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Alzheimer's Disease and Related Disorders and Out-of-Pocket Healthcare Spending and Burden among elderly Medicare Beneficiaries

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Abstract

Objective—To estimate the excess burden of out-of-pocket healthcare spending associated with Alzheimer's disease and related disorders (ADRD) among older individuals (age ≥ 65 years).

Methods—We adopted a retrospective, cross-sectional study design with data from 2012 Medicare Current Beneficiary Survey. The study sample comprised of elderly community dwelling individuals who had positive total healthcare expenditures, and enrolled in Medicare throughout the calendar year (462 with ADRD, and 7,160 without ADRD). We estimated the per-capita total annual out-of-pocket spending on healthcare and out-of-pocket spending by service type: inpatient, outpatient, home health, prescription drugs, and other services. We measured out-of-pocket spending burden by calculating the percentage of income spent on healthcare and defined high out-of-pocket spending burden as having this percentage above 10%. Multivariable analyses included ordinary least squares regressions and logistic regressions and these analyses

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adjusted for predisposing, enabling, need, personal healthcare practices and external environment characteristics.

Results—The average annual per-capita out-of-pocket healthcare spending was greater among individuals with ADRD compared to those without ADRD (\$3,285 vs. \$1,895); home health and prescription drugs accounted for 52% of total out-of-pocket spending among individuals with ADRD and 34% among individuals without ADRD. Elderly individuals with ADRD were more likely to have high out-of-pocket spending burden (AOR = 1.49; 95% CI = 1.13, 1.97) compared to those without ADRD.

Conclusion—ADRD is associated with excess out-of-pocket healthcare spending, primarily driven by prescription drugs and home healthcare use.

Introduction

Alzheimer's disease and related disorders (ADRD) affect 8.24% of individuals in the United States (US)¹. ADRD are associated with neurocognitive impairments due to its multiple etiologies, including Alzheimer's disease, Lewy body disease, vascular disease, traumatic brain injury, HIV infection, prion disease, Parkinson's disease, Huntington's disease, and certain medications. Among ADRD, 80% of dementias are attributed to Alzheimer's disease². Individuals with ADRD may have worsening neurocognitive impairments as the disease progresses, often requiring increasing levels of medical and non-medical care, including full-time residential services. Most elderly with Alzheimer's disease are covered by Medicare because Medicare provides coverage for nearly all of the elderly in the US³. However, not all healthcare expenditures are covered by Medicare. The patients and families bear some direct medical care costs in terms of deductibles, coinsurance, and copayments for medical care and prescription drugs, insurance premiums for supplemental coverage, amount paid for non-prescription medications; transportation to health care providers; and uncovered structural or lifestyle modifications. For example, among Medicare beneficiaries, health insurance premiums account for 42% of the total out-of-pocket spending, with payments towards cost-sharing and non-covered services and goods accounting for the remaining 58%³. In fact, the total payments for health care, long-term care and hospice care are estimated to be \$236 billion for people with ADRD in 2016, with just under half of the costs covered by Medicare⁴. Therefore, high out-of-pocket spending for ADRD care may place a significant financial burden on families draining resources for the household as a whole⁵.

It is important to assess the magnitude of out-of-pocket expenditures because high expenditures can lead to worse health outcomes. For example, individuals with high out-of-pocket spending may stop taking their medications⁶ and may not use preventive care or outpatient services for their healthcare in order to save money^{7, 8}. This may exacerbate the ADRD symptoms and lead to higher rates of morbidity and mortality⁹. Furthermore, with disease progression, as individuals with ADRD face worsening medical complications and declining functional status, their mix of services required may vary. For example, it has been reported that nearly one-third (34.5%) used home healthcare and the incremental total costs for paid home care in 2010 was \$5,678, accounting for 20% of the incremental direct costs associated with ADRD¹⁰. These services may require co-payments leading to high out-of-

pocket expenses. Therefore, it is also important to examine out-of-pocket spending for different types of care such as home health, inpatient, outpatient, medical provider, and prescription drugs. This may also reflect the trade-off decisions patients need to make on the type of services when faced with limited financial resources.

