MILLIMAN WHITE PAPER

Alzheimer's disease: An analysis of the diagnosed population and out-of-pocket cost exposure

Commissioned by Eli Lilly and Company

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Most individuals diagnosed with Alzheimer's disease are enrolled in Medicare; more than 98% of beneficiaries have coverage that limits or caps out-of-pocket exposure to Part A and Part B services and drugs.

Introduction

Alzheimer's disease (AD) is a progressive brain disease that results in a gradual decline in memory, thinking, behavior, function, and social skills. It is characterized by changes in the brain, including the presence of amyloid plaque and neurofibrillary (tau) tangles that result in loss of neurons and their connections.[1] There are two therapies directed against amyloid plaque for treatment of AD that have received approval* from the U.S. Food and Drug Administration (FDA),[2,3] with more than 15 ongoing phase 3 clinical trials for therapies directed against amyloid plaque.[4] The approved therapies are indicated for mild cognitive impairment (MCI) or mild dementia stage of the disease.

According to the Alzheimer's Association, in 2023 there were an estimated 6.7 million people in the United States with dementia due to AD, including approximately 200,000 affected individuals under age 65. In addition, MCI due to AD was estimated to affect five million to seven million adults aged 65 and older.[5] These estimates are based on prevalence studies, which are typically performed by closely studying a sample of individuals over time. For this reason, these estimates include individuals who are diagnosed, as well as individuals who have the condition but are not yet diagnosed. Notably, both MCI and dementia due to AD have high rates of underdiagnosis, late diagnosis, or misdiagnosis.[6,7,8]

Among those with AD, only a subset may be indicated for an amyloid-targeting therapy (ATT). According to published studies, an estimated 50%[9] of individuals with dementia due to AD have a mild severity, with 70% to 87% having evidence of amyloid pathology; 46% to 56% of individuals with MCI have evidence of amyloid pathology.[5,10]

Due to the size of the prevalent population and potential financial impact of these therapies to both patients and U.S. payers, there is a need to better understand the currently diagnosed population, as it exists today. For this reason, Eli Lilly and Company engaged Milliman to prepare this report. The purpose of this report is to:

- Estimate the Medicare and commercial population currently diagnosed with dementia due to AD or MCI using administrative claims data.
- Assess the Medicare Part A/B out-of-pocket (OOP) cost exposure for diagnosed beneficiaries who may be considered for treatment with an ATT.

This white paper intends to build upon the insights and content presented in a previous publication, "Medicare Beneficiary Out-of-Pocket Cost Exposure for Part B Drugs and Services,"[11] which discussed Part B OOP cost exposure for all Medicare beneficiaries aged 65 and older. This paper adds to the previous publication by focusing on the diagnosed AD and MCI populations. This research uses real-world Part A/B cost experience for diagnosed beneficiaries to capture current medical cost and utilization for diagnosed individuals, and projects the range of Part A/B OOP costs, with and without the inclusion of a Part B ATT treatment regimen, at varying annual cost scenarios.

Among the diagnosed population with Medicare coverage who may be considered for an ATT, approximately 61% of beneficiaries are estimated to have incremental costs of $50 or less annually when adding the costs of a physician-administered ATT treatment regimen to their baseline incurred costs. Coverage selections and plan designs that limit cost sharing and/or include a maximum OOP (MOOP) insulate more than 98% of diagnosed beneficiaries from exposure to uncapped OOP cost for Part A and Part B services and drugs. See the Methodology and Results sections for more information.

Note that this paper does not estimate the number of people who will be treated with an ATT. The results in this study estimate the number of people who are diagnosed with MCI or mild dementia due to AD and are amyloid positive. Not all individuals with MCI

* As of February 21, 2024. Only Leqembi (lecanemab) has traditional approval, as of June 2023. In January 2024, the manufacturer of Aduhelm (aducanumab), Biogen, announced it will be discontinuing all development and sales of the drug.

or dementia due to AD may be considered appropriate by their healthcare providers for the approved and pipeline therapies. This paper does not intend to estimate the number of individuals who qualify for or would be prescribed by a healthcare provider one of the approved or pipeline monoclonal antibodies directed against amyloid plaque. Additionally, this study contemplates the OOP exposure related to physician-administered therapies. The results do not reflect or represent Part D costs or experience of diagnosed individuals.

Methodology

DATA SOURCES

The Medicare 100% Research Identifiable Files (RIF) were used to estimate and analyze the AD and MCI diagnosed populations, the number of dual eligible beneficiaries (i.e., those who have both Medicare and Medicaid coverage) and the baseline Part A/B expenditures incurred by diagnosed beneficiaries. Data years 2020 through 2022 were used for Original Medicare. Medicare Advantage encounter data is less recent, thus, data years 2018 through 2020 were used for Medicare Advantage. The Original Medicare patient counts were observed directly from the data, while the Medicare Advantage encounter diagnosed cohort results were trended to 2022 based on projections of Medicare in 2022 by the Congressional Budget Office (CBO).[12]

Milliman's Consolidated HCG Source Database Plus (CHSD+) dataset was used to estimate the diagnosed prevalence of dementia due to AD and MCI in a commercially insured population. The CHSD+ has approximately 60 million enrollees in the calendar year (CY) 2022 commercial group data; data years 2020 through 2022 were used. Prevalence was estimated by age band and gender for commercial group and individual coverages. Each age/gender prevalence rate was multiplied by 2022 U.S. enrollment statistics for commercial and individual coverage to extrapolate to national estimates.[13,14,15]

IDENTIFICATION OF DIAGNOSED COHORTS

Three years of claims data were used to identify the presence of an AD or MCI ICD-10 diagnosis code for members in the data. Individuals who met the diagnosis criteria over the three-year period and were enrolled in the most recent data year (e.g., 2022) were included in the diagnosed cohort presented in this white paper. Diagnosed individuals were excluded from the study if they were observed with a diagnosis code that is inconsistent with a diagnosis of AD or MCI. See Appendix A for the ICD-10 diagnosis codes, exclusionary codes, and additional methodology detail used for this analysis.

Note that data years used for this analysis included years affected by COVID-19. Therefore, results may vary from diagnostic patterns and utilization experience in the future.

ESTIMATING THE DIAGNOSED POPULATION THAT MAY BE CONSIDERED FOR ATT TREATMENT

The current FDA-approved and pipeline ATTs are intended to treat MCI due to AD and AD in the mild stage. Diagnosis codes do not distinguish between causes of MCI, nor do they differentiate between severity levels of AD (e.g., mild). It is likely the diagnosed AD population observed in claims databases has a higher proportion of severe cases, given milder forms may be underdiagnosed.

