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THE LIFETIME BURDEN OF CHRONIC DISEASE AMONG THE ELDERLY

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Abstract

The high costs of treating chronic diseases suggest that reducing their prevalence would dramatically improve Medicare's financial stability. In this paper, we examine the impact of selected chronic diseases on the distribution of health care expenditures and the variation in spending over the course of disease. We also use a microsimulation model to estimate the impact of these conditions on life expectancy and health care spending from age 65 to death. We find that a 65-year-old with a serious chronic illness spends \$1,000 to \$2,000 more per year in health care services than a similar adult without the condition. However, cumulative Medicare payments are only modestly higher for the chronically ill due to their shorter life expectancy. While reducing the prevalence of chronic disease at age 65 is a worthy goal, it will have only modest effects on Medicare spending.

INTRODUCTION

Concerns over the solvency of the Medicare program have focused attention on the medical expenses of elderly Americans with serious chronic conditions. Medicare spending is highly skewed — about 10 percent of Medicare beneficiaries, almost all chronically ill, account for three-fourths of program outlays each year.¹ Per capita medical expenditures are three to 10 times higher for older adults reporting one or more chronic conditions than for those with none.² Beneficiaries who have been treated for such conditions as heart attacks, cancer, or diabetes in one year have above average expenditures in future years as well.³ Thus from many perspectives, any attempt to control Medicare costs must address the demand for medical care among this subset of beneficiaries.

The high annual costs associated with many chronic illnesses suggest that reducing the prevalence of these conditions might lower lifetime health care spending. Yet because healthier individuals live longer, cumulative Medicare spending may be largely invariant to

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beneficiaries' general health status at age 65 or 70.⁴ Initial assessments of disease management programs tell a similar story. Better coordination and management of chronically ill patients improves quality of care, but does not reduce overall treatment costs.⁵

In this paper, we use a microsimulation model to examine how seven of the most common chronic illnesses among the elderly affect average life expectancy and health care spending from age 65 to death. For each condition, we examine health care spending by stage of disease, the distribution of medical expenditures and the impact on Medicare and Medicare beneficiaries. For example, what are the lifetime costs to Medicare and to Medicare beneficiaries of diabetes or cancer at age 65? How do costs vary by stage of disease and by years after diagnosis? Understanding the burden of specific chronic diseases and the persistence of high spending in the elderly can have broad implications in designing appropriate insurance coverage, risk-adjusting payments to health plans and identifying the economic consequences of screening and prevention.

STUDY DATA

We use data compiled for the Future Elderly Project that links extended Medicare claims (1991–1999) to each respondent in the Medicare Current Beneficiary Survey (MCBS) from 1992 to 1999. The MCBS is a nationally representative sample of the Medicare population. It was initially designed as a fixed panel with no predetermined limit on how long sample members would be followed. However, due to attrition, the MCBS moved to a rotating panel beginning in 1994. Each fall, approximately one-third of the sample is retired and a new cohort is included to meet a target sample size of approximately 12,000 persons. The MCBS asks about chronic conditions, utilization of health care services, medical care expenditures, and health insurance coverage. The survey also asks respondents about limitations in their activities of daily living (ADLs). Reimbursements in the MCBS are categorized into nine different service groups, such as inpatient care, ambulatory services, outpatient prescription drugs, home health, and institutional care, and include services not typically covered by Medicare. The MCBS includes sample weights which reflect the probabilities of selection, over-sampling, and non-response.

MCBS data were linked to historical Medicare claims to track medical care utilization and costs over an extended period of time. The data include up to nine years of claims data for persons age 65 or older in 1991, where the actual length of the panel depends on survival. Medicare claims data include use and cost information on inpatient hospitalizations, outpatient hospital care, physician services, home health care, durable medical equipment, skilled nursing home services, hospice care, and other medical services.

