

Prevalence of Psychotropic Medication Use among German and Austrian Nursing Home Residents: A Comparison of 3 Cohorts

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Background: Despite increasing knowledge about the limited effectiveness and severe adverse effects, the prescription rate of psychotropic medications in frail elderly persons remains high. Prescriptions are mainly made to control behavioral and psychological symptoms of dementia, although factors associated with prescriptions are rarely reported. However, such information is a prerequisite to develop intervention programs aiming to safely reduce psychotropic medication in nursing home residents.

Methods: We report the comparison of cross-sectional data of psychotropic medication prescription rates from 3 large studies including nursing home residents in Germany and Austria. We aimed to compare the prevalence of (1) psychotropic medication, (2) different classes of psychotropic medication, (3) psychotropic medication administered for bedtime use, and (4) associations between prescription of psychotropics and institutional and residents' characteristics. Confidence intervals of prevalences and multiple logistic regression analyses were adjusted for cluster correlation.

Results: Data from 5336 residents in 136 long-term care facilities were included. In Austria, 74.6% (95%

CI 72.0–77.2%) of all residents had a prescription of at least one psychotropic medication compared to Germany with about 51.8% (95% CI 48.3–55.2%) and 52.4% (95% CI 48.7–56.1%). Of all antipsychotics, 66% (Austria) and 47% (Germany) were prescribed for bedtime use. Most prescriptions were conventional, low-potency antipsychotics. In all 3 studies, there was no statistically significant association between psychotropic medication prescription and nursing home characteristics. On the level of residents, consistent positive associations were found for higher level of care dependency and permanent restlessness. Consistent negative associations were found for older age and male gender.

Conclusion: Frequency of psychotropic and especially antipsychotic medication is substantial in nursing home residents in Germany and Austria. The high number of prescriptions is likely to be an indicator for a perceived or actual lack of strategies to handle behavioral and psychological symptoms of dementia. (*J Am Med Dir Assoc* 2011; ■: ■–■)

Keywords: Nursing homes; dementia; psychotropic drugs; prevalence; association

Behavioral and psychological symptoms of dementia (BPSD), such as aggression, delusions, hallucinations, and other neuropsychiatric symptoms, are highly prevalent among residents with dementia and other psychiatric disorders.¹ Managing BPSD poses a major challenge for nursing home staff

and frequently leads to distress in patients and carers,² therefore, a number of pharmacological interventions aim at treating BPSD.³ Psychotropics are the most frequently prescribed medications in nursing home residents throughout Western countries.^{4–6} Reported prevalence in nursing homes varies substantially among studies with a range of 50% to 80% of residents with at least one prescription of psychotropic medication.^{5–7} The prescription numbers are remarkable, taking into account the limited effectiveness of psychotropics for the treatment of BPSD. A recent meta-analysis suggests that atypical antipsychotics are the only effective psychotropic medications in the treatment of BPSD.³ Various adverse effects, such as sedation and extrapyramidal and anticholinergic symptoms have been reported.^{8,9} An increased risk of stroke and mortality has been discussed for both typical and atypical antipsychotics,^{10,11} although study results are contradictory.^{11–14} Benzodiazepines and

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antidepressants increase the risk of falling and fall-related fractures.⁸ Nursing home residents may have an even higher risk for adverse drug reactions because of modified age-related pharmacokinetics and pharmacodynamics, as well as multiple drug use.^{15,16} Different studies show inconsistent results regarding characteristics associated with prescription of psychotropics, such as age, gender, or cognitive impairment in nursing home residents as well as institutional characteristics.^{5,17–19} Efforts have been made to assist in choosing the most appropriate medication for the elderly. One approach is the avoidance of inappropriate medication. Several consensus-based lists are available that aim at explicitly defining potentially inappropriate medication.^{20–24} Even though explicit lists have the advantage of being easily applicable, critical judgment of a drug as potentially inappropriate medication requires detailed information not only about the frequency, dosage, and comedication, but also individual patient-related information.

In this article, we report data on prescription of psychotropics from 2 large cross-sectional studies of nursing home residents in Germany⁴ and Austria,⁷ and 1 large parallel-group effectiveness study in Germany.²⁵ We aim to compare the prevalence of (1) psychotropic medication among studies, (2) different classes of psychotropic medication, and (3) psychotropic medication administered for bedtime use, as well as (4) associations between prescription of psychotropics and institutional and residents' characteristics.

