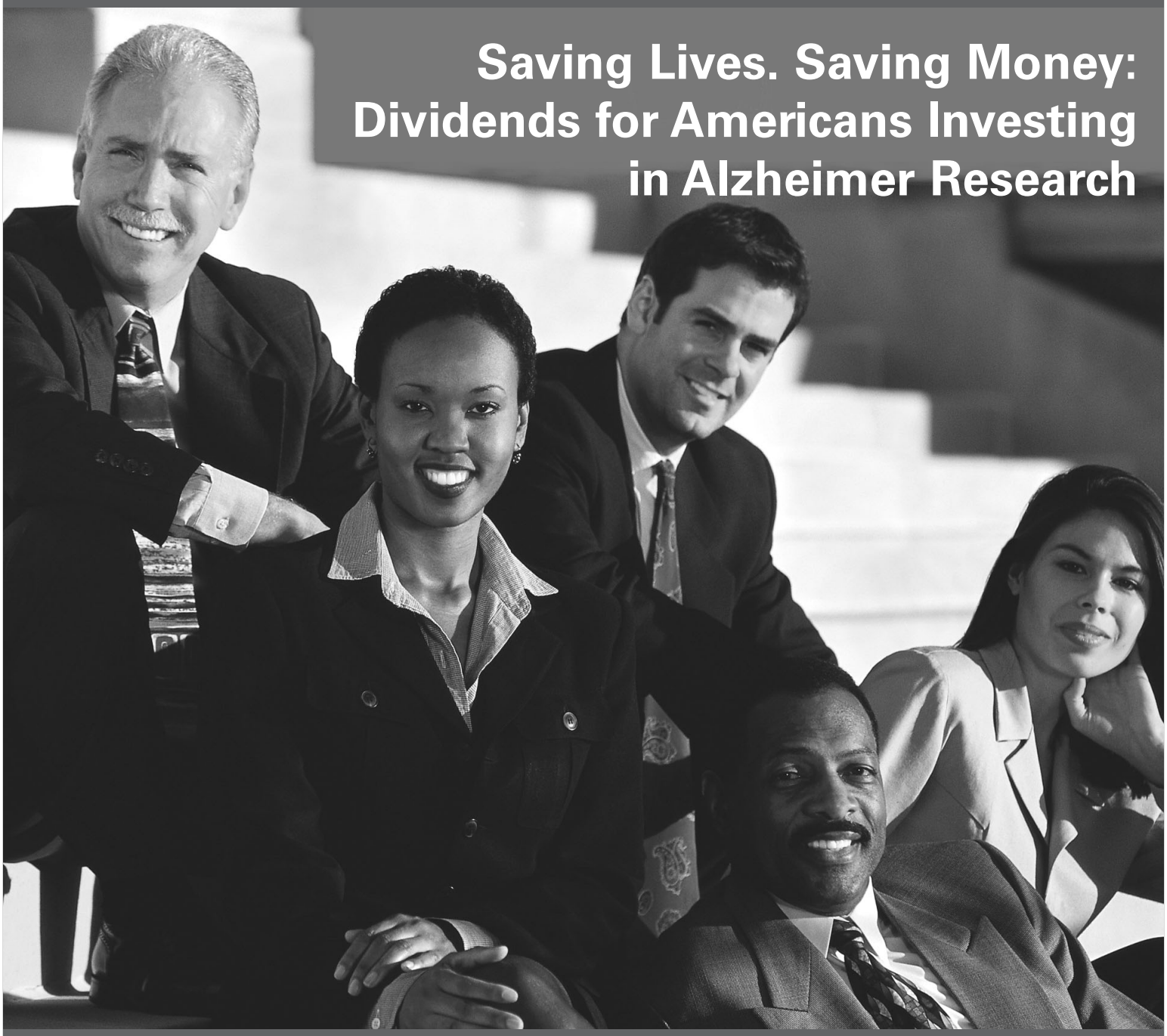
Report of the Lewin Group
to the Alzheimer's Association

Saving Lives. Saving Money: Dividends for Americans Investing in Alzheimer Research



The Lewin Group

alzheimer's association

Saving Lives. Saving Money:
Dividends for Americans Investing in Alzheimer Research

Alzheimer research breakthroughs now within reach offer the best hope for reducing the number of people with Alzheimer's disease and public healthcare costs for treatment. If these breakthroughs can be achieved in the next five years, the return on this investment would be enormous.

A study by The Lewin Group, commissioned by the Alzheimer's Association, projects the impact of research advances on Medicare and Medicaid spending for care of people with Alzheimer's disease. By 2015, a short-term investment in research, measured in savings to the Medicare program, could deliver a potential return of 10 to 1 to the federal government. By 2025, the annual return could be 25 to 1, and by 2050, almost 90 to 1. The return could be even greater (13 to 1 by 2015 and almost 100 to 1 by 2050) if savings in federal and state Medicaid spending are added to the equation.

The Alzheimer's Association believes that the only way we can realize these returns, however, is with an immediate commitment of the necessary public and private resources to research. Alzheimer research is a three-legged stool. As the largest private voluntary funder of such research, the Alzheimer's Association is stimulating new areas of inquiry and supporting young investigators. The pharmaceutical industry plays the critical role of drug development, which results in new treatments. The third critical leg, without which the research stool cannot stand, is the federal government through the National Institutes of Health (NIH).

The National Institutes of Health's ongoing Alzheimer's disease research is absolutely critical to delivering the research breakthroughs that are necessary for us to realize the potential for Medicare savings. This research includes studies to uncover Alzheimer's disease risk factors; clinical research on non-pharmaceutical interventions; and identification of pre-symptomatic disease markers that will speed the drug discovery process, and provide doctors with access to new treatments for individuals with Alzheimer's disease.

