# Letters

RESEARCH LETTER

## Estimated Annual Spending on Lecanemab and Its Ancillary Costs in the US Medicare Program

Lecanemab, an antidementia medication with modest clinical benefit, received accelerated US Food and Drug Administration (FDA) approval. Traditional FDA approval of lecanemab could occur in 2023, prompting Medicare to reconsider coverage restrictions and potentially enabling widespread use. Lecanemab's $26 500 proposed annual acquisition cost and ancillary spending (eg, imaging) could increase Medicare spending, possibly leading to beneficiary premium increases. To estimate annual Medicare spending on lecanemab, we performed a cost analysis using nationally representative survey data from the 2018 Health and Retirement Study (HRS).

Supplemental content

**Methods** | In this cross-sectional study, we included traditional Medicare and Medicare Advantage beneficiaries aged 65 years or older and used validated cognitive measures to estimate mild cognitive impairment (MCI) or mild dementia prevalence (**Figure**; eMethods in Supplement 1).[1] We also examined all traditional Medicare and Medicare Advantage 2019 claims data (n = 51.6 million beneficiaries). Due to undercoding and underascertainment, coded prevalence of MCI was low (1.7%); we therefore relied on HRS-estimated MCI and mild dementia prevalence. Given the medication's risks, we assumed patients would undergo screening and diagnostic confirmation de novo. Cognitive screening is also undercoded; we assumed a lower bound informal cognitive screening rate of 27%[2] and an upper bound screening rate of 29.7% (10% anticipated increase). We assumed the lower bound informal screening positivity rate would match HRS-estimated prevalence of MCI or mild dementia. For the upper bound, we estimated a 25% relative increase in positivity rates, assuming higher MCI or dementia positivity rates among those seeking screening.

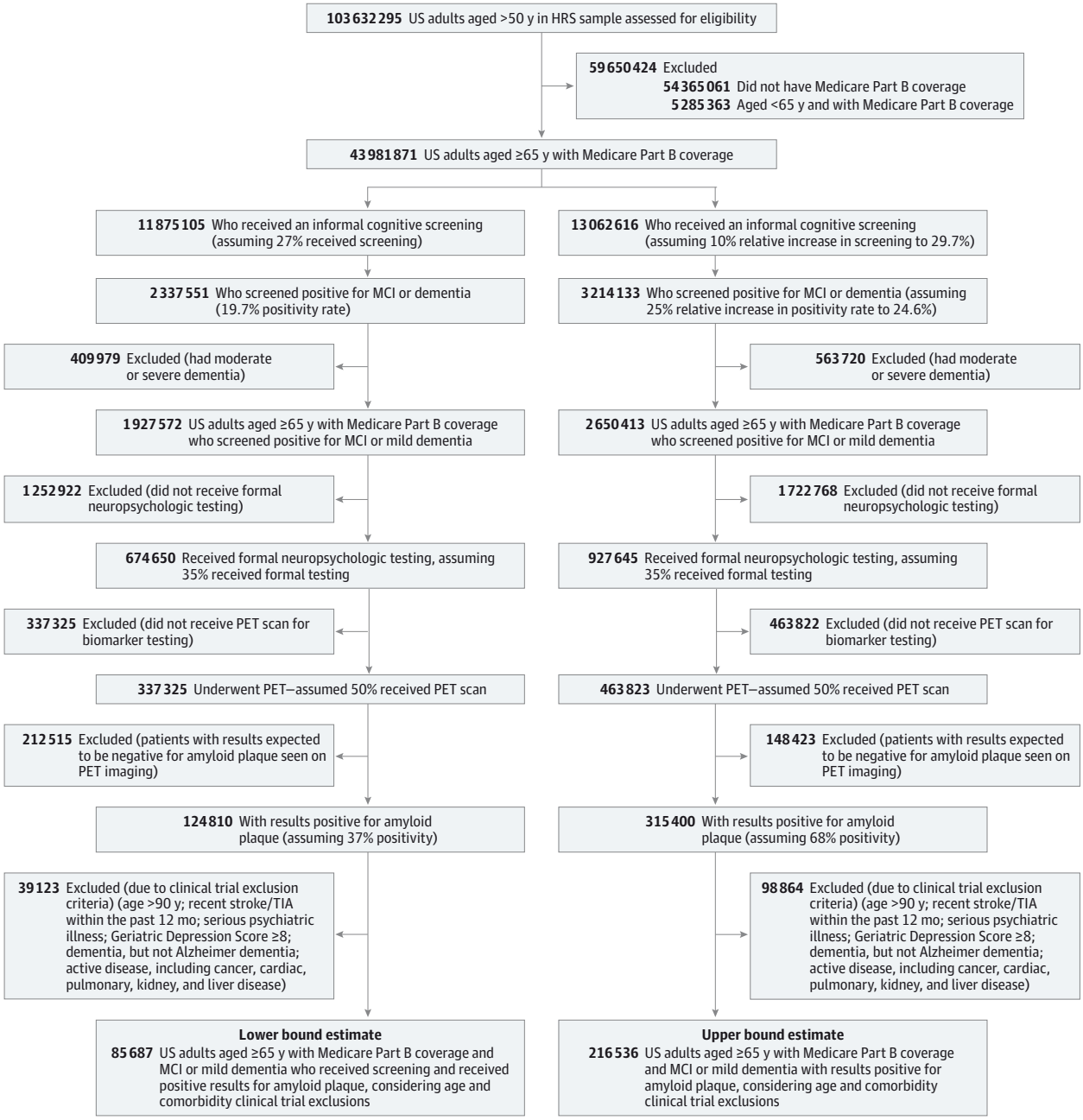
Using prior studies and expert input,[3] we assumed 35% of patients who screened positive for MCI or dementia would undergo formal neurocognitive testing; of those, 50% would receive a positron emission tomography (PET) scan with 37% (lower bound) to 68% (upper bound) testing positive for amyloid plaque.[1,4] We applied clinical trial age and comorbidity restrictions. We calculated survey-weighted dosages using self-reported body weights and multiplying by announced wholesale vial prices. We calculated ancillary costs, including magnetic resonance imaging scans and neurology visits to monitor for brain bleeding/swelling, using clinical trial data and Medicare's fee schedule (**Table**). We multiplied annualized per-patient costs assuming traditional Medicare 80% coverage rules and trial data showing 19% attrition.[5] A previous publication[1] and eMethods in Supplement 1 provide further details on dementia identification and cost assumptions. We analyzed data using SAS version 9.4 (SAS Institute). We accounted for survey stratification and clustering and adjusted results by survey weights for national representativeness and response rate. The University of California, Los Angeles institutional review board approved this study. Informed consent was waived because the study analyzed publicly available deidentified data. We followed the STROBE reporting guideline for cross-sectional studies.