Information about chronic conditions was obtained in two ways. MCBS participants were asked at each interview if they had ever been diagnosed with specific conditions (lifetime prevalence). We also used ICD-9 diagnostic codes from the Medicare claims to identify beneficiaries who received treatment for each condition during the year (treated prevalence). For most conditions, we used a single diagnosis to classify a patient. However, we required two codes for several conditions in case “rule-out” diagnoses were recorded on the claims.⁶

STUDY SAMPLE

The study sample includes 28,482 Medicare beneficiaries and 73,260 person years of data. We excluded years in which the Medicare beneficiaries were less than age 65 or enrolled in Medicare HMOs. We also excluded beneficiaries residing in a facility at age 65 during any point in the year.⁷ We chose seven high prevalence and/or high cost conditions that were continuously asked in the MCBS survey. These include hypertension, diabetes, cancer (excluding skin), chronic obstructive pulmonary disease (COPD), acute myocardial infarction (AMI), coronary heart disease (CHD), and stroke. Our definition of cancer includes lung, breast, prostate, colon, uterine, throat, bladder, kidney and brain cancer. Chronic obstructive pulmonary disease is a category of respiratory illness that includes chronic bronchitis, emphysema and some forms of asthma.

We examined resource use by three, mutually-exclusive disease stages: incident, maintenance, and terminal. We identified a terminal year based on the date of death recorded on the claims. For non-terminal years, we defined an incident year of treatment based on a primary diagnosis for the condition in year (t) and the absence of a related diagnosis in prior years. All other years were classified as maintenance years.

FUTURE ELDERLY MODEL

To simulate the consequences of having each chronic disease at age 65, we used the Future Elderly Model (FEM), a microsimulation that tracks elderly Medicare beneficiaries over time to project their health, functional status, and health care expenses over their remaining lifetime. We focus on the elderly because they incur a large fraction of total health care costs and their expenses are primarily borne by Medicare and Medicaid.

We simulated health transitions by first predicting each individual's probability of dying, getting a new health condition, or achieving a new functional status. We then drew a random number to determine the simulated outcome. Our simulation yielded for each individual in the age cohort a complete lifetime profile of medical costs, disease history, and age at death. More specifically, we predicted annual life expectancy by estimating a set of proportional hazard models. The hazard of getting a disease and dying depends on patient demographics (gender, education, race, ethnicity, education), risk factors (obesity, smoking history), and other health conditions. We treated all health states as absorbing, i.e. once an individual got an illness it was permanent, and modeled transitions into each condition. For instance, for a person age 65 in 1992, we predicted his or her probability of death and their probabilities of developing selected disease conditions at age 66. We then used a random draw to determine whether or not a person had any of these conditions in 1993, controlling for their demographic characteristics and risk factors. The process was repeated to obtain a complete lifetime profile of medical costs, disease history, and age at death for each person in the sample. We then simulated disease prevalence and costs for a representative cohort of 65-year-olds.

For medical expenditures, we estimated average annual Medicare expenditures and total health care expenditures paid by the beneficiary and all third-party payers. Lifetime

expenditures are the sum of expenditures over each individual's simulated lifetime. This follows the approach of Lubitz and colleagues (2003).⁸ Expenditures were based on pooled weighted least squares regressions with total Medicare reimbursement and total healthcare reimbursement as the dependent variables, and patient demographics, risk factors, disease conditions and ADLs as the independent variables. All costs are in 1999 dollars and future costs are discounted at a 3 percent rate. (More detail on the FEM is contained in the Technical Appendix.)

We then used the simulated cohort of 65-year-olds, and their subsequent spending and life expectancy, to estimate the independent effects of each chronic disease from age 65 to death. We regressed the simulated outcomes (life years, total costs, Medicare costs) on patient characteristics and their disease conditions at age 65. We used a Generalized Linear Model with a logarithmic link function rather than OLS, but our results are largely insensitive to this choice.

STUDY RESULTS

Lifetime prevalence rates at age 65 are shown in Exhibit 1, based on participant responses to ever being told by a physician they had a specific condition. We also report prevalence rates based on ICD-9 diagnostic codes that capture treatment prevalence at age 65. More than 45 percent of 65-year-olds were diagnosed with hypertension; 14.6 percent with diabetes; and 13 percent with cancer and COPD. More than 10 percent reported having had a heart attack or diagnosed with coronary heart disease. Treated prevalence rates were considerably lower, but remained high in absolute terms. For example, nearly 23 percent of 65-year-olds were treated for hypertension in a year; 5 percent were treated for cancer; and 4 percent for stroke. Lifetime prevalence rates of AMI and some cancers are substantially higher than their (annual) treatment prevalence. This is due to the acute nature of these conditions. Many individuals who survive a heart attack before age 65 do not require further medical treatment for the condition. In contrast, treatment prevalence of diabetes, which is generally considered a permanent condition that requires ongoing treatment, is about two-thirds the lifetime rate.