That is why the Alzheimer's Association and the scientific community are calling on Congress to increase the annual federal investment in Alzheimer research to $1 billion – an increase of $320 million over current levels of funding.

Note: The Alzheimer's Association developed this analysis based on a study prepared by The Lewin Group. The Lewin research is based on published studies of estimated prevalence of Alzheimer's disease, costs to Medicare and Medicaid, and the impact of research breakthroughs. Employing a model developed by researchers at the University of North Carolina at Chapel Hill, Lewin measured the potential impact of the discovery of Alzheimer treatments that would slow the onset and progression of Alzheimer's as much as we can now slow onset of congestive heart failure and progression of Parkinson's disease.

Highlights and Key Findings

The Situation Today: Medicare beneficiaries with Alzheimer's disease account for 34% of Medicare spending, even though they constitute only 12.8% of the population age 65 and older.

- This is happening even though Medicare does not pay for the long-term care that people with Alzheimer's disease need. It is happening because 95% of Medicare beneficiaries with dementia have other chronic conditions common in the elderly, which are exacerbated by their dementia.
- Among beneficiaries with particularly costly chronic conditions like coronary heart disease, diabetes, or chronic pulmonary disease, Medicare costs more than double when dementia is also present.
- On average, beneficiaries with dementia cost Medicare 3 times more than other elderly beneficiaries.

1. Left unchecked, the costs of treating people with Alzheimer's disease will break the bank for Medicare and Medicaid. The future of Medicare and Medicaid depends on getting Alzheimer's disease under control.

- As Baby Boomers enter the age of increased risk, the number of persons over 65 with Alzheimer's will increase from 4.5 million in 2000 to 6.5 million in 2025 and 13.4 million in 2050.
- Total Medicare spending for beneficiaries with Alzheimer's will increase at an even greater rate than the growth in numbers with the disease. It will triple by 2015 – from $62 billion in 2000 to $189 billion.
- By 2025, Medicare will have increased 4.5 times – to $294 billion.
- By 2050, Medicare will be spending over $1 trillion ($1,049 billion) on beneficiaries with Alzheimer's disease and related dementias – 4 out of every 10 dollars spent in the program.
- State and federal Medicaid spending on people with Alzheimer's disease, for nursing home care only, was estimated at $19 billion in 2000.
- By 2025, that spending will increase to $32 billion.
- By 2050, it will increase more than 6 fold – to $118 billion.

2. Medicare and Medicaid costs can be reduced by slowing the onset and progression of Alzheimer's disease. This could achieve annual Medicare savings of $51 billion by 2015, $126 billion by 2025, and $444 billion by 2050. Annual savings in Medicaid spending on nursing home care would also be significant – $10 billion in 2015, $23 billion by 2025, and $70 billion by 2050.

Slowing the onset and progression of Alzheimer's disease would dramatically change the picture in two ways:

- Far fewer people age 65 and over would get Alzheimer's. In 2015, there would be 3.7 million with the disease – less than there are today – instead of a projected 5.3 million. In 2050, 8.1 million would have the disease, rather than the projected 13.4 million.

- A much larger proportion of people who would still have Alzheimer's would be in the mild stage of the disease, when they can still live in and contribute to their community with far less need for expensive care. The proportion with moderate to severe disease would decline from 73% in 2000 to 66% in 2015, and to 53% by 2025. By 2050, 4.4 million instead of a projected 10.3 million would have moderate to severe disease.

The impact on projected Medicare costs would be dramatic:

- Within 5 years of discovery – by 2015 – projected annual Medicare spending would decline by $51 billion or 27% (down from $189 billion to $138 billion.)
- By 2025, Medicare spending projections would be $126 billion a year less – a decline of 43% (down from $294 billion to $168 billion.)
- By 2050, Medicare would be saving $444 billion a year (down from a projected $1,049 billion to $605 billion)

The impact on projected Medicaid spending for nursing home care for people with Alzheimer's disease would be equally dramatic:

- Within 5 years of discovery – by 2015 – that spending would decline by 37% (from $27 billion to $17 billion.)
- By 2025, Medicaid would be spending $15 billion on nursing home care for people with dementia – a 60% decline.
- By 2050, spending would be $48 billion – a projected savings of $70 billion.

3. An annual investment of $1 billion in Alzheimer research is critical if the U.S. is to realize the potential for Medicare and Medicaid savings. Taxpayers would receive a huge annual return on this investment if research breakthroughs can be achieved by 2010, with the savings in Medicare and Medicaid costs beginning in 2015.

A $1 billion investment in research requires an increase of $320 million over the current annual commitment at NIH to Alzheimer research. It pales in comparison with the potential savings to Medicare and Medicaid that would come from that investment, if scientists can achieve the breakthroughs modeled in this analysis.

- Within 5 years of discovery, by 2015, the total annual return on this investment would be 13 to 1.
- By 2025, the annual combined return on the investment would be 28 to 1.
- By 2050, the annual combined return would be nearly 100 to 1.

The Alzheimer's Association calls on Congress to appropriate $1 billion to the National Institutes of Health for Alzheimer research. The scientific community believes that this amount can be spent wisely now. There is enormous momentum in Alzheimer research, as evidenced by the dramatic increase in investigator initiation research proposals to the National Institute on Aging (NIA), the increasing number of academic institutions competing for Alzheimer's Disease Center grants from the NIA, and the presence of more than 4,000 scientists at the 9th International Conference on Alzheimer's Disease and Related Disorders in July 2004.

These estimates assume that by 2010, researchers will achieve two breakthroughs:

- A way to delay onset of Alzheimer's as much as we are already delaying onset of congestive heart failure, and
- A way to slow the progression of Alzheimer's as much as we have already been able to slow Parkinson's disease.

Conclusion: The Need for Immediate Action

Prior investments in research have brought us to the point where we can reasonably hope for a dramatic turn around in the plague of Alzheimer's disease. Now, just as that possibility is within our grasp, the momentum of discovery is threatened by a slowdown in the federal investment in research. We must not allow that to happen.