**Results** | Among 7588 HRS participants representing 44 million Medicare beneficiaries, 16.2% (7 139 159 of 43 981 871) had MCI or mild dementia. Total annualized weight-based per-beneficiary medication costs were $25 851. Ancillary costs were $7330, increasing per-patient total costs by 28%. If 85 687 (lower bound) eligible patients received lecanemab, Medicare would spend $2.0 billion annually (95% CI, $1.8-2.2 billion). If 216 536 (upper bound) eligible patients received lecanemab, Medicare would spend $5.1 billion annually (95% CI, $4.6-5.7 billion). Estimated annual per-patient coinsurance could reach $6636.

**Discussion** | Lecanemab and associated ancillary services could add an estimated $2 billion to $5 billion annually to Medicare spending with substantial out-of-pocket costs for beneficiaries lacking supplemental coverage. Limitations include using plaque rates from population studies rather than scans on HRS participants.[4] The validated approach to identify dementia prevalence and stage may misclassify some cases.[1] The HRS responses may be less reliable among participants with cognitive impairment, although proxies can answer on participants' behalf.[6] We did not account for rebates, price changes, or societal costs, such as caregiver burden, which may shift due to transportation to infusions and appointments or changes in patients' cognitive function. Despite incorporating increases in cognitive screening and case positivity rates, these estimates are conservative; changes in physician behavior, cognitive screening capacity and demand, new diagnoses of MCI or mild dementia, and associated spending may increase more than anticipated.