A large fraction of older adults with chronic diseases have multiple chronic conditions, as well as some type of activity limitation. Our data indicate that only a minority of 65-year-olds are free of comorbidity. Only 20 percent of 65-year-olds with hypertension or cancer are free of comorbidities and physical limitations, and the fraction falls below 5% for patients with coronary heart disease and stroke. The most common comorbid conditions among the elderly are hypertension and osteoarthritis. About two-thirds of 65-year-olds with a history of AMI report having hypertension, 53% have osteoarthritis, and 52% have heart disease. Among those with hypertension at age 65, more than 20% report having diabetes (not shown).

The impact of a chronic illness on the demand for health care services varies considerably by condition as well as across patients with the same condition (Exhibit 2). A typical Medicare beneficiary age 65 or older with hypertension spends about \$9,500 in total medical expenses in the incident year, and expenses fall by about 10 percent in subsequent, non-

terminal years. The pattern is quite different for cancer, stroke, and coronary heart disease. An average beneficiary with one of these conditions spends about twice as much as a hypertensive in the incident year (\$17,000 to \$19,000), but their costs decline 40 to 50 percent in subsequent years (among survivors). The reduction in health care spending following an incident AMI is even more dramatic. Average spending in the incident year exceeds \$25,000 per elderly survivor, but declines by 60 percent in subsequent years.

Recent work has devoted considerable attention to the health care costs of decedents, as well as the fraction of lifetime costs that occur in the final year of life. We find that average health care spending in the terminal (calendar) year is relatively insensitive to disease condition. Average health care expenses in the last year of life average \$25,000 to \$30,000 for all of our conditions, although we lack information on the cause of death.

Because medical spending in a given year is highly skewed, average expenditures can mask the burden of disease for some patients. The median level of spending is modest for most of the conditions, ranging from \$3,000 to \$10,000 annually. However, the top 10 percent of spenders incur annual expenses that are three to six times higher.

Prior research suggests that elderly beneficiaries with high medical expenditures in one year are likely to have higher than average expenditures in other years. Yet even among survivors, it is unusual to remain in the highest deciles of spending for more than a few years.⁹ Exhibit 3 presents average medical spending in the years before and after diagnosis, where the year of diagnosis is defined as having one or more medical claims for a condition in calendar year t and the absence of a claim in prior years. Health care costs in the years before diagnosis are modest and fairly similar across conditions. However, the spike in health expenditures in the incident year (t) varies considerably. Incident costs are substantially higher for acute, life-threatening conditions such as AMI and stroke than more progressive illnesses such as hypertension and diabetes. We also find that health care spending declines in the years after diagnosis, but remains above the pre-diagnosis level for all seven conditions.

Despite high medical costs associated with serious chronic illness, out-of-pocket expenses are moderate for the average person. Average annual out-of-pocket costs in an incident year range from about \$1,100 to \$1,875 and are fairly stable over time. While average costs are modest, some beneficiaries do face high medical expenses. Exhibit 4 presents out-of-pocket spending for the 90th percentile of beneficiaries. Expenses are fairly constant across disease conditions, particularly in the incident year. Ten percent of 65-year-olds spend \$2,200 or more out-of-pocket on health care costs in an incident year, with modestly higher costs for AMI patients. Moreover, for 6 of 7 conditions, out-of-pocket expenses three years later are largely unchanged. The lone exception is AMI, where out-of-pocket expenses fall substantially over time. This anomaly partly reflects our sampling frame, which excludes beneficiaries residing in a nursing homes or other facilities at age 65. If we include them, average out-of-pocket expenses rise dramatically for AMI patients. For example, AMI patients in the top decile of out-of-pocket costs pay \$14,000 or more in the incident year and their expenses tend to rise in subsequent years (not shown).

Estimates of average life expectancy and health care spending from age 65 to death are presented in exhibit 5, by health status and for all beneficiaries. A healthy beneficiary, defined as having no comorbidities or ADL's at age 65, lives an additional 21.7 years on average and incurs (discounted) health care expenses of about \$87,000 over his/her remaining lifetime. In comparison, a beneficiary with 3 or more comorbidities at age 65 will live 5.3 fewer years on average and spend an additional \$35,000 on medical care over his/her remaining lifetime.

