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Elder-clowning in long-term dementia care: Results of a pilot study

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Conflicts of interest

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Conflict of Interest Disclosures

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	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Employment or Affiliation		✓		✓		✓		✓		✓		✓		✓		✓
Grants/Funds		✓		✓		✓		✓		✓		✓		✓		✓
Honoraria		✓		✓		✓		✓		✓		✓		✓		✓
Speaker Forum		✓		✓		✓		✓		✓		✓		✓		✓
Consultant		✓		✓		✓		✓		✓		✓		✓		✓
Stocks		✓		✓		✓		✓		✓		✓		✓		✓
Royalties		✓		✓		✓		✓		✓		✓		✓		✓
Expert Testimony		✓		✓		✓		✓		✓		✓		✓		✓
Board Member		✓		✓		✓		✓		✓		✓		✓		✓
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All authors contributed to the conception and design or acquisition of data or analysis of the data, drafting the article or revising it critically for important intellectual content, and final approval of the version to be published.

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Abstract

Objectives—To assess the effects of elder-clowning on moderate to severe behavioral and psychological symptoms of dementia (BPSD) in nursing home residents with dementia, primarily of the Alzheimer's type.

Design—Before-after study.

Setting—Nursing home.

Participants—Twenty-three nursing home residents with moderate to severe BPSD defined by the Neuropsychiatric Inventory-Nursing Home version (NPI-NH) score of ≥ 10 , and their care aides.

Intervention—A pair of elder-clowns visited all residents twice weekly (approximately 10 minutes per visit) for 12 weeks. They utilized improvisation, humor and empathy, as well as expressive modalities such as song, musical instruments, and dance to individualize resident engagement.

Measurements—Primary outcomes were BPSD measured by the NPI-NH, quality of life measured by Dementia Care Mapping (DCM), and nursing burden of care measured by the Modified Nursing Care Assessment Scale (M-NCAS). Secondary outcomes included occupational disruptiveness measured by the NPI-NH, agitation measured by the Cohen Mansfield Agitation Inventory (CMAI), and psychiatric medication use.

Results—Over 12 weeks, NPI-NH scores significantly declined ($t_{22} = -2.68$, $p = 0.01$) and DCM quality of life scores significantly improved ($F_{1,50} = 23.09$, $p < 0.001$). CMAI agitation scores decreased nominally, but was not statistically significant ($t_{22} = -1.86$, $p = 0.07$). The occupational disruptiveness score significantly improved ($t_{22} = -2.58$, $p = 0.02$), yet there was no appreciable change in M-NCAS scores of staff burden of care.

Conclusion—Results suggest that elder-clowning reduced moderate to severe BPSD of nursing home residents with dementia, primarily of the Alzheimer's type. Elder-clowning is a promising intervention that may improve Alzheimer's dementia care for nursing home residents.

Keywords

Behavioral and psychological symptoms of dementia; Person-centered care; Arts-based intervention; Loss of self

INTRODUCTION

The treatment and management of behavioral and psychological symptoms of dementia (BPSD) is associated with high levels of use of psychotropic medications,¹ which has

received national² and international³ attention given evidence of significant harms, and deleterious consequences of inappropriate psychotropic use.^{4, 5} Additionally, the behavior of persons with Alzheimer's disease is not always symptomatic of dementia itself, but may be need-driven⁶ or indicative of other purposeful and meaningful communication.⁷⁻⁹

In response, best practice guidelines now recommend non-pharmacological interventions before resorting to antipsychotics or other psychotropic medications.^{10, 11} Arts-based approaches are gaining prominence for their demonstrated behavioral improvements and their promotion of quality of life.^{12, 13} The most recent development in arts-based approaches to dementia care is the use of specialized red-nosed clowns, referred to as elder-clowns.¹⁴ Elder-clowns utilize improvisation, humor and empathy, as well as expressive tools such as song, musical instruments, and dance to engage nursing home residents.¹⁴

