

RETROSPECTIVE ANALYSIS OF COSTS OF AMYLOID DIAGNOSTIC TESTS FOR ALZHEIMER’S DISEASE FROM A HEALTH-SYSTEM PERSPECTIVE



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Introduction

- Alzheimer’s disease (AD) is characterized by beta-amyloid (Aβ) and tau build-up in the brain (outside and inside neurons, respectively), causing neurodegeneration¹⁻²
- Healthcare expenditures related to AD are increasingly driven by the aging population, rising demand for sophisticated diagnostics and the intensive resource needs for long-term care³⁻⁴
- Timely diagnosis of early AD is important for increasing the likelihood of implementing treatment in the period when anti-amyloid therapies are most effective and for improving quality of care.
- Aβ testing can be done via cerebrospinal fluid (CSF), amyloid positron emission tomography (PET) brain scans, and, more recently, via highly sensitive blood-based biomarker (BBM) tests
- As diagnostic testing becomes more widespread, understanding cost implications is critical for optimizing resource allocation and access
- This study estimated direct costs of conducting such tests from the perspective of US hospitals/health systems

Methods

- The administrative database contains service and billing information from standard hospital-based discharge files for >1.4 billion patient encounters from across >1,400 U.S. facilities⁶
- Patients who received care from January 1, 2023 to March 31, 2025, were aged ≥ 55 years, had an inpatient/outpatient encounter for a diagnostic procedure (PET, CSF or BBM) for AD and detailed costs for the diagnostic procedures were included
- Procedure costs included hospital billed services, such as lab tests, supplies, and diagnostic services and were stratified by site of care (inpatient/outpatient)
- Cost data were reported by the hospitals and obtained from patients’ discharge files and billing records. Costs reflected expenses incurred by hospitals, not the reimbursement amount received from the payers
- PET and CSF costs were compared to 2025 Medicare reimbursement rates (not currently available for BBMs)
- Patient characteristics collected include age, sex, race, ethnicity, and primary insurance payer
- Descriptive statistics were conducted

Results

- The study population consisted of 4,823 unique patients at 155 facilities (some with multiple diagnostic procedures): 2,514 (51%) patients with positron emission tomography, 1,233 (25%) with cerebrospinal fluid, and 1,182 (24%) with blood-based biomarker testing (**Table 1**)
- Across testing types, mean (standard deviation) age was 73 (7.6) years old, 53.7% female, 84.5% White, and 6.7% Hispanic
- Testing facilities were often in urban areas (n=4,385, 90.9%) and associated with teaching hospitals (n=3,136, 65.0%)

Table 1. Demographic, facility, and other characteristics of patients with amyloid diagnostic testing

Characteristic	Overall Sample ^a		PET		CSF		BBM	
	Patients, n	4,823	2,514		1,233		1,182	
	Facilities, n	155	54		86		59	
	N	%	N	%	N	%	N	%
Age Category, n (%)								
55 to <65 years	710	14.7	288	11.5	247	20.0	194	16.4
65 to <75 years	1,903	39.5	1,023	40.7	482	39.1	450	38.1
75+ years	2,210	45.8	1,203	47.9	504	40.9	538	45.5
Age, continuous, in years								
Mean (std. dev.)	73	±7.6	73.4	±7.1	72.1	±8.2	73	±8.0
Sex, n (%)								
Female	2,589	53.7	1,337	53.2	648	52.6	663	56.1
Male	2,234	46.3	1,177	46.8	585	47.4	519	43.9
Race, n (%)								
White	4,074	84.5	2,059	81.9	1,069	86.7	1,040	88.0
Black	282	5.8	157	6.2	60	4.9	71	6.0
Asian	75	1.6	38	1.5	24	1.9	13	1.1
Other	213	4.4	140	5.6	27	2.2	47	4.0
Unknown	179	3.7	120	4.8	53	4.3	11	0.9
Ethnicity, n (%)								
Hispanic	322	6.7	221	8.8	61	4.9	45	3.8
Non-Hispanic	4,221	87.5	2,077	82.6	1,116	90.5	1,121	94.8
Unknown	280	5.8	216	8.6	56	4.5	16	1.4
Health insurance status, n (%)								
Medicare	3,950	81.9	2,150	85.5	939	76.2	934	79.0
Medicaid	92	1.9	36	1.4	33	2.7	24	2.0
Commercial insurance	621	12.9	276	11.0	201	16.3	169	14.3
Uninsured	83	1.7	10	0.4	34	2.8	44	3.7
Other/Unknown	77	1.6	42	1.7	26	2.1	11	0.9
Primary diagnosis ^b at initial testing encounter, n (%)								
Alzheimer’s disease	947	19.6	717	28.5	150	12.2	97	8.2
Mild cognitive impairment	937	19.4	634	25.2	169	13.7	148	12.5
Related dementia	789	16.4	475	18.9	145	11.8	191	16.2
Encounter setting, n (%)								
Inpatient	355	7.4	2	0.1	277	22.5	78	6.6
Outpatient	4,468	92.6	2,512	99.9	956	77.5	1,104	93.4
Hospital size, n (%)								
Small: 1–299 beds	1,053	21.8	258	10.3	375	30.4	445	37.6
Medium: 300–499 beds	1,883	39.0	1,056	42.0	490	39.7	400	33.8
Large: 500+ beds	1,887	39.1	1,200	47.7	368	29.8	337	28.5
Teaching status, n (%)								
Teaching hospital	3,136	65.0	1,601	63.7	893	72.4	722	61.1
Non-teaching hospital	1,687	35.0	913	36.3	340	27.6	460	38.9
Population served, n (%)								
Rural	438	9.1	10	0.4	183	14.8	267	22.6
Urban	4,385	90.9	2,504	99.6	1,050	85.2	915	77.4
Geographic location, n (%)								
Midwest	1,494	31.0	608	24.2	447	36.3	497	42.0
Northeast	199	4.1	49	1.9	98	7.9	55	4.7
South	2,817	58.4	1,695	67.4	548	44.4	613	51.9
West	313	6.5	162	6.4	140	11.4	17	1.4