**Julia Cave Arbanas, BA**
**Cheryl L. Damberg, PhD**
**Mei Leng, MS**
**Nina Harawa, PhD**
**Catherine A. Sarkisian, MD, MSHS**
**Bruce E. Landon, MD, MBA, MSc**
**John N. Mafi, MD, MPH**

Figure. Flow Diagram of Estimated Range of Older US Adults With Mild Cognitive Impairment (MCI) and Dementia in the 2018 Health and Retirement Study (HRS) Core Sample Potentially Eligible for Treatment With Lecanemab




We used data from the 2018 HRS, a nationally representative longitudinal survey of community-dwelling adults age >50. This biennial household-level survey uses multistage national area-clustered probability sampling. We identified 7588 HRS participants representing 43 981 871 Medicare beneficiaries with age ≥65 in 2018. This estimate includes both Medicare fee-for-service and Medicare Advantage beneficiaries. We used the HRS' 27-point cognitive assessment score to identify eligible patients with MCI or mild dementia. This assessment includes items such as serial 7 subtraction and immediate and delayed 10-noun free recall.[1] Participants with scores of 0-6 were classified as having dementia, and participants with scores of 7-11 were classified as having MCI. If the participant was unable to complete the cognitive assessment, they could be represented by a designated health care proxy. For health care proxy responses, an 11-point scoring scale classified scores of 6-11 as having dementia and scores of 3-5 as having MCI. We subclassified the cognitive assessment scales to identify dementia severity with 27-point and 11-point scales: (1) mild dementia, 5 to 6 and 6; (2) moderate dementia, 3 to 4 and 7; and (3) severe dementia, 0 to 2 and 8 to 11. This classification system for dementia severity demonstrated strong validity.[1-3] We performed a sensitivity analysis, in which these dementia staging thresholds corresponded with the presence of an informal caregiver (frequently used as a proxy for declining functional status) (eMethods in Supplement 1). PET indicates positron emission tomography; TIA, transient ischemic attack.

Table. Estimated Annual Spending on Lecanemab Among Older US Adults With Mild Cognitive Impairment or Mild Dementia in the 2018 HRS Core Sample[a]

| Service type | No. of events per patient-year | $ | | | | | |
|---|---|---|---|---|---|---|---|
| | | Estimated per-patient unit costs | Annualized Medicare cost per patient (80% of cost) | Annualized coinsurance cost to beneficiaries, private supplemental plans, MA, and/or state Medicaid plans (20% of cost) | Anticipated annualized per-patient out-of-pocket cost ranges | Annual Medicare cost estimate (millions) | |
| | | | | | | Lower bound (n = 85 687 [95% CI, 78 097-93 278]) | Upper bound (n = 216 536 [95% CI, 197 368-244 469]) |
| Lecanemab | 24 | 1045.74 | 20 680.55 | 5170.14 | 0-5170.14 | 1 772 054 651.16 | 4 478 084 492.91 |
| PET scan | 1 | 1564.88 | 1251.90 | 312.98 | 0-312.98 | 107 271 898.05 | 271 082 284.54 |
| Intravenous infusion | 24 | 133.67 | 2566.46 | 641.62 | 0-641.62 | 219 912 600.77 | 555 731 848.70 |
| Neurology or geriatrics visit | 4 | 155.75 | 498.40 | 124.60 | 0-124.60 | 42 706 400.80 | 107 921 542.40 |
| Routine MRI scan of brain | 3 | 445.01 | 1068.02 | 267.01 | 0-267.01 | 91 515 772.49 | 231 265 644.86 |
| Apo E serum testing | 1 | 99.00 | 79.20 | 19.80 | 0-19.80 | 6 786 410.40 | 17 149 651.20 |
| ARIA-related additional MRI scans | 0.172 | 445.01 | 61.25 | 15.31 | 0-15.31 | 5 248 157.38 | 13 262 396.93 |
| ARIA-related additional neurology visits | 0.172 | 155.75 | 21.41 | 5.35 | 0-5.35 | 1 834 387.30 | 4 635 602.69 |
| Hospitalization for severe AE | 0.027 | 14 700.00 | 317.52 | 79.38 | 0-79.38 | 27 207 336.24 | 68 754 510.72 |
| Subtotal costs | NA | NA | 26 544.72 | 6636.18 | 0-6636.18 | NA | NA |
| Total costs accounting for attrition (95% CI) | NA | NA | NA | NA | NA | 2 015 163 231.64 (1 836 663 705.13-2 193 686 275.87) | 5 092 433 922.60 (4 641 646 185.56-5 749 354 512.07) |

Abbreviations: AE, adverse event; Apo E, apolipoprotein E; ARIA, amyloid-related imaging abnormality; HRS, Health and Retirement Study; MA, Medicare Advantage; MRI, magnetic resonance imaging; NA, not applicable; PET, positron emission tomography; TM, Traditional Medicare.