For this reason, diagnosed individuals with one of the following characteristics were excluded from the potential-treatment cohort, as a proxy for estimating the AD population with Medicare coverage who may be considered for ATT:

- Beneficiaries who died
- Beneficiaries who had at least one month of hospice
- Beneficiaries who were institutionalized

While some individuals with the above characteristics may qualify for treatment with an ATT, in most circumstances there is a lower likelihood that these individuals would be prescribed or be able to receive a provider-administered ATT.

Lastly, in the current healthcare system, testing for amyloid plaque is not common practice. Additionally, the results of lab tests or scans are not captured in administrative claims data. For this reason, a rate of amyloid positivity from published literature was applied to the diagnosed cohorts to estimate the population that is amyloid positive who may be considered for ATTs.

ESTIMATING MEDICARE COVERAGES AND ANNUAL OOP COSTS FOR PART A/B DRUGS AND SERVICES

The analysis of diagnosed beneficiary coverage (Original Medicare and Medicare Advantage, subset by dual and non-dual) was used in conjunction with published information about secondary and supplemental coverages.

For each coverage type, Part A and Part B cost sharing assumptions reflect 2023 deductibles, copays, coinsurances, and maximum OOP levels (where applicable) from publicly available sources. See Appendix B for the benefit designs used in this analysis. Benefit designs used in this analysis reflect in-network cost sharing and MOOP levels; out-of-network cost sharing was not modeled.

In the claims data, the 2022 allowed costs for all Part A and Part B claims* were captured for each diagnosed beneficiary and

*The Medicare Advantage data does not include cost information. Therefore, Original Medicare data was used for the baseline costs for both Original Medicare and Medicare Advantage. This assumes utilization of services is consistent between Original Medicare and Medicare Advantage beneficiaries.

aggregated for the year. The following steps were performed to estimate OOP costs for diagnosed Medicare beneficiaries:

- The observed allowed costs ("baseline costs") for diagnosed beneficiaries from the 2022 data were adjudicated under each Medicare coverage benefit design to estimate annual patient Part A/B OOP exposure under the baseline scenario.
- Three scenarios of varying Part B costs were added, representing the addition of an ATT and/or related services, e.g., infusion procedures. The baseline allowed costs and these additional costs were aggregated and re-adjudicated under each benefit design.
- The resulting beneficiary OOP costs under each Medicare benefit design were averaged. Those averages were weighted by the estimated enrollment distribution across Medicare coverage types to produce the distribution of average beneficiary OOP estimates for Original Medicare, Medicare Advantage, and in total across all coverage types.

The difference in OOP between the treated scenarios and the baseline scenario represents the estimated incremental OOP increase due to the addition of the ATT and related services.

Results

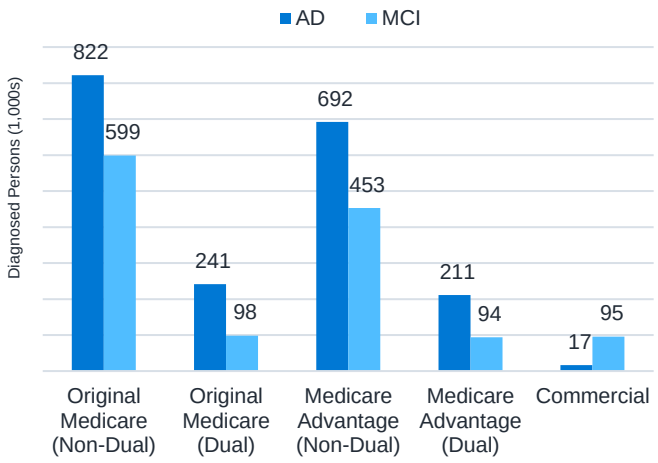
DIAGNOSED POPULATION ESTIMATES

In Medicare, the number of beneficiaries with an AD diagnosis exceeds the number of beneficiaries with an MCI diagnosis. In aggregate, in 2022 there were an estimated 1.97 million Medicare beneficiaries with an AD diagnosis and 1.24 million Medicare beneficiaries with an MCI diagnosis. Among the diagnosed Medicare beneficiaries, 1.06 million beneficiaries with AD and 0.70 million beneficiaries with MCI were covered by Original Medicare. An estimated 0.90 million beneficiaries with AD and 0.55 million beneficiaries with MCI were covered by Medicare Advantage.

Under commercial coverage, an estimated 17,000 commercially insured members had an AD diagnosis, and an estimated 95,000 members had an MCI diagnosis. The lower number of individuals with a diagnosis of AD or MCI who are commercially insured compared to Medicare is expected, considering that age is the highest risk factor for developing AD.[16]

In aggregate, the Medicare population diagnosed with AD represents 99% of the total Medicare and commercially insured diagnosed populations. For MCI, the diagnosed Medicare population represents 93% of the total Medicare and commercially insured diagnosed populations. Figure 1 displays the count of diagnosed individuals by coverage type.

FIGURE 1: COUNT OF INDIVIDUALS DIAGNOSED WITH AD OR MCI WHO HAVE MEDICARE OR COMMERCIAL COVERAGE (2022)



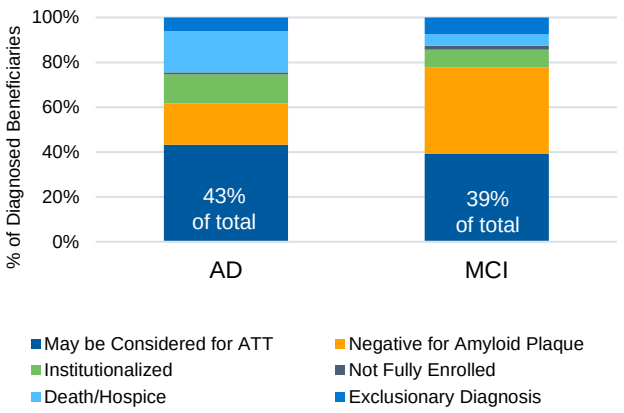
Note: Results exclude diagnosed individuals who had an excluded ICD-10 code.

To estimate the population who may be considered for an ATT, the diagnosed population was refined to exclude those who died in the year, had hospice claims, were institutionalized, and/or did not have a full 12 months of enrollment in Medicare. In aggregate, 38% of the diagnosed AD population and 22% of the diagnosed MCI population met one of the criteria for exclusion from the cohort that may be considered for an ATT. The AD cohort had a greater proportion of death, hospice, and institutionalization compared to the MCI cohort.