However, only a few studies have evaluating the association between ADRD and out-of-pocket healthcare spending¹⁰⁻¹³ and these studies have limitations. Kelley et al. reported that the average out-of-pocket spending during the last five-years of life for patients with dementia was 81% higher compared to patients without dementia¹¹. This study used Health Retirement Survey (HRS) and included only fee-for-service Medicare beneficiaries (> 70 years) who died between 2005 and 2010. Hurd et al. used the same dataset and found that the average annual out-of-pocket spending can be as high as \$6,194 among elderly with ADRD¹⁰ However, this study used an estimated probability of dementia rather than the observed status (yes/no). Delavande et al. compared individuals with normal cognition, dementia with cognitive impairment and dementia without cognitive impaired and reported that those with dementia and cognitive impairment had 356% higher annual out-of-pocket expenditures compared to those with normal cognition¹². This study did not analyze out-of-pocket spending burden as a percentage of income spent. Another study used the Medicare Current Beneficiary Survey (MCBS) and analyzed gender differences in life-time out-of-pocket spending¹³. However, that study included out-of-pocket spending only for assisted living facilities and home healthcare.

Therefore, the main objective of the current study is to estimate the excess burden of annual total direct out-of-pocket spending and out-of-pocket spending on different types of healthcare services among all community-dwelling elderly Medicare beneficiaries with ADRD by comparing them to those without ADRD.

Conceptual framework

The explanatory variables for this study were selected using the Andersen's Expanded Behavioral Model¹⁴. Under this model, out-of-pocket expenditures of an individual is influenced by predisposition factors (e.g., age, sex, and race), enabling factors (e.g., marital status, education, and poverty status), need factors (e.g., chronic conditions, health status) and personal health practices (e.g., smoking, obesity, physical activity).

METHODS

Study Design

We adopted a retrospective cross-sectional design.

Data source

The data source is the Medicare Current Beneficiary Survey (MCBS) for the year 2012. The MCBS is nationally representative sample of Medicare beneficiaries - the aged, disabled and institutionalized. The survey began in 1992 and is released every year. The survey directly collects data from the respondents and includes self-reported health status, height and weight, activities of daily living, functional status, living arrangement, history of medical

conditions, out-of-pocket expenditures, non-Medicare utilization, expenditures, and other health-related information. Data collected from the beneficiaries are merged with Medicare claims except for Part D through an extensive and rigorous reconciliation process. The survey is designed with a multistage, stratified, random sampling of Medicare beneficiaries⁴. West Virginia University Institutional Review Board reviewed this project and granted exemption status to the study as all the data were de-identified.

Study Sample

In this study, we restricted our sample to older adults (≥ 65 years), who lived in the community, who were alive, and enrolled in Medicare throughout the entire year. We excluded individuals who did not answer the relevant health questionnaires considered in our study (n =158) and those who had zero total healthcare expenditures (n=107). The final study sample included 7,622 Medicare beneficiaries with (N = 462) or without ADRD (N = 7160).

Measures

Dependent Variables: Out-of-pocket healthcare spending—Out-of-pocket healthcare spending consisted of Medicare cost sharing and non-covered services, but not insurance premiums. We examined out-of-pocket spending using several measures: absolute out-of-pocket expenditures; the log-transformed out-of-pocket spending; and out-of-pocket spending burden. We used log-transformed out-of-pocket expenditures, to reduce skewness^{15, 16} Out-of-pocket spending burden was based on percent income spent out-of-pocket for healthcare. We defined an indicator of positive out-of-pocket spending, and an indicator of high out-of-pocket spending burden indicating that the percentage was above 10% of income based on prior studies^{17, 18}. There were seven components of out-of-pocket spending which were considered in the analyses: home health, facility charges, hospice, inpatient, outpatient, medical provider, prescription drugs, and dental care. The out-of-pocket spending was measured over a one year period in 2012.