PARTICIPANTS AND METHODS

Study Design

Data on prescription of psychotropics were obtained from 3 studies performed in Germany and Austria between 2004 and 2007. In the German studies, data were collected as baseline data in a cluster-randomized controlled trial on two different fall-risk assessment strategies (referred to as PROF study)²⁵ and in a cross-sectional study on restraint use (referred to as MORIN study).⁴ In the Austrian cross-sectional study, prevalence of psychotropic medication was assessed among nursing home residents in Vorarlberg (referred to as VAB study).⁷

Study and Sample Characteristics

Nursing homes

Hamburg, the second largest city of Germany, with about 1.7 million inhabitants (including catchment area) has approximately 180 nursing homes. In MORIN, nursing homes were recruited consecutively between November 2004 and April 2005. Thirty of 79 randomly selected and invited homes participated. In PROF, 78 further nursing homes were invited between September 2005 and February 2006, of which 58 agreed to participate. Vorarlberg is an urban-rural region in the Western part of Austria with about 368,000 inhabitants. In VAB, all 50 nursing homes were invited, of which 48 agreed to participate.

Residents

In MORIN and VAB, the study population consisted of all residents living in the nursing homes on the day of baseline

data collection. In PROF, approximately 20 randomly selected residents per home fulfilling the following criteria were included: at least 70 years old, able to walk with or without assistance, and living in the nursing home for at least 3 months. Data about age, gender, legal guardian designation, falls and fractures, and residents' functional status were retrieved from residents' charts. For description of residents' functional status, the levels of care dependency were used as determined by the Austrian Federal Act on Nursing Care and the medical service of the German statutory health insurance system, respectively. Data about cognitive status were determined using the Dementia Screening Scale,²⁶ a validated 8-question screening tool for use by nursing staff, with a cutoff level of 3 or more points indicating cognitive impairment. Data about residents' BPSD were determined using an abridged version of the Cohen Mansfield Agitation Inventory.²⁷ Nurses who knew the residents well were asked to rate on 5 domains: general restlessness, verbal agitation, handling things inappropriately, negative attitude, and aggression on a 4-point Likert scale (never, once or twice, repeatedly, permanently during preceding 4 weeks). Data about residents' cognition, BPSD, and designation of a legal guardian were not assessed in PROF.

Recording of Psychotropics

In each study, data about all regularly prescribed medications were collected from residents' medication documentation sheets. Data were collected by trained medical doctors and medical students (VAB) or trained research assistants (PROF and MORIN) and coded by 2 trained researchers at the University of Hamburg according to the World Health Organization Anatomical Therapeutic Chemical Classification (ATC 2005).²⁸ Psychotropics were defined on the basis of ATC codes as antipsychotics (N05A), anxiolytics (N05B), hypnotics (N05C), and antidepressants (N06A). For each group of psychotropics, subgroups were defined (Table 1). Classification followed recommendations of experts in the field. A complete list of subgroup classifications is available from the authors. In MORIN, only data about prescribed medications were collected, whereas in PROF and VAB, dosage and time of intake (morning, noon, evening, night) were also recorded. In PROF and VAB, medications prescribed for bedtime use were defined as administration scheduled for evening only, night only, or for evening and night only.

Statistical Methods

Baseline characteristics of nursing homes and residents were described as means with standard deviations (SD), numbers, and percentages. All parameters describing psychoactive medication were considered as outcomes. Corresponding prescription prevalences and 95% confidence intervals were estimated, adjusted for cluster correlation.²⁹ Owing to the unequal number of residents per nursing home within and between studies, minimum variance weighted results were used.³⁰ Relative frequencies of night medications were evaluated descriptively without cluster adjustment. Analyses of associations between characteristics of institutions or residents and prescription of psychotropic medications were

