2007 [16] and, in 2013, almost every other

person was prescribed an antidepressant drug. Even if the side-effects are less harmful than those of antipsychotics, monitoring effects and side-effects are important since this patient group is fragile and SSRI side-effects, such as fractures and hyponatremia, might cause severe problems [7]. The prevalences of the behavioral and psychological symptoms remained largely unchanged between 2007 and 2013 among the population although the use of psychotropic drugs decreased, which might indicate that such drugs have been withdrawn from the patients where the indications for use were weak; however, we only have information about the population as a whole, not the individuals. Another possible explanation is that the staff from education and guidelines have learned to treat behavioral and psychological symptoms in a better way than earlier, for example, through non-pharmacological means. Non-pharmacological treatment is recommended as the first line treatment for behavioral and psychological symptoms among people with dementia [21], but, overall, the trends in prescribing patterns are positive and to the benefit of the persons concerned.

A strength of the present study is the large, unselected populations of the two samples, 2007 and 2013, of old people living in geriatric care settings. Also, the quality of the recorded data was generally good, based on the high response rate and how the research group has judged the quality of the collected MDDAS forms which were, in general, carefully answered.

Nevertheless, some limitations to this study have to be taken into account. The study includes people living in different geriatric care units, where the staff might have different knowledge and experience concerning behavioral and psychological symptoms among people with cognitive impairment, and the assessments of the symptoms might differ because of this. Also, staff assessments might differ between the years. The observation period was just one week and therefore reflects only the symptoms the person exhibited at that time.

We do not know any of the diagnoses within the study population, including dementia diagnoses. We do not know the causes of any individual's cognitive impairment; it might have been a dementia disorder but could also have been some other cause, and some of the persons in the study have probably been estimated false positive or false negative. These limitations should be born in mind when interpreting the results; however, as these limitations apply to both years, they should not affect the comparisons between the years in any systematic way.

The reasons for drug prescription were not recorded in this study and neither were the doses of the drugs. Another limitation is that pro re nata medication was not registered. In Swedish tradition, antipsychotics prescribed as pro re nata are uncommon; one study (Brännström J et al. (2015) unpublished data) showed that less than 5 % of the antipsychotic

prescribing was pro re nata. However, other PRN drugs such as sedatives are used to a somewhat larger extent. This should be borne in mind when interpreting the results.

Furthermore, we did not know the duration of psychotropic drug treatment, or whether any attempts at dose reduction or the use of non-pharmacological treatment of behavioral and psychological symptoms had been made. The background or other diseases of the participants were not recorded.

Conclusion

The use of antipsychotics, anxiolytic, hypnotic, and sedative drugs decreased considerably between 2007 and 2013 among old people with cognitive impairment living in geriatric care units. Despite this reduction, the prevalences of behavioral and psychological symptoms remained largely unchanged. The observed change in the prescribing of psychotropic drugs indicates a positive trend. However, as adverse effects are commonly associated with these drugs among this group of people, it is important to carefully consider any prescribing of medication and closely monitor the effects.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflicts of interest to disclose.

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