There have been few empirical studies examining the effects of the presence of elder-clowns on dementia care units. Most have been qualitative observation studies that suffered methodological limitations.¹⁵⁻¹⁷ One exception is Low et al's¹⁸ single-blind longitudinal cluster randomized controlled study designed primarily to evaluate the effectiveness of elder-clowning combined with "laughterbosses" (healthcare practitioners trained to assist elder-clowns in introducing humor in care practices and to continue the humor intervention between elder-clown visits) in improving mood, decreasing agitation and other behavioral disturbances, and increasing quality-of-life and social engagement in nursing home residents. They found intervention residents exhibited reduced agitation scores, but there were no significant differences in depression, overall behavioral disturbances, social engagement or quality of life. The impact of the intervention on medication use and staff outcomes beyond satisfaction¹⁹ was not addressed, despite important links between reduced agitation, practice efficiency, and improved staff-resident relationships.²⁰

This study sought to evaluate the impact of elder-clowning on nursing home residents' BPSD and quality of life, and nursing burden of care in Canada. Secondary outcomes included effect on resident agitation levels, nursing-perceived occupational disruptiveness, and residents' psychotropic medication use. The evaluation included a qualitative component to explore the aesthetic and relational components of elder-clowning.²¹

METHODS

Eligibility Criteria and Recruitment

This was a mixed methods before-after study of residents with dementia from two 28-bed special care units of a 472-bed nursing home in urban central Canada. The units provide flexible schedules for programs and personal care. Family member substitute decision-makers of 54 residents agreed to be contacted about the study; 45 provided consent for participation in the study; 9 declined because of poor health of the resident or for undisclosed reasons. All consented resident participants were screened using the Neuropsychiatric Inventory: Nursing Home Version (NPI-NH).²² Twenty-three of the consenting residents with an NPI-NH score of 10 or greater (indicating moderate to severe behavioral challenges) were included in the intervention. Care aides with resident participants on their caseloads were also recruited. Approval for the study was obtained from

the ethics review boards of the study site and the research institute of the Principal Investigator.

Intervention

Four elder-clowns were hired to deliver the program; two as the lead pair and the others as back-up either to work as a pair or individually to fill in for an absent member of the lead pair. Consistent with current practice, all the elder-clowns had been trained at professional clown organizations and received dementia-specific training (symptomatology, differences between Alzheimer's disease and other dementias, practice approaches, ethical care). Also consistent with practice, resident participants were visited individually in their rooms or in a public space of the unit by a clown pair 2 times per week for 12 weeks. Visits typically averaged 10 minutes.²³ The duration is determined by the judgment of the elder-clowns regarding resident receptivity and engagement. This is assessed by attending to verbal and gestural cues (e.g. is the resident relaxed and open to the interaction or tense and closed to it).

Elder-clowns don a red nose but unlike pediatric clowns, they keep their faces natural with minimal make-up and wear clothing that evokes an earlier era such as 1950's swing dresses. Elder-clowns also rely upon clinical, social, and familial details to tailor their interactions to the uniqueness of each individual resident in a manner appropriate to mood, interactional style or clinical condition. Examples of interactions in our study included: song and music, such as singing with residents their favorite songs with the accompaniment of a miniature ukulele, or co-constructing with them improvised songs; witty, playful scenarios involving, for example, teasing the elder-clowns by playfully pretend-kicking their buttocks as clowns bent over, to which the elder-clowns responded with exaggerated pratfalls, sound explosions, and facial animations; supporting sadness with soft reassuring touch rather than trying to change the emotional timbre; and artistic expression by residents through the elder-clowns' provision of pens and sketch pads, or more imaginative engagement of residents such as an elder-clown creatively miming an artist painting a canvas.

During visits with residents, the elder-clowns were careful not to interfere with care tasks. Staff were able to observe the interactions when in close proximity, but did not participate in them.