Table 1. Prescribed Psychotropic Medication

Study	VAB (n = 1844)	PROF (n = 1125)	MORIN (n = 2367)
Residents with at least one prescription of ...			
Any psychotropic medication	74.6 (72.0–77.2)	51.8 (48.3–55.2)	52.4 (48.7–56.1)
Antipsychotic medication	45.9 (42.7–49.1)	28.4 (25.2–31.7)	28.4 (24.2–32.7)
Conventional, low potency incl. Tiaprid	31.5 (28.4–34.5)	16.8 (14.2–19.4)	17.7 (14.2–21.2)
Conventional, middle and high potency	6.4 (5.2–7.7)	2.3 (1.4–3.2)	4.0 (2.7–5.3)
Atypical	19.5 (17.2–21.8)	13.6 (11.4–15.8)	10.7 (8.5–13.0)
Anxiolytic medication	22.2 (20.0–24.5)	10.9 (9.1–12.8)	12.9 (10.6–15.1)
Benzodiazepine*	21.6 (19.3–23.9)	10.4 (8.6–12.2)	12.6 (10.4–14.9)
Other	0.9 (0.4–1.3)	0.8 (0.1–1.4)	0.3 (0.1–0.6)
Hypnotic medication	13.3 (11.3–15.4)	9.9 (8.1–11.6)	10.7 (8.9–12.5)
Benzodiazepine†	11.4 (9.6–13.3)	3.7 (2.6–4.8)	3.3 (2.6–4.1)
Zolpidem, Zopiclone	2.0 (1.4–2.6)	4.5 (3.3–5.8)	5.3 (4.0–6.7)
Other	0	1.8 (1.0–2.6)	2.5 (1.4–3.6)
Antidepressant medication	36.8 (34.1–39.6)	20.4 (17.6–23.2)	20.1 (17.9–22.3)
Selective serotonin reuptake inhibitor	30.8 (28.2–33.5)	8.8 (7.1–10.5)	6.3 (4.9–7.7)
Tricyclic	8.2 (7.0–9.5)	11.5 (9.5–13.4)	
Other	2.1 (1.3–2.9)	1.5 (0.8–2.2)	14.8 (13.1–16.5)

Values are cluster-adjusted percentages (95% confidence interval).

VAB, Austrian cross-sectional study of prevalence of psychotropic medication assessed among nursing home residents in Vorarlberg; PROF, data collected as baseline data in a German cluster-randomized controlled trial on 2 different fall-risk assessment strategies; MORIN, data collected as baseline data in a German cross-sectional study on restraint use.

* Alprazolam, bromazepam, diazepam, dikaliumclorazepat, lorazepam, oxazepam, prazepam, tetrazepam.

† Brotizolam, flunitrazepam, lormetazepam, nitrazepam, temazepam, triazolam.

investigated by multiple logistic regression analysis for each of the three studies. In searching for characteristics associated with use of psychotropics, the following characteristics of residents were considered as independent variables (in fixed variable sets): age, sex, legal guardian designated, fall during preceding 12 months, permanent restlessness, permanently handling things inappropriately, permanent negative attitude, permanent aggression, cognitive impairment, and level of care dependency. As the latter refer to two different classification systems, we have chosen a cutoff value that seems comparable in both systems. Correlation within clusters was considered by robust variance estimation.^{31,32} Cluster-adjusted odds ratios (AORs) were estimated in these models. Logistic regression models were fitted separately with regard to 5 different dependent variables: prescription of any psychotropic medication, prescription of antipsychotic anxiolytic, hypnotic, or antidepressant medication.

Cluster-adjusted multiple logistic regression analysis was performed to investigate institutional and resident characteristics associated with prescription. The level of significance was .05. Statistical analysis was performed using the statistical software packages SAS 9.2 (SAS Institute, Inc: Cary, NC) and STATA 10.0 (StataCorp LP: College Station, TX) (robust variance estimation in logistic regression models). For more detailed description of statistical methods, see the primary studies.^{4,7,25}

RESULTS

Sample Characteristics

Data from 5336 residents in 136 long-term care facilities were included. Baseline characteristics of residents and nursing homes are shown in Tables 2 and 3. Mean number of residents was higher in Hamburg compared with Vorarlberg. Compared

with PROF, there were more residents with most severe levels of care dependency in MORIN owing to different inclusion criteria. As Austria uses a different classification system, comparison between German and Austrian studies seems not feasible for description. In all studies, roughly half of residents were cognitively impaired. In Vorarlberg, BPSD prevalence was higher than in Hamburg.

Prevalence of Psychotropics

The percentage of residents with at least one prescription of psychotropic medication was higher in Vorarlberg (74.6%) than in Hamburg (51.8% and 52.4%). This was also the case for all 4 subgroups of psychotropics. In VAB, 45.9% of all residents received at least one antipsychotic medication compared with 28.4% in both PROF and MORIN. Numbers for the other subcategories are shown in Table 1.

