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Caregiver and Care Recipient Characteristics as Predictors of Psychotropic Medication Use in Community-Dwelling Dementia Patients

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Abstract

Objectives—The current practice of prescribing psychotropic medication for the management of dementia-related behavioral disturbances is under substantial debate. Using Pearlin's stress process model as theoretical underpinning, the aim of this investigation is to identify caregiver and care recipient characteristics as predictors of anxiolytic, antipsychotic, and antidepressant use among community-dwelling dementia patients. We hypothesized that caregiving burden and patient characteristics, particularly behavior disturbances and pain, would be positively associated with psychotropic medication use.

Methods—Data for this exploratory, cross-sectional study were drawn from the baseline assessment of the Resources for Enhancing Alzheimer's Caregiver Health II trial. Only participants with full baseline information were examined (N=598). Caregiver characteristics, such as confidence managing problematic behaviors, and care recipient characteristics including pain, problem behaviors, cognitive impairment, and functional impairment, were examined in relation to care recipient psychotropic medication use.

Results—Contrary to our hypothesis, behavioral disturbances and burden associated with these disturbances were not significantly associated with psychotropic use. Rather, caregiver characteristics such as race and overall vigilance, and care recipient characteristics such as

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cognitive status, functional status, and pain were significantly associated with the use of psychotropic medication. Findings differed by class of medication.

Conclusion—These exploratory findings suggest the utility of a holistic approach to understanding the factors associated with pharmacotherapy among community dwelling elders with dementia. Significant associations between caregiver characteristics and care recipient psychotropic medication use suggest that educating caregivers in non-pharmacologic strategies hold promise for a more balanced biopsychosocial approach to maintaining dementia patients in the community.

Keywords

Psychotropics; Analgesics; Dementia Caregiving

Background

The practice of prescribing psychotropic medications to patients with dementia for the management of behavioral disturbances has generated substantial debate as evidence of serious side effects has emerged (Treloar et al., 2010). In April 2005, the Federal Food and Drug Administration (FDA) mandated that a black box warning surrounding the increased risk of stroke and death be placed on all atypical antipsychotics. This mandate came after a meta-analysis of 17 well-designed, clinical trials among elderly dementia patients revealed that atypical antipsychotics were associated with significantly greater mortality risk versus placebo (Jeste et al., 2008). The FDA warning was extended to typical antipsychotics in 2008. Although these warnings resulted in a slight decrease in the use of atypical antipsychotics among elderly patients with dementia, atypicals continue to be a popular treatment option in this patient population (Desai, Heaton, & Kelton, 2012; Dorsey, Rabbani, Gallagher, Conti, & Alexander, 2010). This is particularly concerning given recent evidence that the absolute effect of antipsychotics on mortality in elderly patients with dementia may be higher than previously reported (Maust et al., 2015). Other psychotropic medications commonly prescribed to dementia patients also carry substantial risks. For example, benzodiazepines are commonly used to treat anxiety and agitation in dementia despite contraindications such as increased risk of memory loss, increased sedation, disinhibition, impaired psychomotor ability and falls (Wright et al., 2009). Tricyclic antidepressants and selective serotonin reuptake inhibitors also increase the risk of falls and hip fracture in elders (Ziere et al., 2008). Consequently, there is an immediate need to identify modifiable risk factors for psychotropic medication use among elders with dementia, particularly in informal care settings where institutional guidelines for use do not apply.

A recent report from the United States Government's Accountability Office found that antipsychotic drugs are frequently prescribed to dementia patients in nursing homes, and that agencies within the Department of Health and Human Services have initiated programs to reduce use in this setting. The report also concludes that over-prescribing of antipsychotic drugs to older adults is not specific to those in nursing homes; however, no actions have been directed at reducing prescribing patterns outside of formal care facilities (United States Government Accountability Office, 2015). Only a handful of studies investigating the determinants of psychotropic medication use in community-dwelling elders with dementia

have been published (Kunik et al., 2010; Jano, Johnson, Chen, & Aparasu, 2008), and even fewer have investigated caregiver characteristics that influence care recipient psychotropic medication use (Rhee, Csernansky, Emanuel, Chang, & Shega, 2011).