Key Independent Variable: Alzheimer's' Disease and Related Dementias (ADRD)—The key explanatory variable in our study was the presence or absence of ADRD. ADRD was ascertained using self-reports or Medicare claims. Self-reported ADRD was based on giving an affirmative response to either of the following two questions: “Has a doctor (ever) told [you/(SP)] that (you/he/she) had Alzheimer's disease?” and “Has a doctor (ever) told [(you/(SP))] that (you/he/she) had any type of dementia other than Alzheimer's disease?”. We used the International Classification of Diseases, 9th edition Clinical Modification (ICD-9-CM) codes to derive ADRD from Medicare claims. The ICD-9-CM codes (including 3310, 33111, 33119, 3312, 3317, 2900, 29010, 29011, 29012, 29013, 29020, 29021, 2903, 29040, 29041, 29042, 29043, 2940, 29410, 29411, 29420, 29421, 2948, and 797). These codes were based on the Centers for Medicaid and Medicare Services (CMS) chronic conditions warehouse algorithm¹⁹.

Other Explanatory Variables—Using the Andersen Model health care utilization model, we identified *predisposing characteristics consisting of* sex (male/female), age (65–69 years, 70–74 years, 75–79 years, and 80 years and older), race/ethnicity (White, African American,

Latino, other), *enabling factors* comprising marital status (married, widowed, divorced/separated, or never married), education (less than high school, high school, or above high school, college), income relative to the federal poverty line (FPL) (less than 200% of FPL or at least 200% of FPL), supplementary health insurance Medicaid (yes/no), private insurance (yes/no), and prescription drug coverage (yes/no), and *need factors* (number of chronic conditions [considered from the following list: arthritis, cancer, diabetes, heart disease, hypertension, respiratory disease, osteoporosis, mental illness] (none, one, two to three, four or more), individual perceived health status (excellent, very good, good, fair, poor), functional limitations measured by activities of daily living (none, one to two, three or more). We also adjusted for personal health practice factors, including body mass index (BMI) (underweight, normal weight, overweight, or obese), and smoking status (never-smoker, former smoker, or current smoker). The BMI categories were based on the CDC definition: underweight (<18.5), normal (18.5 to <25), overweight (25.0 to <30), and obese (30.0 or higher). We also accounted for external environment such as socioeconomic status which included region of residence (Northeast, Midwest, South, and West), urban/rural status (metropolitan area/non-metropolitan area) and income relative to the federal poverty level (less than 200% of federal poverty level or at least 200% of federal poverty level). It has to be noted that all our independent variables were measured as categorical variables.

Statistical analyses: We tested statistically significant differences between ADRD and no ADRD groups with chi-square statistics. We used ordinary least squares for out-of-pocket spending in the whole sample and among those with positive out-of-pocket spending.

We conducted logistic regressions to examine the relationship between ADRD and having out-of-pocket spending burden above 10%. All our multivariable models adjusted for expanding number of covariates.

RESULTS

The sample consisted of 57% female, and 79% white. The age groups were equally distributed with 24% between 65 and 69 years, 27% were between 70 and 74 years, 20% between 75 and 79 years and 30% at least 80 years of age (Table 1).

There were significant group differences involving ADRD status and sex, race, age, marital status, poverty status, being on Medicaid, number of chronic conditions, perceived health status, functional limitations, BMI, and smoking status. A lower percentage of ADRD individuals had college education (21.8% versus 29.7%) and a higher percentage of individuals with ADRD were poor defined as less than 200% of the FPL (65% vs 45%), and were on Medicaid (26% vs 13%) compared to those without ADRD. A higher percentage of individuals with ADRD had 3 or more ADL (35.6% versus 8.9%) compared to those without ADRD. A higher percentage of those with ADRD had 4 or more chronic conditions compared to individuals without ADRD (39% vs 31%).

Unadjusted Differences in Out-of-Pocket Expenditures by ADRD Status

The average out-of-pocket spending by type of services and ADRD status are presented in Table 2. Elderly with ADRD had significantly higher out-of-pocket spending across all

measures except dental care. The total out-of-pocket spending in ADRD group was \$3,284.6 whereas the total out-of-pocket spending in no-ADRD group was \$1895.0. Among those who had positive out-of-pocket spending (i.e. expenditures that the insurance did not cover), the results were similar (total out-of-pocket spending was \$3,319.40 in ADRD group vs. \$1,907.20 in no-ADRD group), except the difference in outpatient spending became insignificant. Results for out-of-pocket spending burden is similar however differences in outpatient, medical provider and dental spending failed to reach significance.