The human impact of Alzheimer's – on the person who is robbed of memory and ability to function, on families overwhelmed by the emotional, financial, and physical burdens of care, and on a society that suffers the loss of the experience and wisdom of so many of its older citizens -- should be enough to drive the search for a cure. The Lewin report adds one more set of compelling reasons why we must turn the course of this disease now – for the economic and health security of our nation.

The ambitious but still modest breakthroughs envisioned in this report will not put an end to Alzheimer's disease. But it will reduce it to a manageable scale, where individuals, families, and our health care system can deal with it. Even with these breakthroughs, many older people would still have Alzheimer's disease, although a declining percentage of them will require intensive, full-time care.

The need for continued investment in research will continue, until the disease is finally brought to its knees. Medicare will have to adapt to meet the chronic health care needs of beneficiaries who have dementia. And our long term care financing and delivery systems will have to adapt to meet the changing needs of those who will need supports and services to continue to live in and contribute to their community even though they have Alzheimer's disease.

The Alzheimer's Association believes that with a five-year investment in research, we could achieve breakthroughs that would delay the onset of the disease and slow its progression. The resulting savings to our health care system would be astronomical. If Congress wants to control health care costs, Alzheimer's disease is the place to begin, and the time to begin is now.

Report of the Lewin Group to the Alzheimer's Association

The Lewin Group

The Lewin Group analysis was funded through
an unrestricted grant by PhRMA to the Alzheimer's Association.

I. INTRODUCTION

This report estimates the potential impact of delaying the onset of Alzheimer's disease and/or slowing the progression on: 1) the number of individuals with Alzheimer's disease; 2) Medicare expenditures; and 3) Medicaid expenditures for nursing facility care.

II. METHODOLOGY

The analysis combines techniques used by Sloane et al.[1] for examining the potential impact of break through drugs, incidence rates (the percent of individuals that get the disease over the course of a year) from Evans et al[2] with the resulting prevalence estimates (the percent of individuals with the disease at a point in time) reported by Hebert et al,[3] per capita Medicare spending estimates for individuals with Alzheimer's or other dementias from Medicare claims data[4] and differential spending by severity level (mild, moderate and severe) based on Leon et al[5] and Small et al[6]

A. Baseline Estimates

The baseline assumptions result in estimates similar to Hebert et al., which include a decline in prevalence by age (***Exhibit 1***) from 2000 to 2050. The approach estimated a 2000 cohort of individuals with Alzheimer's disease, and then, using incidence rates, progression from mild to moderate to severe, and differential mortality rates, projected the number of individuals with Alzheimer's by severity for each single year of age 60 and over to 2050. Each year a new cohort of individuals age 60 were added to the analysis. The age 60 cohorts added were consistent with the most recent projections from the Census Bureau that incorporate the 2000 Decennial Census results.[7]

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1 Sloane, Phillip, Sheryl Zimmerman, Chirayath Suchindran, Peter Reed, Lily Wang, Malaz Boustani, and S. Sudha (2002) The Public Health Impact of Alzheimer's Disease, 2000-2050, Potential Implication of Treatment Advances, *Annual Review of Public Health*, vol. 23(1).

2 Evans, Denis, David Bennett, Robert Wilson, Julia Bienias, Martha Clare Morris, Paul Scherr, Liesi Hebert, Neelum Aggarwal, Laurel Beckett, Rajiv Joglekat, Elizabeth Berry-Kravis,, and Julie Schneider (2003) Incidence of Alzheimer Disease in a Biracial Urban Community, *Archives of Neurology*, vol. 60: 185-189.

3 Hebert, Liesi, Paul Scherr, Julia Bienias, David Bennett and Denis Evans (2003) Alzheimer Disease in the US Population, *Archives of Neurology*, vol. 60: 1119-1122.

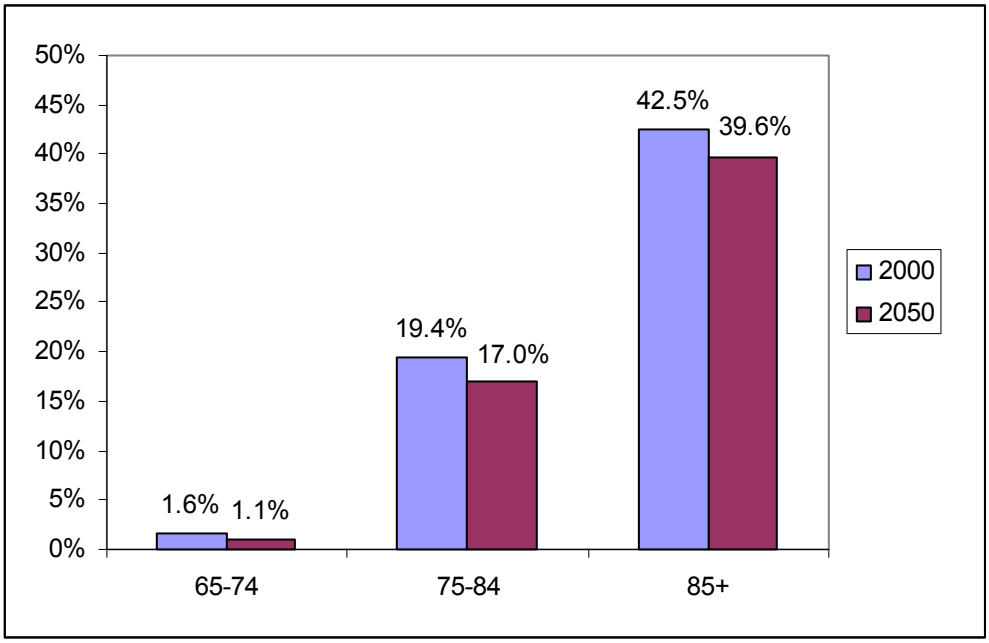
4 Alzheimer's Association, Use of Medicare Services and Medicare Costs for People with Alzheimer's Disease and Other Dementias. (Unpublished data from Medicare claims for a 5% national random sample of Medicare beneficiaries, CMS FY 2000 data set). Alzheimer's Association Public Policy Office, Washington DC 2003.

