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a longitudinal study**

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Psychotropic drug use in residents with dementia living in small-scaled special care facilities; a longitudinal study

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ABSTRACT

Objectives: Over the past decade, a trend has been noticed in the Netherlands to replace large-scaled special care units (SCUs) caring for 20–30 residents with dementia by small-scaled SCUs caring for up to 8 residents. Systematic evaluations, however, have yielded a differentiated picture of the effects. As the impact on psychotropic drug use has hardly been addressed thus far, we examined the (potential) impact of psychotropic drug use when moving residents with dementia from large-scaled to small-scaled SCUs.

Methods: We conducted a non-randomized, controlled study with a six-month follow-up. Among 145 residents with dementia living in large-scaled SCUs for dementia caring for 20–30 residents per unit, a total of 77 residents were moved to small-scaled SCUs caring for up to 8 residents per unit. Psychotropic drug use, classified according to the Anatomical Therapeutic Chemical Classification (ATC) system was monitored at 2 months before replacement, as well as at 3 and 6 months thereafter. Repeated measures ANOVAs were conducted for the mean Defined Daily Doses (DDDs) of both groups.

Results: No significant differences between both groups in psychotropic medication use were found over a period of 8 months.

Conclusion: Prescription of psychotropic drugs does not change after a transfer from a large-scaled SCU to a small-scaled SCU of patients with moderate to severe dementia.
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Introduction

Dementia encompasses a group of neurodegenerative diseases which primarily affects the cognitive functions (Gale, Acar, & Daffner, 2018). In greying societies, dementia is one of the main challenges for the sustainability of Western health care systems (Gerlach & Kales, 2018). While cognitive deficits are the core symptoms of dementia, non-cognitive symptoms (sometimes referred to as Behavioural and Psychological Symptoms of Dementia (BPSD) (Haaksma et al., 2017) like agitation, aggression, depression or apathy (Gerlach & Kales, 2018; Legere, McNeill, Martin, Acorn, & An, 2018; Dutcher et al., 2014) are often the primary reason for admission to a residential care facility (Toot, Swinson, Devine, Challis, & Orrell, 2017).

Residents with severe dementia who need residential care are generally placed in Special Care Units (SCUs) (Kok, Berg, & Scherder, 2013). These units have been developed to deal with the cognitive as well as the non-cognitive symptoms of dementia. Polypharmacy, however, is rather the rule than the exception among residents of these SCUs (Walsh et al., 2016; Kröger et al., 2015). To manage chronic somatic diseases like respiratory and alimentary illness (Ivanova et al., 2018) as well as BPSD simultaneously results in complex medication regimes, containing, among others, psychotropic drugs (McGrattan, Ryan, Barry, & Hughes, 2017). Psychotropic drug use is common in nursing homes, with reported prevalence rates as high as 68% and 65% in

Western Europe and the Netherlands, respectively (Smeets et al., 2017; Janus, van Manen, IJzerman, & Zuidema, 2016).

Whether these high prescription rates in residents with dementia are justified is highly debated (Parsons, 2017; Kim, Brown, Ding, Kiel, & Berry, 2011), as psychotropic drugs may induce falls (van Strien, Koek, van Marum, & Emmelot-Vonk, 2013; Ham et al., 2014), worsens cognitive functioning (Vigen, 2011) and increases mortality rates (Ralph & Espinet, 2017; McMaster, Fielding, Lim, Moyle, & Beattie, 2017; Gareri, De Fazio, Manfredi, & De Sarro, 2014; Gardette et al., 2012; Huybrechts et al., 2012). Moreover, in case of BPSD psychotropic drugs are often prescribed 'off-label' (Tible, Riese, Savaskan, & von Gunten, 2017; Allers, Dörks, Schmiemann, & Hoffmann, 2017). For example, anti-psychotics are not approved for, but often prescribed for insomnia (Bjerre et al., 2018) or agitation (Masopust, Protopopová, Vališ, Pavelek, & Klímová, 2018), while their risk-benefit ratio is questionable (Bonner et al., 2015) because of the adverse effects on for example cognition and higher mortality (Prentice & Wright, 2014; Vigen, Maddox, & Allen, 2012; Kohen, Lester, & Lam, 2010; Eggermont, de Vries, & Scherder, 2009; Madhusoodanan & Shah, 2008; Meeks & Jeste, 2008).