Adjusted Differences in Out-of-Pocket Expenditures by ADRD Status

Based on multivariable OLS regression on out-of-pocket spending (Table 3), we observed that Individuals with ADRD spent \$1,101 higher in total, \$274 higher in prescription drugs ($p < .01$), \$622 higher in home health ($p < 0.05$) than individuals without ADRD. Among those who had positive out-of-pocket spending, those with ADRD had substantially higher home health out-of-pocket spending (\$5,570) compared to individuals without ADRD. Individuals with ADRD also incurred higher out-of-pocket spending on prescription drugs (\$274, p -value <0.001) and total out-of-pocket spending (\$1,126, $p < 0.01$). Individuals with ADRD spent less out-of-pocket on inpatient (\$401, p -value <0.001) than individuals without ADRD.

In ordinary least squares estimation for log-transformed out-of-pocket spending analyses, individuals with ADRD had higher home health ($\beta = .304$ $p < .01$), prescription drugs, ($\beta = .498$ $p < .001$), inpatient ($\beta = .273$ $p < .01$) and overall out-of-pocket spending ($\beta = .319$ $p < .001$) compared to those without ADRD.

Out-of-Pocket Spending Burden by ADRD Status

We also examined the out-of-pocket spending burden by ADRD status using percent income spent on healthcare services (Table 4). Individuals with ADRD spent a significantly higher percentage of their income on medical services among those without ADRD (at 12% vs 7%). They also spent a significantly higher percentage on home health, prescription drugs, and medical provider visits. Similar results were obtained using the ordinary least squares regression (e.g., higher percentage of their income spent on home health, prescription drugs and overall).

We examined the number and percentages of individuals with out-of-pocket spending burden above 10% (high out-of-pocket spending burden) (Table 5). Individuals with ADRD were more likely to have spent greater than 10% of their income on healthcare (30% vs. 17%; $P < .0001$). We expanded the list of covariates adjusted in the model and found that although the adjusted odds ratio were attenuated, a significant association of ADRD and higher out-of-pocket remained in the model (Adjusted odds ratio: 1.49; 95% confidence interval: 1.13, 1.97).

Discussion

In unadjusted analyses, we found that having ADRD was associated with a doubling of total out-of-pocket spending over those without ADRD. Even after adjusting for other factors, those with ADRD had 37.5% higher out-of-pocket spending compared to those without

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ADRD. The care of individuals with ADRD is complex because the care includes increasing dependency on others for basic daily care needs, the management of comorbid conditions and the need for appropriate end-of-life care²⁰. Their range of needs span from minor assistance at the outset of the dementia to comprehensive services to meet activities of daily living and other care to address issues from the disease progression or other co-morbidities. The usual course of the disease is 5 to 10 years with the majority of the care focused on keeping the individual in community rather than a nursing facility.

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We are not able to directly compare our estimates of out-of-pocket spending on healthcare with published studies due to differences in samples, time period, and components of out-of-pocket spending. However, when examined as proportions, our estimates were considerably smaller (73%) compared to the 356% higher out-of-pocket spending reported by Delavande et al.¹². We speculate that our estimates are lower because our study sample included elderly who were living in the community and did not include nursing home spending. It has to be noted that our finding of higher out-of-pocket spending among individuals with ADRD is contrary to the published study by Delavande et al, who found no significant differences among those with dementia and cognitive impairment or normal cognition²¹.

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In our study, we found higher levels of out-of-pocket spending on home healthcare among those with ADRD compared to elderly without ADRD. This was not unexpected because home health is an important component of overall health management as this level of care often provides some assistance with self-care and opportunities for social engagement for the person with dementia and prevents behavioral outbursts, falls, injuries, or individuals from getting lost while the individual is receiving skilled nursing care. The increased utilization of home health and other skilled care has been noted in other studies, particularly in Lin et al., 2016, where they found, when compared to matched controls, individuals with ADRD were shown to use more home health before and after diagnosis²². These authors concluded that recognition of the ADRD diagnosis takes special attention, It is worth noting that there is a recognition of the impact of the ADRD crisis by the policy-makers at the U.S. Department of Health and Human Services who created the National Plan to Address Alzheimer's Disease to assist family members and persons with ADRD through research, care, and governmental collaboration²³.