5 Leon, Joel, Chang-Kuo Cheng, and Peter Neumann (1998) Alzheimer's Disease Care: Costs and Potential Savings, *Health Affairs*, vol. 17(6).

6 Small GW, DD McDonnell, RL Brooks, et al: (2002) The Impact of Symptom Severity on the Cost of Alzheimer's Disease. *Journal of the American Geriatrics Society*; vol. 50: 321-327

7 U.S. Census Bureau, Population Division, Population Projections Branch, *Interim Projections of the U.S. Population by Age, Sex, Race, and Hispanic Origin*, posted March 18, 2004.

Exhibit 1
Estimated Prevalence of Alzheimer's Disease by Age



Source: Hebert, Liesi, Paul Scherr, Julia Bienias, David Bennett and Denis Evans (2003) Alzheimer Disease in the US Population, *Archives of Neurology*, vol. 60: 1119-1122.

1. Prevalence of Alzheimer's Disease by Age and Severity in 2000

In order to project the number of individuals with Alzheimer's disease by severity, we first estimated the number of individuals with mild, moderate and severe Alzheimer's by age in 2000. Prevalence rates were based on a combination of Hebert et al. prevalence by age and severity by age from the Canadian Study of Health and Aging.[8] The Canadian study was used for the proportion at each severity level because the severity level estimates reported in Hebert et al. are for a sample of individuals with incident disease only and therefore include a higher proportion of individuals with mild disease than would be found in a sample that also contained prevalent cases. The combined prevalence rates were applied to single year of age estimates of the population from the 2000 Decennial Census.

[8] Graham, Janice, Kenneth Rockwood, B. Lynn Beattle, Robin Eastwood, Serge Gauthier, Holly Tuokko and Ian McDowell (1997) Prevalence and Severity of Cognitive Impairment With and Without Dementia in an Elderly Population, *The Lancet*, vol. 349.

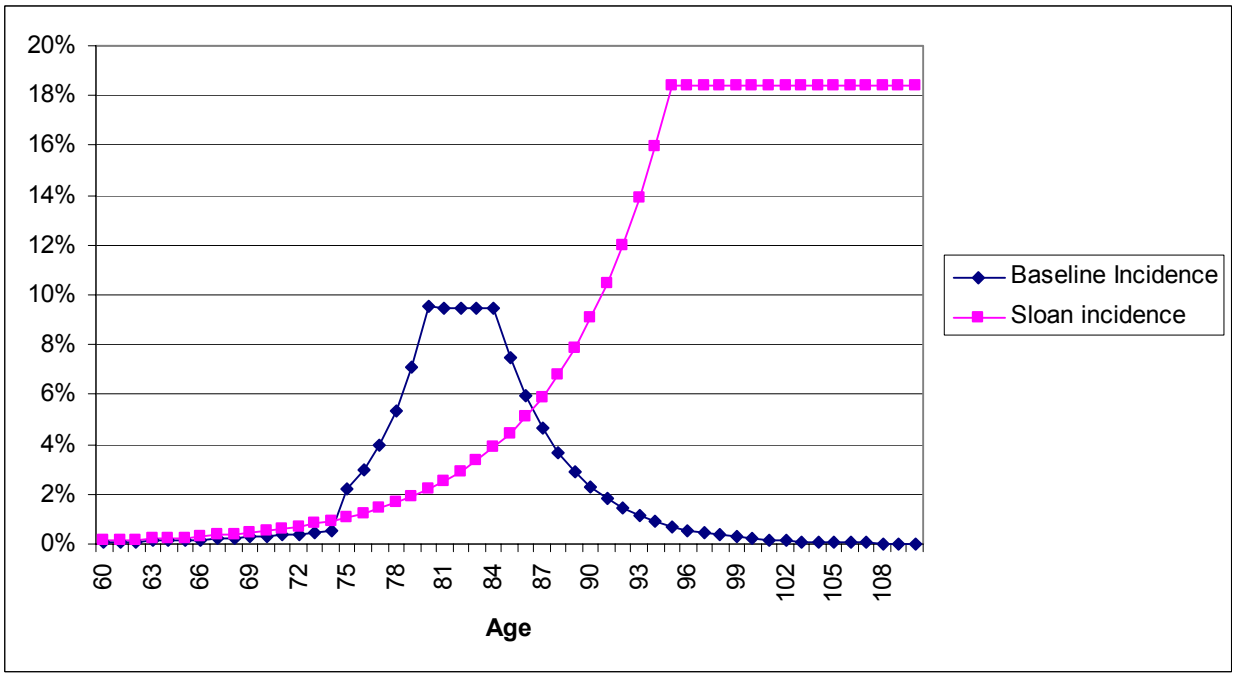
2. *Baseline Incidence of Alzheimer's Disease*

Sloane et al. based their prevalence rates on the General Accounting Office's 1998 estimates.[9] Sloane et al. assumed the following incidence:

$$.001278e^{(0.1423)(\text{age } -60)}$$

This incidence assumption implies an ever increasing incidence rate by age. For their analysis, Sloane et al. held the incidence constant from age 95 on. For our analysis, we used Hebert et al. prevalence rates, which are higher than the GAO estimates, and developed estimates of the incidence rates necessary to produce the Hebert et al. prevalence. The incidence curve by age for the two prevalence rates differ fairly substantially with the Sloane et al. estimate an upward sloping curve and the Hebert et al. estimate more of a bell shaped curve (***Exhibit* 2**).