The impact of specific chronic diseases on life expectancy and total medical costs is shown in Exhibit 6. For each condition, we present the average reduction in life expectancy and change in health care spending relative to a similar beneficiary without the condition. For example, having diabetes at age 65 lowers average life expectancy by 3.1 years (compared to a similar 65-year-old without the condition). Diabetes also increases health care costs by \$1,930 per year and \$13,032 cumulatively. Similarly, having a stroke by age 65 reduces average life expectancy by three years and increases annual treatment costs by \$1,389. However, cumulative costs differ by less than \$4,000 for those with and without a history of stroke at age 65, as the reduction in life expectancy almost completely offsets the increase in annual health care expenditures.

Chronic illness has a similar effect on Medicare payments, although the level of spending is slightly lower. Annual Medicare expenses increase by about \$500 to \$1,500 for persons with a serious chronic illness at age 65, while cumulative Medicare expenses increase by \$2,000 to \$12,000 across the seven chronic conditions.

One possible explanation why we observe only modest differences in cumulative spending by health status is that the incidence of many diseases increases with age. Exhibit 7 shows average incidence rates for each condition between ages 65–69 and 65–74. The annual incidence rate of hypertension is 6.7 percent from ages 65 to 69 and 6.9 percent per year between 65 and 74. Thus, nearly 30 percent of those without hypertension at age 65 will develop it by age 70.

DISCUSSION

Many chronic diseases affecting the elderly have considerable impact on life expectancy and health care costs. The expected reduction in average life expectancy ranges from 0.3 years for a 65-year-old with hypertension to more than three years for an average beneficiary with stroke or diabetes. While all of the conditions we studied increased annual health care costs, cumulative spending from age 65 to death was only modestly higher for the chronically ill. A person with coronary heart disease at age 65 will incur about \$12,000 more in total medical expenses over his remaining life years than in the absence of the condition. Our findings are generally consistent with recent work by Lubitz and colleagues (2003)¹⁰, who found that a 70-year-old in good (self-reported) health lives longer, but incurs similar medical costs over his remaining lifetime to a 70-year-old in poor health.

Why does the prevalence of a chronic condition at age 65 only have modest effects on cumulative spending? First, as shown in exhibit 7, many beneficiaries without a condition at

age 65 will develop it in subsequent years. Thus the cost-savings from better health at age 65 do not accrue indefinitely. Second, the costs incurred in the final year of life are substantial and largely invariant to disease condition or age. Extending life by several years reduces the high (discounted) costs incurred prior to death, but they cannot be avoided altogether under the current system of care.

Whether one views these findings as half-empty or half-full depends on their perspective. Findings in exhibit 5 indicate that being free of comorbidity and disability at age 65 lowers cumulative spending in old age by more than 16 percent relative to an “average” beneficiary. On the other hand, more policy-relevant comparisons presented in exhibit 6 show how life expectancy and medical spending would change if we reduced the prevalence of each chronic condition in the entering cohort of 65-year olds. In all cases, average life expectancy increases, but the cost savings are modest.

Our study also illustrates how cost trajectories vary across conditions. Acute, life-threatening illnesses such as a heart attack, stroke, or cancer cause a large spike in medical costs in the incident year largely due to use of inpatient care. While health care spending declines considerably in subsequent years (among survivors), it remains higher than before diagnosis. In contrast, more progressive illnesses such as hypertension, diabetes or indolent cancers lead to more modest cost increases in the incident year and remain near that level in subsequent, non-terminal years.

Our estimates of annual health care spending are not directly comparable to prior cost of illness studies that rely on cross-sectional data. Those studies typically estimate the costs of a specific condition over a year, holding constant other comorbidities that are likely to be affected by the underlying condition of interest. In contrast, the use of longitudinal data on a simulated cohort of 65-year-olds allows us to capture the stream of costs, both monetary and life years, associated with a condition, allowing each condition to influence the likelihood of developing other illnesses.