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We observed that elderly with ADRD had higher out-of-pocket spending on prescription drugs compared to those without ADRD, consisted with prior studies²⁴. The cost of prescription medications are on the rise in the U.S. In 2016, the total U.S. prescription sales were \$448.2 billion, a 5.8% increase compared with 2015. Prescription expenditures in clinics and nonfederal hospitals totaled \$63.7 billion (an 11.9% increase from 2015) and \$34.5 billion (a 3.3% increase from 2015), respectively²⁵. This increase may disproportionately impact those with ADRD because they have higher number of multiple chronic conditions that require medications compared to patients without ADRD, which has been observed in our study as well as other published studies²⁴. Multimorbidity and polypharmacy complicate the needs of persons with ADRD and may also result in potentially inappropriate medications, adverse events from medications, both of which may also increase the out-of-pocket costs for these patients with ADRD²⁶.

Another contributing factor to increased levels of out-of-pocket expenditures for those with ADRD is the presence of the “donut-hole” gap (i.e. prescription drug coverage gap) in Medicare coverage. Patients with ADRD are particularly vulnerable to this gap; 39.5% of patients with ADRD experienced “donut-hole”, which may partially explain the high OOP²⁷.

These findings have implications for clinical management of chronic conditions. Although not specific to ADRD, a systematic review of cost sharing for prescription drugs found that in 85% of the studies cost sharing for prescription drugs had a negative effect on adherence²⁸. The same review indicated that many studies (86% of the total studies reviewed) found improved adherence to be associated with improved health outcomes, suggesting that cost-sharing may lead to poor health outcomes²⁸.

Given that the number of older Americans with ADRD will likely increase significantly in the future, changes in public funding and healthcare policy aimed at reducing out-of-pocket spending for can reduce the financial burden of individuals with ADRD and their families. It is estimated that a tax credit for insured Americans who spent more than 5% of their income on healthcare can decrease spending up to 33%²⁹. Setting copays based on the level of sickness such as those adopted in France can also be considered³⁰⁻³². As cost-sharing is a major barrier for chronic care³³, waiving or reducing cost-sharing for those with chronic illnesses such as ADRD may not only decrease the financial burden on the patients and their families but also improve chronic illness care.

Study Limitations

Several limitations to our study should be noted. Misclassification bias is possible with MCBS data. MCBS may not have captured all of the individuals with ADRD since, as a medical claims data source, if individuals have not sought care for ADRD, they would not have been identified as having ADRD. We could not measure the severity of ADRD as MCBS did not collect severity information. Also, some components of treatments may not be included in charges (and therefore not in the claims data) if reimbursement rates are very low, even if the treatment is provided or if out-of-pocket costs resulted. Medicare’s home healthcare benefit is limited. Medicare does not cover 24-hour care at home, meals delivered to the individual’s home, and homemaker or custodial care services (i.e. cooking, shopping, and laundry) unless such care is part of the skilled nursing or skilled therapy services individuals receive from a home health aide³⁴. Finally, income and asset data are not available for people with ADRD in MCBS dataset.

Considerations for future research

Individuals with ADRD often have family members or significant others provide uncompensated care. It is estimated that informal caregivers provide 70 hours/week to individuals with ADRD^{35, 36}. Caregivers often experience lost earnings as a result^{37, 38}. The Alzheimer’s Association reported 17.4 billion hours of unpaid care was provided for individuals with ADRD in 2011, valued at \$210 billion³⁹. In addition, more than 60% of formal services provided for individuals with ADRD are financed by the family, regardless of care setting⁴⁰. The growing elderly population and the possible shortage of informal

caregivers increase individuals' healthcare needs and costs⁴¹. Policymakers recommend that people plan and save for the likelihood of requiring long-term care, and that tax proposals should be in place to limit the financial burdens.

Additional research is needed to examine caregiver burden including the extent to which individuals are providing care to those with ADRD, the nature of the care that is being provided, the impact on the family psychosocially by providing the care, and the impact on the family financially. Previously most of the research has focused upon the person with ADRD, additional information is needed about the impact more broadly.

Conclusion

Medicare beneficiaries with ADRD have higher out-of-pocket expenditures as compared with Medicare beneficiaries without ADRD. The financial burden as a percent of income is higher with Medicare beneficiaries with ADRD as compared with Medicare beneficiaries without ADRD.