Exhibit 2
Baseline and Sloane et al. Assumed Incidence of Alzheimer's Disease by Age



Source: Sloane, Phillip, Sheryl Zimmerman, Chirayath Suchindran, Peter Reed, Lily Wang, Malaz Boustani, and S. Sudha (2002) The Public Health Impact of Alzheimer's Disease, 2000-2050, Potential Implication of Treatment Advances, *Annual Review of Public Health*, vol. 23(1).and The Lewin Group assumptions.

[9] U.S. General Accounting Office (1998) *Alzheimer's Disease: Estimates of Prevalence in the United States*, Pub. no. HEHS-98-16.

3. *Progression Between Disease Severity Levels and Differential Mortality*

Sloane et al. assumed 28 percent of individuals progressed from mild to moderate/severe. In our baseline analysis, we assumed the transition probabilities from mild to moderate were 45 percent annually and moderate to severe were 28 percent annually. Not accounting for deaths, this transition rate implies staying in a mild state for approximately two years and a moderate state for four years. We also assumed differential mortality rates relative to the overall mortality rate for those with Alzheimer's disease that increased with severity:[10]

- 1.2 for those with mild Alzheimer's,
- 1.5 for moderate, and
- 2.0 for severe.

And an additional upward adjustment in the mortality rates at younger ages.

4. *Adjustments to Incidence to Match Hebert et al. Projections*

Using the incidence rates to produce the 2000 prevalence rates by age, do not replicate the Hebert et al. projections. The Hebert et al. projections actually indicate a declining prevalence within age group as a result of improvement in educational attainment, associated with less likelihood of developing Alzheimer's, among future cohorts of the elderly (***Exhibit 1***). Therefore, to more closely approximate the Hebert et al. projections, the incidence rates by age were adjusted downward over time based on the increasing proportion of individuals with high school education by age group.

B. Delayed Onset of Alzheimer's Disease

In their analysis, Sloane et al. hypothesize that if effective preventive strategies that delayed the onset of Alzheimer's disease came available in 2010, the incidence of Alzheimer's would be reduced such that the median age of onset would be approximately six to seven years later.[11] Sloane et al. accomplished this by reducing the reducing the slope of the incidence rates by age such that the slope factor changed from 0.143 to 0.1.

$$.001278e^{(0.1423)(\text{age } -60)} \qquad \text{becomes} \qquad .001278e^{(0.1)(\text{age } -60)}$$

In this analysis, the onset of disease is also delayed by approximately six years (***Exhibit 3***).

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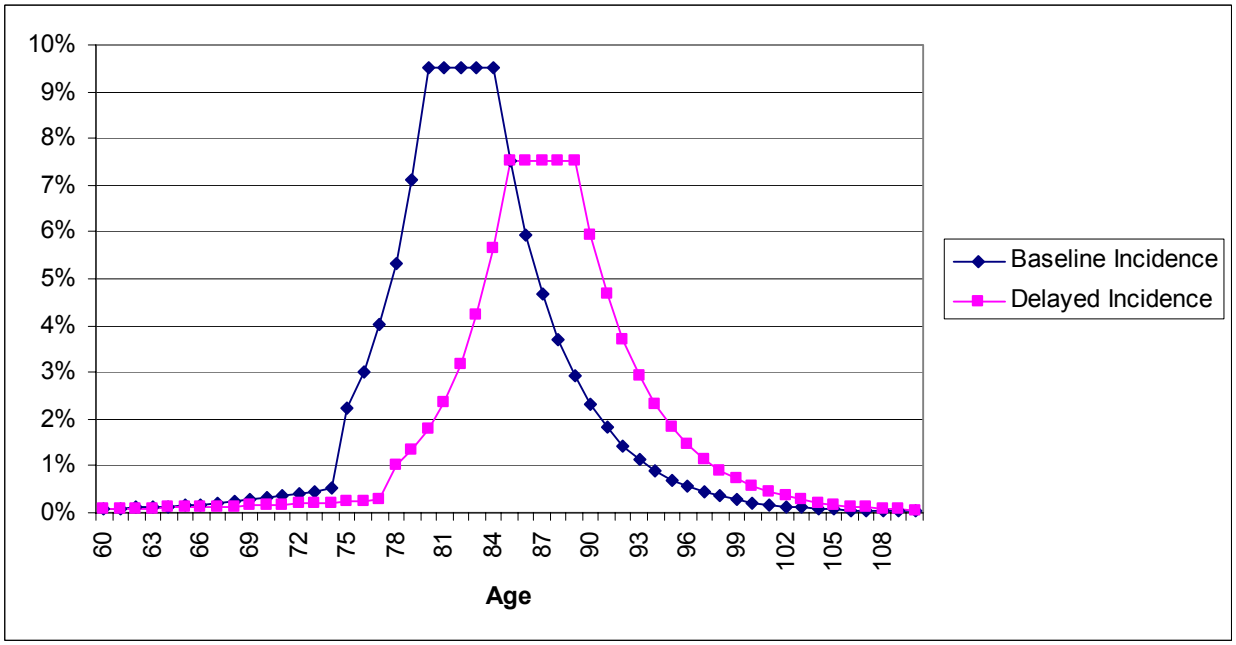
[10] Several studies have found higher mortality among individuals with Alzheimer's disease or other dementia. For example, Dodge, Hiroko, Changyu Shen, Tajesh Pandav, Steven DeKosky and Mary Ganguli (2003) Functional Transitions and Active Life Expectancy Associated With Alzheimer Disease, *Archives of Neurology*, vol. 60: 253-259. In their analysis, Sloane et al. assumed mortality for those with mild Alzheimer's was 10 percent higher than that for a disease free state and 20 percent higher for moderate/severe Alzheimer's. We used higher differentials based on Dodge et al's findings that the differential can be up to three times depending on age.