Analgesics can show adverse neurological and psychiatric reactions (Erdal et al., 2018), psycholeptics can induce higher fall rates (Kosse, de Groot, Vuillerme, Hortobágyi, & Lamoth, 2015), anxiolitics, hypnotics & sedatives and anti-

depressants can increase the risk of developing cognitive disturbances (Wang et al., 2018; Lee, Jung, Choi, Shin, & Lee, 2018; Picton, Marino, & Nealy, 2018). Besides specific side effects, every additional psychotropic drug increases the risks of drug-drug interactions (Bogetti-Salazar, González-González, Juárez-Cedillo, Sánchez-García, & Rosas-Carrasco, 2016). Consequently, guidelines generally advise to reduce psychotropic drug use as much as possible in residents with dementia and consider non-pharmacological strategies as the first choice for BPSD (Ralph & Espinet, 2017; McMaster et al., 2017).

The emphasis on environmental management as a first step in the treatment of BPSD (Tible et al., 2017; Gauthier et al., 2010; Hort et al., 2010) has stimulated the development of different types of SCUs. In the Netherlands, there is a trend to replace large-scaled SCUs with up to 20–30 residents by small-scaled (homelike) SCUs with about 8 residents per ward. Large-scaled SCUs have centrally coordinated (social) activities and food supply (Verbeek et al., 2010; Verbeek et al., 2009). In contrast, in small-scaled SCUs normal life is emphasized by the use of person-centered care (Roën et al., 2017). For example, residents participate in household activities and meals are prepared by the residents and personnel (Ausserhofer et al., 2016). Small-scaled SCUs have been developed to improve quality of life for residents with dementia (Cadigan, Grabowski, Givens, & Mitchell, 2012; Gruneir, Lapane, Miller, & Mor, 2008); improvement of pain treatment and a decrease in the use of anti-psychotics and physical restraints.

The objective of the present study was to explore changes in psychotropic drug use among residents with dementia when moving from large-scaled to small-scaled SCUs and to compare this with residents who remained in large-scaled SCUs. We hypothesized that psychotropic drugs use would decline when residents move from a large-scaled to a small-scaled SCUs due to a more personalized care (Haddad et al., 2018; Zuidema, de Jonghe, Verhey, & Koopmans, 2010; Lai, Yeung, Mok, & Chi, 2009).

Methods

Study design

A non-randomized, controlled field study with a six-month follow-up in two large nursing home facilities. Eligible residents were all residents with an established medical diagnosis of dementia living in a large-scaled SCUs ($n = 186$). Residents of these large-scaled units with up to 20–30 residents shared bedrooms and one living room per unit. For organizational reasons, all residents of one nursing home ($n = 83$) were moved to a new facility with small-scaled units (7–8 residents) and single bedrooms (intervention group). The nursing staff of the intervention group received a 9-hour training program focused on psychosocial interventions (Scales, Zimmerman, & Miller, 2018). Residents who remained in the large-scaled SCUs were considered the control group ($n = 103$).

Participants (see below) resident were assessed 2 months before replacement (baseline assessment) as well as at 3 and 6 months thereafter. For details of study methodology, we refer to previous papers this study (Kok, van

Heuvelen, Berg, & Scherder, 2016; Kok, Berg, Blankevoort, & Scherder, 2017; Kok, Nielen, & Scherder, 2018).

The study has been approved by the Ethical Commission of the department Psychology of the University of Groningen (registration number PPO008093) and was retrospectively registered in the primary clinical trial registry Current Controlled Trials ISRCTN11151241 with registration date: 21 June 2017. The study follows the principles of the Declaration of Helsinki. Because of the severity of cognitive problems of the residents, proxy consent was needed; legal representatives of the residents were asked for written permission.

Resident characteristics

The legal representatives of 145/186 (78.0%) eligible residents gave informed consent for the study, i.e. 77/83 (92.8%) of residents moving to small-scaled SCUs and 68/103 (66.0%) residents remaining in large-scaled SCUs (see Figure 1).