There were an estimated 2.33 million diagnosed AD and MCI Medicare beneficiaries who may be considered for an ATT in 2022, after removing the beneficiaries who met the exclusionary criteria from claims. However, only a subset of this diagnosed cohort would be eligible for an ATT because a treatment-eligible individual should be positive for amyloid plaque. Testing for amyloid plaque was not common practice in the study period. Additionally, the results of lab tests or scans are not captured in administrative claims data. Therefore, an estimate for amyloid positivity was applied using factors from published research (55.3% for MCI, 70.1% for AD).[10]

After adjusting for the rate of amyloid positivity, there were an estimated 1.48 million Medicare beneficiaries who may be considered for ATT treatment. Figure 2 displays the portion of the Original Medicare diagnosed cohort removed due to the various criteria. Demographic information for this cohort can be found in Appendix C.

FIGURE 2: BENEFICIARIES DIAGNOSED WITH AD AND MCI, DISTRIBUTED BY CRITERIA FOR ATT CONSIDERATION (ORIGINAL MEDICARE, 2022)



Note that while this study estimates 43% of those diagnosed with AD and 39% of those diagnosed with MCI with Medicare coverage may be considered for an ATT (as noted in Figure 2), there are numerous considerations that will further refine the potentially treatable population. This may include health system readiness, patient access to health care providers who can diagnose and initiate treatment, reimbursement and policy barriers, safety considerations, and patient willingness to undergo treatment. The complexity associated with diagnosing and identifying appropriate patients for ATTs, in combination with previously stated considerations, are likely contributors to the limited uptake seen with ATTs at the time of the publication of this white paper.[17]

ENROLLMENT DISTRIBUTION BY MEDICARE COVERAGES

Overall, 55% of diagnosed beneficiaries who may be considered for an ATT are covered under Original Medicare, and 45% are covered under Medicare Advantage. The distribution of Medicare coverage can be further stratified into the subsets of coverage, secondary coverage, and supplemental coverages that are available to Medicare beneficiaries. Figure 3 displays the estimated Medicare coverage distribution for beneficiaries who may be considered for treatment with an ATT.

Approximately 1.6% of all beneficiaries who may be considered for an ATT are exposed to standard Medicare Part B cost sharing (20% coinsurance) without a limit or annual cap. All other beneficiaries are enrolled in plan types or secondary and supplemental coverages that cover some or all of a patient's cost share, and/or cap the annual OOP with a MOOP. For more information about the Medicare coverages and plan types presented in Figure 3, please refer to the previous publication, "Medicare Beneficiary Out-of-Pocket Cost Exposure for Part B Drugs and Services."[11]

FIGURE 3: MEDICARE COVERAGE DISTRIBUTION OF THE DIAGNOSED POPULATION WHO MAY BE CONSIDERED FOR AN ATT

Total = 1.48 Million	Percent	Beneficiary Count
Original Medicare	**54.8%**	**812,000**
Medicare A/B Only (No Supplement)	1.6%	23,100
Medicare A/B + VA	2.5%	37,000
Medicaid	7.7%	113,700
Medigap	24.5%	363,100
Employer-Sponsored Supplement	18.6%	275,100
Medicare Advantage	**45.2%**	**668,900**
Dual Special Needs Plan (Medicaid)	8.1%	120,300
Employer Group Waiver Plan (EGWP)	8.1%	119,900
Medicare Advantage + VA	2.3%	34,000
Standard Plans / Other	26.7%	394,700

VA = Veterans Health Administration coverage. Note: Numbers may not sum due to rounding. The totals for Original Medicare and Medicare Advantage, and the sub-totals for the dual eligible (Medicaid) categories were sourced from the RIF data analysis. All other distributions were estimated using sources 18-24.

Standard Medicare Advantage plans are open to the Medicare-eligible population for enrollment, and beneficiaries can switch between Medicare Advantage plans annually without medical underwriting. Plans are required to have an annual MOOP to cap cost sharing on Part A/B services and drugs. Thus, enrollees who meet their MOOPs have no cost sharing for in-network Part A/B covered services for the remainder of the year.*

An estimated 26.7% of diagnosed beneficiaries who may be considered for an ATT are covered under a standard Medicare Advantage plan. From an analysis of the Medicare Advantage encounter data, normalized to reflect the 2023 Medicare Advantage plan designs, an estimated 80% of beneficiaries have a MOOP between $3,000 and $6,700. Approximately 10% of the cohort have a MOOP below $3,000, and 10% have a MOOP above $6,700. The MOOP limit of $6,700 is the most popular (15% of the diagnosed cohort), followed by $3,500 (8% of the diagnosed cohort). See Appendix B for more information on the process used for estimating the enrollment of diagnosed beneficiaries across 2023 Medicare Advantage plan designs.

Note that there is no data source available with information about the distribution of secondary or supplemental Medicare coverages for individuals diagnosed with AD or MCI. Therefore, the distribution of diagnosed beneficiaries across Medigap, Veterans Health Administration (VA), employer supplement, Employer Group Waiver Plan (EGWP), and standard Medicare Advantage plans was estimated using national enrollment across these coverage types.

*There is typically a separate MOOP if the enrollee goes out-of-network. Part D cost sharing does not contribute to the Part A/B MOOP.

OOP COSTS UNDER BASELINE AND TREATED SCENARIOS AMONG THOSE WHO MAY BE CONSIDERED FOR AN ATT

The benefit designs, cost sharing, and mix of services determine the OOP exposure experienced by an enrolled Medicare beneficiary. The annual Part A/B incurred services for beneficiaries who may be considered for an ATT were aggregated and adjudicated under the cost sharing associated with each Medicare coverage type (see Appendix B for more information). *Note that employer sponsored supplement and EGWPs are excluded from the results in this section due to lack of publicly available information about the plan benefit designs and cost sharing. These plans typically have lower member cost sharing than standard plans.*

The subsequent figures are intended to provide insight into baseline OOP costs for Medicare beneficiaries who may be considered for an ATT ("baseline"), as well as under three additional cost scenarios, as follows:

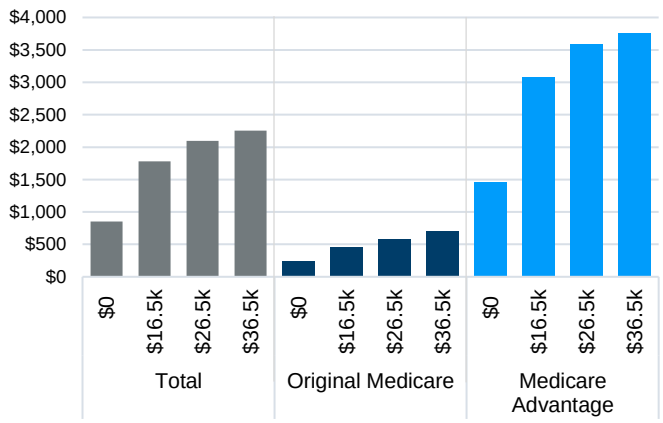
1. With the addition of $16,500 Part B costs
2. With the addition of $26,500* Part B costs
3. With the addition of $36,500 Part B costs

The varying cost amounts intend to provide insight into the sensitivity of patient OOP to higher or lower Part B cost amounts. For example, the higher amount may reflect the inclusion of an ATT plus associated treatment costs like specialist visits and radiology exams, while the lower amount may reflect a shorter duration of treatment with an ATT in the year.