PET: positron emission tomography, CSF: cerebrospinal fluid, BBM: blood-based biomarker N: number, Q1, Q3: first quartile, third quartile, Std Dev: standard deviation
^a Because a patient may have multiple types of amyloid testing, total counts for the Overall Sample do not equal the sum of the 3 individual types of amyloid testing.
^b International Classification of Diseases, Tenth Revision, Clinical Modification diagnosis codes were used to identify Alzheimer’s disease, mild cognitive impairment, related dementia, and other diagnoses. Other diagnoses included mental degenerative diseases, other mental disorders and other diagnoses of aging cognitive decline.

- Most procedures were in patients ≥65 years old (85.3%), conducted in outpatient settings (92.6%), at teaching facilities (65.0%), and located in urban areas (90.9%)
- Positron emission tomography scans were frequently (n=2,256, 89.7%) utilized in medium or large facilities, whereas CSF and blood-based biomarker testing were more evenly distributed across facility sizes
- The overall mean (standard deviation) hospital administrative cost was \$2,345 (\$1,299) for amyloid positron emission tomography scans, \$429 (\$309) for amyloid CSF tests, and \$179 (\$122) for amyloid blood-based biomarker testing (**Table 2**)

Results (continued)

Table 2. Cost (in 2024 U.S. dollars) ^a to the hospitals/health system of amyloid testing

Procedure Cost ^b	PET		CSF		BBM	
	N	2	N	436	N	110
Inpatient						
Mean (Std. Dev.)	--	--	\$402.66	±323.35	\$157.57	±102.56
Median (Q1, Q3)	--	--	\$424.47	91.56, 649.77	\$138.68	65.80, 213.85
	N	2,543	N	1,248	N	1,443
Outpatient						
Mean (Std. Dev.)	\$2,345.10	±1,299.22	\$437.73	±303.89	\$180.40	±123.65
Median (Q1, Q3)	\$2,637.18	1,118.71, 3,560.35	\$439.02	103.69, 683.19	\$140.17	65.80, 329.00
	N	2,545	N	1,684	N	1,553
Inpatient + Outpatient						
Mean (Std. Dev.)	\$2,343.97	±1,299.41	\$428.65	±309.33	\$178.78	±122.38
Median (Q1, Q3)	\$2,637.18	1,118.71, 3,560.35	\$439.02	93.33, 675.65	\$140.17	65.80, 329.00

PET: positron emission tomography, CSF: cerebrospinal fluid, BBM: blood-based biomarker, N: number, Q1, Q3: first quartile, third quartile, Std Dev: standard deviation ^a Cost are adjusted for 2024 U.S. dollars from US Department of Labor, Bureau of Labor Statistics. 2025 U.S. dollars values are based on half year average. ^b Cost values are Winsorized (i.e., blunted) for outlying values (i.e., bottom and top 10% are given the same, respective, bottom or top value). This technique does not influence the median (IQR) or sample size.