[a] We used data from the 2018 HRS, a nationally representative longitudinal survey of community-dwelling adults with age >50. We identified 7588 HRS participants representing 43 981 871 Medicare beneficiaries with age ≥65 in 2018. We used HRS patient weights to calculate drug costs, along with twice-monthly infusion at 10 mg/kg. Lecanemab comes in 2 vial sizes: a 200 mg vial ($254.81) and a 500 mg vial ($637.02). These announced vial prices represent a wholesale acquisition cost; therefore, we added a 3% markup to approximate an actual acquisition cost more closely per Medicare payment rules. We used the most efficient dosing approach to calculate costs. Incorporation of nationally representative patient body weights and the 3% markup yielded an annual weighted patient drug cost of $25 850.69, 80% ($20 680.55) of which would be paid by Medicare, according to TM cost-sharing rules. Ancillary costs attributed to lecanemab were calculated by multiplying the 2022 Medicare physician fee schedule costs in combination with facility fees by the lower and upper bound populations. We did not attribute informal cognitive screening, neuropsychiatric testing, initial MRI brain imaging or other upstream costs to lecanemab because these services are part of a general dementia diagnostic evaluation. Total spending estimates reflect the final eligible population; we did attribute PET scan costs to lecanemab for the final eligible population because the purpose of this test is to confirm presence of amyloid plaque. Additional costs due to symptomatic mild or moderate ARIA event, any type of severe ARIA event, and severe AEs were also obtained by using rates from the clinical trial.[5] Note that the annualized cost estimates for the individual component costs exceed the grand total estimate when summed because they do not account for attrition. However, the total estimated annual costs for all services accounted for 19% attrition rate from the phase 3 clinical trial.[5] TM Part B cost-sharing rules mandate that Medicare will pay 80% of the physician fee schedule rate. The remaining 20% coinsurance is paid in full or in part: out-of-pocket by the beneficiary, by state Medicaid programs, or by commercial supplemental plans. Cost-sharing rules may vary for MA beneficiaries, but exact split proportions were not available. Therefore, we assumed this 80:20 cost-sharing ratio for all Medicare beneficiaries. Without supplemental insurance, patients would potentially be responsible for the entire 20% of remaining costs, or $6636.18. Some Medicare and Medicaid dual-eligible beneficiaries classified as Qualified Medicare beneficiaries may not be billed by Medicare clinicians for Part A or B cost sharing, such as coinsurance, copays, or deductibles. Therefore, they would pay $0 in out-of-pocket costs. Some state Medicaid programs may not pay for the 20% coinsurance for lecanemab under Part B rules for dual-eligible beneficiaries. In such a case, physicians would not be allowed to charge the dual-eligible beneficiary directly, and they would only receive 80% of the total payment from Medicare. This might disincentivize some physicians to screen or offer lecanemab to dual-eligible beneficiaries. The eMethods in Supplement 1 contains additional information.

**Author Affiliations:** Division of General Internal Medicine and Health Services Research, David Geffen School of Medicine at University of California, Los Angeles (Arbanas, Leng, Harawa, Sarkisian, Mafi); RAND Corporation, Santa Monica, California (Damberg, Mafi); Fielding School of Public Health at University of California, Los Angeles (Harawa); VA Greater Los Angeles Healthcare System Geriatrics Research & Clinical Center (GRECC), Los Angeles, California (Sarkisian); Harvard Medical School and the Division of General Medicine, Beth Israel Deaconess Medical Center, Boston, Massachusetts (Landon).

**Accepted for Publication:** March 19, 2023.

**Published Online:** May 11, 2023. doi:10.1001/jamainternmed.2023.1749

**Corresponding Author:** John N. Mafi, MD, MPH, Division of General Medicine and Health Services Research, Department of Medicine, David Geffen School of Medicine at UCLA, 1100 Glendon Ave, #908, Los Angeles, CA 90024 (jmafi@mednet.ucla.edu).