Figure 4 displays the average OOP costs under the baseline scenario, i.e., no additional costs were added ($0), and under the three additional cost scenarios for total Medicare, Original Medicare, and Medicare Advantage. On average, beneficiaries with Medicare Advantage have higher OOP cost exposure than Original Medicare, due to the large proportion of Original Medicare beneficiaries with low cost sharing supplemental coverage (e.g., Medigap plans) and dual coverage. See Appendix D for the average annual OOP cost exposure for each modeled benefit design within the Original Medicare and Medicare Advantage cohorts.

After applying patient cost sharing by coverage type to the observed allowed costs for the diagnosed cohort, the average Part A/B OOP was estimated to be $850 annually for beneficiaries who may be considered for treatment with an ATT. This OOP increased to an average of $1,780 with the addition of $16,500 Part B costs, $2,100 with the addition of $26,500, and $2,250 with the addition of $36,500. The incremental increase is not linear due to the effect of more covered members reaching the MOOPs at the higher Part B cost scenarios.

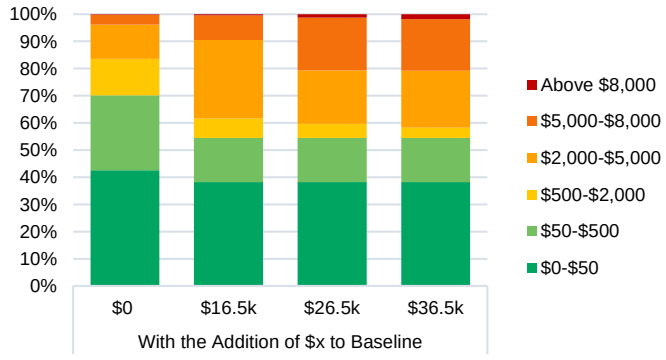
FIGURE 4: AVERAGE ANNUAL BENEFICIARY OOP BASELINE AND THREE ADDITIONAL PART B COST SCENARIOS



Note: Original Medicare includes individuals with enhanced cost-sharing (e.g., Medicaid, VA, etc.). See Appendix D for results by benefit design. Results exclude employer sponsored supplement and EGWPs due to lack of publicly available information on benefit design and cost sharing.

Figure 5 displays the annual OOP under each additional cost scenario by OOP bucket. Under all three additional Part B cost scenarios (baseline plus the addition of $16,500, $26,500, and $36,500), approximately 55% of diagnosed beneficiaries would have an annual OOP cost of $500 or less, suggesting these beneficiaries are insulated from increasing Part B costs. In contrast, fewer than 2% of beneficiaries would have an annual OOP greater than $8,000 with the addition of $36,500 to the baseline costs. Nearly 80% of beneficiaries would have an annual OOP cost less than $5,000 under the $26,500 and $36,500 scenarios, and 90% would have an annual OOP cost less than $5,000 under the $16,500 scenario.

FIGURE 5: OOP DISTRIBUTION OF THE DIAGNOSED POPULATION WHO MAY BE CONSIDERED FOR AN ATT UNDER VARYING COST SCENARIOS



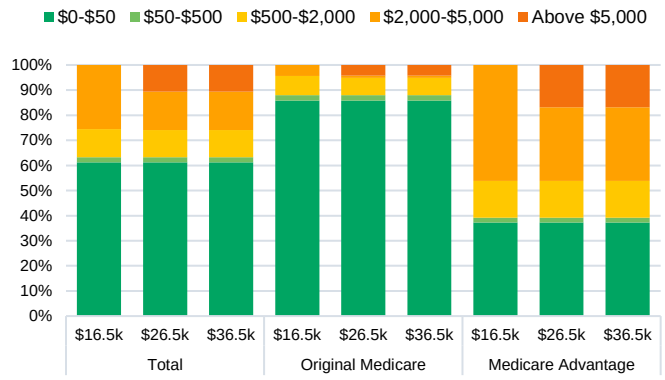
Note: Results exclude employer sponsored supplement and EGWPs due to lack of publicly available information on benefit design and cost sharing.

*This is the list price of the ATT that has traditional FDA-approval, Leqembi (as of January 2024).

Figure 6 presents the incremental annual OOP costs associated with each cost scenario. The results represent the amount annual OOP costs increased compared to the baseline due to the additional Part B costs.

Across all three scenarios, 61% of Medicare beneficiaries have incremental OOP costs of $50 or less. Medicare Advantage beneficiaries are more sensitive to the additional costs, with 37% of beneficiaries having an incremental OOP increase of $50 or less, compared to approximately 86% of those with Original Medicare. At the two higher cost scenarios, approximately 4% with Original Medicare and 17% with Medicare Advantage had an incremental increase in OOP of $5,000 or more. Among Original Medicare and Medicare Advantage, the incremental OOP across all three cost scenarios produced consistent results for the categories of $2,000 OOP or less, suggesting little to no cost sensitivity for beneficiaries in the lower cost sharing categories.

FIGURE 6: INCREMENTAL OOP UNDER VARYING COST SCENARIOS COMPARED TO BASELINE OOP



Note: Results exclude employer sponsored supplement and EGWPs due to lack of publicly available information on benefit design and cost sharing.

Discussion

From an analysis of recent Medicare claims data, there are an estimated 1.48 million beneficiaries who are diagnosed with dementia due to AD or MCI who may be considered for treatment with an ATT. This estimate reflects diagnosing and healthcare utilization associated with the data years studied. If patterns in diagnosing AD or MCI improve, the size of the diagnosed population (as presented in this analysis) could eventually approach the size of the estimated prevalent population.

Among beneficiaries who may be considered for an ATT, more than 98% have coverage that limits or caps the amount of OOP costs for Part A/B services and drugs. The annual OOP for baseline expenditures was an estimated $850 average OOP, segmented as $240 average OOP for Original Medicare and $1,460 for Medicare Advantage. When an additional $26,500 of Part B costs are added to the baseline expenditures, the average OOP increased to $2,100 average annual OOP, segmented as $580 average OOP for Original Medicare and $3,580 for Medicare Advantage.