Measures

Demographic data were collected from staff participants, and for resident participants a family member substitute decision-maker completed a demographic questionnaire. Primary outcome measures included: the total scores of the NPI-NH,²² an interview-based instrument to assess BPSD, and the Modified Nursing Care Assessment Scale (M-NCAS),²⁴ a self-administered questionnaire to measure nursing burden of care, each administered at baseline and at 12 weeks; and the WIB score of Dementia Care Mapping (DCM),²⁵ an observational tool that provides detailed, standardized observational ratings of behaviors and levels of mood and engagement over a period of time,²⁶ conducted at baseline, 4, 8, and 12 weeks to identify shorter and longer term changes. Secondary measures included: three subscale scores (aggressive behavior, physically nonaggressive behavior, and verbally

agitated behavior) and their total from the Cohen-Mansfield Agitation Inventory (CMAI), an interview-based scale to measure prevalence and type of agitation among nursing home residents, collected at baseline and 12 weeks; the NPI-NH domain and occupational disruptiveness scores; other DCM scores (agitation and distress, potential for positive engagement, occupational diversity, withdrawal, and passive engagement); and psychotropic medication use collected at baseline, 4, 8, and 12 weeks.

A research associate (author RC) collected the NPI-NH, CMAI, and the M-NCAS measures at baseline and at the end of the intervention; care aides provided the ratings for each of these measures in relation to the resident participants on their assigned caseloads. DCM takes place only in public areas of the care environment (e.g. dining room, hallway). A recording is made every five minutes – referred to as time frames (TFs) – for a period of up to 6 consecutive hours, to achieve a maximum 72 TFs per resident. DCM observations were made during day and evening nursing shifts by a trained mapper.

Analysis

Sample size was driven by feasibility given the time intensive methodological demands of DCM in a study with 4 time points.

While a maximum of 72 TFs per participant was targeted at each time point, not all participants were available in the observation areas (public areas of the nursing home) to achieve this. Variation in the range of TFs is attributed to infectious outbreaks, which barred the mapper from entering the unit, and occasions when participants were off the unit.

The distribution of DCM TFs showed that a small subset of participants ($n = 5$) had fewer than 15 TFs of data recorded at one or two of the observation time points. We considered any time points with fewer than 15 TFs insufficient for the purposes of analysis and therefore these were excluded. Three participants ($n=3$) were excluded from the DCM analysis altogether since they had an insufficient number of TFs at three or more time points. This was because they had been confined to bed or wished to remain in their room and thus were unavailable in the observation areas for DCM.

For each of these five outcome measures, a paired t-test was used to test whether significant change occurred over the 12-week period. A random effects model with random intercept and unstructured covariance matrix structure was used to test whether significant change in the WIB score of the DCM occurred over the 12-week period. Hypothesis tests were performed at an α -level of 5%.

For analysis of medication use, we considered four different classes of drugs: antipsychotics, benzodiazepines, antidepressants, and dementia symptom control medications (i.e., cholinesterase inhibitors and memantine). For antipsychotics, olanzapine equivalents were calculated based on within-class dosing equivalencies for antipsychotic medication.²¹ Dosing equivalents were not calculated for the other drug classes because we were unable to find within-class dosing equivalents for anti-depressants and dementia medications. Rate of change in dosing (mg/quarter) was then calculated for each class of drug for each resident.

RESULTS

Consent by proxy was obtained for 45 residents to be screened with the NPI-NH. Of 45 residents screened, we recruited the 23 residents with NPI-NH 10, 12 with moderate behavioral challenges ($10 > \text{NPI-NH} < 20$) and 11 with major behavioral challenges ($\text{NPI-NH} > 20$). The characteristics of the participants are described in Table 1. The residents were predominately elderly females with Alzheimer's dementia. Sixteen care aides with these residents on their caseloads were recruited; they were predominately middle-aged females. There was minimal variation in dose of the intervention; 10 resident participants received all 24 possible visits and 13 of the 23 resident participants missed an average of 2.31 elder clown visits ($SD = 1.75$) out of a total of 24 possible per resident (e.g. unit lockdown due to influenza outbreak). Duration of visits was an average of 10 minutes with a range of 2–35 minutes; 93% of visits were 5 minutes or longer.