Pearlin's stress process model asserts that the tangible hardships of caregiving (objective primary stressors), along with caregiver perceptions and resources (subjective and secondary stressors, respectively), work together to influence outcomes (Pearlin, Mullan, Semple, & Skaff, 1990). These constructs are applicable for examining psychotropic medication use in community-dwelling elders with dementia, as previous research has found that pharmacologic management of problem behaviors, a primary stressor, reduces the negative impact of these symptoms on family caregivers and helps delay the need for institutionalization (Grossberg, 2008; Kirshner, 2008). Additionally, non-pharmacologic interventions are not currently reimbursable and may be difficult for some families to implement at home. Consequently, families caring for a relative with dementia often appeal for pharmacotherapy after unsuccessful attempts to manage through other means (Geldmacher, 2003). To make informed decisions regarding appropriate pharmacotherapy for dementia patients, it is important to have a better understanding of caregiver characteristics associated with care recipient psychotropic medication use.

The role of pain in psychotropic medication use among community-dwelling elders with dementia is also overlooked, and care recipient pain may directly contribute to caregiver primary stress in the Pearlin model (Haley, LaMonde, Han, Burton, & Schonwetter, 2003). Individuals with dementia are often unable to communicate pain to their caregivers. As a result, care recipient pain is commonly under-managed (Fisher et al., 2002). Unaddressed pain manifests in ways that are strikingly similar to the symptoms of dementia (Cohen-Mansfield & Lipson, 2008). In fact, it can be difficult to differentiate between behavioral and psychological symptoms of dementia and the behaviors associated with physical pain (Treloar et al., 2010), increasing the likelihood that psychotropic medications may be inappropriately prescribed in response to pain. Luijendijk et al. (2008) found that joint pain was associated with an increased risk of new-onset, chronic, benzodiazepine use in a cohort of non-demented elders (Luijendijk, Tiemeier, Hofman, Heeringa, & Stricker, 2008). Hassam et al. (2011) found a positive association between the presence of a pain-related diagnosis and the use of psychotropic medication among elders with dementia (Haasum, Fastbom, Fratiglioni, Kareholt, & Johnell, 2011) but in this instance, the sample included both patients living in the community and in formal care facilities. It is unknown whether pain is associated with psychotropic medication use within the population of community-dwelling elders with dementia.

Given the gaps in our knowledge regarding the determinants of psychotropic medication use among dementia patients living in the home, the goal of this study was to investigate caregiver and care recipient characteristics associated with the use of anxiolytics, antipsychotics, and antidepressants. Using data collected from the baseline assessment of the Resources for Enhancing Alzheimer's Caregiver Health (REACH) II randomized clinical trial, we hypothesized that caregiving burden and patient characteristics, particularly behavior disturbances and pain, would be positively associated with use of psychotropic medication.

Methods

Sample

The data for this study were drawn from the baseline assessment of REACH II ([ClinicalTrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT00177489) Identifier [NCT00177489](https://clinicaltrials.gov/ct2/show/study/NCT00177489)). Recruitment procedures, eligibility criteria, and psychometric properties of all measures and intervention outcomes are described elsewhere (Belle et al., 2006). The primary goal of the REACH II trial was to evaluate a multi-component, psychosocial intervention aimed at improving the quality of life of Alzheimer's caregivers. Data were not collected to address pre-specified hypotheses about psychotropic medication use in the care recipients. In total, 642 community-dwelling dementia care recipients and their caregivers were recruited during the period of 2001–2004 from 5 sites: Birmingham, AL; Memphis, TN; Miami, FL; Palo Alto, CA; and Philadelphia, PA). Only participants with full baseline assessment batteries were included in the current, exploratory analyses (N=598).

Outcome Measures

This study focused on care recipient use of anxiolytic, antipsychotic, and antidepressant medications as primary outcome measures. Information on medications was collected using the “brown bag” method of data collection (Psaty et al., 1992). Caregivers were asked to display all currently administered medications to the in-home interviewer. Medication names were recorded by study personnel and were later assigned a therapeutic classification code (Aloisi, 2002). Although more detailed information on drug dosages and duration would have been informative, this information was not collected as part of the REACH II trial.