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Table 1
 Characteristics of Elderly Medicare Beneficiaries by ADRD Status Medicare Current Beneficiary Survey, 2012

	Total		ADRD		No ADRD	
	N	Wt %	N	Wt %	N	Wt %
ALL	7,622	100.0	462	100.0	7,160	100.0
Sex						
Women	4,290	56.5	303	64.6	3,987	56.0
Men	3,332	43.5	159	35.4	3,173	44.0
Race/Ethnicity						
White	5,956	78.5	320	70.7	5,636	78.9
African American	624	7.8	67	13.2	557	7.4
Latino	699	9.1	58	12.1	641	8.9
Other race	320	4.7	17	4.1	303	4.7
Age in Years						
65–69	1,404	23.6	19	6.5	1,385	24.5
70–74	1,779	27.3	52	14.7	1,727	28.0
75–79	1,558	20.1	73	17.6	1,485	20.2
80 +	2,881	29.1	318	61.2	2,563	27.3
Marital Status						
Married	4,028	54.6	195	44.4	3,833	55.2
Widowed	2,413	28.4	211	43.2	2,202	27.6
Divorced/Separated	919	13.4	41	9.3	878	13.7
Not Married	260	3.5	15	3.1	245	3.6
Metro Status						
Metro	5,661	77.5	341	76.5	5,320	77.6
Not Metro	1,961	22.5	121	23.5	1,840	22.4
Education						
Less than HS	1,772	21.2	173	35.1	1,599	20.4
High School	2,585	33.3	138	29.9	2,447	33.4
Above High School	1,187	16.3	58	13.1	1,129	16.5
College	2,054	29.2	90	21.8	1,964	29.7

	Total		ADR		No ADR	
	N	Wt %	N	Wt %	N	Wt %
ALL	7,622	100.0	462	100.0	7,160	100.0
Poverty Status						
Less than 200%	3,721	46.1	306	65.2	3,415	45.1
At least 200%	3,901	53.9	156	34.8	3,745	54.9
Medicaid						
Yes	1,088	13.8	124	26.4	964	13.1
No	6,534	86.2	338	73.6	6,196	86.9
Private Health Insurance						
Yes	4,257	56.2	269	58.0	3,988	56.1
No	3,365	43.8	193	42.0	3,172	43.9
Prescription Drug Coverage						
Yes	6,199	81.8	386	84.0	5,813	81.7
No	1,423	18.2	76	16.0	1,347	18.3
# of Chronic Conditions						
None	335	5.0	12	2.7	323	5.2
One	1,002	13.9	49	10.5	953	14.1
2-3	3,775	49.8	222	47.4	3,553	49.9
4 or more	2,510	31.3	179	39.4	2,331	30.8
Health Status						
Excellent	1,402	19.5	59	12.1	1,343	19.9
Very good	2,532	33.6	111	24.4	2,421	34.1
Good	2,270	29.3	135	30.5	2,135	29.2
Fair	1,079	13.5	117	24.8	962	12.9
Poor	310	4.1	38	8.2	272	3.9
Functional Limitations						
None	4,970	67.3	168	37.7	4,802	68.9
1 or 2	1,839	23.0	124	26.7	1,715	22.8
3 or more	808	9.8	170	35.6	638	8.3
Body Mass Index						
Underweight	177	2.2	21	4.2	156	2.1

	Total		ADRD		No ADRD	
	N	Wt %	N	Wt %	N	Wt %
ALL	7,622	100.0	462	100.0	7,160	100.0
Normal	2,597	33.3	185	38.8	2,412	33.0
Overweight	2,824	37.7	168	38.2	2,656	37.7
Obese	1,957	26.8	78	18.8	1,879	27.2
Smoking Status						
Current Smoker	644	9.4	23	5.5	621	9.6
Past Smoker	3,779	49.5	215	47.9	3,564	49.6
Never smoked	3,195	41.1	223	46.6	2,972	40.8

Note: Based on 7,622 Medicare beneficiaries age 65 and older, alive during the calendar and had positive total healthcare expenditures. Significant group differences in characteristics by ADRD status was based on chi-square tests.