Incrementally, 61% of beneficiaries were estimated to have an increase in OOP costs of $50 or less. Medicare Advantage beneficiaries were more sensitive to the additional costs, with 37% of beneficiaries having an incremental OOP increase of $50 or less, compared to approximately 86% of those with Original Medicare. Because of the Part A/B MOOP of standard Medicare Advantage plans, only 1% of individuals had an OOP above $8,000 (capped at $8,300).

Note that the OOP estimates presented in this study are limited to a single year. If patients receive treatment over multiple years, they will be subject to OOP costs each year, thus, total OOP cost exposure will be dependent on the duration of treatment.

Plan selection is an important component of the patient OOP cost exposure. Under Original Medicare, beneficiaries who have a supplemental coverage plan, e.g., Medigap, have very little sensitivity to increasing Part B expenditures. However, Medigap plans are funded through a premium amount, so the total cost of coverage (both healthcare expenses and premiums) should be considered when assessing plan choice and OOP cost exposure.

In Medicare Advantage, beneficiaries in higher MOOP plans are more sensitive to larger increases in Part B expenditures. However, most beneficiaries (about 65%) diagnosed with AD or MCI were enrolled in a Medicare Advantage plan with an annual Part A/B MOOP of $5,000 or less, with the mode MOOP level observed to be between $3,000 and $4,000 (about 25% of diagnosed individuals). Beneficiaries can switch between Medicare Advantage plans annually without medical underwriting. Thus, if a diagnosed individual experienced higher OOP costs in one year due to enrollment in a plan with higher cost sharing, they may choose to shop for a new plan the following year with lower cost sharing or a lower MOOP level, if available.

Conclusion

Alzheimer's disease is a progressive neurodegenerative disorder characterized by cognitive and functional decline with behavioral changes. Therapies targeting amyloid plaque offer a new option for treating the disease in its early stages. This study estimated the number of diagnosed individuals with dementia due to AD or MCI, assessed the distribution of Medicare coverages for diagnosed individuals, and analyzed the potential OOP costs exposure for these therapies on Medicare beneficiaries.

As presented in this study, the vast majority of patients diagnosed with dementia due to AD or MCI are Medicare beneficiaries, with a smaller proportion covered under commercial insurance. There are an estimated 1.48 million diagnosed Medicare beneficiaries who may be considered for an ATT, based on 2022 claims data.

This analysis of cost exposure demonstrates that more than 98% of Medicare beneficiaries who may be considered for an ATT have coverage that limits or caps their OOP costs for Part A/B services and drugs. For most beneficiaries, the increase in OOP due to the addition of an ATT and related services is less than $50 annually. Those enrolled in a Medicare Advantage plan, particularly those with higher MOOP levels, have the greatest exposure to increases in annual OOP costs. Therefore, options for managing OOP cost exposure to Part B services and drugs should be considered, such as enrolling in plans with lower MOOP levels.

Limitations

Milliman was engaged by Eli Lilly to support exploring Medicare and commercial populations diagnosed with dementia due to AD or MCI. This paper was supported using claims data and research of publicly available enrollment and sources.

The results presented in this research assumed costs were incurred uniformly throughout the year. If a treatment duration was shorter than a full year, OOP costs would vary from what has been presented in this report.

In performing this analysis, we relied on publicly available research, Milliman CHSD+, and Medicare Research Identifiable Files (RIF). We have not audited or verified this data and other information. If the underlying data or information is inaccurate or incomplete, the results of our analysis may likewise be inaccurate or incomplete. We performed a limited review of the data used directly in our analysis for reasonableness and consistency and have not found material defects in the data. If there are material defects in the data, it is possible that they would be uncovered by a detailed, systematic review and comparison of the data to search for data values that are questionable or for relationships that are materially inconsistent. Such a review was beyond the scope of our assignment.

Differences between our estimates and actual amounts depend on the extent to which experience conforms to the assumptions made for this analysis. It is certain that actual experience will not conform exactly to the assumptions used in this analysis. Actual amounts will differ from estimated amounts to the extent that actual experience deviates from expected experience.

Guidelines issued by the American Academy of Actuaries require actuaries to include their professional qualifications in all actuarial communications. Jessica Naber is a member of the American Academy of Actuaries and meets the qualification standards for authoring this report.