The percentage of residents with at least one prescription of antipsychotic medication for bedtime use was 35.9% in VAB compared with 14.0% in PROF (Table 4). Of all antipsychotics, 66.1% (VAB) and 46.7% (PROF) were prescribed for bedtime use. Most prescriptions for bedtime use were conventional, low-potency antipsychotics.

The most commonly prescribed antipsychotic in VAB was prothipendyl, an azapenothiazin structurally related to the phenothiazines. The drug was prescribed in 25.9% of residents. In all but one resident, prescriptions were for bedtime use. In PROF, this medication was rarely prescribed. Here, the most often prescribed antipsychotic for bedtime use was Melperon, a conventional, low-potency butyrophenone derivate.

Residents' Characteristics Associated with Use of Psychotropic Medication

In all three studies, there were no statistically significant associations between psychotropic medication prescription and

Table 2. Baseline Characteristics of Nursing Homes

Study	VAB	PROF	MORIN
No. of nursing homes	48	58	30
No. of residents	1844	1125	2367
Residents per ...			
Nursing home (mean ± SD)	38 ± 21	104 ± 61	80 ± 51
Full-time caregiver* (mean ± SD)	2.4 ± 0.8	3.6 ± 1.9	2.4 ± 0.7
Ownership of homes:			
Private	7 (15)	16 (28)	12 (40)
Affiliated with church	3 (6)	16 (28)	6 (20)
Nonprofit	34 (71)	26 (45)	11 (37)
State owned	4 (8)	0	1 (3)
Time period of data collection	03/07–10/07	09/05–04/06	11/04–05/05
Residents' inclusion criteria	Personally assessable at baseline data collection	≥ 70 years; ambulatory; living in the nursing home for ≥ 3 months	Personally assessable at baseline data collection

Values are numbers (percentage) unless stated otherwise.

VAB, Austrian cross-sectional study of prevalence of psychotropic medication assessed among nursing home residents in Vorarlberg; PROF, data collected as baseline data in a German cluster-randomized controlled trial on 2 different fall-risk assessment strategies; MORIN, data collected as baseline data in a German cross-sectional study on restraint use.

* Number of full-time positions for nurses and nurse assistants (ie, 35–40 hours/week).

nursing home characteristics concerning proportion of residents per caregiver, proportion of trained nurses, and number of beds per nursing home (data not shown).

On the level of residents, we found different characteristics associated with prescription of psychotropic medication in multiple logistic regression models (Table 5). In all cohorts, older age and male gender were negatively associated and higher level of care dependency was positively associated with the prescription of psychotropics. Permanent restlessness was positively associated in VAB and MORIN (no data available for PROF). Designation of a legal guardian was positively associated in MORIN and not significantly

in VAB. At least one fall during the preceding 12 months was positively associated in VAB, but not in MORIN and PROF. Permanent negative attitude was positively associated in MORIN but not in VAB. Cognitive impairment was negatively associated in VAB, but not in MORIN.

Table 6 displays results on residents' characteristics associated with subgroups of psychotropic medications. For antipsychotics, consistent positive associations were found for permanent restlessness and higher level of care dependency; consistent negative associations were found for age. For anxiolytics, consistent positive associations were found for permanent negative attitude; consistent negative associations were

Table 3. Baseline Characteristics of Residents

Study	VAB (n = 1844)	PROF (n = 1125)	MORIN n = 2367
Women	1340 (73)	959 (85)	1919 (81)
Mean age, years ± SD	81 ± 12	87 ± 6	86 ± 8
Median length of residence, months (interquartile range)	29 (12–67)	26 (13–49)	29 (12–54)
Legal guardian designated	852 (46)	n.a.	1,560 (66)
Level of care dependency*			
None (level 0)	n.a.*	108 (10)	225 (10)
Considerable (level 1)	n.a.*	511 (45)	777 (33)
Severe (level 2)	n.a.*	455 (40)	942 (40)
Most severe (level 3/3+)	n.a.*	51(5)	423 (18)
Cognitive impairment (cut-off ≥ 3)	880 (48)	n.a.	1335 (56)
At least one fall during preceding 4 weeks	205 (11)	160 (14)	303 (13)
At least one fall during preceding 12 months	625 (34)	559 (51)	893 (39)
Agitated behavior at least once during preceding 4 weeks			
Restlessness	744 (41)	n.a.	847 (36)
Verbal agitation	570 (31)	n.a.	556 (24)
Handling things inappropriately	585 (32)	n.a.	588 (25)
Negative attitude	754 (42)	n.a.	727 (31)
Aggression	457 (25)	n.a.	536 (23)

Values are numbers (percentage) without missing data unless stated otherwise. Values for missing data are between 2 and 97.