ADRD: Alzheimer's disease and related dementias ; HS: High School; Sig: Significance; Wt: Weighted

*** p < .001;

** .001 p < .01;

* .01 p < .05.

Out-of-Pocket Spending among Elderly Medicare Beneficiaries by Alzheimer’s Disease and Related Dementias Medicare Current Beneficiary Survey, 2012

Table 2

ALL	ADRD			No ADRD		
	N	Wt. Mean	SE	N	Wt. Mean	SE
Total	462	3,284.6	376.0	7,160	1,895.0	47.3
Inpatient	462	111.4	35.6	7,160	42.9	6.4
Outpatient	462	161.2	65.6	7,160	120.9	12.5
Medical Provider	462	981.2	136.6	7,160	667.1	20.5
Prescription Drugs	462	847.5	61.8	7,160	597.9	14.0
Home Health	462	874.3	276.9	7,160	52.7	26.1
Dental	462	242.2	62.0	7,160	404.9	15.8
Other	462	66.9	21.5	7,160	8.8	1.7
Among those with Out-of-Pocket Spending > 0						
Total	457	3,319.4	379.6	7,114	1,907.2	47.8
Inpatient	42	1,228.1	356.9	279	1,109.2	151.9
Outpatient	145	508.1	204.2	2,316	381.0	36.8
Medical Provider	410	1,101.5	151.2	6,421	744.9	22.4
Prescription Drugs	451	867.7	64.0	6,855	627.4	14.6
Home Health	26	14,523.7	3,492.5	80	5,060.4	2,431.8
Dental	152	726.3	183.3	3,516	798.4	28.0
Other	20	1,496.1	340.5	79	908.4	160.6

Note: Based on 7,622 Medicare beneficiaries age 65 and older, alive during the calendar and had positive total healthcare expenditures. Significant group differences average out-of-pocket spending by ADRD status were based on t-tests. Among those with out-of-pocket spending greater than zero, the total spending is not sum of individual domains.

ADRD: Alzheimer’s disease and related disorders; SE: Standard error; Sig: Significance; Wt: Weighted

*** p < .001;

** .001 p < .01;

* .01 p < .05

Table 3

Regression Coefficients and Standard Errors of ADRD Status from Multivariable Linear Models on Out-of-Pocket Spending Medicare Current Beneficiary Survey, 2012

Ordinary Least Squares Regression (Whole Sample)				
	Estimate	SE	Prob.	
Total	\$1,101.1	\$378.7	0.004	
Inpatient	\$42.2	\$43.3	0.330	
Outpatient	\$39.7	\$67.1	0.554	
Medical Provider	\$144.1	\$137.2	0.294	
Prescription Drugs	\$274.4	\$65.3	<0.0001	
Home Health	\$622.2	\$285.2	0.030	
Dental	-\$68.1	\$70.5	0.335	
Other	\$46.5	\$21.2	0.029	
Ordinary Least Squares Regression (Out-of-pocket spending >0)				
	Estimate	SE	Prob.	
Total	\$1,125.5	\$381.4	0.003	
Inpatient	-\$401.1	\$113.2	<0.0001	
Outpatient	\$93.1	\$210.5	0.658	
Medical Provider	\$165.1	\$153.8	0.284	
Prescription Drugs	\$274.1	\$67.1	<0.001	
Home Health	\$5,570.2	\$836.5	<0.001	
Dental	-\$11.0	\$183.5	0.952	
Other	\$231.6	\$0.0	<0.0001	
Ordinary Least Squares Regression Log-transformed Out-of-Pocket Spending				
	Estimate	SE	Prob.	
Total	0.319	0.070	<0.0001	
Inpatient	0.273	0.090	0.002	
Outpatient	0.005	0.135	0.969	
Medical Provider	0.176	0.110	0.111	
Prescription Drugs	0.498	0.072	<0.001	
Home Health	0.304	0.100	0.002	
Dental	-0.428	0.132	0.001	
Other	0.195	0.060	0.001	

Note: Based on 7,622 Medicare beneficiaries age 65 and older, alive during the calendar and had positive total healthcare expenditures. The regression models controlled for sex, age, race/ethnicity, marital status, education, poverty status, Medicaid, private insurance, prescription drug coverage, number of chronic conditions, perceived physical health, functional status, body mass index, and current smoking.

