

By Kenneth E. Thorpe, Lydia L. Ogden, and Katya Galactionova

Chronic Conditions Account For Rise In Medicare Spending From 1987 To 2006

doi: 10.1377/hlthaff.2009.0474
HEALTH AFFAIRS 29,
NO. 4 (2010): -
©2010 Project HOPE—
The People-to-People Health
Foundation, Inc.

ABSTRACT Medicare beneficiaries' medical needs, and where beneficiaries undergo treatment, have changed dramatically over the past two decades. Twenty years ago, most spending growth was linked to intensive inpatient (hospital) services, chiefly for heart disease. Recently, much of the growth has been attributable to chronic conditions such as diabetes, arthritis, hypertension, and kidney disease. These conditions are chiefly treated not in hospitals but in outpatient settings and by patients at home with prescription drugs. Health reform must address changed health needs through evidence-based community prevention, care coordination, and support for patient self-management.

Kenneth E. Thorpe (kthorpe@sph.emory.edu) is the Robert W. Woodruff Professor and Chair of the Department of Health Policy and Management, Rollins School of Public Health, Emory University, in Atlanta, Georgia.

Lydia L. Ogden is on assignment from the Centers for Disease Control and Prevention and is currently chief of staff for the Center for Entitlement Reform and a doctoral candidate in health services research and health policy at the Rollins School of Public Health.

Katya Galactionova is a research analyst at the Department of Health Policy and Management, Rollins School of Public Health.

Slowing the rise in health spending is among the nation's top health policy priorities. Absent policy change, the Congressional Budget Office (CBO) estimates that Medicare spending will grow at an average of 7 percent each year from 2010 to 2018, rising to \$879 billion annually and 4 percent of gross domestic product (GDP). The rate of growth of Medicare spending over the long term is predicted to exceed the rate of growth in federal revenues and the overall economy.¹ As a result, much academic and political attention has focused on reforming Medicare as imperative for restraining spending increases.

Many Medicare reform proposals designed to slow the growth in spending would redirect costs from the government to others, such as enrollees and participating providers. The slowdown would be accomplished by reducing provider payments,² increasing the age of Medicare eligibility,³ implementing means testing for Medicare,⁴ restricting coverage as with the Part D "doughnut hole,"⁵ and increasing copayments and deductibles.² These approaches are unlikely to produce long-term reductions because they fail to address the key factors driving the rise in health care spending overall and in Medicare spending, particularly for chronic diseases.

Understanding these facts is essential to reaching the right policy solutions.

Common approaches to tracking trends in health spending analyze changes in use (who is seeking care and for what), payment source (who pays), and provider (who gets paid).⁶ Analyses also examine trends in the inputs used to treat patients, such as rising rates of diagnostic imaging⁷ and treatment duration and intensity, as well as changes in the definition of *treatable disease* and targeted patient populations for medication therapy.⁸

But cost-trend analysis by itself provides little insight into the ultimate causes of spending increases or the clinical characteristics of patients driving the rise in spending. And factors underlying the rise in treatment duration and intensity are not well understood across disease states.

We examined the changing clinical characteristics of Medicare patients that account for the rise in spending over the past twenty years, analyzing changes in the prevalence of treated disease, condition-specific spending, and sources of treatment in 1987, 1997, and 2006.

Much of the recent growth in spending among Medicare beneficiaries is attributable to rising spending on chronic conditions—specifically, diabetes and hypertension, both of which rose

considerably in treated prevalence over the past two decades. Channels of spending for the most prevalent conditions have changed, too, with more spending for care provided in outpatient settings and for prescription drug therapy and less for inpatient care.

Our analysis did not disaggregate the component increases in spending that result from factors such as expanded treatment guidelines or innovative medical technology and therapies. Instead, we focused on changes in disease prevalence, changes in spending by disease, and changes in treatment locations as three important aspects of overall health outlays. Understanding these disease and care trends is critical to ensuring that health reform policy levers address the real drivers of current and anticipated health spending.

Study Data And Methods

DATA We evaluated disease prevalence along with the level of and change in spending on the top ten most expensive conditions in the Medicare population in 1987, 1997, and 2006. Data were drawn from the Household Component of the 1987 National Medical Expenditure Survey (NMES) and the 1997 and 2006 Medical Expenditure Panel Survey (MEPS), consisting of a subset of Medicare beneficiaries with six months of coverage or more.⁹ These data sets are comparable in scope and survey instrument, which permits evaluation of many aspects of health care use, cost, sources of care, and financing in the United States.¹⁰ For consistency across survey methodologies, we used guidelines developed by the Agency for Healthcare Research and Quality (AHRQ) to adjust spending data in 1987 from charges to payments.^{11,12}

In these surveys, respondents are asked to describe the reason for a medical event, such as a physician visit, and to provide information on payments per event. Up to four diagnoses linked to a medical visit were listed in event files. When multiple unrelated conditions were specified, we allocated total event spending equally across all reported conditions to avoid double-counting expenditures.^{12,13} Because most events were associated with only one diagnosis, this method, on average, accurately captures the dynamics of condition-specific spending.¹⁴

METHODS We linked medical conditions with payments for physician care, outpatient care, inpatient care, emergency care, home health services, and prescription medication. Diagnoses linked to payments for these sources of care were used to estimate treated disease prevalence. It is important to note that increases in treated prevalence may result from the growth of dis-

ease, or rising incidence; improved diagnosis and treatment rates; changing clinical thresholds for treatment; or a combination of all three. Our analysis did not decompose these factors. We obtained annual condition-specific spending by aggregating per visit payments across diagnoses and sources of care for each respondent.