Our findings indicate that reducing the prevalence of chronic disease at age 65 will lead to only modest reductions in Medicare outlays. All seven chronic conditions we studied increased total Medicare reimbursements. Yet, the cost savings from averting these conditions at age 65 would yield cumulative savings of \$500 to \$12,000 per case, a small percentage of the total average spending from age 65 to death.¹¹

Reducing chronic illness in future elderly cohorts may not yield large savings to the Medicare program. Yet the combination of modest cost savings and improvements in longevity and quality of life suggest that early prevention and screening for some conditions may be effective public health measures. Reducing the prevalence of chronic disease in younger populations may not only lower prevalence rates at age 65, but can also reduce the likelihood of ever developing these conditions at older ages. These implications are particularly germane given the rising prevalence of disability and chronic disease in pre-Medicare populations. Between 1984 and 1996, disability rates of 40 to 49-year-olds rose by one percentage point, or almost 40%, and this increase coincided with substantial growth in rates of asthma and diabetes among the young.¹²

STUDY LIMITATIONS

Our study has several limitations. First, we excluded Medicare beneficiaries residing in a nursing home or other institutions at age 65 for any part of the year. Thus our estimates of life expectancy and costs per disease only apply to community-dwelling Medicare beneficiaries. However, our estimates capture all health care costs, including long-term care and Medicaid expenses, after age 65 for our simulated cohort. Second, we identified the chronically ill and defined disease stage from survey data and medical claims. The main concern with the use of claims data is false positives if “rule-out” diagnoses are recorded on the claims. We tried to minimize this error by requiring two or more medical claims for diabetes and hypertension. Further, drawing our sample of chronically ill from claims data may overstate the average severity of illness since patients with mild cases are less likely to receive treatment. Finally, our analyses focus exclusively on the elderly and ignore changes in quality of life. Reducing the prevalence of chronic disease in younger populations can lead to substantially larger improvements in health-adjusted life expectancy and reductions in health care spending.

CONCLUSION

Chronic diseases are responsible for more a majority of health care spending in the United States, and just five chronic diseases — heart disease, cancer, stroke, COPD, and diabetes — account for more than two-thirds of all deaths.¹³ Many of these conditions are often preventable and effective measures exist to prevent or delay much of the burden associated with serious chronic disease. While this is a goal worth pursuing, it will have only modest effects on the financial stability of the Medicare program.