VAB, Austrian cross-sectional study of prevalence of psychotropic medication assessed among nursing home residents in Vorarlberg; PROF, data collected as baseline data in a German cluster-randomized controlled trial on 2 different fall-risk assessment strategies; MORIN, data collected as baseline data in a German cross-sectional study on restraint use; n.a., not applicable.

* In Austria different "levels of care dependency" ranging from 0 to 7 are applied.

Table 4. Prescribed Antipsychotic Medication for Bedtime Use Only

Study	VAB (n = 1844)	PROF (n = 1125)
Residents with ... (%)		
At least one antipsychotic bedtime prescription	662/1844 (35.9)	158/1,125 (14.0)
At least one antipsychotic bedtime prescription/residents with antipsychotic prescription	662/843 (78.5)	158/320 (49.4)
Total number of antipsychotic bedtime prescriptions	709*	165*
Conventional, low potency (% of all antipsychotic bedtime prescriptions)	554 (78.1)	106 (64.2)
Conventional, middle and high potency (% of all antipsychotic bedtime prescriptions)	27 (3.8)	5 (3.0)
Atypical (% of all antipsychotic bedtime prescriptions)	128 (18.1)	54 (32.7)

Values are numbers (percentage) unless stated otherwise. VAB, Austrian cross-sectional study of prevalence of psychotropic medication assessed among nursing home residents in Vorarlberg; PROF, data collected as baseline data in a German cluster-randomized controlled trial on 2 different fall-risk assessment strategies.

* Missing information about application time of prescription of antipsychotics: VAB: n = 14/1086 (1.3%); PROF: n = 31/384 (8.1%).

found for permanent aggression and cognitive impairment. For hypnotics, consistent positive associations were found for permanent restlessness and permanent negative attitude; consistent negative associations were found for cognitive impairment. For antidepressants, consistent positive associations were found for female gender and permanent negative attitude; consistent negative associations were found for permanent aggression and age.

DISCUSSION

This article contributes to the evidence that psychotropic medication is still highly prevalent in nursing homes. It compares 3 large populations of nursing home residents in two European countries within comparable health care systems. In all cohorts, numbers of residents with at least one psychotropic medication were considerable, with about half of all residents in the German cohorts and three-fourths in Austria receiving at least one psychotropic medication. Nearly every third resident in Germany received an antipsychotic medication; in Austria almost every second. Particularly bedtime use of antipsychotics, with 66% of all prescribed antipsychotics

in Austria and 47% in Germany, indicates inadequate prescription practice, as antipsychotics are not considered appropriate for the treatment of sleeping disorders.³³ Recently published evidence-based recommendations emphasize behavioral and psychological interventions as highly effective in the treatment of chronic primary and secondary insomnia in older adults.^{34,35} Medication is recommended only as second-line therapy. According to the National Institutes of Health, antipsychotics as well as all other psychotropic drugs cannot be recommended because of unproven effectiveness.^{35,36} Presence of permanent restlessness and prescription of antipsychotics turned out to be consistently associated. Earlier publications indicate that prescription of antipsychotics is still widely regarded as first-line option for the treatment of BPSD.⁵⁻⁷ Various explanations are possible. Residents showing permanent restlessness are likely to induce increased workload and high levels of stress in staff members and other residents. Also, nurses and relatives might be concerned about an increased risk of falling. We could not find consistent associations between falls and antipsychotic drug prescriptions. Therefore, despite the positive association

