

Budget Impact of Memantine for Alzheimer's Disease Patient Among Medicare Beneficiaries in the United States

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Background

•Alzheimer's disease (AD) constitute a public health crisis affecting the US aging population and society.

•An estimated 6.7 million Americans aged 65 years and older are living with AD in 2023. Seventy-three percent are age 75 or older.¹

•By 2050, the total estimated prevalence of AD is expected to be 12.7 million.¹

•The pharmacological managements of AD include two symptomatic approaches: The inhibition of acetylcholinesterase and the inhibition of N-methyl-D-aspartate receptors.

•Acetylcholinesterase inhibitors (AChEIs) such as donepezil, galantamine, and rivastigmine are the recommended treatments for managing mild to moderate AD.^{1,2,3}

•In 2023, AD and other dementias will cost the nation \$345 billion — not including the value of unpaid caregivers.¹

• Medicare and Medicaid are expected to cover \$222 billion.¹

Table 1. Drug list for the budget impact model

Pharmacological Class	Drugs	FDA indication
Cholinesterase inhibitors	Galantamine	Mild to moderate Alzheimer's symptoms
Cholinesterase inhibitors	Rivastigmine	Mild to moderate Alzheimer's symptoms
Cholinesterase inhibitors	Donepezil	Mild to moderate Alzheimer's symptoms
Immunotherapies	Lecanemab	Treat early Alzheimer's disease
Immunotherapies	Aducanumab	Treat early Alzheimer's disease
N-methyl-D-aspartate (NMDA) antagonist	Memantine	Treatment of moderate to severe Alzheimer's disease.

This study aimed to determine the effect of memantine on total healthcare cost for treating AD in the US.

Results

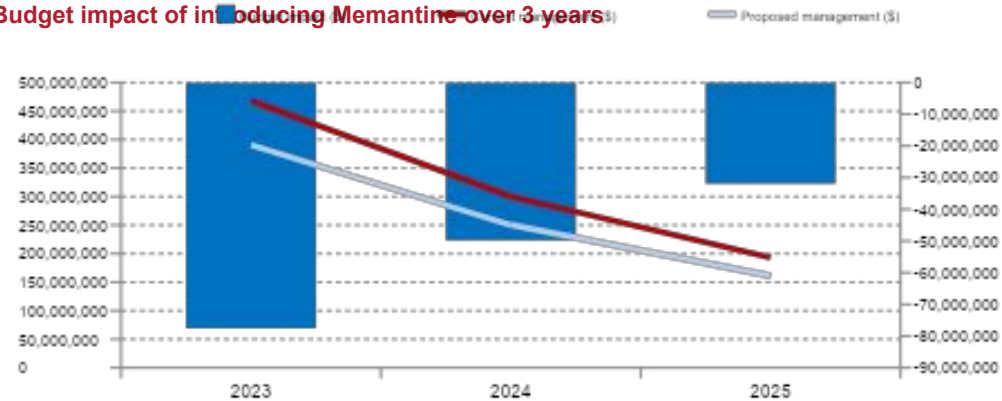
- The estimated budget impact of introducing memantine for treating eligible patients with Alzheimer's disease in the US from a health plan of one million members and eligible Medicare beneficiaries over three years is saving of \$159,460,328; with an incremental PMPM a saving of \$ 4.4 and a PTMPM \$98.9 saving.
- We controlled the effect of gender and race and found that both male and female, with different race have the same PTMPM cost; the only differences lay on the BI and PMPM.
- Sensitivity analysis suggests a decrease in the budget, mainly due to improvement in the prevalence of AD.