The results for the primary and secondary outcome measures are shown in Table 2. The NPI-NH total score at 12 weeks was significantly lower ($t_{22} = -2.68$, $p = 0.01$) using a paired t-test. In addition, the NPI-NH occupational disruptiveness total score improved significantly ($t_{22} = -2.58$, $p = 0.02$). The NPI-NH agitation and aggression domain score was also significantly lower at 12 weeks ($t_{22} = -2.30$, $p = 0.03$). No differences were found on the other domain scores. For the M-NCAS, at 12 weeks, neither the attitude ($t_{22} = -0.02$, $p = 0.98$) nor the strain total score ($t_{22} = 0.39$, $p = 0.69$) was found to be different from baseline using a paired t-test. For DCM scoring, an average of 4.28 hours of observation was carried out per participant. A random effects model for the DCM's WIB score showed an improvement over time ($F_{1,50} = 23.09$, $p < 0.001$).

The DCM agitation and distress score also improved over time ($F_{1,50} = 6.02$, $p = 0.02$). No change over time was detected for the other DCM variables (see Table 2). The total of the three CMAI subscales at 12 weeks was nominally, but not statistically significantly lower ($t_{22} = -1.86$, $p = 0.07$). The physically nonaggressive behavior subscale was significantly lower at 12 weeks ($t_{22} = -2.32$, $p = 0.03$). No differences were found on the other CMAI subscales.

A nominal decrease in dosing of psychotropic medications was observed over the 12 week period (see Table 3), but the magnitude of this difference was very small ($d = -0.08$ if residents not on antipsychotics were included as zero change and $d = -0.13$ if only residents on antipsychotics at some point during the study were considered) and the change was not statistically significant.

DISCUSSION

This pilot study found a significant reduction of BPSD, based on the NPI-NH total score and agitation/aggression domain score, for nursing home residents with dementia, primarily of the Alzheimer's type, who were exposed to elder-clowning. In contrast, the elder-clowning study of Low et al.¹⁸ did not find a significant decrease in NPI-NH scores. This may be attributed to their co-introduction of "laugherbosses" who were not tested for competency in delivering humour,¹⁸ and thus may have contributed to the intervention failing to exhibit

its full impact since they assisted in the delivery of the intervention. The lack of detectable change in the NPI-NH domain scores other than agitation/aggression may suggest that elder-clowning is not effective for other behaviors, such as apathy, but needs further study. It may also be attributed to the challenges in rating these types of neuropsychiatric symptoms compared to overt aggression²⁷ and may require a structured training period for the care aides providing proxy data in order to be used successfully.²⁸

DCM proved a useful objective outcome measure that did not rely on staff report of resident behaviors and well-being, and DCM data showed significant improvement in quality of life over 12 weeks. These benefits suggest it should be considered for future studies, in spite of time demands its use places on researchers. These findings replicate those of other intervention studies involving music¹³ and dance.²⁹ Since elder-clowns utilize a far broader range of artistic modalities (e.g. drama and magic), future research should examine which particular modalities of elder-clowning are most efficacious.

Neither the attitude nor the strain total scores of the M-NCAS were found to be affected by the intervention, indicating that there was no appreciable change in staff burden of care. Yet the NPI-NH occupational disruptiveness total score improved significantly, which indicates that staff routines were less affected by resident activities such as repetitive behaviors. This discrepancy may reflect the inclusion in the M-NCAS of questions related to staff perceptions of the meaningfulness and utility of residents' lives. Societal biases concerning the loss of self attributed to Alzheimer's,³⁰ may have negatively affected staff beliefs, and contributed to an emotional burden that was not ameliorated by improvements in residents' well-being and responsive behaviors. Training of staff and their education/years of experience regarding dementia care were not assessed and might be associated with staff perceptions of BPSD. Resident functional abilities, chronic diseases, pain, and time since admission, which might have affected engagement/mood, were also not assessed. Thus further research is required to better understand both resident- and staff-level factors that contribute to resident behaviors and nursing burden of care.