Table 5. Characteristics Associated with Prescription of Psychotropics

Characteristics	VAB (n = 1690)	PROF (n = 1108)	MORIN (n = 2265)
Age (AOR per 1-year increase)	0.99 (0.98–0.998)*	0.96 (0.95–0.98)‡	0.98 (0.97–0.99)‡
Male	0.71 (0.54–0.93)*	0.68 (0.48–0.97)*	0.76 (0.62–0.93)†
Level of care dependency¶	1.70 (1.28–2.26)‡	1.56 (1.19–2.03)‡	1.24 (1.001–1.53)*
Legal guardian designated	1.10 (0.86–1.41)	n.a.	1.39 (1.21–1.60)‡
Fall during preceding 12 months	1.66 (1.26–2.18)‡	1.13 (0.88–1.46)	1.19 (0.96–1.48)
Permanent restlessness§	1.52 (1.30–1.76)‡	n.a.	1.39 (1.27–1.52)‡
Permanently handling things inappropriately§	0.97 (0.83–1.14)	n.a.	0.98 (0.88–1.08)
Permanent negative attitude§	1.13 (0.98–1.30)	n.a.	1.34 (1.18–1.51)‡
Permanent aggression§	0.87 (0.71–1.06)	n.a.	0.97 (0.85–1.10)
Cognitive impairment (cut-off >3)	0.70 (0.56–0.88)†	n.a.	0.89 (0.71–1.12)

Values are cluster-adjusted odds ratios (95% confidence interval). Residents excluded because of missing data: VAB: n = 154 (8%); PROF: n = 17 (2%); MORIN: n = 102 (4%).

VAB, Austrian cross-sectional study of prevalence of psychotropic medication assessed among nursing home residents in Vorarlberg; PROF, data collected as baseline data in a German cluster-randomized controlled trial on 2 different fall-risk assessment strategies; MORIN, data collected as baseline data in a German cross-sectional study on restraint use; n.a., not applicable.

* $p \leq .05$.

† $p \leq .01$.

‡ $p \leq .001$.

§ During preceding 4 weeks, AOR per 1 unit increase: VAB: ordinal 1–2–3–4, Ref. 1 5 never; MORIN: ordinal 0–1–2–3, Ref. 0 5 never.

¶ VAB: ≥ 4 vs < 4 ; PROF and MORIN: 2+3 vs 0+1.

Table 6. Characteristics Associated with Prescription of Antipsychotics, Anxiolytics, Hypnotics, and Antidepressants