We identified the ten most expensive disease categories among Medicare beneficiaries in terms of total spending in 2006. These were heart conditions, trauma-related disorders, cancer, mental disorders, osteoarthritis and other nontraumatic joint disorders, hypertension, diabetes mellitus, chronic obstructive pulmonary disease, kidney disease, and hyperlipidemia.¹⁵ We estimated treated prevalence for these top-ten conditions in 1987, 1997, and 2006, along with inflation-adjusted¹⁶ total and condition-related payments for the population.

We analyzed how much each of the ten conditions contributed to the growth in total health care spending, reported as the percentage change in total annual spending. We evaluated sources of condition-specific growth by type of care, reported as a percentage of the total change in condition-related spending.

Study Results

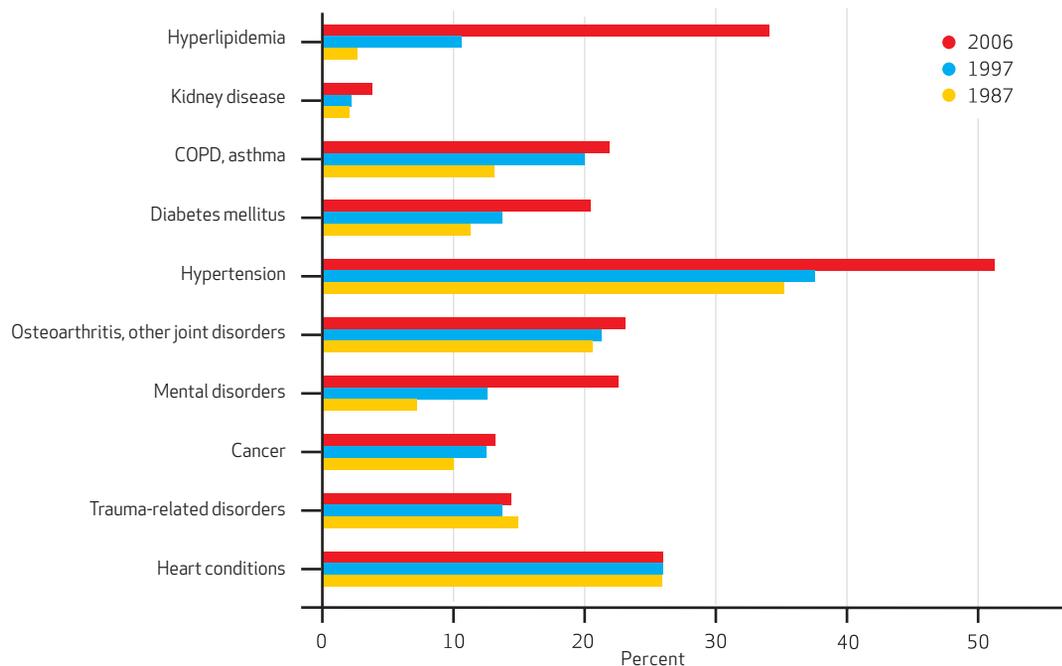
Exhibit 1 shows changes in treated disease prevalence for the top-ten medical conditions in 1987, 1997, and 2006. Exhibit 2 shows the percentage of spending growth attributable to the same conditions. The top-ten medical conditions accounted for approximately half of the inflation-adjusted rise in Medicare spending over the two-decade period—47 percent from 1987 to 1997 and 51 percent from 1997 to 2006 (Exhibit 1). However, condition-specific growth varied appreciably between years and across the twenty-year span. (Additional information, including confidence intervals for our estimates, sample sizes, and total population, is available in the Online Technical Appendix.)¹²

Exhibit 2 highlights two important findings. First, heart disease ranked first among the top-ten conditions in terms of attributable share of growth from 1987 to 1997, accounting for nearly 14 percent of the increase in Medicare spending. From 1997 to 2006, however, heart conditions fell to tenth, accounting for just 0.25 percent of spending growth. Across both periods, treated prevalence for heart disease was static.