Baseline characteristics are presented in Table 1, stratified by group status. The intervention group and control group did not differ with respect to age, sex, education level, global cognitive functioning (sMMSE), mood and behavioural aspects (Kok et al., 2017) at baseline. Participants had a mean age of 83 years, a mean education level similar to primary school (Verhage, 1964) and 70% were female. The mean standardized Mini Mental State Examination (sMMSE) score as 8.6, indicative of severely impaired cognitive functioning (Eefsting, Boersma, van Tilburg, & van den Brink, 1997; Molloy, Alemayehu, & Roberts, 1991; Folstein, Folstein, & McHugh, 1975).

Within the intervention group, most residents were diagnosed with an Alzheimer's disease (31%) in the medical file, 23% with dementia not otherwise specified (nos), 8% with mixed dementia and 7% with vascular dementia. The group 'nos' presumably contains a large amount of residents with the most common type of dementia; Alzheimer's disease (Niu, Álvarez-Álvarez, Guillén-Grima, & Aguinaga-Ontoso, 2017).

Materials

Psychotropic drug use was extracted from the medical record of the residents at baseline as well as 3 and 6-month follow-up. All psychotropic drugs were classified according to the Anatomical Therapeutic Chemical Classification (ATC) system (Ronning, Blix, Harbø, & Strøm, 2000) of the World Health Organization (WHOC, 2016). The ATC classification distinguishes five main classes for drugs affecting the nervous system, i.e. analgesics (N02), antiepileptics (N03), anti-Parkinson (N04), psycholeptics (N05) and psychoanaleptics (N06). The subgroup 'psycholeptics' are subdivided in anti-psychotics (N05A), anxiolytics (N05B) and hypnotics & sedatives (N05C) and the psychoanaleptics in antidepressants (N06B) and anti-dementia drugs (N06D). In order to compare drug use between both groups over time, dosages of individual drugs were converted into Defined Daily Doses (DDDs, see Table 3). An DDD is 'the assumed maintenance dose per day for a drug used for its main indication in adults' (cite, ATC/DDD index WHO website December 2017).

Figure 1. Participant flow chart.

Subsequently, we calculated the average dosage (in DDD) given to each resident per ATC (sub)class. Nonetheless, the recommended dosages for older persons with dementia may differ from healthy adults (Davies & O'Mahony, 2015), we also report dosages in resident milligrams (mean and standard deviation) (see Table 2). Furthermore, medication (sub)classes with less data than 6 cases in both groups were excluded from between group comparisons.

Statistical analysis

Repeated measures multivariate analyses of variance (MANOVA) were used to analyse changes in psychotropic drug use over time. Group status (intervention versus control) was included as a between subject factor, with separate analyses for each (sub) class of psychotropic drugs (in DDD) the dependent variable. The time by group interaction terms were included to evaluate group differences over time. Effect sizes were expressed as Eta squared (95% CI) of which .14 and higher is considered large, .06 to .13 moderate and .01 to .05 small (Robey, 2004).

All analyses were conducted in SPSS version 25. P-values less than .05 were considered statistically significant.

Results

Psychotropic drug use at baseline

In total, 84.3% of the residents used any kind of psychotropic drugs with no difference between the two groups ($t(111) = 0.607$, $p = .55$). In both groups the prescription of anti-dementia drugs was nihil.

The two groups only differed at baseline with respect to the use of anti-epileptics ($p = .008$). In the control group, residents were prescribed more anti-epileptics. However, with a low number of residents compared (total $n = 8$).

In the intervention group, the dosages of analgesics, anti-Parkinson drugs, anti-psychotics, anxiolytics and anti-depressants were relatively low (<1 DD). Anti-epileptics and hypnotics & sedatives were used above one DDD.

In the control group, the dosages of analgesics, anti-Parkinson drugs, anti-psychotics, anxiolytics and hypnotics & sedatives were below one DDD and above one DDD for anti-epileptics and anti-depressants.

Medication use over time (DDD)

Table 3 presents the dosages of the psychotropic drug classes as analyzed by MANOVA. We found no significant difference over time when the dosages of all central nervous system medication categories are combined.

Effect-sizes of an increase in drug use over time in the intervention group compared to control group were large for hypnotics & sedatives, moderate for analgesics, anti-Parkinson, anxiolytics, and total psycholeptics, and were small for anti-psychotics and total central nervous system medication.