Predictors

The variables collected in REACH II were guided by Pearlin's stress process model (Pearlin, Mullan, Semple, & Skaff, 1990). Previous work has demonstrated the satisfactory fit of these measures to the Pearlin Stress Process Model (Hilgeman et al., 2009). This study investigates stress process constructs as predictors of psychotropic medication use in the dementia care recipients.

Care recipient variables. The care recipient variables included here reflect the objective primary stressors described in the Pearlin model. These variables capture the nature and intensity of care needed and include care recipient baseline cognitive status as measured by the Mini-Mental State Examination (Folstein, Folstein, & McHugh, 1975); care recipient functional impairment as measured by the amount of assistance required to perform IADLs and ADLs (possible scores ranged from 0 to 14 with higher scores indicating more functional impairment) (Katz, Ford, Moskowitz, Jackson, & Jaffe, 1963); the number of different behavioral symptoms exhibited in the past week as measured by the Revised Memory and Behavior Problem Checklist (RMBPC) (possible scores range from 0–24 with higher scores indicating more problem behaviors) (Teri et al., 1992); and pain. No direct measure of pain was used in REACH II; however, information on care recipient analgesic medication use was available. Previous research supports the use of analgesic medication as a proxy for pain (Norton, Allen, Snow, Hardin, & Burgio, 2010; Manfredi et al., 2003); therefore, care recipient use of narcotics and COX-2 inhibitors were utilized as a

dichotomous surrogate for pain. Over-the-counter non-steroidal anti-inflammatory agents (NSAIDs) were not considered here because of their use for lower intensity pain (American Geriatrics Society Panel on the Pharmacological Management of Persistent Pain in Older, 2009). Additionally, NSAIDs such as aspirin are often used to decrease platelet aggregation and prevent blood clots (Alhusban & Fagan, 2011). An overwhelming majority of the NSAID use in this study was aspirin (74.76%).

Caregiver variables. Caregiver variables included in this study reflect multiple domains of the Pearlin Stress Process Model including the caregiving context, subjective primary stressors, secondary stressors, and resources. Variables used to capture the caregiving context include care recipient race (White, Black, Hispanic), sex (male/female), age at baseline, and caregiver relationship to the care recipient (spouse/non-spouse). Caregiver race was highly correlated with care recipient race and was therefore not considered in this investigation.

Subjective primary stressors capture the subjective experience of the caregiver and include the extent to which caregivers were bothered while assisting with functional limitations (daily care bother; possible scores ranged from 0=not at all to 4=extremely) (Gitlin et al., 2005); the extent to which caregivers were bothered by problem behaviors (possible scores ranged from 0=not at all to 4=extremely) (Teri et al., 1992); overall caregiving burden as measured by an abbreviated, 12-item version of the Zarit Caregiver Burden Inventory (possible scores range from 0 to 48, with higher scores indicating greater burden) (Bedard et al., 2001; Zarit, Orr, & Zarit, 1985); and vigilance, measured by the hours per day a caregiver reported needing to be “on duty” to care for the care recipient (Belle et al., 2006).

Secondary stressors capture both the challenges of maintaining multiple roles while providing care and the extent to which caregiving infringes on personal identity. Variables considered in this study include the presence of negative social interactions, assessed with four questions asking caregivers to rate the frequency of negative interactions on a four-point scale (possible scores ranged from 0–12 with higher scores indicating a greater frequency of negative social interactions) (Lubben, 1988); income adequacy, as measured by perceived difficulty with paying for basics (possible scores range from 1=not difficult at all to 4=very difficult); the amount of confidence caregivers had handling the problem behaviors (Gitlin et al., 2005; Teri et al., 1992); caregiving mastery, assessed by eight items developed by REACH II investigators (Belle et al., 2006) (possible scores ranged from 0 to 16 with lower scores indicating greater mastery); and positive aspects of caregiving, as measured by the nine-item Positive Aspects of Caregiving Scale (possible scores ranged from 0 to 36, with higher scores indicating more positive appraisals of the caregiving situation) (Tarlow et al., 2004).