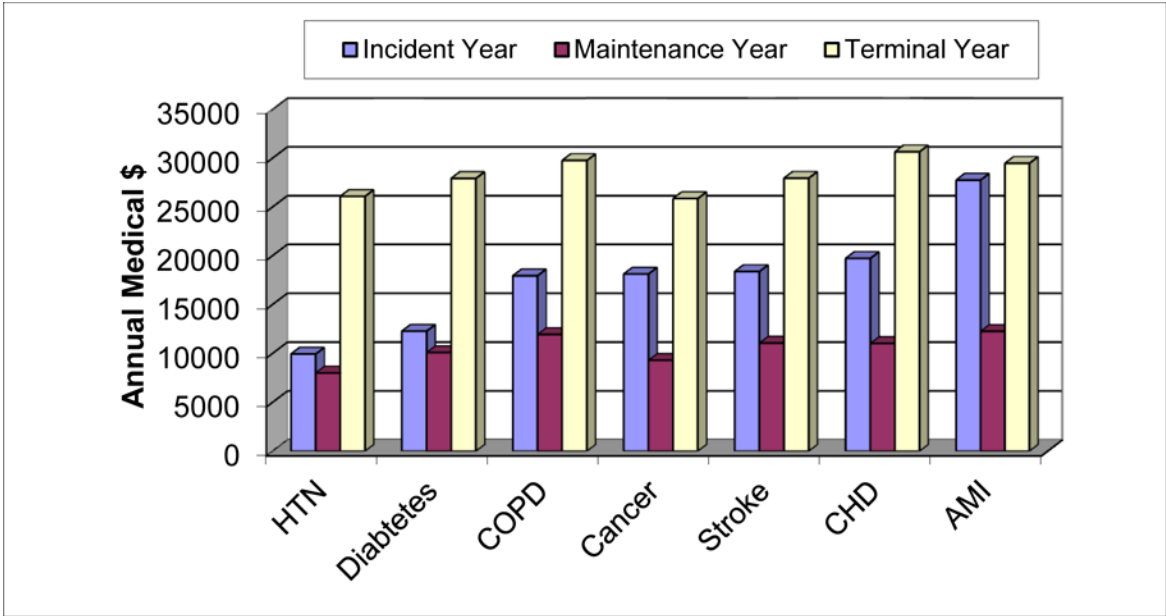
Acknowledgments

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NOTES

1. Berk ML and Monheit AC, “The Concentration of Health Expenditures: An Update,” *Health Affairs* 11, no. 4 (1992): 145–149. [PubMed: 1483633]
2. Fishman P et al., “Chronic Care Costs in Managed Care,” *Health Affairs* 16, no. 3 (1997): 239–247. [PubMed: 9141341]
3. Garber AM, MaCurdy TE, and McClellan MB, “Persistence of Medicare Expenditures Among Elderly Beneficiaries,” NBER Working Paper #6249 10 1997.
4. Lubitz J et al., “Health Life Expectancy, and Health Care Spending among Elderly,” *New England Journal of Medicine* 349, no. 11 (2003): 1048–1085. [PubMed: 12968089]
5. Fireman B, Bartlett J, and Selby J, “Can Disease Management Reduce Health Care Costs By Improving Quality?,” *Disease Management* 23, no. 6 (2004): 63–75.
6. Physicians may code for the associated signs or symptoms of a condition rather than the condition itself. To avoid misclassifying patients as having a condition based on these “rule-out” diagnoses, we required individuals to have two or more codes for diabetes and hypertension.

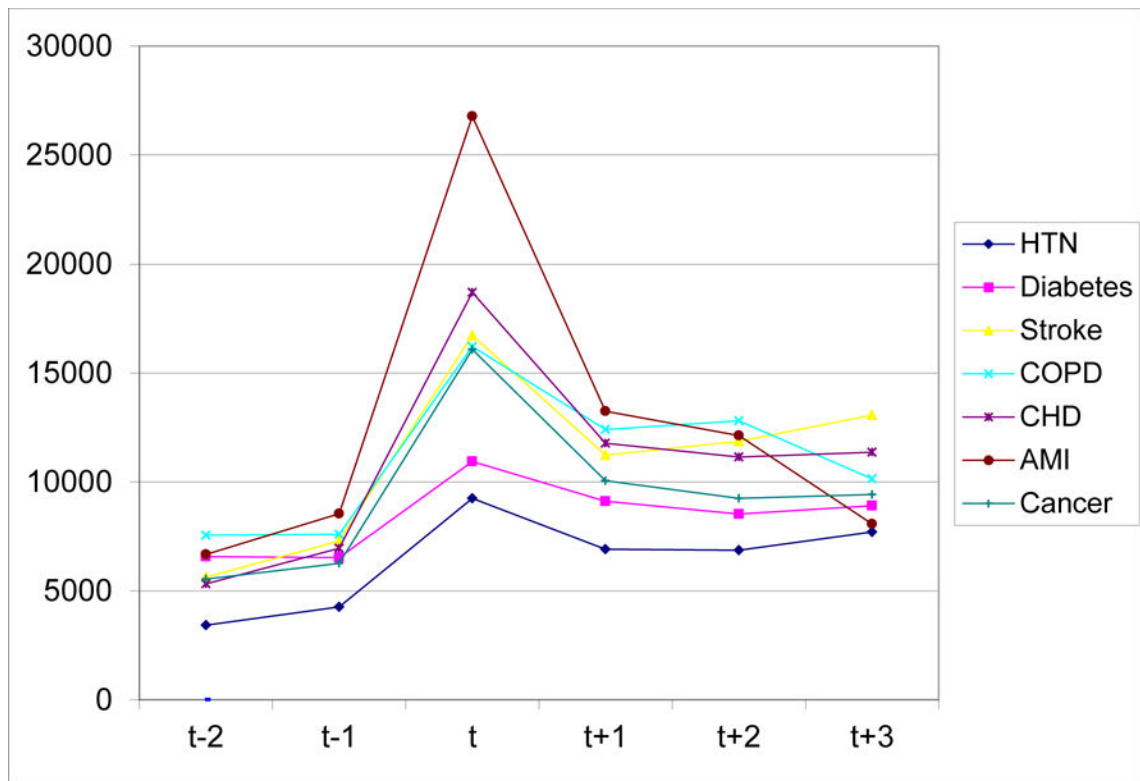
7. Starting in 1997, the MCBS changed the wording of some survey questions regarding disease prevalence and disability for beneficiaries residing in a facility. As result, self-reported prevalence and disability rates fell dramatically relative to 1992–1996. Because of this inconsistency, we excluded beneficiaries residing in a facility at age 65. However, for those living in the community at age 65 (i.e. the study sample), our estimates of medical expenditures capture all types of service use, include skilled nursing facilities.
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9. Garber et al. “Persistence of Medicare Expenditures Among Elderly Beneficiaries”
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13. Department of Health and Human Services, *The Burden of Chronic Diseases and their Risk Factors*, (Atlanta: CDC, 2004).