ADRD: Alzheimer's disease and related dementias; Prob: Probability; SE: Standard error; Sig: Significance; Wt: Weighted.

p < .001;

**
.001 p < .01;

*
.01 p < .05

Table 4
Out-of-pocket Spending Burden (Percent Income Spent Out-of-pocket) among Elderly Medicare Beneficiaries Medicare Current Beneficiary Survey, 2012

	ADRD				No ADRD			
	N	Wt. Mean	SE	N	Wt. Mean	SE	Sig	
Total	462	12.44	1.13	7,160	6.85	0.15		
Inpatient	462	0.68	0.25	7,160	0.19	0.04		
Outpatient	462	0.67	0.21	7,160	0.53	0.05		
Medical Provider	462	4.33	0.56	7,160	2.79	0.10		
Prescription Drugs	462	4.28	0.44	7,160	2.57	0.10		
Home Health	462	2.23	0.70	7,160	0.07	0.02		
Dental	462	1.11	0.28	7,160	1.35	0.08		
Other	462	0.30	0.10	7,160	0.04	0.00		

Regression Co-efficient and Standard Errors of ADRD status from Ordinary Least Squares Regression on Out-of-pocket Spending Burden (Percent Income Spent Out-of-pocket)							
	Beta	SE	Prob	Sig			
Total	3.376	1.122	0.003				
Inpatient	0.370	0.247	0.135				
Outpatient	0.048	0.229	0.834				
Medical Provider	0.136	0.556	0.806				
Prescription Drugs	1.194	0.446	0.008				
Home Health	1.854	0.693	0.008				
Dental	-0.160	0.328	0.625				
Other	0.182	0.096	0.058				

Note: Based on 7,622 Medicare beneficiaries age 65 and older, alive during the calendar and had positive total healthcare expenditures. The regression models controlled for sex, age, race/ethnicity, marital status, education, poverty status, Medicaid, private insurance, prescription drug coverage, number of chronic conditions, perceived physical health, functional status, body mass index, and current smoking.

ADRD: Alzheimer's disease and related dementias; Prob: Probability; SE: Standard error; Sig: Significance; Wt: Weighted

*** p < .001;

** .001 p < .01;

* .01 p < .05

Table 5

High Out-of-pocket Spending Burden among Elderly Medicare Beneficiaries Medicare Current Beneficiary Survey, 2012

		High OOP Spending Burden		Low OOP Spending Burden	
		N	Wt %	N	Wt %
ALL		1,409	17.6	6,213	82.4
ADR					
Yes		139	29.9	323	70.1
No		1,270	16.9	5890	83.1
Adjusted Odds Ratios (AOR) and 95% Confidence Intervals (CI) of ADR Status from Logistic Regressions on High Out-of-pocket Spending Burden					
AOR	95% CI	Sig			
Model 1 – Unadjusted					
ADR					
Yes	2.12	[1.67, 2.68]			
No					
Model 2 ADR + Sex + Race + Age					
ADR					
Yes	1.78	[1.39, 2.28]			
No					
Model 3 ADR + Sex + Race + Age + marital status + education + health insurance					
ADR					
Yes	1.73	[1.34, 2.23]			
No					
Model 4 ADR + Sex + Race + Age + marital status + education + health insurance + life style					
ADR					
Yes	1.59	[1.21, 2.09]			
No					
Model 5 ADR + Sex + Race + Age + marital status + education + health insurance + life style + health + functional status					
ADR					
Yes	1.49	[1.13, 1.97]			
No					

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Note: Based on 7,622 Medicare beneficiaries age 65 and older, alive during the calendar and had positive total healthcare expenditures. The regression models controlled for sex, age, race/ethnicity, marital status, education, poverty status, Medicaid, private insurance, prescription drug coverage, number of chronic conditions, perceived physical health, functional status, body mass index, and current smoking. High out-of-pocket spending burden is defined as spending greater than 10% of family income out-of-pocket for medical care.

ADRD: Alzheimer's disease and related dementias; SE: Standard error; Sig: Significance; Wt: Weighted

p < .001;

0.01 < p < .01;

*
0.1 < p < .10;
*