Resources available to the caregiver were also considered and included spiritual and religious coping as assessed by nine questions asking caregivers to rate the extent to which religious and spiritual beliefs affect their caregiving (possible scores ranged from 0 to 18 with higher scores indicating greater spiritual and religious coping) (Pargament et al., 1990); dementia knowledge as measured by the caregiver’s general knowledge of memory loss, dementia, and end of life legal issues (total scores range from 0 to 4, with higher scores

indicating greater knowledge of dementia and dementia related issues) (Belle et al., 2006); social network size, and satisfaction received from social support. Social network size was assessed with two questions regarding the number of people who can be counted on to provide help. Possible scores range from 0 to 10 with higher scores indicating larger social networks. Caregiver satisfaction with the help received from social contacts was assessed with three questions. Possible scores range from 0 to 9, with higher scores indicating more satisfaction (Krause, 1995; Krause & Markides, 1990).

Finally, we considered two measures of caregiver health as a predictor of care recipient psychotropic medication use. These measures include self-reported health (both current and current versus six months previous; possible scores range from 0–5 with higher scores indicating poorer health) (Schulz et al., 1997) and depression, as measured by the 10-item version of the Center for Epidemiological Studies-Depression Scale (CES-D), (scores range from 0 to 30, with higher scores indicating greater depressive symptomatology; scores of 16 or greater may indicate clinically significant depression) (Radloff, 1977);

Statistical Analysis

Descriptive statistics were computed for important demographic variables to provide a basic understanding of sample characteristics. Tetrachoric correlations between medications were also examined.

Non-linear mixed models utilizing a logit link were used to account for clustering within intervention site while estimating the association between caregiver and care recipient characteristics and care recipient psychotropic medication use. Based on previous observations that predictors of psychotropic medication vary across medication type (Aparasu, Mort, & Brandt, 2003), analyses for each psychotropic medication outcome proceeded separately in two stages. First, preliminary models were utilized to examine the association between each predictor and the odds of medication use, while controlling for care recipient race, sex, age, and caregiver relationship to the care recipient. Predictors with a p-value less than or equal to 0.10 were retained for use in the next stage of the analysis because it would be otherwise unlikely that a covariate would contribute to a multivariable model. All variables retained from the preliminary analyses were then included in multivariable models that also controlled for care recipient race, sex, age at baseline, and caregiver relationship to the care recipient. Estimates from the multivariable models were considered statistically significant at the 5% level. Due to the exploratory nature of this study, correction for multiple testing was not performed (Bender & Lange, 2001).

Results

Demographic information for study participants is presented in Table 1. As shown in Table 2, care recipients displayed an average of 11 different problem behaviors in the past week. These behaviors caused caregivers “a little” to a “moderate” amount of bother. Figures 1 and 2 display the prevalence of psychotropic medication use in the study sample. As shown in Figure 1, the prevalence of psychotropic medication use in this sample was high, with approximately 59% of participants using at least one anxiolytic, antipsychotic, or antidepressant. Figure 2 displays the prevalence of each psychotropic medication type. Over

a quarter of care recipients were receiving an antipsychotic or antidepressant. Approximately 18% of care recipients used an anxiolytic. The correlation between study medications is shown in Table 3. Anxiolytics were significantly but weakly correlated with antipsychotics and pain medications ($r=0.11$ and $r=0.09$ respectively). Antidepressants demonstrated a significant, but weak correlation with antipsychotics ($r=0.09$). No significant correlations were observed between the remaining medications. In the non-linear mixed model analyses for each medication type, there were no site differences.

Anxiolytics

Results from the multivariable model predicting anxiolytics are presented in Table 4. This model contains all caregiver and care recipient variables demonstrating a significant association with anxiolytic use in preliminary analyses ($\alpha=0.10$ for preliminary analysis). Fit statistics from the multivariable model indicated that the model fit was appropriate ($\chi^2/df=1.03$). Poorer care recipient functional status and utilization of analgesic medication were associated with increased odds of anxiolytic medication use; however, the estimates were not statistically significant (OR=1.07, $p=0.11$; OR=1.74, $p=0.07$ respectively). Greater caregiver vigilance was significantly associated with more anxiolytic use (OR=1.06, $p<0.01$) whereas increased confidence managing problem behaviors was protective (OR=0.76, $p=0.04$).

