

Supplementary Material

Costs of Early Stage Alzheimer’s Disease in the United States: Cross-Sectional Analysis of a Prospective Cohort Study (GERAS-US)

Supplementary Table 1. Unit Costs (USD2017) for Resource Utilization Measures in the US

Cost Component	Unit Cost (USD2017) ^a	Assumptions	Source
Work loss	Per hour		
			United States Department of Labor—Bureau of Labor Statistics. https://www.bls.gov/news.release/pdf/wkyeng.pdf , Accessed September 21, 2019.
Work loss for working participants	22.12	September 2017 average annual gross hourly wage; Note: Median costs were also assessed and were fairly consistent (\$22.60)	
Lost leisure time for nonworking caregivers (35% of hourly wage)	7.74		
Basic care (minimum wage)	7.25		
Accommodations	Per night		
Intermediate care (nondementia specific)	121.75	Median daily costs for assisted living	Genworth 2016 Cost of Care Survey, conducted by CareScout®, April 2016. https://www.genworth.com/about-us/industry-expertise/cost-of-care.html , Accessed 23 August 2019.
Dementia-specific residential care	160.33	Alzheimer’s care in assisted living communities costs approximately \$1150 more each month.	American Elder Care Research Organization. Paying for Senior Care. https://www.payingforseniorcare.com/about-us.html , Accessed 22 September 2019.
Long-term institutional care (nursing home)	244.53	Average of median daily costs for semi-private and private rooms	Genworth 2016 Cost of Care Survey, Conducted by CareScout®, April 2016. https://www.genworth.com/about-us/industry-expertise/cost-of-care.html , Accessed 23 August 2019.
Other	175.54	Average across subcategories, as no description of “other” provided	
Hospitalizations	Per night		
			Agency for Healthcare Research and Quality. Hospital Inpatient Services—Mean and Median Expenses per Person with Expense and Distribution of Expenses by Source of Payment: United States, 2014. Medical Expenditure Panel Survey Household Component Data. Generated interactively. https://meps.ahrq.gov/mepsweb/data_stats/quick_tables.jsp , Accessed 22 September 2019. National Center for Health Statistics. Health, United States 2016: With Chartbook on Long-term Trends in Health. Hyattsville, MD. 2017. https://www.cdc.gov/nchs/data/16.pdf , Accessed 22 September 2019

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	4050.71	Mean inpatient expenditures for those 55 to 85 years of age [Agency for HCRQ Hosp Inpt 2014], assuming average hospital stay was 5.5 days [National Ctr Health Stats 2016]. This is an underestimate as it includes “0 nights.” It also averages same costs over 5.5 days, whereas each day in the hospital becomes less expensive (i.e., costs in 2014 for 1 night is \$8350, \$9835 for 2, \$10,824 for 3, and \$19,740 for 4 or more nights).	
Healthcare visits	Per visit		
Emergency room (<24 h)	1854.76	Mean emergency room visits for those 55 to 85 years of age	Agency for Healthcare Research and Quality. Emergency Room Services-Mean and Median Expenses per Person with Expense and Distribution of Expenses by Source of Payment: United States, 2014. Medical Expenditure Panel Survey Household Component Data. Generated interactively. https://meps.ahrq.gov/mepsweb/data_stats/quick_tables.jsp , Accessed 22 September 2019.
Neuropsychological assessment	98.69	CPT 96118 nonfacility code (Neuropsychological test by psychiatrist/psychologist), for national payment amount	CMS Physician Fee Schedule 2016. National Payment Amount by HCPCS Code. https://www.cms.gov/apps/physician-fee-schedule/search/search-results.aspx?Y=0&T=4&HT=1&CT=0&H1=99285&M=5 , Accessed 23 August 2019.
General practitioner	99.88	Average nonfacility costs for office/outpatient visits for new (99201-99205) and established (99211-99215) patients	CMS Physician Fee Schedule 2016. National Payment Amount by HCPCS Code. https://www.cms.gov/apps/physician-fee-schedule/search/search-results.aspx?Y=0&T=4&HT=1&CT=0&H1=99285&M=5 , Accessed 23 August 2019.
Geriatrician	99.88	Average nonfacility costs for office/outpatient visits for new (99201-99205) and established (99211-99215) patients	CMS Physician Fee Schedule 2016. National Payment Amount by HCPCS Code. https://www.cms.gov/apps/physician-fee-schedule/search/search-results.aspx?Y=0&T=4&HT=1&CT=0&H1=99285&M=5 , Accessed 23 August 2019.
Neurologist	122.38	Average nonfacility costs for CPT 99490 (chronic care management) plus office/outpatient visits for new (99203-99205) and established (99213-99215) patients.	CMS Physician Fee Schedule 2016. National Payment Amount by HCPCS Code. https://www.cms.gov/apps/physician-fee-schedule/search/search-results.aspx?Y=0&T=4&HT=1&CT=0&H1=99285&M=5 , Accessed 23 August 2019.