Table 5. Disaggregated base case analysis results ^a

	Current management	Proposed management	Budget impact	Per Member Per Month BI	Per Treated Member Per Month BI
Cumulative total costs (\$)					
Acquisition	\$909,524,960	\$757,334,994	-\$152,189,967	-\$4	-\$94
Administration	\$7,427,122	\$6,093,943	-\$1,333,178	\$0	-\$1
Initiation	\$603,612	\$578,080	-\$25,532	\$0	\$0
Health state costs	\$41,773,435	\$35,654,292	-\$6,119,143	\$0	-\$4
Adverse events	\$2,334,127	\$2,728,387	\$394,260	\$0	\$0
Total	\$961,663,255	\$802,389,696	-\$159,273,559	-\$4	-\$99

^aTime considered over 3 years. The costs of adverse events were included in the model (base case analysis). HCRU, healthcare resource utilization cost; PMPM, per member per month; PTMPM, per treated member per month.

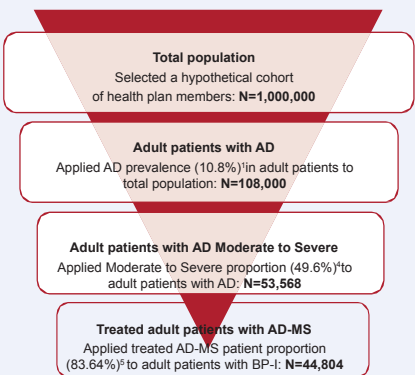
Figure 3. Budget impact of introducing Memantine over 3 years¹



Methods

- A model was developed to estimate the budget impact, across gender and race, of introducing memantine in a hypothetical US health plan of one million members, including 108,000 (10.8%) patients with AD, 49.6% of whom were moderate to severe, and out of which 83.64% were eligible for maintenance treatment (Figure 1).⁵

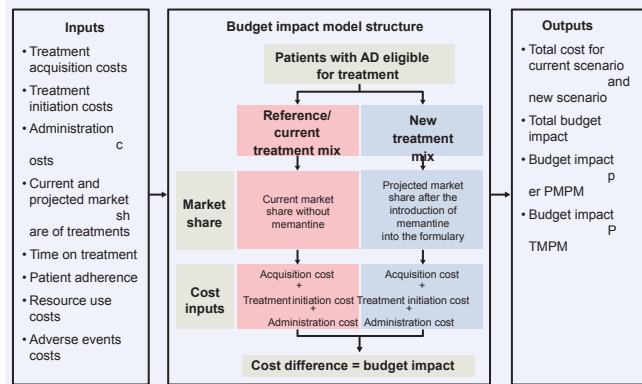
Figure 1. Target population for the budget impact model*



AD, Alzheimer's disease; MS, moderate to severe. *: this figure does not account for gender & race.

- The average population growth (0.51% per annum) was extracted from the US general population census in 2022.⁸
- Inputs to the model included estimates of market share (literature + assumption) of treatments; treatment acquisition, administration and initiation costs; resource use costs; adverse event costs; time on treatment; and treatment compliance; (Figure 2).

Figure 2. Budget impact model design



AD, Alzheimer's disease PMPM, per member per month; PTMPM, per treated member per month.

- The difference in total annual costs between scenarios with and without memantine was used to calculate the net budget impact of its introduction over a 3-year time horizon.
- Other outputs included cost per member per month (PMPM) and per treated member per month (PTMPM).
- Drug acquisition costs and the unit cost with duration of treatment initiation are presented in Table 2 to Table 4, respectively.
- A payer's perspective (Medicare) was used for this analysis.

Table 2: Cost inputs: acquisition, administration, and initiation

Treatment*	Dosage(Frequency of administration per year)	Treatment costs (Price per unit, \$)**	Administration costs (Cost per administration, \$)**	Treatment initiation costs (Price per unit, \$)**	Duration of treatment initiation (day)**
Memantine	284.08	\$2.63	\$0.00	\$1.39	4.00
Donepezil 10-23	365.25	\$0.94	\$0.00	\$0.20	59.63
Rivastigmine tdm	182.63	\$15.07	\$0.00	\$0.00	0.00
Aducanumab	13.04	\$282.00	\$14.23	\$0.00	0.00
Lecanemab	26.07	\$127.41	\$14.23	\$0.00	0.00

*Costs for all treatments are provided based on one dose per administration. Off-label treatments were included in the model if they were known to have a sizeable market share. **BID MicroMedex— Redbook. *Centers for Medicare & Medicaid Services— Medicare/Medicare-Fee-for-Service-Payment.