The control group showed an increased psychotropic drug use over time compared to the intervention group with respect to anti-epileptics (large effect size), anti-depressants (large effect sizes), and total use of psychoanal-
leptics (moderate effect-size).

Table 1. Resident characteristics at baseline.

	Small scaled homelike group, mean (SD) ^a	Regular care group, mean (SD) ^a	Test statistic [*]
Sample size (<i>n</i>)	77	68	
Age	83.4 (6.1)	82.8 (7.6)	.611 ¹
Gender			.671 ¹
Male	24 (31%)	19 (28%)	.674 ¹
Female	53 (69%)	49 (72%)	
Education ^b	3.3 (1.4)	3.3 (1.4)	.907 ²
Global cognitive function ^c	8.7 (6.5)	8.4 (6.5)	.802 ¹
Mood ^d	1.3 (1.2)	1.0 (0.8)	.187 ¹
Behavioural aspects			
Restlessness	8.22 (2.90)	9.03 (3.82)	.027 ³
Repetitive behaviour	8.35 (3.64)	8.07 (3.04)	.001 ³
Dementia type			
Alzheimer's dementia	24 (31%)	13 (19%)	
Mixed dementia	6 (8%)	11 (16%)	
Vascular dementia	5 (7%)	8 (12%)	
Lewy body dementia	1 (1%)	1 (2%)	
Frontotemporal dementia	0 (0%)	4 (6%)	
Dementia nos	18 (23%)	26 (38%)	
Other ^e	4 (5%)	1 (2%)	
DDD nervous system			
Analgetics	0.80 (0.71)	0.51 (0.63)	1.86 ¹
Antiepileptics	1.00 (1.89)	5.75 (0.35)	−3.40 ¹
Anti-Parkinson	0.64 (0.37)	0.54 (0.20)	0.35 ¹
Psycholeptics	0.35 (0.36)	0.25 (0.29)	1.10 ¹
Anti-psychotics	0.39 (0.17)	0.31 (0.20)	0.79 ¹
Anxiolitics	1.48 (1.32)	0.54 (0.36)	2.10 ¹
Hypnotics & sedatives	0.94 (0.53)	1.17 (0.51)	−1.20 ¹
Psychoanalgetics			
Antidepressants	1.47 (1.53)	1.30 (1.43)	0.61 ¹
Total CNS medication	81.2%	87.7%	

DDD, defined daily dose.

^aUnless indicated otherwise.^bConform Verhage [26], Low = category 1 + 2 + 3^b, Middle = category 4 + 5^b, High = category 6 + 7^b.^cSMSSE, Standardized Mini Mental State Examination;^dGDS, Geriatric Depression Scale;^eParkinson dementia, alcohol dementia, Korsakov, semantic dementia, corticobasal degeneration.^{*}p < 0.001;¹t-test,²pearson chi-square test,³eta square.

Discussion

Confirming high rates of psychotropic drugs (84%) among 145 older nursing home residents with severe dementia, our hypothesis that replacement of residents from large- to small-scaled SCUs would result in a reduction of psychotropic drugs, had to be rejected. In contrast, we found a slight increase (trend, Table 3) in overall psychotropic drug use over time in small versus large-scaled SCUs. In other words, the assumed positive effects on the mental well-being of residents with dementia at a small-scaled SCU (Kok et al., 2013), even when staff receive additional training as done in our study, is not reflected in a reduction of psychotropic drug use. These findings contrast with studies showing that educational programs directed at staff level (Richter, Meyer, Möhler, & Köpke, 2012) as well as cultural or process changes (Birkenhäger-Gillesse et al., 2018), do reduce prescription rates of psychotropic drugs.

The high rate of psychotropic drug use points to severe mental health issues in the SCUs for residents with dementia and places these residents at high risks of potential drug-drug interactions (Axmon, Kristensson, Ahlström, & Midlöv, 2017; Pasqualetti, Tognini, Calsolaro, Polini, & Monzani, 2015). Although, we found no differences between both group at the total level of psychotropic drug use, specific findings with respect to individual drug classes merit some attention.