Antipsychotics

As with anxiolytics, antipsychotic medication multivariable model fit statistics indicated an appropriate model fit ($\chi^2/df=1.03$). Results from the model are presented in Table 4. Compared to White care recipients, Black and Hispanic care recipients were significantly less likely to take antipsychotic medication (OR=0.60, $p=0.03$; OR=0.47, $p<0.01$ respectively). Greater care recipient functional impairment and analgesic use were associated with increased use of antipsychotics (OR=1.08, $p=0.05$; OR=1.70, $p=0.05$ use; however, the estimate was not statistically significant (OR=1.02, $p=0.28$).

Antidepressants

Results from the multivariable model predicting antidepressants are presented in Table 4. Fit statistics indicated that the model was an appropriate fit ($\chi^2/df=1.01$). This analysis revealed that younger care recipients and higher cognitive status were associated with greater use of antidepressants (OR=0.97, $p<0.01$; OR=1.04, $p<0.01$ respectively), as were higher levels of dementia knowledge (OR=1.18 $p=0.02$) among caregivers.

Discussion

The results of this exploratory study suggest that the use of psychotropic medication for dementia patients living in the community is influenced both by constructs identified in the Pearlin stress process model (Pearlin et al., 1990), including care recipient characteristics and the subjective experience of informal dementia caregivers. However, contrary to our hypothesis, when caregiver/care recipient characteristics were included in multivariable analyses neither the number of problem behaviors nor the amount of caregiver distress associated with these behaviors was significantly associated with increased odds of psychotropic use. This finding is in contrast to Kunik et al. who reported an increased risk of

anxiolytic and antipsychotic use associated with aggressive behaviors among community-dwelling elders with dementia (Kunik et al., 2010). It is noteworthy, however, that Kunik et al. did not include caregiver characteristics in their analyses. Informal caregivers are key agents in the plan of care for patients with chronic illness such as dementia. Physicians rely on input from caregivers when assessing dementia patients and prescribing treatments. Failure to include caregiver perceptions may exaggerate the relation between dementia symptoms and pharmacologic treatment found in the Kunik study.

The caregiver and care recipient characteristics associated with psychotropic use differed by type of medication. For anxiolytic medication, greater caregiver vigilance was significantly associated with more anxiolytic use. In REACH II, vigilance was defined as the amount of time a caregiver needed to be “on duty” regardless whether the care recipient required immediate attention. An interpretation of this finding is that anxiolytics were prescribed to render the care recipients’ overall behavior more “manageable” for the caregiver. The finding that patients whose caregivers expressed greater confidence managing problem behaviors were significantly less likely to be receiving anxiolytics is logically consistent with the finding regarding vigilance.

Analyses of antidepressants revealed that higher care recipient cognitive status, younger caregiver age, and higher levels of caregiver dementia knowledge were significantly associated with care recipient antidepressant use. Previous literature suggests that depression symptoms are easier to detect in patients with higher cognitive status (Olin, Katz, Meyers, Schneider, & Lebowitz, 2002). Together with the finding that patients cared for by individuals with higher levels of dementia knowledge were more likely [italics in original submission] to be receiving antidepressant medication, the finding suggests that these caregivers were better able to recognize care recipient depression and describe depressive symptoms to the patient’s primary care provider, resulting in prescription and use of antidepressant medication.

Finally, use of the most powerful class of psychotropics, the antipsychotics, was the only class significantly associated with prescription analgesics—a frequently used proxy for pain in dementia patients (Fisher et al., 2002). This observation suggests that antipsychotics may be inappropriately and inadvertently prescribed in response to pain. The results also revealed that antipsychotics were more likely to be used with patients with greater functional impairment, implying that antipsychotics are reserved for dementia patients in significant distress. White patients were significantly more likely to be receiving antipsychotics than either African American or Hispanic patients. Unfortunately, the data do not allow us to ascertain whether physicians were less likely to prescribe this class of medications for non-majority patients or whether these caregivers were less likely to accept a prescription for antipsychotics from physicians.