Cost Component	Unit Cost (USD2017)^a	Assumptions	Source
Psychiatrist	132.07	Average nonfacility costs for CPT 90791	CMS Physician Fee Schedule 2016. National Payment Amount by HCPCS Code. https://www.cms.gov/apps/physician-fee-schedule/search/search-results.aspx?Y=0&T=4&HT=1&CT=0&H1=99285&M=5 , Accessed 23 August 2019.
Physiotherapist (20 min)	51.23	Average nonfacility costs for CPT 97161-97163 (patient evaluation low, moderate, and high) and 97110, 97140, 97112, 97116, 97530, and 97525 (therapies)	CMS Physician Fee Schedule 2016. National Payment Amount by HCPCS Code. https://www.cms.gov/apps/physician-fee-schedule/search/search-results.aspx?Y=0&T=4&HT=1&CT=0&H1=99285&M=5 , Accessed 23 August 2019.
Occupational therapist (20 min)	51.23	Average nonfacility costs for CPT 97161-97163 (patient evaluation low, moderate, and high) and 97110, 97140, 97112, 97116, 97530, and 97525 (therapies)	CMS Physician Fee Schedule 2016. National Payment Amount by HCPCS Code. https://www.cms.gov/apps/physician-fee-schedule/search/search-results.aspx?Y=0&T=4&HT=1&CT=0&H1=99285&M=5 , Accessed 23 August 2019.
Social worker (30 min)	22.30	Assuming a 30-minute visit; CPT G0155 - services of clinical social worker in home health or hospice settings, 15 minutes each	CMS Physician Fee Schedule 2016. National Payment Amount by HCPCS Code. https://www.cms.gov/apps/physician-fee-schedule/search/search-results.aspx?Y=0&T=4&HT=1&CT=0&H1=99285&M=5 , Accessed 23 August 2019.
Psychologist	132.07	Average nonfacility costs for CPT 90791, 90832, 90834, 90837, 96116, and 96118	CMS Physician Fee Schedule 2016. National Payment Amount by HCPCS Code. https://www.cms.gov/apps/physician-fee-schedule/search/search-results.aspx?Y=0&T=4&HT=1&CT=0&H1=99285&M=5 , Accessed 23 August 2019.
Other	88.88	Average across subcategories, as no description of “other” provided	CMS Physician Fee Schedule 2016. National Payment Amount by HCPCS Code. https://www.cms.gov/apps/physician-fee-schedule/search/search-results.aspx?Y=0&T=4&HT=1&CT=0&H1=99285&M=5 , Accessed 23 August 2019.
Community care services	Per event		
District nurse	125.53	Average for home visit new and established patients (CPT 99347-99350 and 99341-99345)	CMS Physician Fee Schedule 2016. National Payment Amount by HCPCS Code. https://www.cms.gov/apps/physician-fee-schedule/search/search-results.aspx?Y=0&T=4&HT=1&CT=0&H1=99285&M=5 , Accessed 23 August 2019.
Home aide/orderly (assuming 3 hours)	60.00	Assume 3 hours at \$20.00 per hour	Genworth 2016 Cost of Care Survey, Conducted by CareScout®, April 2016. https://www.genworth.com/about-us/industry-expertise/cost-of-care.html , Accessed 23 August 2019. American Elder Care Research Organization. Paying for Senior Care. https://www.payingforseniorcare.com/about-us.html , Accessed 22 September 2019.

Cost Component	Unit Cost (USD2017) ^a	Assumptions	Source
Food delivery	11.74	Average cost of home-delivered meal including cost of meal and value of labor and nonlabor resources	Ziegler J, Redel N, Rosenberg L, Carlson B (2015) Older Americans Act Nutrition Programs Evaluation: Meal Cost Analysis. <i>Mathematica Policy Research</i> , http://www.mealsonwheelsamerica.org/docs/default-source/default-document-library/nsp-meal-cost-analysis.pdf , Accessed 22 September 2019.
Transportation (care related)	37.43	Average nationwide cost per trip for paratransit. This may be an underestimate as it excludes ambulance services but may be on overestimate as use of vanpools may have increased since 2012	Federal Transit Administration. Accessible transit services for All, FTA Report No. 0081. www.transit.dot.gov/sites/fta.dot.gov/files/FTA0081_Research_Report_Summary.pdf , Accessed 22 September 2019
Transportation (care related) for patients with ambulance use	803.00	This item was asked as a yes/no question and was only counted as 1 visit per data collection wave Mean ambulance expenditures for those 55+ years of age	Agency for Healthcare Research and Quality. Emergency Room Services-Mean and Median Expenses per Person With Expense and Distribution of Expenses by Source of Payment: United States, 2014. Medical Expenditure Panel Survey Household Component Data. Generated interactively. https://meps.ahrq.gov/mepsweb/data_stats/quick_tables.jsp , Accessed 22 September 2019.
Day care	70.00		Genworth 2016 Cost of Care Survey, conducted by CareScout®, April 2016. https://www.genworth.com/about-us/industry-expertise/cost-of-care.html , Accessed 23 August 2019.
Other	59.87	Average across subcategories, as no description of “other” provided	
Medications associated with comorbidities	Per day		IMS Health, IMS MIDAS Quantum MAT March 2013. https://www.imshealth.com/files/web/IMSH%20Institute/NPA_Data_Brief.pdf , Accessed 11 May 2019. Truven Health Analytics. RED BOOK A Comprehensive, Consistent Drug Pricing Resource. Micromedex Solutions. http://micromedex.com/products/product-suites/clinical-knowledge/redbook , Accessed 22 September 2019.
Depression	2.94	Four databases were used to estimate costs: (1) The top 3 drugs per comorbidity were identified using IMS National Drug Therapeutic Index (2Q2017), which reports US physicians’ prescribing behaviors;	
Epilepsy	6.81		
Stroke	1.83		
Coronary artery disease	1.06		
Hypertension	1.66		
Diabetes mellitus, Type I	3.08		
Diabetes mellitus, Type II	1.58		