[11] Sloane et al based their assumption on the effect of treatment and behavioral change effects on congestive heart failure, but assume that the only about half the effect would apply to Alzheimer's disease because of the later age of onset than congestive heart failure.

Exhibit 3
Current Incidence and Delayed Onset Incidence of Alzheimer's Disease by Age



Source: The Lewin Group assumptions.

C. Slowed Progression of Alzheimer's Disease

In the same spirit as the analysis of delayed onset, Sloane et al. examined the potential impact of slowing the progression between severity levels of Alzheimer's disease. They hypothesized that medication might reduce the annual transition rate between mild to moderate/severe from 0.28 to 0.1 based on the experience for Parkinson's Disease, essentially halving the rate of progression. We slowed progression from mild to moderate from 45 percent to 20 percent and for moderate to severe from 28 percent to 10 percent.

D. Medicare and Medicaid Spending for Individuals with Alzheimer's Disease

Medicare spending estimates for individuals with and without Alzheimer's disease were based on an analysis of a five percent national random sample of Medicare beneficiaries' 2000 Medicare claims prepared by the Alzheimer's Association from CMS data provided by the Partnership for Solutions project at John Hopkins University. The sample was fee-for-service beneficiaries age 65 and older. Those with at least one Medicare claim with an ICD-9 code diagnosis 290, 294, or 331 were considered to have Alzheimer's disease or other dementias. These estimates provided the per capita spending by age for those with and without Alzheimer's disease (***Exhibit 4***).

Exhibit 4
Number of Medicare Beneficiaries and Average Medicare Spending by Diagnosis of Alzheimer's Disease from Medicare Claims, 2000

	Number of Individuals	Average Medicare Spending
Total		
All Beneficiaries	1,246,427	$5,329
No Alzheimer's Disease or Dementia	1,134,642	$4,454
All with Alzheimer's Disease or Dementia	111,785	$13,207
65-74		
All Beneficiaries	623,357	$4,241
No Alzheimer's Disease or Dementia	603,321	$3,851
All with Alzheimer's Disease or Dementia	20,036	$15,998
75-84		
All Beneficiaries	458,553	$5,969
No Alzheimer's Disease or Dementia	409,262	$5,044
All with Alzheimer's Disease or Dementia	49,291	$13,650
85+		
All Beneficiaries	164,517	$6,981
No Alzheimer's Disease or Dementia	122,059	$5,433
All with Alzheimer's Disease or Dementia	42,458	$11,374

Source: Alzheimer's Association, Use of Medicare Services and Medicare Costs for People with Alzheimer's Disease and Other Dementias. (Unpublished data from Medicare claims for a 5% national random sample of Medicare beneficiaries, CMS FY 2000 data set). Alzheimer's Association Public Policy Office, Washington DC 2003.

In order to model variation in spending for the three severity levels used in the projections, we used the differential spending by severity reported by Leon et al. and Small et al. Both of these analyses found that average spending increased with severity level. The differential factors relative to the average for all individuals with Alzheimer's used in our analysis were as follows:

Mild – 0.79

Moderate – 1.05

Severe – 1.57

Exhibit 4 provides the 2000 per capita Medicare spending assumptions. The 2000 estimates were then inflated by the 2004 Centers for Medicare and Medicaid Services (CMS) actuaries assumed real rate of increase in per capita Medicare expenditures independent of age effects.[12]

The Centers for Medicare and Medicaid Services actuaries' estimates of future Medicare spending include the cost of medications and the impact of the new prescription drug program. For our estimates, we did not make explicit assumptions about the costs of potential new Alzheimer disease medications or the impact of the prescription drug program on the costs of these medications.