In line with other studies, the overall consumption of analgesics and anti-psychotic drugs is high (Tampi, Hassell,

Joshi, & Tampi, 2017; Shah, Carey, Harris, DeWilde, & Cook, 2011) and did not change over time. As cultural and environmental factors are associated with the prescription rates of these drug (van der Putten, Wetzels, Bor, Zuidema, & Koopmans, 2014) and psychosocial interventions are effective for reducing the use of antipsychotics (Birkenhäger-Gillesse et al., 2018), we expected a reduction of anti-psychotic drugs among residents moving to a small-scaled SCU. On the one hand, our training program for psychosocial interventions may have been too limited. On the other hand, we cannot exclude the possibility that in small living groups other behavioural problems arises for which antipsychotic drugs are prescribed or that non-reduction is simple due to reluctance of physicians fearing recurrence of BPSD. Further, it is possible that the transfer itself caused stress among the residents, as a result of which there was no reduction in the prescription of medication.

Interestingly, a closer look at the level of psycholeptic drug use shows an increase of the prescription rates among residents transferred to small-scaled SCUs (moderate effect size). Psycholeptic drugs share a calming effect upon persons, which may point to a higher prevalence and treatment level of agitation over time in small-scaled SCUs. This might be explained by the fact that the ratio between residents and nursing staff remained similar, with the bottom line that nurses at the small-scaled SCUs sometimes have to work alone in contrast to nurses at large-scaled SCUs and are thereby less flexible in caring for agitated individuals.

Table 2. Medication use in milligrams for both groups conform ATC, mean, standard deviation.