Characteristics	Antipsychotic Medication	Anxiolytic Medication	Hypnotic Medication	Antidepressant Medication
Age (AOR per 1-year increase)				
VAB	0.99 (0.98–0.996) [†]	0.99 (0.98–1.001)	1.01 (0.996–1.02)	0.98 (0.97–0.99) [†]
PROF	0.96 (0.94–0.99) [†]	0.99 (0.96–1.01)	0.98 (0.95–1.01)	0.96 (0.94–0.98) [‡]
MORIN	0.99 (0.97–0.997) [*]	1.01 (0.99–1.03)	0.99 (0.97–1.01)	0.96 (0.95–0.98) [‡]
Male gender				
VAB	1.05 (0.87–1.28)	0.62 (0.47–0.82) [‡]	1.20 (0.87–1.65)	0.60 (0.45–0.80) [‡]
PROF	0.97 (0.65–1.44)	0.52 (0.28–0.99) [*]	0.67 (0.35–1.27)	0.44 (0.26–0.73) [†]
MORIN	1.19 (0.87–1.63)	0.73 (0.49–1.07)	0.72 (0.51–1.01)	0.57 (0.42–0.75) [‡]
Level of care dependency[§]				
VAB	1.58 (1.16–2.14) [†]	0.93 (0.70–1.24)	1.12 (0.83–1.49)	1.47 (1.14–1.90) [†]
PROF	2.52 (1.88–3.38) [‡]	0.92 (0.62–1.38)	0.81 (0.57–1.15)	1.03 (0.75–1.41)
MORIN	1.40 (1.08–1.82) [*]	1.16 (0.89–1.50)	1.06 (0.72–1.55)	1.06 (0.80–1.40)
Legal guardian designated				
VAB	1.52 (1.16–2.00) [†]	1.04 (0.80–1.36)	0.71 (0.50–1.01)	0.83 (0.68–1.02)
MORIN	1.43 (1.07–1.91) [*]	0.95 (0.66–1.37)	0.98 (0.67–1.43)	1.39 (1.15–1.68) [‡]
Fall during preceding 12 months				
VAB	1.12 (0.91–1.38)	1.18 (0.95–1.48)	1.04 (0.72–1.49)	1.35 (1.07–1.70) [*]
PROF	1.34 (0.99–1.81)	0.90 (0.64–1.27)	1.12 (0.77–1.63)	0.98 (0.71–1.35)
MORIN	0.87 (0.74–1.03)	0.98 (0.70–1.38)	1.18 (0.82–1.70)	1.27 (1.01–1.60) [*]
Permanent restlessness during preceding 4 weeks[¶]				
VAB	1.47 (1.33–1.64) [‡]	1.23 (1.09–1.39) [‡]	1.29 (1.11–1.49) [‡]	1.01 (0.88–1.17)
MORIN	1.59 (1.43–1.77) [‡]	1.10 (0.98–1.24)	1.26 (1.09–1.45) [‡]	1.02 (0.90–1.16)
Permanently handling things inappropriately during preceding 4 weeks[¶]				
VAB	1.11 (0.96–1.28)	1.03 (0.89–1.21)	0.93 (0.77–1.13)	0.83 (0.73–0.95) [†]
MORIN	0.95 (0.86–1.04)	1.10 (0.95–1.28)	1.07 (0.88–1.29)	0.93 (0.82–1.05)
Permanent negative attitude during preceding 4 weeks[¶]				
VAB	0.96 (0.87–1.06)	1.24 (1.08–1.42) [†]	1.14 (1.001–1.30) [*]	1.33 (1.20–1.48) [‡]
MORIN	1.17 (1.04–1.32) [†]	1.23 (1.05–1.44) [*]	1.29 (1.10–1.52) [†]	1.36 (1.19–1.55) [‡]
Permanent aggression during preceding 4 weeks[¶]				
VAB	1.01 (0.84–1.21)	0.80 (0.66–0.97) [*]	1.14 (0.91–1.43)	0.85 (0.73–0.99) [*]
MORIN	1.17 (1.04–1.33) [*]	0.82 (0.69–0.99) [*]	0.78 (0.64–0.96) [*]	0.84 (0.73–0.96) [†]
Cognitive impairment				
VAB	0.94 (0.70–1.25)	0.61 (0.47–0.79) [‡]	0.59 (0.40–0.88) [†]	0.81 (0.63–1.04)
MORIN	1.90 (1.48–2.43) [‡]	0.60 (0.42–0.85) [†]	0.54 (0.39–0.74) [‡]	0.80 (0.63–1.03)

Values are cluster-adjusted odds ratios (95% confidence interval). Residents excluded because of missing data: VAB: n = 154, PROF: n = 17, MORIN n = 102.

AOR, adjusted odds ratio; VAB, Austrian cross-sectional study of prevalence of psychotropic medication assessed among nursing home residents in Vorarlberg; PROF, data collected as baseline data in a German cluster-randomized controlled trial on 2 different fall-risk assessment strategies; MORIN, data collected as baseline data in a German cross-sectional study on restraint use.

* $p \leq .05$.

† $p \leq .01$.

‡ $p \leq .001$.

§ VAB: ≥ 4 , Ref. 0–3, MORIN, PROF: 2,3, Ref. 0,1.

¶ AOR per 1 unit increase: VAB: ordinal 1–2–3–4, Ref. 1 = never; MORIN: ordinal 0–1–2–3, Ref. 0 = never.

observed in the Austrian study, we cannot conclude that psychotropic drug prescriptions lead to falls or vice versa. A lack of knowledge about the limited effectiveness of psychotropic medication and about skills to manage BPSD, in both physicians and nurses, may further increase prescription.

Typical antipsychotics were prescribed considerably more often than atypical antipsychotics. Despite recent publications about typical antipsychotics' higher rates of side effects and moderate effectiveness in treating BPSD,^{3,8,9} a shift in prescription practice from typical to atypical antipsychotics has not yet taken place in Germany and Austria. There is no objective reason, why low-potency antipsychotics are still predominantly prescribed.