**Author Contributions:** Ms Arbanas and Dr Damberg had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Ms Arbanas and Dr Damberg are co-first authors.
*Concept and design:* Arbanas, Damberg, Sarkisian, Landon, Mafi.
*Acquisition, analysis, or interpretation of data:* Arbanas, Damberg, Leng, Harawa, Mafi.
*Drafting of the manuscript:* Arbanas, Damberg, Leng.
*Critical revision of the manuscript for important intellectual content:* All authors.
*Statistical analysis:* Arbanas, Damberg, Leng, Mafi.
*Obtained funding:* Sarkisian, Mafi.
*Administrative, technical, or material support:* Arbanas, Mafi.
*Supervision:* Arbanas, Damberg, Mafi.

**Conflict of Interest Disclosures:** Ms Arbanas reported grants from National Institutes of Health National Institute on Aging (NIH/NIA) during the conduct of the study; grants from NIH/NIA, grants from Arnold Ventures, and grants from The Commonwealth Fund outside the submitted work. Dr Damberg reported grants from NIH during the conduct of the study. Dr Harawa reported grants from NIH/NIA 5R01AG070017 during the conduct of the study. Dr Sarkisian reported grants from NIH/NIA (K24), grants from NIH/National Center for Advancing Translational Sciences (NCATS), and grants from NIH/NIA (R24) during the conduct of the study. Dr Mafi reported grants from NIH/NIA R01AG070017-01 and grants from NIH/NIA Beeson Emerging Leaders in Aging Research Career Development Award (grant K76AG064392-01A1) during the conduct of the study; grants from Arnold Ventures, grants from Commonwealth Fund, and nonfinancial support from Milliman MedInsight for studying low-value care in Medicare, and provided unpaid consulting to Milliman MedInsight outside the submitted work. Dr Mafi also provided unpaid consulting to the Agency for Healthcare Research and Quality (AHRQ) outside the submitted work. No other disclosures were reported.

**Funding/Support:** This work was supported by NIH/NIA award R01AG070017-01. Dr Mafi was also supported by a NIH/NIA Beeson Emerging Leaders in Aging Research Career Development Award (grant K76AG064392-01A1). Dr Mafi and Ms Arbanas reported additional grants from the NIH/NIA, Arnold Ventures, and The Commonwealth Fund. Dr Mafi received nonfinancial support from Milliman MedInsight outside this work and also provided unpaid consulting to Milliman MedInsight and AHRQ. Dr Landon reported grants from NIH/NIA, National Cancer Institute (NCI), and AHRQ. Dr Damberg reported grants from the Centers for Medicare and Medicaid Services (CMS), National Heart, Lung, and Blood Institute (NHLBI), NIA, and AHRQ. Dr Harawa reported grants from NCATS. Dr Sarkisian reported grants from NIH/NIA, and the University of California, Los Angeles Clinical and Translational Science Institute (CTSI).

**Role of the Funder/Sponsor:** The funding organizations had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

**Data Sharing Statement:** See Supplement 2.

**Meeting Presentation:** This paper was presented at the 2023 Annual Meeting of the Society of General Internal Medicine; May 11, 2023; Aurora, Colorado.

**1**. Mafi JN, Leng M, Arbanas JC, et al. Estimated annual spending on aducanumab in the US Medicare Program. *JAMA Health Forum*. 2022;3(1):e214495. doi:10.1001/jamahealthforum.2021.4495

**2**. Jacobson M, Thunell J, Zissimopoulos J. Cognitive assessment at Medicare's Annual Wellness Visit in fee-for-service and Medicare Advantage plans. *Health Aff (Millwood)*. 2020;39(11):1935-1942. doi:10.1377/hlthaff.2019.01795

**3**. Liu J, Hlavka J, Hillestad R, Mattke S. *Assessing the Preparedness of the U.S. Health Care System Infrastructure for an Alzheimer's Treatment*. RAND Corporation; 2017. doi:10.7249/RR2272

**4**. Doraiswamy PM, Sperling RA, Johnson K, et al; AV45-A11 Study Group; AV45-A11 Study Group. Florbetapir F 18 amyloid PET and 36-month cognitive decline: a prospective multicenter study. *Mol Psychiatry*. 2014;19(9):1044-1051. doi:10.1038/mp.2014.9

**5**. van Dyck CH, Swanson CJ, Aisen P, et al. Lecanemab in early Alzheimer's disease. *N Engl J Med*. 2023;388(1):9-21.

**6**. Langa KM, Chernew ME, Kabeto MU, et al. National estimates of the quantity and cost of informal caregiving for the elderly with dementia. *J Gen Intern Med*. 2001;16(11):770-778. doi:10.1111/j.1525-1497.2001.10123.x