Source: Authors calculations based on MCBS and Medicare claims.

Notes: We categorize each disease into three mutually-exclusive stages. We identify a *terminal* year based on the date of death recorded in the claims data. For non-terminal years, an *incident* year of treatment is defined as having a medical claim for the condition in calendar year *t* and the absence of any claims for the condition in prior years. All years not categorized as *incident* or *terminal* are classified as *maintenance* years of treatment. Estimates are for the entire sample of beneficiaries age 65 and older and all expenditures are in 1999 dollars.

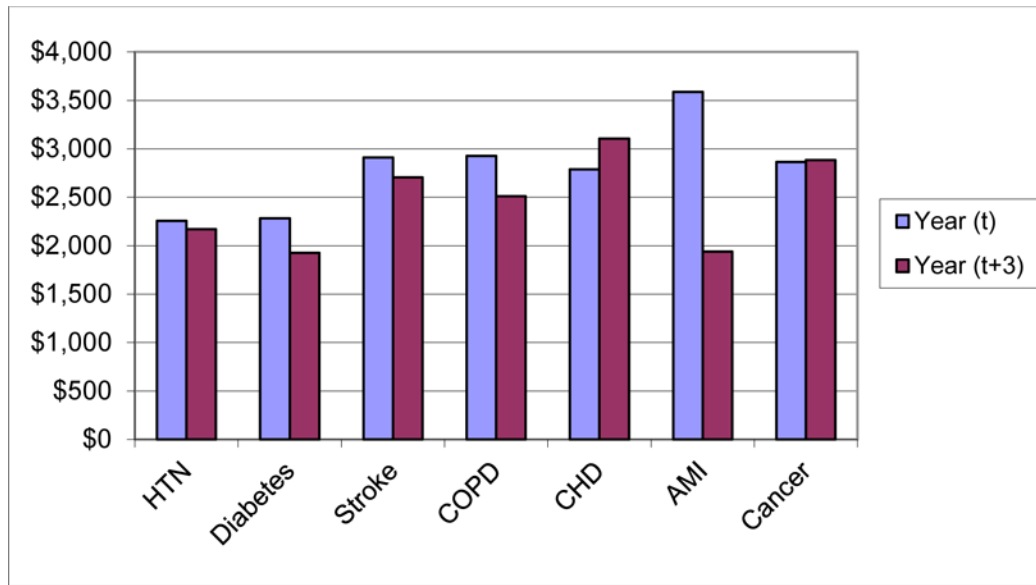
Exhibit 2.
Annual Medical Expenditures by Chronic Condition and Stage of Disease



Source: Authors estimates based on MCBS and Medicare claims.

Notes: Year t represents an incident year, which is defined as having a medical claim for the condition in calendar year (t) and the absence of any claims for that condition in prior years. Year ($t-2$) reflects total annual medical expenditures two calendar years before the year of diagnosis. Estimates are for the entire sample of beneficiaries age 65 and older and all expenditures are in 1999 dollars.

Exhibit 3.
Total Annual Medical Expenditures Pre- and Post-Diagnosis



Source: Authors estimates based on MCBS and Medicare claims.

Notes: Total annual out-of-pocket expenses for Medicare beneficiaries age 65 and older, excluding decedents. Year (t) represents out-of-pocket in an incident year. Year ($t+3$) reflects out-of-pocket expenditures three calendar years after the year of diagnosis. All expenditures are in 1999 dollars.