Consistent with the significant reduction in the NPI-NH agitation/aggression domain score, we found a significant decrease in the physically nonaggressive behavior subscale of the CMAI. DCM scores for agitation and distress also significantly decreased over the course of the study. The significant improvements seen in behavioral symptoms over the 12-week study period cannot be attributed to increased doses of psychotropic medications given our finding of a small, non-significant decrease in dosing over the course of the intervention (see Table 3). Still, it will be important for a larger future trial to explore the impact of elder-clowning on psychotropic medication use.

Unlike the NPI-NH agitation/aggression domain, we did not find significant reductions in the aggressive behavior and verbally agitated behavior scores on the CMAI. This might be due to differences in how each measures agitation and aggression (e.g. the CMAI includes 29 different agitated behaviors and the NPI-NH combines agitation and aggression in 8 broader behavior types). Additionally, there was a non-significant increase in aggressive behavior scores on the CMAI, suggesting the need for close examination of adverse effects in future studies.

This study has several limitations. We did not have a control group, so we cannot exclude improvements over time unrelated to the intervention. Our sample size was small so we may not have had sufficient power to identify significant changes across all of our outcome measures. As a preliminary quantitative study of elder-clowning in a small sample without a control group, our results should be considered as hypothesis generating and that confirmation of our findings in future larger comparative studies is required. We recruited our participants from a single nursing home, potentially limiting the generalizability of our findings to other nursing home settings. We did not define intervention dose beyond receipt of elder-clowning visits for approximately 10 minutes, twice per week, and thus were not able to examine the implications of variation in the intervention dose. Attending to the impact of different doses of the intervention will be important in future investigations of elder-clowning. Finally, we relied on established measures which, although validated for this population, do not reflect current understandings of BPSD in the dementia field,^{6, 7, 20} specifically differentiation between behaviors based on their potential cause. In consequence, our quantitative assessment of impact of the elder-clowning intervention was not able to discern between changes in need-driven behaviors that may be more amenable to psychosocial intervention and those with other causes which may not (e.g. pain).⁶

When considering the effectiveness of an intervention, it is important to compare the observed changes with differences that are considered clinically relevant. For clinical trials in dementia of the Alzheimer's type, it has been assumed that differences as small as 4.5 points on the NPI-NH³¹ are clinically relevant. In our study, average differences that we observed on NPI-NH over the period of the clowning intervention exceeded this clinically relevant difference (mean difference = 5.83). However, observed effects on the M-NCAS were similar to (strain total score) or even smaller than (attitude total score) those for nonresponders in the risperidone clinical trial,³² concurring with the lack of statistical evidence for changes in perceived burden of care. That we observed a reduction in overall BPSD, particularly agitation; reduced occupational disruptiveness scores due to behavioral disturbances; and improved residents' quality of life over a period of time during which residents with dementia were exposed to elder-clowning, suggests that elder-clowning is a promising intervention primarily for nursing home residents with behavioral symptoms of Alzheimer's dementia. As arts-based approaches are gaining prominence in person-centered dementia care, elder-clowning will be an important intervention for continued evaluation in a large adequately powered RCT to further assess its clinical effectiveness and cost-effectiveness.