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Hypercholesterolemia	5.34	the most common strength per drug for patients similar to this study's patient population (60 years of age and older) using IMS Rx Extended Insights database was applied to the FDA recommended daily dose such that if 40 mg/day was the recommended dose and the most common strength was 20 mg, then 20 mg/BID was used rather than a 40 mg/QD; next, a single average cost per drug/strength/daily dose was defined by using an AWP from REDBOOK (2016); finally, the proportion of the market for each drug was identified using the 2Q2017 IMS MIDAS database and cost per drug was weighted proportionately into a single average	
Cancer	12.91		
Urinary tract disorder	5.91		
Obstructive pulmonary disease	2.42		
Alcohol dependency	3.03		
Drug dependency	5.57		
Seizures but not epilepsy	4.04		
Rheumatoid arthritis	37.83		
Sleep disorders	2.96		
Medications reported by study partners	Per day		
Pain	6.67	Costs of medications were supplemented for study partners using the same methodology as above for indications not elsewhere classified based on their listing of medication use per data collection wave (up to 7 medications per visit)	
Allergy	1.13		
Endocrine	1.19		
Eye disorders	1.32		
Anxiety	1.46		
Cardiac other	2.53		
GI disorders	3.43		
Other	0.18		
Cost of AD treatments received	Per day		Truven Health Analytics. RED BOOK A Comprehensive, Consistent Drug Pricing Resource. Micromedex Solutions.

Cost Component	Unit Cost (USD2017) ^a	Assumptions	Source
			http://micromedex.com/products/product-suites/clinical-knowledge/redbook , Accessed 22 September 2019.
Donepezil	9.78	AWP 10 mg/day and 23 mg/day	
Galantamine	6.59	AWP 12 mg/BID	
Memantine	13.66	AWP memantine XR 28 mg/day and memantine 10 mg/BID	
Rivastigmine	12.55	AWP for 6 mg/BID and transdermal 13.3 mg/24 hours	
Other	11.60	AWP for the 4 medications above plus \$15.43 for namzaric 28/10 mg/day	
Cost of psychiatric/hypnotic/acetylcholinesterase inhibitor	Per day		Truven Health Analytics. RED BOOK A Comprehensive, Consistent Drug Pricing Resource. Micromedex Solutions. http://micromedex.com/products/product-suites/clinical-knowledge/redbook , Accessed 22 September 2019.
Acetylcholinesterase inhibitors	11.60	Same as “other” AD treatment above	
Anxiolytic	11.49	AWP quetiapine (oral 25, 50, 100, and 200 mg/day), olanzapine (oral 2.5, 5, 7.5, and 10 mg/day), risperdone (oral 0.25, 0.5, 1, 2, and 3 mg/BID)	
Benzodiazepines	1.83	AWP top 3 drugs for population (alprazolam 0.25, 0.5, and 1 mg/TID; lorazepam 0.5, 1, and 2 mg/BID; and diazepam 2 to 5 BID)	
Other hypnotics/sedatives	2.90	AWP for buspirone oral 5, 7.5, 15, and 30 mg/BID and hydroxyzine oral 10, 25, and 50 mg/TID	

AD, Alzheimer’s disease; AWP, average wholesale price; BID, twice daily; FDA, Food and Drug Administration; QD, once daily; US, United States; TID, 3 times daily

^aEach cost component will be computed by multiplying the number of recorded events per cost unit. Any unit costs not reported in 2017 values were adjusted using consumer price index (CPI) data from the US Bureau of Labor Statistics (US Bureau of Labor Statistics 2017). At baseline, the observation period was set to cost in the month prior to baseline.