References

1. National Institute on Aging (December 24, 2019). What Causes Alzheimer's Disease? Retrieved February 18, 2024, from https://www.nia.nih.gov/health/what-causes-alzheimers-disease#alzheimer.
2. FDA (June 7, 2021). FDA Grants Accelerated Approval for Alzheimer's Drug. Press release. Retrieved February 18, 2024, from https://www.fda.gov/news-events/press-announcements/fda-grants-accelerated-approval-alzheimers-drug.
3. FDA (July 6, 2023). FDA Converts Novel Alzheimer's Disease Treatment to Traditional Approval. Press release. Retrieved February 18, 2024, from https://www.fda.gov/news-events/press-announcements/fda-converts-novel-alzheimers-disease-treatment-traditional-approval.
4. Huang, L.K., Kuan, Y.C., Lin, H.W., & Hu, C.J. (October 2, 2023). Clinical trials of new drugs for Alzheimer disease: A 2020-2023 update. *J Biomed Sci*;30(1):83. doi: 10.1186/s12929-023-00976-6.
5. Alzheimer's Association (April 2022). 2022 Alzheimer's disease facts and figures.18(4):700-789. doi: 10.1002/alz.12638. Epub 2022 Mar 14. PMID: 35289055.
6. Amjad, H., Roth, D.L., Sheehan, O.C,, Lyketsos, C.G., Wolff, J.L.. & Samus, Q.M. (2018). Underdiagnosis of Dementia: An Observational Study of Patterns in Diagnosis and Awareness in U.S. Older Adults. *J Gen Intern Med*;33(7):1131-1138. doi: 10.1007/s11606-018-4377-y. Epub 2018 Mar 5. PMID: 208259; PMCID: PMC6025653.
7. Alzheimer's Disease International (September 21, 2021). World Alzheimer Report 2021: Journey through the diagnosis of dementia. Retrieved February 18, 2024, from https://www.alzint.org/u/World-Alzheimer-Report-2021.pdf.
8. Naber, J. (June 2, 2023). Alzheimer's Disease Severity Progression: Prevalent Population Estimates Over Time. Milliman White Paper. Retrieved February 18, 2024, from https://www.milliman.com/en/insight/ad-severity-progression-estimates.
9. Yuan, J., Maserejian, N., Liu, Y., Devine, S., Gillis, C., Massaro, J., & Au, R. (2021). Severity Distribution of Alzheimer's Disease Dementia and Mild Cognitive Impairment in the Framingham Heart Study. J Alzheimers Dis, 79(2), 807-817. doi: 10.3233/JAD-200786.
10. Rabinovici, G.D., Gatsonis, C., Apgar, C., Chaudhary, K. et al. (April 2, 2019). Association of Amyloid Positron Emission Tomography With Subsequent Change in Clinical Management Among Medicare Beneficiaries With Mild Cognitive Impairment or Dementia. *JAMA*;321(13):1286-1294. doi: 10.1001/jama.2019.2000.
11. Naber, J. (May 2022). Medicare Beneficiary Out-of-Pocket Cost Exposure for Part B Drugs and Services. Milliman Brief. Retrieved February 18, 2024, from https://www.milliman.com/en/insight/medicare-beneficiary-oop-cost-exposure-for-part-b.
12. CBO (May 2023). Baseline Projections: Medicare. Retrieved February 18, 2024, from https://www.cbo.gov/system/files/2023-05/51302-2023-05-medicare.pdf.
13. CBO (September 2023). Federal Subsidies for Health Insurance: 2023 to 2033, Table A-1: CBO's Projections of Health Insurance Coverage, by Source. Retrieved February 19, 2024, from https://www.cbo.gov/publication/59613.
14. State Health Compare. Health Insurance Coverage Type. Shadac. Retrieved February 19, 2024, from https://statehealthcompare.shadac.org/table/4/health-insurance-coverage-type-by-age.
15. U.S. Census Bureau. Health Insurance Historical Tables – HHI Series. Retrieved February 19, 2024, from https://www.census.gov/data/tables/time-series/demo/health-insurance/historical-series/hic.html.
16. National Institute on Aging. Thinking About Your Risk for Alzheimer's Disease? Five Questions To Consider. Retrieved February 19, 2024, from https://www.nia.nih.gov/health/alzheimers-causes-and-risk-factors/thinking-about-your-risk-alzheimers-disease-five.
17. Eisai Co. (February 2024). Q3 FY2023 Financial Results Presentation. Retrieved February 27, 2024, from https://www.eisai.com/ir/library/presentations/pdf/e4523_240206.pdf.
18. CMS. Medicare Advantage/Part D Contract and Enrollment Data. Retrieved February 19, 2024, from https://www.cms.gov/data-research/statistics-trends-and-reports/medicare-advantagepart-d-contract-and-enrollment-data.
19. CMS. Monthly Enrollment by Plan: 2023-12. Retrieved February 19, 2024, from https://www.cms.gov/data-research/statistics-trends-and-reports/medicare-advantagepart-d-contract-and-enrollment-data/monthly-enrollment-plan.
20. Ochieng, N. et al. (December 13, 2023). A Snapshot of Sources of Coverage Among Medicare Beneficiaries. KFF. Retrieved February 19, 2024, from https://www.kff.org/medicare/issue-brief/a-snapshot-of-sources-of-coverage-among-medicare-beneficiaries/.
21. CMS. Monthly Contract and Enrollment Summary Report: 2023-10. Retrieved February 19, 2024, from https://www.cms.gov/data-research/statistics-trends-and-reports/medicare-advantagepart-d-contract-and-enrollment-data/monthly-contract-and-enrollment-summary-report.
22. CMS. SNP Comprehensive Report 2023 12. Retrieved February 19, 2024, from https://www.cms.gov/research-statistics-data-and-systems/statistics-trends-and-reports/mcradvpartdenroldata/special/snp-comprehensive-report-2023-12.

23. AHIP (February 2023). The State of Medicare Supplement Coverage. Retrieved February 19, 2024, from https://www.ahip.org/documents/202301-AHIP_MedicareSuppCvg-v03.pdf.
24. Wang, Z.J. et al. (September 24, 2021). 2021 Survey of Veteran Enrollees' Health and Use of Health Care. Advanced Survey Design. Retrieved February 19, 2024, from https://www.va.gov/VHASTRATEGY/SOE2021/2021_Enrollee_Data_Findings_Report-508_Compliant.pdf.
25. CMS (September 27, 2022). Fact Sheet: 2023 Medicare Parts A & B Premiums and Deductibles 2023 Medicare Part D Income-Related Monthly Adjustment Amounts. Retrieved February 19, 2024, from https://www.cms.gov/newsroom/fact-sheets/2023-medicare-parts-b-premiums-and-deductibles-2023-medicare-part-d-income-related-monthly.
26. VA (January 1, 2023). Past rates: 2023 VA health care copay rates. Retrieved February 19, 2024, from https://www.va.gov/health-care/copay-rates/past-rates-2023/.
27. Medicare. Compare Medigap Plan Benefits. Retrieved February 19, 2024, from https://www.medicare.gov/health-drug-plans/medigap/basics/compare-plan-benefits.
28. Medigap. Medicare Supplement Plan K for 2023. Retrieved February 19, 2024, from https://www.medigap.com/medicare-supplements/medigap-plan-k/.
29. CMS. Benefits Data. Retrieved February 19, 2024, from https://www.cms.gov/data-research/statistics-trends-and-reports/medicare-advantagepart-d-contract-and-enrollment-data/benefits-data.

Appendix A: Identifying Diagnoses in Claims Data

AD ICD-10 codes

- G30.0 Alzheimer’s disease with early onset
- G30.1 Alzheimer’s disease with late onset
- G30.8 Other Alzheimer’s disease
- G30.9 Alzheimer’s disease, unspecified

MCI ICD-10 code

- G31.84 Mild cognitive impairment

AD and MCI ICD-10 exclusionary codes

- G31.1 Senile degeneration of brain, not elsewhere classified (this code specifically excludes Alzheimer’s)
- R41.81 Age-related cognitive decline
- G10 Huntington's disease
- F84.3 Other childhood disintegrative disorder
- G20 Parkinson’s Disease

Individuals were considered to be diagnosed with AD or MCI if they had at least one inpatient or two outpatient/professional claims, excluding lab and radiology, with an AD or MCI diagnosis code(s) during the study period. The AD and MCI cohorts are mutually exclusive. A person with both AD and MCI diagnosis codes was classified as having AD. The rate of meeting one of the exclusion criteria (e.g., death, institutionalization) in the Original Medicare population was applied to the Medicare Advantage population, due to the Medicare Advantage data not including all encounter claims. In particular, the Medicare Advantage data had a low rate of hospice claims submitted by plans.