	Small scaled homelike group (n = 77)			Control group (n = 68)		
	T1 ^b Mean (SD)	T2 ^c Mean (SD)	T3 ^d Mean (SD)	T1 ^b Mean (SD)	T2 ^c Mean (SD)	T3 ^d Mean (SD)
Fentanyl	3.5 (0.0)	3.5 (0.0)	2.9 (0.0)	0.9 (0.5)	0.77 (0.3)	0.9 (0.5)
Morfine	10.0 (0.0)	0.0	0.0	12.0 (11.3)	15.0 (7.1)	15.0 (7.1)
Tramadol	166.7 (28.7)			0.0		
Analgetica?	166.7 (28.9)	183.3 (28.9)	187.5 (85.4)	0.0	0.0	0.0
Acetylsalicylzuur	80.0 (0.0)	80.0 (0.0)	80.0 (0.0)	117.8 (192.6)	128.3 (217.9)	77.4 (11.5)
Carbasalaatcalcium	93.0 (19.6)	92.2 (21.9)	84.5 (28.7)	89.7 (25.3)	100.0 (0.0)	100.0 (0.0)
Paracetamol	2578.1 (1008.9)	2369.6 (855.7)	2448.3 (899.9)	2500.0 (829.2)	2538.5 (967.4)	2321.4 (1076.1)
Carbamazepine	465.0 (157.8)	420.0 (159.7)	420.0 (173.2)	0.0	0.0	0.0
Valproïnezuur	500.0 (173.2)	600.0 (0.0)	600.0 (0.0)	0.0	0.0	0.0
Fenobarbital	0.0	0.0	0.0	150.0 (0.0)	150.0 (0.0)	150.0 (0.0)
Fenytoïne	300.0 (0.0)	300.0 (0.0)	300.0 (0.0)	250.0 (70.7)	300.0 (0.0)	300.0 (0.0)
Levetiracetam	750.0 (353.6)	730.0 (353.6)	730.0 (353.6)	0.0	0.0	0.0
Trihexyfenidyl	0.0	0.0	0.0	4.0 (0.0)	4.0 (0.0)	4.0 (0.0)
Bipirideen	3.0 (1.4)	3.0 (1.4)	3.0 (1.4)	0.0	0.0	0.0
Levodopa	387.5 (243.7)	350.0 (227.9)	350.0 (227.9)	406.3 (0.0)	406.3 (0.0)	0.0
Haloperidol	3.6 (2.8)	3.9 (2.3)	4.0 (1.6)	1.8 (0.9)	2.1 (1.5)	1.6 (0.6)
Pipamperon	26.0 (13.4)	30.0 (14.1)	32.0 (16.4)	27.5 (29.6)	23.3 (12.3)	22.7 (14.2)
Zuclopentixol	4.0 (0.0)	6.0 (2.8)	4.0 (0.0)	18.0 (8.5)	10.5 (2.6)	12.0 (0.0)
Clozapine	0.0	0.0	0.0	25.0 (0.0)	0.0	0.0
Olanzapine	7.5 (3.5)	5.0 (0.0)	5.0 (0.0)	8.8 (8.8)	10.0 (7.1)	10.0 (7.1)
Quetiapine	75.0 (62.9)	62.6 (44.0)	56.3 (47.3)	68.8(87.5)	83.3 (101.0)	75.0 (0.0)
Risperidone	3.0 (0.0)	3.0 (0.0)	3.0 (1.0)	1.3 (0.8)	1.0 (0.6)	1.0 (0.6)
Lithiumcarbonate	400.0 (0.0)	400.0 (0.0)	400.0 (0.0)	0.0	0.0	0.0
Perfenazine	16.0 (0.0)	16.0 (0.0)	16.0 (0.0)	0.0	0.0	0.0
Amitryptiline	50.0 (20.4)	50.0 (20.4)	50.0 (20.4)	0.0	0.0	0.0
Oxazepam	19.3 (8.4)	16.3 (9.5)	14.0 (9.6)	16.3 (10.3)	15.0 (10.0)	15.0 (12.4)
Hydrozine	0.0	0.0	0.0	15.0 (0.0)	0.0	0.0
Temazepam	15.0 (5.8)	20.0 (0.0)	13.3 (5.8)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)
Midazolam	5.0 (0.0)	15.0 (0.0)	15.0 (0.0)	5.7 (5.1)	6.4 (5.4)	6.1 (6.7)
Melatonine	4.0 (2.0)	4.0 (2.0)	3.7 (2.3)	1.6 (0.8)	1.5 (0.9)	3.5 (2.1)
Zolpidem	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	0.0	0.0	0.0
Zopiclon	7.5 (0.0)	0.0	0.0	0.0	0.0	0.0
Nortryptiline	0.0	0.0	0.0	32.5 (0.0)	10.0 (0.0)	10.0 (0.0)
Citalopram	17.6 (10.3)	17.0 (10.3)	17.3 (9.7)	23.3 (10.5)	22.8 (12.4)	28.0 (10.3)
Paroxetine	0.0	0.0	0.0	30.0 (0.0)	30.0 (0.0)	30.0 (0.0)
Venlafaxin	150.0 (0.0)	0.0	0.0	150.0 (0.0)	150.0 (0.0)	0.0
Mirtazepine	15.0 (0.0)	15.0 (0.0)	15.0 (0.0)	30.0 (0.0)	30.0 (0.0)	30.0 (0.0)
Trazodon	150.0 (0.0)	150.0 (0.0)	100.0 (0.0)	0.0	0.0	0.0
Fluvoxamine	0.0	200.0 (0.0)	200.0 (0.0)	0.0	0.0	0.0
Rivastigmine	24.0 (0.0)	24.0 (0.0)	0.0	9.5 (0.0)	0.0	0.0

^a<6 residents in both group,^b2 months before transfer,^c3 months after transfer,^d6 months after transfer.

Another interesting point is increased use of psycho-analeptics at a group level. Residents in the large-scaled SCUs showed a, non-significant, higher prescription level over time with moderate effect size. This effect was driven by the use of anti-depressants (high effect-size) and might implicate a higher incidence of mood disturbances in large-scaled SCUs as the prevalence of mood disturbances did not differ at baseline between the two groups.

Finally, the last possible clinically relevant finding is the increased use of analgesics after moving to small-scaled SCUs compared to large-scaled SCUs (moderate effect size, total $n > 10$). In residents with dementia, the experience of pain is strongly associated with inappropriate behaviour (Lukas et al., 2013; Onder et al., 2012) and lower quality of life (Rostad et al., 2017). Our findings might implicate that pain as a cause of BPSD is better recognized and appropriately treated in small-scaled SCUs.

Strength and weaknesses

For proper interpretation of our results, some methodological issues should be considered. First, our sample size is relatively small. Although resident numbers are sufficient to

monitor overall psychotropic drug use and the main classes, analyses of more specific drug classes are under-powered. Nonetheless, also pilot data remain highly relevant acknowledging the scarcity of longitudinal studies in this field.