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Table 1

Baseline Participant Characteristics

Participants	Frequency (%) or Mean $\pm$ SD (Range ^a)
Residents (N = 23)	
Age	87.78 $\pm$ 8.00 (69–101)
Sex	
Female	16 (69.6)
Male	7 (30.4)
Dementia Diagnosis	
Alzheimer's Dementia	17 (73.9)
Vascular Dementia	1 (4.4)
Mixed Alzheimer's and Vascular Dementia	3 (13.0)
Lewy Body Dementia	2 (8.7)
Neuropsychiatric Inventory-Nursing Home Version Screening Scores	24.00 $\pm$ 11.90 (11–49)
10–20	12 (52.2)
>20	11 (47.8)
Care Aides (N = 16)	
Age	54.91 $\pm$ 6.34 (46–63)
Sex	
Female	14 (87.5)
Male	2 (12.5)

^aSample range based on the observed values in these participants.

Table 2

Primary and Secondary Outcomes at Baseline, 4 Weeks, 8 Weeks and 12 Weeks

Outcomes	Baseline	4 Weeks	8 Weeks	12 Weeks	Test Statistic	p-value
	Mean (±SD)	Mean (±SD)	Mean (±SD)	Mean (±SD)		
Primary Outcomes^a						
Neuropsychiatric Inventory-Nursing Home Version ^b						
Total Score (scale = 0 to 144)	24.43 (±12.91)	.	.	18.60 (±13.15)	t ₂₂ = -2.68	0.01 [*]
Dementia Care Mapping						
Well/Ill-Being (scale = -5 to 5)	0.045 (±0.51)	1.000 (±0.339)	0.955 (±0.349)	1.048 (±0.283)	F _{1,50} = 23.09 ^c	< 0.001 [*]
Modified Nursing Care Assessment Scale						
Attitude (scale = 0 to 128)	58.56 (±11.48)	.	.	58.52 (±14.83)	t ₂₂ = -0.02	0.98
Strain (scale = 0 to 128)	61.56 (±10.14)	.	.	62.39 (±8.75)	t ₂₂ = 0.39	0.69
Secondary Outcomes^a						
Neuropsychiatric Inventory-Nursing Home Version ^b						
Agitation/Aggression Domain (scale: 0 to 12)	3.30 (±3.28)	.	.	2.09 (±2.00)	t ₂₂ = -2.30	0.03 [*]
Depression/Dysphoria Domain (scale: 0 to 12)	2.08 (±2.76)	.	.	1.48 (±2.59)	t ₂₂ = -0.90	0.37
Apathy/Indifference Domain (scale: 0 to 12)	6.39 (±4.34)	.	.	5.91 (±4.42)	t ₂₂ = -0.70	0.48
Irritability/Lability Domain (scale: 0 to 12)	2.17 (±2.80)	.	.	1.61 (±2.74)	t ₂₂ = -0.98	0.33
Total Occupational Disruptiveness (scale: 0 to 60)	8.09 (±7.10)	.	.	4.87 (±5.19)	t ₂₂ = -2.58	0.02 [*]
Cohen-Mansfield Agitation Inventory ^b						
Total Score for 3 Subscales (scale: 0 to 140)	32.86 (±12.23)	.	.	29.48 (±9.72)	t ₂₂ = -1.86	0.07
Physically Nonaggressive Behavior (scale: 0 to 63)	11.56 (±7.48)	.	.	9.43 (±4.60)	t ₂₂ = -2.32	0.03 [*]
Aggressive Behavior (scale: 0 to 42)	11.78 (±5.08)	.	.	13.48 (±4.55)	t ₂₂ = 0.08	0.94
Verbally Agitated Behavior (scale: 0 to 35)	9.52 (±5.67)	.	.	8.13 (±3.63)	t ₂₂ = -1.50	0.14
Dementia Care Mapping						
Agitation and Distress (scale: 0 to 100)	4.67 (±6.45)	1.33 (±2.32)	1.99 (±4.10)	1.65 (±4.00)	F _{1,50} = 6.02 ^c	0.02 [*]
Potential for Positive Engagement (scale: 0 to 100)	79.98 (±17.56)	75.13 (±25.78)	77.81 (±26.63)	75.89 (±25.63)	F _{1,50} = 0.85 ^c	0.36
Occupational Diversity (scale: 0 to 14)	2.75 (±1.55)	3.33 (±1.65)	2.67 (±1.59)	2.79 (±1.44)	F _{1,50} = 0.35 ^c	0.56