Appendix B: Benefit Designs and Cost Sharing

Benefit designs and assumed cost sharing by Medicare plan type

			Deductible		Beneficiary Cost Share			
Plan Type	Plan Description	AD+MCI Distr.[18-24]	Inpatient (Part A)	Medical (Part B)	Inpatient (Part A) Daily Copay	Part B Drugs / Services	Skilled Nursing Facility (SNF)	Maximum Out-of-Pocket (MOOP)
Original Medicare	Medicare A/B without Supplemental[25]	2.1%	$1,484	$226	$0	20%	100%	Unlimited
Original Medicare	Medicare A/B + VA[26]	3.4%	$320	$0	$0	$11	0%	NA
Original Medicare	Medicare / Medicaid	10.5%	$0	$0	$0	0%	0%	$0
Original Medicare	Medicare A/B with Medigap, Plans C/F/H/J[27]	16.5%	$0	$0	$0	0%	0%	$0
Original Medicare	Medicare A/B with Medigap, Plans B/D/E/G/I/N[27]	16.1%	$0	$226	$0	0%	0%	$226
Original Medicare	Medicare A/B with Medigap, Plan A[27]	0.4%	$1,484	$226	$0	0%	100%	$1,826
Original Medicare	Medicare A/B with Medigap, Plan K[27,28]	0.4%	$742	$226	$0	10%	50%	$6,940
Original Medicare	Medicare A/B with Medigap, Plan L[27]	0.1%	$371	$226	$0	15%	75%	$3,470
Medicare Advantage	MOOP $6,700	5.5%	$0*	$0*	$300*	20%*	100%*	$6,700
Medicare Advantage	MOOP $3,900	2.5%	$0	$0	$300	20%	100%	$3,900
Medicare Advantage	MOOP $7,550	2.1%	$0	$0	$300	20%	100%	$7,550
Medicare Advantage	MOOP $6,500	2.4%	$0	$0	$300	20%	100%	$6,500
Medicare Advantage	MOOP $4,900	1.6%	$0	$0	$300	20%	100%	$4,900
Medicare Advantage	MOOP $3,400	1.4%	$0	$0	$300	20%	100%	$3,400
Medicare Advantage	MOOP $4,500	2.4%	$0	$0	$300	20%	100%	$4,500
Medicare Advantage	MOOP $5,900	1.2%	$0	$0	$300	20%	100%	$5,900
Medicare Advantage	MOOP $5,500	2.3%	$0	$0	$300	20%	100%	$5,500
Medicare Advantage	MOOP $4,200	1.1%	$0	$0	$300	20%	100%	$4,200
Medicare Advantage	MOOP $5,000	1.9%	$0	$0	$300	20%	100%	$5,000
Medicare Advantage	MOOP $2,900	0.8%	$0	$0	$300	20%	100%	$2,900
Medicare Advantage	MOOP $3,800	0.7%	$0	$0	$300	20%	100%	$3,800
Medicare Advantage	MOOP $3,700	0.6%	$0	$0	$300	20%	100%	$3,700
Medicare Advantage	MOOP $3,500	2.7%	$0	$0	$300	20%	100%	$3,500
Medicare Advantage	MOOP $8,500	0.5%	$0	$0	$300	20%	100%	$8,500
Medicare Advantage	MOOP $6,000	1.3%	$0	$0	$300	20%	100%	$6,000
Medicare Advantage	MOOP $3,000	1.4%	$0	$0	$300	20%	100%	$3,000
Medicare Advantage	MOOP $7,000	0.8%	$0	$0	$300	20%	100%	$7,000
Medicare Advantage	MOOP $1,000	0.8%	$0	$0	$300	20%	100%	$1,000
Medicare Advantage	MOOP $4,000	0.8%	$0	$0	$300	20%	100%	$4,000
Medicare Advantage	MOOP $2,500	0.6%	$0	$0	$300	20%	100%	$2,500
Medicare Advantage	MOOP $8,000	0.1%	$0	$0	$300	20%	100%	$8,000
Medicare Advantage	MOOP $2,000	0.4%	$0	$0	$300	20%	100%	$2,000
Medicare Advantage	MOOP $7,500	0.1%	$0	$0	$300	20%	100%	$7,500
Medicare Advantage	MOOP $500	0.2%	$0	$0	$300	20%	100%	$500
Medicare Advantage	MOOP $1,500	0.1%	$0	$0	$300	20%	100%	$1,500
Medicare Advantage	Medicaid / SNP	11.1%	$0	$0	$0	0%	100%	$0
Medicare Advantage	Medicare Advantage + VA[26]	3.1%	$320	$0	$0	$11	100%	NA

*A simplifying assumption was used in this analysis that all Medicare Advantage plans have no inpatient or outpatient deductibles, a $300 per day inpatient cost sharing, 20% coinsurance for Part B, and 100% cost share of SNF, up to the annual maximum. In reality, there are a wide range of cost sharing and benefit designs available across Medicare Advantage plans, but these values were the most common (mode) cost sharing across Medicare Advantage plans, from an assessment of 2019 Medicare Advantage benefit data by plan.[29]

The table above excludes employer sponsored supplement and EGWPs due to lack of publicly available information on benefit design and cost sharing. TRICARE for Life is not reflected in this analysis because it is a wrap-around coverage that can be paired with any of the coverages above.

In this research, it is assumed Medicare beneficiaries with VA coverage will receive treatment at a VA facility and be subject to VA copays rather than Medicare cost sharing. The copay for physician-administered drugs is $11 in 2023; due to the low copay amount, we assumed this as 0% coinsurance relative to the cost scenarios tested in this analysis.

Medicare Advantage plans with “MOOP” in the name were identified as the top MOOP levels among Medicare Advantage plans using 2023 Medicare Advantage Landscape files and enrollment[18,19] in conjunction with the analysis of enrollment by MOOP in the 2020 RIF data. The top 15 MOOP levels (by enrollment) were reflected directly (e.g., MOOP of $6,700). All other MOOP levels, outside of the top 15 MOOPs, were rounded to the nearest $500 to reduce the number of benefit designs being modeled (e.g., a MOOP of $3,100 would be rounded to $3,000).

Methodology regarding benefit designs and OOP cost estimates

The distribution of diagnosed individuals for dual and non-dual coverage under Original Medicare and Medicare Advantage was informed by the claims analysis. The Medicare Advantage OOP maximums were informed by an analysis of the plan and contract IDs observed for AD and MCI diagnosed individuals compared to all other Medicare beneficiaries. For plan designs that were not available in claims, such as Medigap and employer supplemental coverage, the proportion of diagnosed individuals allocated to each was based on public research and enrollment statistics available for Medicare beneficiaries.