The results of this exploratory study should be considered in light of the following limitations. First, this investigation was cross-sectional and did not contain information on drug dosage. Consequently, we were unable to investigate the influence of caregiver and care recipient characteristics on the dosage or duration of psychotropic medication. Information on both of these variables would have yielded a more complete understanding of the

associations of interest. Second, care recipient pain was inferred from the use of analgesic medication. Our study found that individuals being treated with either narcotics or prescription COX-2 inhibitors were at an increased risk of antipsychotic use. A plausible explanation of these results is that pain may not have been adequately managed in these individuals. This interpretation is supported by research indicating that pain among older adults with severe cognitive impairment is often underdiagnosed and undertreated (Zwakhalen, Hamers, & Berger, 2006). It is unknown whether this finding would be replicated using a multi-method assessment of pain, including self- and proxy-report, observational assessment, and an inventory of painful conditions. Third, we did not statistically correct for multiple comparisons due to the exploratory nature of this secondary analysis. Future research should seek to replicate these findings with more detailed and multi-method measurement of pain and psychotropic medication use.

Finally, the data for REACH II were collected prior to the first FDA black box warning on the increased risk of death associated with antipsychotic use in elders. Thus, these findings may not generalize to the post-black box environment. It should be noted, however, that atypical antipsychotics remain a popular class of pharmacotherapy in this population (Desai, Heaton, & Kelton, 2012; Dorsey, Rabbani, Gallagher, Conti, & Alexander, 2010), and may have a stronger effect on mortality in elderly dementia patients than previously reported (Maust et al., 2015). Additionally, the US department of Health and Human Services has confirmed the need to reduce antipsychotic use among older adults outside of formal care settings (United States Government Accountability Office, 2015). Therefore, understanding the predictors of antipsychotic drug use in community-dwelling dementia patients remains a timely and important area of gerontological research.

Conclusions

Despite the limitations, this study suggests the importance of a holistic approach to understanding predictors of psychotropic medication use in community-dwelling dementia patients. Although we had assumed that behavioral disturbances would be a strong predictor of care recipient psychotropic medication use, neither the number of problems nor caregiver burden due to behavior problems was significant. Rather, care recipient characteristics such as cognitive status, functional status, and pain, and caregiver characteristics such as race and vigilance, dementia knowledge, and confidence in managing behavioral disturbances suggest that educating caregivers in non-pharmacologic strategies hold promise for a more balanced biopsychosocial approach to maintaining dementia patients in the community.

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Figure 1.
Prevalence of Psychotropic Medication Use

Figure 2.
Prevalence of Psychotropic Medication Use by Medication

Table 1.

Caregiver and Care Recipient Demographic Information

Demographics	Caregiver Mean (SD)	Care recipient Mean (SD)
Age, years	59.55 (13.09)	79.06 (9.26)
Sex, n (%)		
Female	494 (82.61)	353 (59.03)
Male	104 (17.39)	245 (40.97)
Race, n (%)		
White	214 (35.79)	214 (35.79)
Black	192 (32.11)	186 (31.10)
Hispanic	192 (32.11)	183 (30.60)
Relationship to care recipient		
Spouse	254 (42.47)	
Non-spouse	344 (57.53)	
Years caring for CR	4.93 (7.32)	-

SD=Standard deviation; CR=care recipient

Table 2.