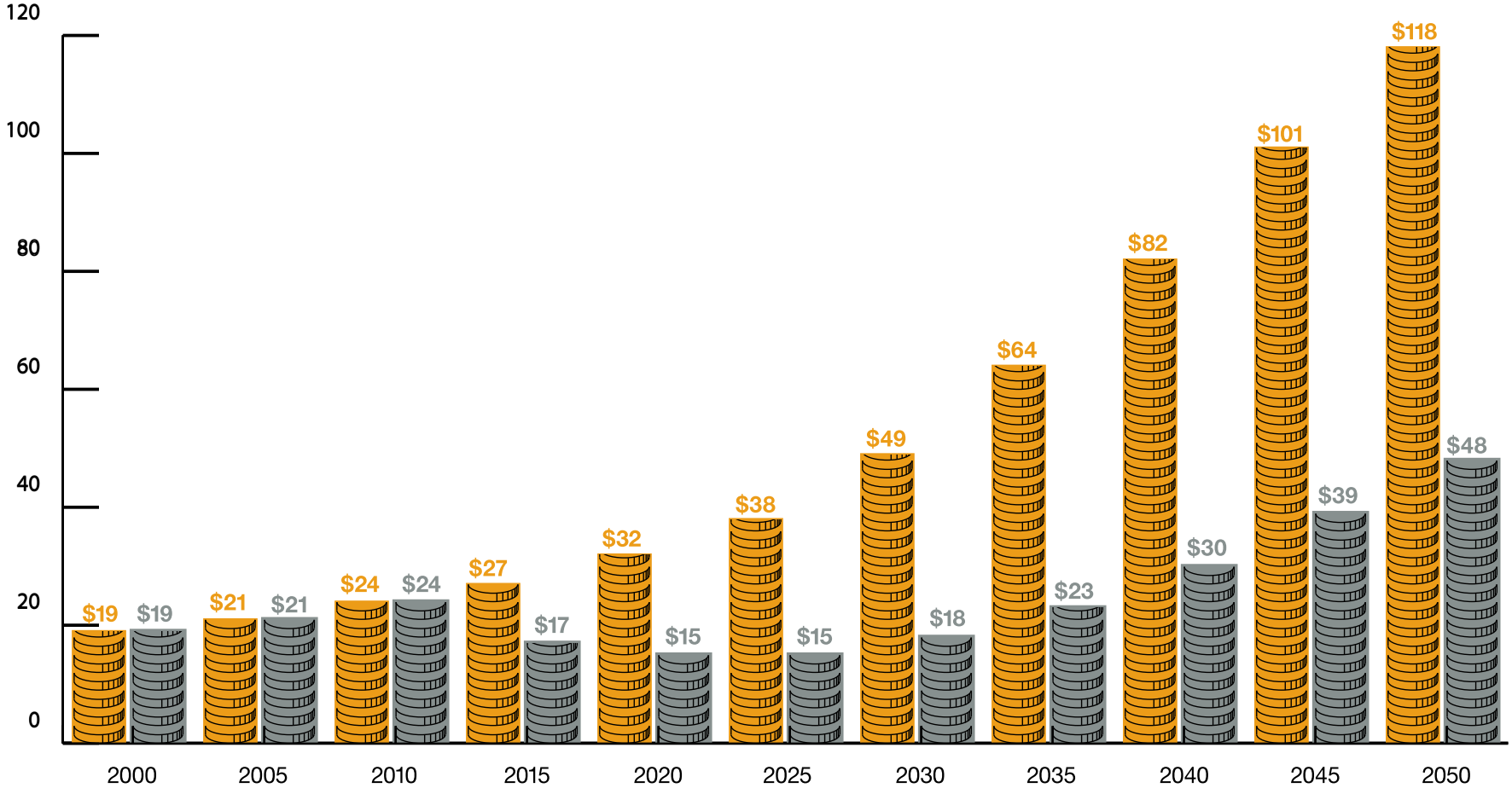
In order to reflect Medicaid payments for nursing facility care for individuals with Alzheimer's disease, we used average annual Medicaid payments per user for nursing facilities inflated by the rate of increase per capita among nursing facility residents used by The Lewin Group's Long Term care Financing Model. We assumed that the per capita spending did not vary by severity, but that the rate of institutionalization did. The change in Medicaid spending assumes that individuals with Alzheimer's disease that are in an nursing facility would not go into a nursing facility if they did not have Alzheimer's or would be less likely if they had a lower severity level. This assumption overstates the effect of a delay in onset or a slower progression rate on Medicaid nursing facility expenditures, because some proportion of those with Alzheimer's disease in a nursing facility will have multiple reasons for being in the facility and could remain in a nursing facility.

III. RESULTS

The results of the assumptions and resulting analysis are presented in ***Exhibits 5, 6*** and ***7***.

[12] *2004 Annual Report of the Boards of Trustees of the Federal Hospital Insurance Trust and Federal Supplementary Medical Insurance Trust Funds*, March 2004.

Medicaid Spending for People with Alzheimer's Disease
Using Current Projections vs. Projections with Delayed Onset and Slowed Progression