Part A and Part B claims included costs from the following RIF tables: inpatient facility, skilled nursing facility (SNF), outpatient facility, durable medical equipment (DME), and home health. Annual Part A/B costs were aggregated for each diagnosed beneficiary. Beneficiaries were ranked from lowest annual Part A/B spend to highest and grouped into equal size groups to represent the average allowed cost for each service category by percentile. The aggregate observed costs ("baseline costs") from the 2022 data were adjudicated under each Medicare coverage type to estimate annual patient Part A/B OOP exposure under the baseline incurred costs. To estimate the OOP exposure due to the addition of a Part B ATT and/or related Part B services, the baseline allowed costs and the additional costs were aggregated and re-adjudicated under the benefit design cost sharing.

This methodology assumes that costs are incurred uniformly throughout the year. In reality, a person's OOP costs associated with the addition of an ATT will be dependent on the order and magnitude of the other Part A/B services as they are incurred in the year.

Note that cost information is not available in the Medicare Advantage data. Therefore, baseline costs for Original Medicare were used as the basis for estimating OOP for all Medicare coverage types.

The Medicare Advantage RIF encounter data is from data year 2020, when the maximum Part A/B MOOP was $6,700. In 2023, the maximum MOOP was $8,300. To account for this increase in MOOP levels, we used the MOOPs for the diagnosed AD/MCI populations in comparison to the non-dual Medicare Advantage population (control). CMS has published Medicare Advantage Landscape files with 2023 MOOP levels and 2023 Medicare Advantage enrollment by plan. Using the 2020 MOOP distribution normalized by the 2023 Medicare Advantage plan enrollment, we estimate the distribution of MOOPs for AD and MCI diagnosed enrollees. Distributions across MOOPs plans were used to inform the enrollee distributions across Medicare Advantage plan designs, as displayed in the table above. Data source: Medicare Research Identifiable Files (RIF) Medicare Advantage data (2020) in combination with 2020 and 2023 Medicare Advantage Landscape files.[18]

Appendix C: Demographic Characteristics of Medicare Diagnosed Population Who May Be Considered for an ATT

Total Beneficiaries = 1.48 Million	Percent	Beneficiary Count
Male	38%	561,700
Female	62%	919,000
Under Age 65 (Avg. Age = 57)	4%	65,300
Age 65 and Older (Avg. Age = 82)	96%	1,415,500
White	82%	1,214,200
Black	9%	136,900
Hispanic	3%	30,100
Asian	2%	49,600
Other / Unknown	3%	50,000

Note: Numbers may not sum due to rounding.

Amyloid positivity assumptions were applied consistently across the sub cohorts.

Appendix D: Average Annual Beneficiary OOP Costs by Benefit Design and Scenario

		Average Annual Beneficiary OOP Baseline and Three Additional Part B Cost Scenarios			
Plan Type	**Plan Description**	**Baseline**	**Additional $16.5k**	**Additional $26.5k**	**Additional $36.5k**
Original Medicare	Medicare A/B without Supplemental	$2,601	$5,908	$7,908	$9,908
Original Medicare	Medicare A/B + VA	$493	$1,318	$1,818	$2,318
Original Medicare	Medicare / Medicaid	$0	$0	$0	$0
Original Medicare	Medicare A/B with Medigap, Plans C/F/H/J	$0	$0	$0	$0
Original Medicare	Medicare A/B with Medigap, Plans B/D/E/G/I/N	$217	$226	$226	$226
Original Medicare	Medicare A/B with Medigap, Plan A	$1,034	$1,043	$1,043	$1,043
Original Medicare	Medicare A/B with Medigap, Plan K	$1,417	$3,062	$4,040	$4,985
Original Medicare	Medicare A/B with Medigap, Plan L	$1,427	$3,214	$3,470	$3,470
Medicare Advantage	MOOP $6,700	$2,290	$4,952	$6,202	$6,700
Medicare Advantage	MOOP $3,900	$1,781	$3,758	$3,900	$3,900
Medicare Advantage	MOOP $7,550	$2,396	$5,162	$6,575	$7,516
Medicare Advantage	MOOP $6,500	$2,263	$4,895	$6,101	$6,500
Medicare Advantage	MOOP $4,900	$1,998	$4,297	$4,900	$4,900
Medicare Advantage	MOOP $3,400	$1,652	$3,394	$3,400	$3,400
Medicare Advantage	MOOP $4,500	$1,917	$4,101	$4,500	$4,500
Medicare Advantage	MOOP $5,900	$2,174	$4,704	$5,758	$5,900
Medicare Advantage	MOOP $5,500	$2,108	$4,555	$5,477	$5,500
Medicare Advantage	MOOP $4,200	$1,851	$3,938	$4,200	$4,200
Medicare Advantage	MOOP $5,000	$2,017	$4,343	$5,000	$5,000
Medicare Advantage	MOOP $2,900	$1,504	$2,900	$2,900	$2,900
Medicare Advantage	MOOP $3,800	$1,756	$3,693	$3,800	$3,800
Medicare Advantage	MOOP $3,700	$1,731	$3,626	$3,700	$3,700
Medicare Advantage	MOOP $3,500	$1,679	$3,477	$3,500	$3,500
Medicare Advantage	MOOP $8,500	$2,495	$5,354	$6,895	$8,101
Medicare Advantage	MOOP $6,000	$2,189	$4,738	$5,820	$6,000
Medicare Advantage	MOOP $3,000	$1,535	$3,000	$3,000	$3,000
Medicare Advantage	MOOP $7,000	$2,329	$5,031	$6,343	$7,000
Medicare Advantage	MOOP $1,000	$694	$1,000	$1,000	$1,000
Medicare Advantage	MOOP $4,000	$1,805	$3,820	$4,000	$4,000
Medicare Advantage	MOOP $2,500	$1,369	$2,500	$2,500	$2,500
Medicare Advantage	MOOP $8,000	$2,445	$5,258	$6,738	$7,820
Medicare Advantage	MOOP $2,000	$1,174	$2,000	$2,000	$2,000
Medicare Advantage	MOOP $7,500	$2,390	$5,151	$6,555	$7,477
Medicare Advantage	MOOP $5,500	$393	$500	$500	$500
Medicare Advantage	MOOP $1,500	$950	$1,500	$1,500	$1,500
Medicare Advantage	Medicaid / SNP	$0	$0	$0	$0
Medicare Advantage	Medicare Advantage - VA	$883	$1,708	$2,208	$2,708

Note: The average annual OOP and incremental OOP described in the white paper reflect the average, weighted by estimated AD / MCI enrollment, across each coverage type (e.g., Original Medicare, Medicare Advantage).

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