Descriptive Statistics for Study Predictors *

Study Predictors	Mean (SD)	Range [†]
<u>Care recipient characteristics</u>		
Cognitive status	12.42 (7.33)	0–30
Functional impairment	10.06 (3.11)	0–14
Number of <i>behavioral symptoms</i>	10.69 (3.98)	0–24
Pain	75 (12.54)	-
<u>Caregiver characteristics</u>		
Self-reported health		
Overall current health	2.11 (1.07)	0–4
Current health compared to 6 months prior	2.12 (0.85)	0–4
Depression	10.02 (6.51)	0–60
Subjective burden	17.32 (8.88)	0–48
Daily care bother	0.77 (0.79)	0–4
Behavioral bother	1.47 (0.90)	0–4
Problem behavior confidence	2.04 (0.93)	0–4
Mastery	5.94 (2.88)	0–6
Vigilance	19.30 (6.73)	0–24
Positive aspects of caregiving	25.45 (8.97)	0–36
Spiritual and religious coping	14.74 (3.54)	0–18
Social Network		
Social network size	6.38 (2.31)	0–10
Social support satisfaction	4.95 (2.82)	0–9
Negative social interaction	2.84 (2.75)	0–12
Income adequacy	1.62 (1.03)	0–3
Dementia knowledge	2.12 (1.32)	0–4

* All values are presented as means and standard deviations, except where noted otherwise

[†] Range of the measurement instrument

SD=Standard deviation

Table 3.

Correlation of Study Medications

Variable	1	2	3	4
1. Anxiolytic	-			
2. Antipsychotic	0.11 *	-		
3. Antidepressant	0.03	0.09 *	-	
4. Pain (Narcotic or COX-2 inhibitor)	0.09 *	0.08	0.03	-

*
p 0.05

Table 4.

Multivariable Non-Linear Mixed Models Predicting Use of Anxiolytic, Antipsychotic, and Antidepressant Medication

Variable	Anxiolytics		Antipsychotics		Antidepressants	
	Odds ratio	95% CI	Odds ratio	95% CI	Odds ratio	95% CI
<u>Care recipient characteristics</u>						
Race						
White	REF	-	REF	-	REF	-
Black	1.72	(0.99, 3.01)	0.60 [†]	(0.37, 0.95)	1.01	(0.66, 1.56)
Hispanic	0.94	(0.51, 1.74)	0.47 [†]	(0.27, 0.81)	0.72	(0.46, 1.13)
Sex						
Female	REF	-	REF	-	REF	-
Male	1.21	(0.69, 2.11)	0.64	(0.39, 1.05)	1.14	(0.73, 1.78)
Age at baseline	0.99	(0.97, 1.01)	0.99	(0.97, 1.01)	0.97 [†]	(0.96, 0.99)
Cognitive status			0.98	(0.95, 1.00)	1.04 [†]	(1.01, 1.06)
Functional impairment	1.07	(0.98, 1.15)	1.07 [†]	(1.00, 1.15)		
Number of behavioral symptoms	1.03	(0.97, 1.09)				
Pain	1.74	(0.96, 3.15)	1.70 [†]	(1.00, 2.92)		
<u>Caregiver characteristics</u>						
Relationship to care Recipient						
Spouse	REF	-	REF	-	REF	-
Non-Spouse	0.99	(0.56, 1.77)	0.94	(0.57, 1.55)	1.16	(0.74, 1.84)
Self-reported health						
Overall current health	1.08	(0.87, 1.36)	1.08	(0.89, 1.30)		
Current health compared to 6 months prior			1.23	(0.96, 1.57)		
Caregiver depression	1.02	(0.97, 1.06)				
Caregiver subjective burden	1.00	(0.97, 1.03)				
Problem behavior Confidence	0.76 [†]	(0.59, 0.99)				
Vigilance	1.06 [†]	(1.01, 1.10)	1.02	(0.98, 1.05)		
Positive aspects of Caregiving					0.99	(0.97, 1.01)
Spiritual and religious Coping					0.96	(0.91, 1.01)
Social network size	0.94	(0.85, 1.05)				
Income adequacy	0.94	(0.74, 1.19)			1.04	(0.87, 1.24)
Dementia knowledge					1.18 [†]	(1.02, 1.35)

* Estimates from non-linear mixed models controlling for recipient race (White, Black, Hispanic, .), sex (male/female), age at baseline, and caregiver relationship to the care recipient (spouse/non-spouse). Variables with a p-value greater than or equal to 0.10 were not included in the multivariable models.

[†] p 0.05