Secondly, the study was not randomized. However, the two groups did not differ at baseline. Moreover, as the decision to move residents from large-scaled to small-scaled SCUs was made at the management level of one facility, we consider bias by indication, the main risk of non-randomized intervention studies, unlikely.

Finally, the ATC system of the WHO (Ronning et al., 2000) classifies the relative potency of drugs in DDD, but side effects generally not parallel DDDs. A system that classifies the sedative and analgesic drug effects therefore might have led to different results (Sloane, Ivey, Roth, Roederer, & Williams, 2008; Linjakumpu et al., 2003).

The findings suggest that further research on care facility in relation to medication use is warranted, over a longer period of time with larger groups based on the effect sizes found. Moreover, the impact of environmental factors on medication use should also be taken into account in further research.

Table 3. Medication use in defined daily dose (DDD) for both groups conform ATC, mean, standard deviation, CI.

	Small scaled homelike group (n = 77)						Large scaled SCU (n = 68)					
	T1			T2			T1			T2		
	Mean (SD)	95% CI		Mean (SD)	95% CI		Mean (SD)	95% CI		Mean (SD)	95% CI	
Analgesics	0.80 (0.71)	.57 to 1.02		0.77 (0.77)	.48 to 1.06		0.51 (0.63)	.30 to .72		0.55 (0.53)	.35 to .76	
Antiepileptics	1.00 (1.89)	-.46 to 2.45		1.19 (2.13)	-.79 to 3.16		5.75 (0.35)	2.57 to 8.92		6.75 (1.06)	-2.78 to 16.28	
Anti-Parkinson	0.64 (0.37)	.26 to 1.02		0.59 (0.34)	.23 to .95		0.54 (0.20)	-1.24 to 2.32		0.54 (0.20)	-1.24 to 2.32	
Psycholeptics	0.35 (0.36)	.18 to .51		0.56 (1.10)	.03 to 1.09		0.25 (0.29)	.15 to .35		0.24 (0.27)	.14 to .33	
Anti-psychoics	0.39 (0.17)	.23 to .54		0.33 (0.19)	.02 to .63		0.31 (0.20)	.17 to .45		0.30 (0.20)	.05 to .55	
Anxiolytics	1.48 (1.32)	.47 to 2.49		2.00 (1.34)	.59 to 3.41		0.54 (0.36)	.31 to .78		0.54 (0.35)	.29 to .79	
Hypnotics & sedatives	1.11 (1.50)			0.44 (0.38)			1.03 (1.48)			0.42 (0.38)		
Total psycholeptics												
Psychoanalitics	0.94 (0.53)	.61 to 1.28		0.98 (0.61)	.55 to 1.42		1.17 (0.51)	.93 to 1.41		1.42 (1.02)	.92 to 1.93	
Antidepressants	2.67 (—)	— ^b		2.67 (—)	— ^b		1.06 (—)	— ^b		1.06 (—)	— ^b	
Anti-dementia	1.25 (1.42)	.54 to 1.95		1.25 (0.34)	.53 to 1.96		1.25 (0.28)	.67 to 1.83		1.33 (0.28)	.75 to 1.92	
Total psychoanalitics	1.47 (1.53)	-.38 to .72		1.58 (1.78)	-.65 to .80		1.30 (1.43)	-.38 to .72		1.51 (1.72)	-.65 to .80	
Total CNS medication												
CNS, central nervous system.												

CNS, central nervous system.

^aPartial eta squared.^b<6 residents in both groups.^cgroup × time.

*Significant p < .05.

Conclusion

This study monitored all classes of psychotropic drug use in residents with dementia living who moved from a large to small-scaled SCUs. Interestingly, compared to residents who remained at the large-scaled SCUs, we found no reduction in psychotropic drug use over time.

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Conflict of interests

The authors report no conflict of interest.

Data

The authors are willing to allow the journal to review the data if requested.

Author contributions

Conceived and designed the experiments: JSK, EJAS. Performed the experiments: JSK. Analyzed the data: JSK. Wrote the paper: JSK, RCOV, EJAS. Conceived and designed the original study: JSK, EJAS.

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