- Medicare reimbursement for PET (\$4880) was significantly higher than cost and similar for CSF (\$433)
- PET utilization increased by >400% post-Medicare policy changes (330 in 2023, 1571 in 2024); BBM utilization tripled (313 in 2023, 949 in 2024) (**Table 3**)

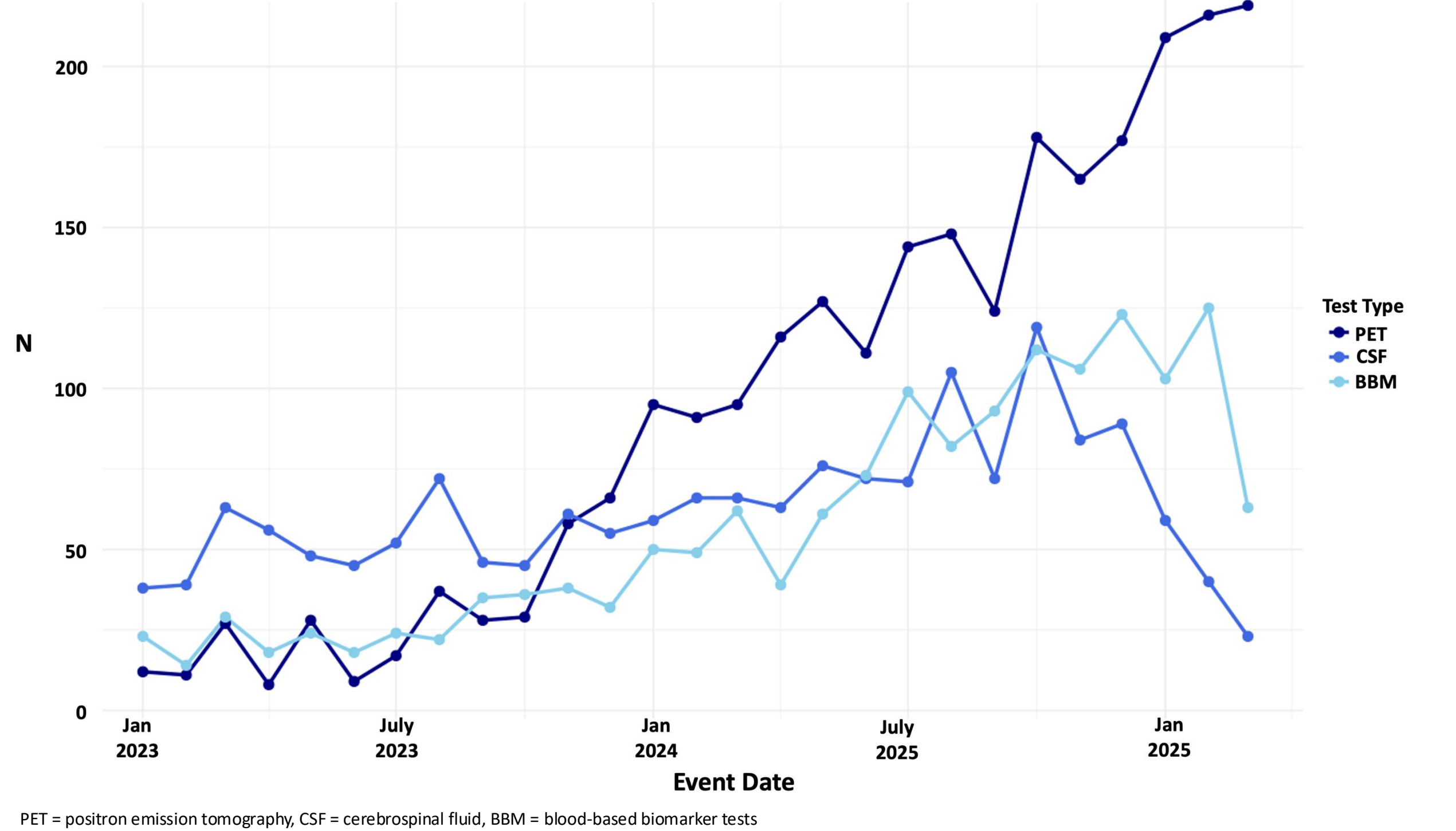
Table 3. Counts of amyloid testing by type and quarter

Amyloid Testing Type	2023				2024				2025
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar
PET	50	45	82	153	281	354	416	520	644
CSF	140	149	170	161	191	211	248	292	122
BBM	66	60	81	106	161	173	274	341	291

PET = positron emission tomography, CSF = cerebrospinal fluid, BBM = blood-based biomarker tests, Q = quarter, Jan = January, Mar = March, Apr = April, Jun = June, Jul = July, Sep = September, Oct = October, Dec = December

- Amyloid diagnostic testing generally increased across the study period; CSF utilization remained stable during the study period (**Figure 1**)

Figure 1. Monthly utilization by type of amyloid test



Conclusions

- Amyloid BBMs are increasingly used, are less invasive, and are a more scalable option at a fraction of the cost of PET and CSF
- Guidelines for minimum acceptable performance of BBM tests for AD diagnosis should be considered in selecting appropriate options
- Further research should assess clinical utility and cost-effectiveness to inform payer and provider decisions

Acknowledgments: Funding for the study, analyses, editorial support (Mayville Medical Communications) was provided by Eisai Inc. and Biogen

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