Presence of a legal guardian in MORIN was positively associated with prescription of psychotropics, whereas no

association was found in VAB. This might be a result of different roles of legal guardians in Austria and Germany. Whereas in Austria legal guardians are not involved in decisions on medical treatment, in Germany they are. In both countries, legal obligations for the use of chemical restraints exist and law allows the application of chemical restraints only in case of a person's behavior leading to life-threatening danger for the person or others. As residents' restlessness and negative attitudes are not appropriate indications, it seems very likely that antipsychotics are often misused as chemical restraints. Despite the legal obligation, there is no factual legal control mechanism in Germany to adequately regulate prescription of antipsychotics. As long as drugs are prescribed for therapeutic use, there are no legal barriers. In Austria, nursing homes have to report chemical restraints according to a recent law, the Austrian

"Heimaufenthaltsgesetz,"³⁷ but as we have formerly reported, there are only a few reports of chemical restraints and these are mostly invalid because of problems of reporting criteria and quality of documentation.³⁸

We did not find an impact of nurse staffing levels and proportion of trained nurses on psychotropic drug prescriptions, even though levels of residents per caregiver varied among nursing homes. Despite the important role of nursing staff in the decision-making process in antipsychotic drug prescription, there must be other less obvious but powerful factors influencing prescribing practice.

Also, we could not consistently show associations between nursing home characteristics and prescription rates. Thus, we assume that the organizational "culture" plays an important role in Austria and Germany. In both countries, medical and nursing guidelines on dementia care strongly emphasize nonpharmacological approaches before considering psychotropic drugs.^{39,40} A change of culture will not be easy as clinicians might consider nonpharmacological approaches as staff and time demanding. Therefore, nursing homes with a culture of frequent psychotropic drug prescription might be resistant toward best evidence. Accordingly, Rochon et al¹⁷ found that high prescription rates strongly predict future psychotropic drug prescriptions. Surely in the future, nursing homes have to make an effort to overcome psychotropic prescription malpractice. Otherwise, they will have to struggle with strong criticism, as expressed by Ballard and Cream,⁴¹ who have claimed that current practice suggests "therapeutic impotence" and ignorance or lack of skills concerning the implementation of nonpharmacological alternatives. Nursing home directors may play an important role in promoting cultural changes initiating staff training aiming to change nursing homes' philosophy or culture of care and nurses' attitudes toward the use of psychotropic drugs or nonpharmacological alternatives.

The influence of physician training on psychotropic drug prescription remains unknown, as we did not assess whether prescribing physicians were specially trained. In Germany, most drugs for nursing home residents are prescribed by general practitioners, with psychotropic drugs also regularly prescribed by neurologists or psychiatrists.^{42,43} In Austria, neurological or psychiatric consultants are rarely involved in the medical care of nursing home residents and there is no special physicians training in geriatric medicine. Available training only comprises an 8-weekend course, whereas in Germany most geriatricians are hospital and rehabilitation based.⁴³

It remains unclear whether finances influence psychotropic drug prescription. Drugs seem to be the easier and cheaper option, as nursing homes or residents do not have to pay for psychotropic drugs. Costs are covered by the mandatory health insurance. In contrast, psychosocial interventions are considered part of residents' regular nursing care without claim for refund. In Germany and Austria, no regulations comparable to OBRA,⁴⁴ requiring periodic review of psychotropic medications, exist. Since the beginning of 2011, every German nursing home will be evaluated yearly by the supervisory body of the health insurance. However, assessment does not

include psychotropic drug prescriptions so far.⁴⁵ In Austria, there is no supervision. Regular drug reviews might go along with fewer prescriptions of psychotropic drugs. However, the experiences with OBRA raise at least some doubt, as after an initial decline, levels of atypical antipsychotic drug prescriptions currently exceed pre-OBRA levels.¹⁷

Our study has limitations. Residents' diagnoses were not assessed because of data protection issues. Therefore, we are unable to evaluate appropriateness of indications for prescriptions of psychotropics. BPSD and cognitive status were judged by nurses' proxy rating, possibly limiting validity. Recruitment strategies differed between studies. In VAB a statewide survey was performed, whereas in MORIN and PROF many nursing homes approached during the recruitment process declined to participate. Therefore, in MORIN and PROF the study centers are somewhat self-selected. In PROF, only ambulatory residents were included, resulting in slight differences between populations. The main strength of this comparison study is the large number of residents included.

In conclusion, the substantial rate of psychotropic medication prescription indicates a perceived or actual lack of strategies to handle BPSD. Effective programs aiming to reduce prescription of psychotropics in nursing homes are warranted. Our currently conducted Cochrane Review on "Psychosocial interventions for reducing antipsychotic medication in care home residents" indicates the urgent need for high-quality studies.⁴⁶

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