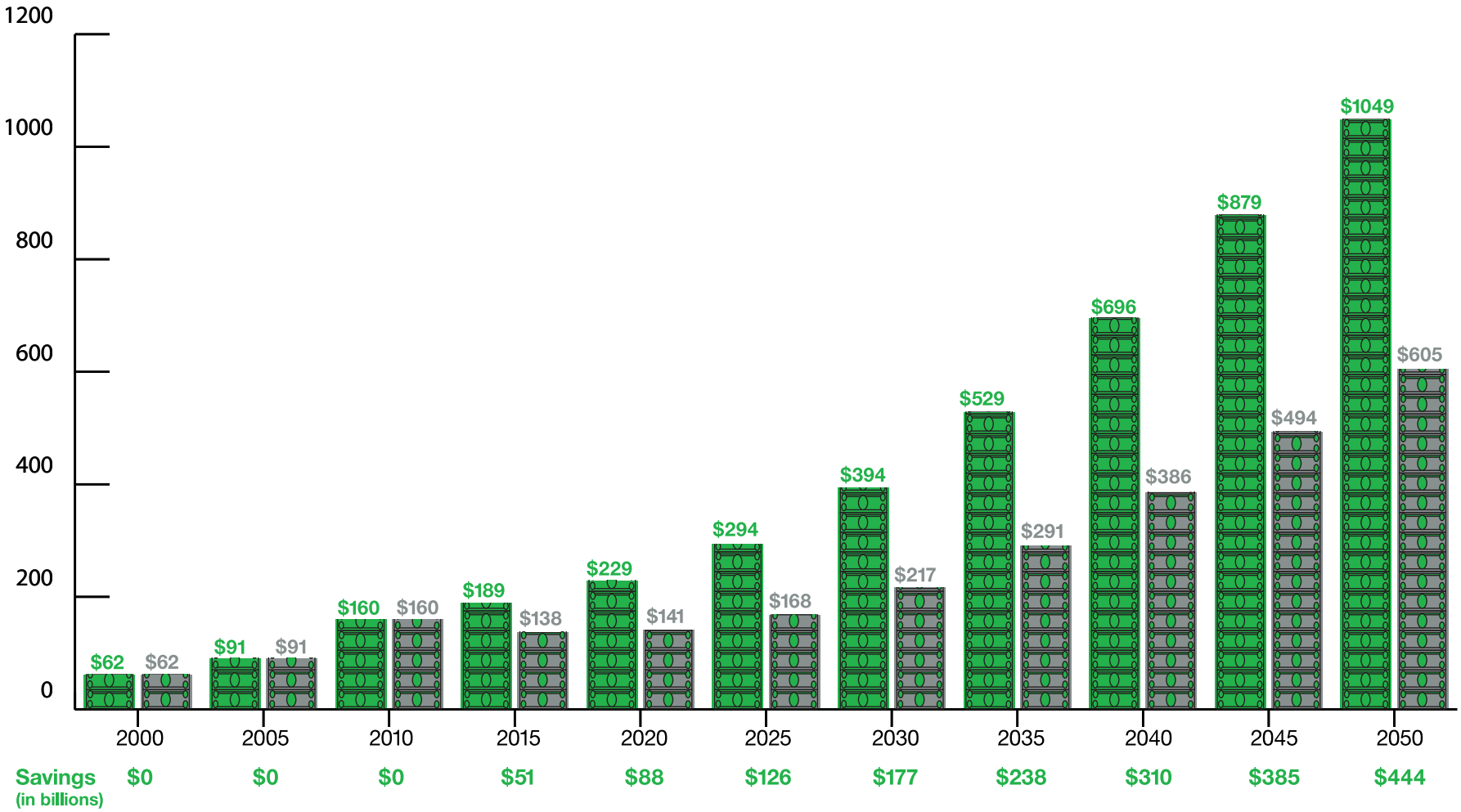


Savings (in billions)	$0	$0	$0	$10	$17	$23	$31	$41	$52	$62	$70

Medicaid Spending for Nursing Home Care for People with Alzheimer's (in billions)

- Baseline Estimates
- Delayed Onset and Slowed Progression

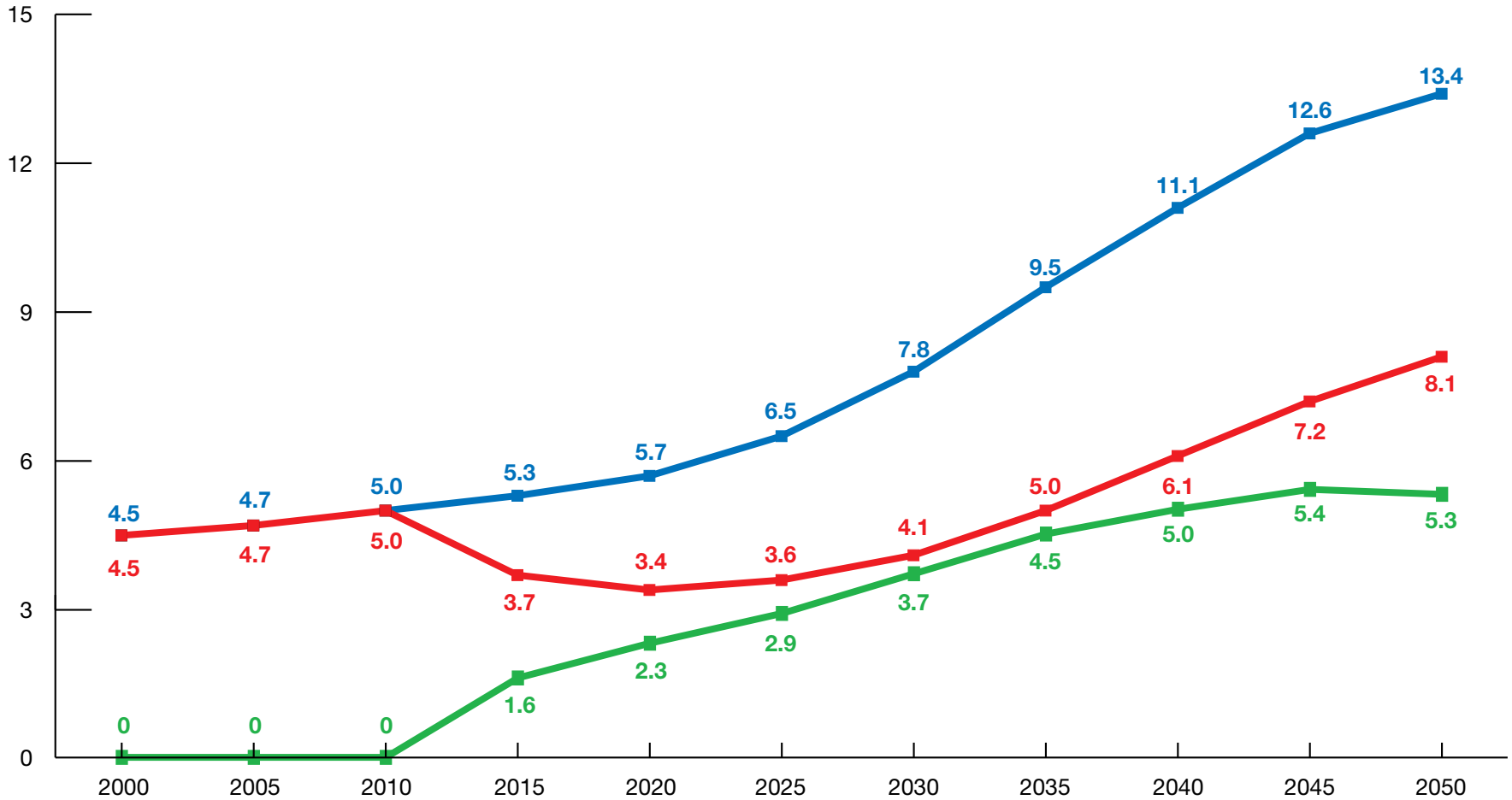
Medicare Spending for People with Alzheimer's Disease
Using Current Projections vs. Projections with Delayed Onset and Slowed Progression



Medicare Spending for People with Alzheimer's (in billions)

- Baseline Estimates
- Delayed Onset and Slowed Progression

Number of People with Alzheimer's Disease
Using Current Projections vs. Projections with Delayed Onset and Slowed Progression



Change (%)	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
	0	0	0	-30%	-40%	-45%	-47%	-47%	-45%	-43%	-40%

Number of People with Alzheimer's (in millions)

- Baseline Estimates
- Delayed Onset & Slowed Progression
- Difference between Current and Delayed