Outcomes	Baseline	4 Weeks		8 Weeks		12 Weeks		Test Statistic	p-value
	Mean (±SD)	Mean (±SD)	Mean (±SD)	Mean (±SD)	Mean (±SD)	Mean (±SD)	Mean (±SD)		
Withdrawal (scale: 0 to 100)	13.58 (±15.70)	14.55 (±24.09)	14.30 (±24.07)	14.41 (±22.54)				$F_{1,50} = 0.18^c$	0.68
Passive Engagement (scale: 0 to 100)	6.68 (±7.70)	9.55 (±14.52)	6.22 (±8.03)	8.75 (±13.59)				$F_{1,50} = 0.01^c$	0.92

^aScale indicates the lower and upper limits of possible values for the measure.

^bThese measures were not administered at 4 and 8 weeks. There are no data for these time points, as indicated by “.” in the table.

^cDegrees of freedom for the random intercept model of DCM scores were calculated as $(k-1)*(n-1) = 50$ with an average of $k=3.28$ observations per resident for each of the $n=23$ residents.

* Statistically significant at an α -level of 0.05.

Table 3

Change in Psychotropic Medication Dose (mg/quarter) during the 12-week Elder-clowning Intervention Ordered by Change in NPI-NH

Participant	NPI-NH Total Score ^d			Dose change over twelve weeks (mg/quarter) ^b				
	Baseline	Week 12	Difference	Antipsychotics - Olanzapine Equivalent ^c	Benzodiazepines	Antidepressants	Dementia Meds ^d	
041	46	7	-39	.	.	0	.	
036 ^e	45	28	-17	-1.125	.	0	0	
044	22	7	-15	.	0	0	0	
016 ^f	32	21	-11	.	.	-7.500	.	
010 ^g	14	4	-10	-0.304	.	0	0	
043	28	18	-10	0	.	.	.	
028 ^h	17	8	-9	-1.125	.	.	.	
008	23	15	-8	.	.	.	0	
021 ⁱ	16	8	-8	.	.	0	-7.200	
022	9	3	-6	.	.	.	.	
042	23	17	-6	.	.	0	0	
018 ^j	25	20	-5	3.000	.	0	0	
007	28	24	-4	.	.	.	0	
025	12	8	-4	.	.	.	.	
037	54	52	-2	.	.	0	.	
040	41	39	-2	.	.	.	0	
014 ^j	40	39	-1	-1.125	.	0	.	
015	16	15	-1	.	.	.	.	
013	13	12	-1	.	.	.	0	
026	12	12	0	.	.	.	.	
027	19	24	5	.	.	.	.	
004	18	39	21	0	.	.	.	

^aParticipants are ordered with respect to change in NPI-NH in order to display patterns of medication change that might be co-occurring with changes in the primary outcome measure.

^bPatients without prescription for that class of drug indicated by “.”

^c Olanzapine equivalents were calculated based on within-class dosing equivalencies for antipsychotic medication. Dosing equivalents were not calculated for the other drug classes as no within-class changes in resident prescriptions were reported.

^d Refers to dementia symptom control medications (i.e., cholinesterase inhibitors and memantine).

^e Olanzapine Oral Disintegrating discontinued at Week 12.

^f Escitalopram Oxalate discontinued at Week 4.

^g Decrease in Quetiapine dosage at Week 12.

^h Olanzapine discontinued at Week 12; PRN Lorazepam added at Week 12.

ⁱ Galantamine Hydrobromide ER discontinued at Week 4.

^j Increase in Olanzapine dosage at Week 8; PRN Lorazepam added at Week 8.

^k Decrease in Respiridone dosage at Week 12.

^l Olanzapine Oral Disintegrating discontinued at Week 12.