Exhibit 4.

90th Percentile of Out-of-Pocket Expenses in Year of Diagnosis (t) and Three Years Later ($t+3$)

Exhibit 1.

Prevalence of Chronic Disease and Comorbidity at Age 65

Disease Condition	Lifetime Prevalence (self-report)	Annual Treatment Prevalence (claims-based)	Number of Comorbid Conditions and Physical Limitations		
			0	1–2	3 or more
Hypertension	45.1	22.6	19.9	46.7	33.4
Diabetes	14.6	9.4	9.2	42.3	48.5
Cancer	13.4	4.8	19.9	44.4	35.7
COPD	13.1	2.3	11.4	36.9	51.7
Myocardial Infarction	10.9	1.8	5.3	27.9	66.8
Coronary Heart Disease	10.4	3.0	3.8	24.8	71.5
Stroke	7.5	3.9	2.7	30.9	66.4

Source: Authors estimates based on the MCBS and Medicare claims.

Notes: Lifetime prevalence is based on MCBS survey responses of beneficiaries age 65. Annual treatment prevalence is based on Medicare claims of 65-year-olds.

The number of comorbidities for each 65-year-old beneficiary is based on a count of MCBS survey responses to “Has a doctor ever told you had [condition]?” or having a claim for a chronic condition other than the primary chronic illness. The number of physical limitations (6) is based on MCBS responses to 6 activities of daily living, defined as having difficulty bathing, dressing, eating, getting out of bed/chair, using the toilet, and walking.

Exhibit 5.

Average Life Expectancy and Medical Expenditures for Persons Age 65

Health at Age 65	Life Expectancy (years)	Total Expenditures (1999\$)		Medicare Expenditures (1999\$)	
		Annual	Lifetime (\$1,000)	Annual	Lifetime (\$1,000)
0 Comorbidities	21.7	4,856	87.6	3,047	49.2
1–2 Comorbidities	20.4	5,855	100.3	3,760	58.2
3+ Comorbidities	16.4	9,996	123.2	6,961	78.5
All Beneficiaries	19.4	6,984	105.1	4,644	62.9

Source: Authors estimates based on MCBS and Medicare claims.

Notes: Estimates of life expectancy and medical expenditures are based on multivariate models for the simulated cohort of 65-year-olds. We calculate the number of comorbidities based on a count of self-reported chronic illnesses and physical limitations at age 65. Physical limitations (ADLs) are defined as having difficulty bathing, dressing, eating, getting out of bed/chair, using the toilet, and walking. Expenditures are in 1999 dollars, discounted at 3%.

Exhibit 6.

Changes in Average Life Expectancy and Medical Spending Associated with Selected Chronic Conditions at Age 65

	Reduction in Life Expectancy (years)	Change in Total Medical Spending (1999\$)	
		Annual	Lifetime
<i>Disease Condition at Age 65</i>			
Hypertension	0.3	686	9,648
Diabetes	3.1	1,930	13,032
Cancer	2.1	1,397	12,279
COPD	2.8	1,525	6,158
Myocardial Infarction	2.3	1,537	13,737
Coronary Heart Disease	0.6	843	11,691
Stroke	3.0	1,389	3,807

Source: Authors estimates based on MCBS and Medicare claims.

Notes: Estimates are based on multivariate models for the simulated cohort of 65-year-olds. The average reduction in life expectancy and change in health care spending are relative to a similar 65-year-old without the condition. For example, having diabetes at age 65 lowers average life expectancy by 3.1 years and increases annual health care costs by \$2,089 compared to a 65-year-old without the condition. Expenditures are in 1999 dollars, discounted at 3%.

Exhibit 7.

Annual Incidence Rates of Selected Conditions Between Ages 65 and 74.

	<u>Average Annual Incidence Rate</u>	
	<u>Ages 65–69</u>	<u>Ages 65–74</u>
<i>Without the disease condition at age 65</i>		
Hypertension	6.7	6.9
Diabetes	1.4	1.6
Cancer	1.9	2.2
COPD	1.3	1.5
Myocardial Infarction	1.3	1.5
Coronary Heart Disease	1.6	1.8
Stroke	1.1	1.2

Source: Authors estimates based on the 1992–1999 MCBS.

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