Table 3: Cost inputs: adverse events

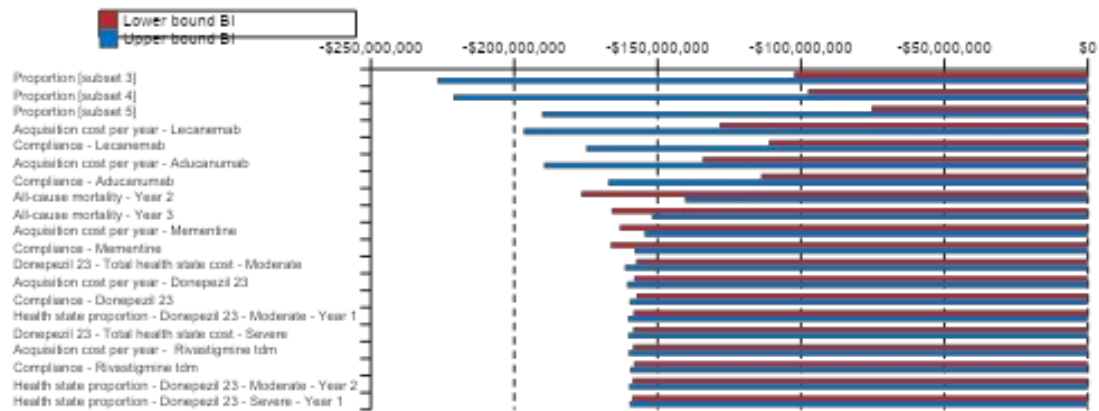
Adverse Events (AEs)	AE costs (\$)**
Abdominal Pain	\$224.03
Anorexia	\$119.74
Anxiety	\$209.44
Asthenia	\$410.10
Confusion	\$1,161.74
Cough	\$112.24
Depression	\$469.74
Diarrhea	\$102.01
Dizziness	\$362.35
Dyspepsia	\$156.49
Echthymosis	\$227.73
Headache	\$123.06
Infection	\$72.64
Infusion-related reactions	\$1.30
Insomnia	\$161.33
Malaise	\$138.55
Nausea	\$118.72
Somnolence	\$83.88
Urinary Tract Infection	\$145.61
Vomiting	\$109.54

*BID MicroMedex— Redbook. *Centers for Medicare & Medicaid Services— Medicare/Medicare-Fee-for-Service-Payment. **Drugs FDA labels. †Assumptions. Alzheimer's Association. 2023 Alzheimer's Disease Facts and Figures. Alzheimers Dement 2023;19(4). DOI 10.1002/alz.13018.

Table 4:Cost inputs: health resource utilization

Resource	Resource use Unit cost (\$)**
Emergency medicine specialist	\$423.93
Geriatric subspecialists	\$445.96
Neurologists	\$9,117.41
Neuropsychologists	\$182.65
Caregivers	\$1,705.90

Figure 4. One-way sensitivity analysis



*The impact of AD Prevalence, AD Moderate-Severe proportion, proportion of Medicare AD Patients were considered in the one-way sensitivity analysis.

Limitations

- Assumptions were made for inputs that lacked data (eg, uptake of treatments over the life of the model, compliance with treatment).

Conclusion

The introduction of memantine as maintenance treatment for adults with AD is expected to be cost saving with respect to US payer budgets and is a potentially favorable option for patients who are Medicare beneficiaries.

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Disclosures

Vakaramoko Diaby, Vassiki Sanogo, and Reem Dhayan Almutairi are affiliated respectively to University of Florida, Northcentral university, and MCPHS university

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