A very different pattern of spending emerged between 1997 and 2006, as outlays for a constellation of medical conditions other than heart disease—diabetes, arthritis, hyperlipidemia, kidney disease, hypertension, and mental disorders—accounted for more than a third of the rise

EXHIBIT 1

Treated Prevalence Of The Top-Ten Health Conditions Among Medicare Beneficiaries, 1987, 1997, And 2006



SOURCE Household Component of the 1987 National Medical Expenditure Survey (NMES) and the 1997 and 2006 Medical Expenditure Panel Surveys (MEPS-HC). **NOTES** ED is emergency department. COPD is chronic obstructive pulmonary disease. Conditions were defined using Clinical Classification System (CCS) groupings aggregated into broader disease categories as described in the MEPS-HC documentation. Tabulations were evaluated using Stata SE version 9, adjusting for the complex survey design of the NMES and MEPS data. Payments for dental services, medical devices, and vision aids were not explicitly examined. Full data tables are available in the Online Technical Appendix (available by clicking the Online Technical Appendix link in the box to the right of the article online).

in Medicare spending.

TREATED PREVALENCE VERSUS SPENDING GROWTH

The treated prevalence of heart disease did not change across the periods examined. Thus, the 6 percent share of total growth in spending for this condition, comparing 1987 to 2006, appears to be driven by rising spending per treated case rather than an increase in actual, diagnosed, or treated disease prevalence. In contrast, from 1987 to 2006, both treated prevalence and spending for several other conditions—including hyperlipidemia, diabetes, hypertension, and mental disorders—rose together, although not equivalently.

In some cases, such as treatment to manage cholesterol and blood pressure, rising treated prevalence reflects, in part, lowered clinical thresholds for treatment over time.¹⁷ Our analysis did not parcel out the role of new treatments or how prevalence and novel interventions interact to increase spending. Technological advances in kidney transplantation and heart disease account for much of the early rise in spending for these conditions.

It is likely that increased spending on some conditions, such as diabetes, results chiefly from

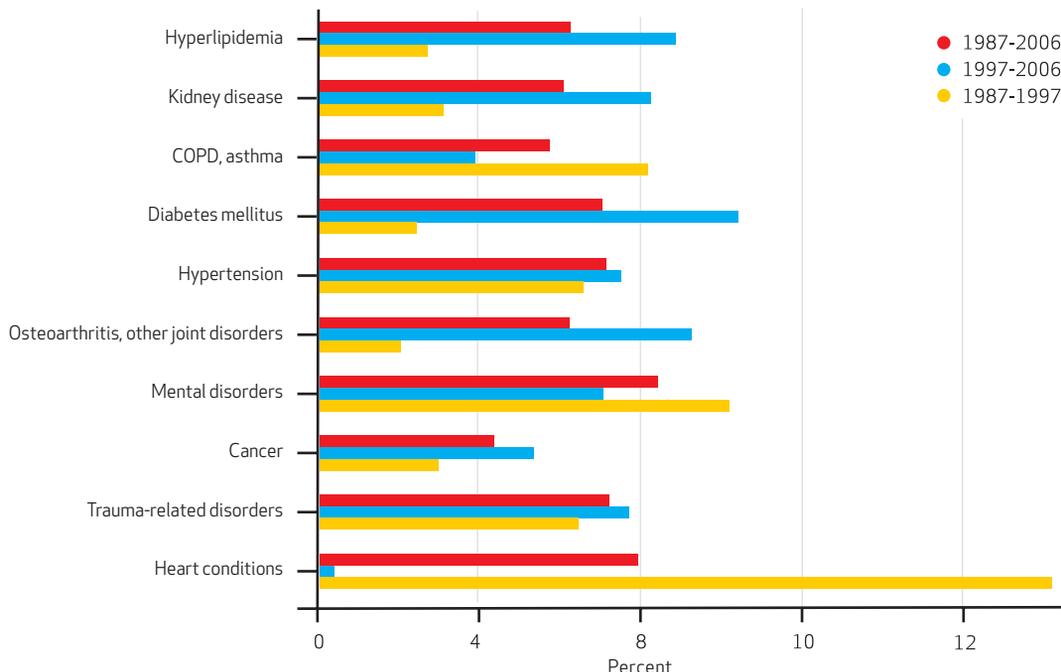
rising incidence of actual disease rather than increased screening and diagnosis.¹⁸ Surveillance data show that diagnosed diabetes prevalence has increased over the past two decades, rising from 5.1 percent of adults in 1988–1994 to 6.5 percent in 1999–2002. Over this period, the ratio of diagnosed to total (diagnosed and undiagnosed) diabetes remained at 62 percent. Together, these two facts indicate, at least for diabetes, that rising prevalence is primarily attributable to rising incidence, not better identification.¹⁹

SOURCES OF GROWTH Exhibit 3 summarizes overall changes in growth in condition-specific treatment costs by care types over the two decades by focusing on four conditions: heart disease, cancer, diabetes, and lung diseases, including chronic obstructive pulmonary disease (COPD) and asthma. The trend is a pronounced reduction in spending for in-hospital care. (Information on all of the top-ten conditions is presented in the Online Technical Appendix.)¹²

Again, the pattern of change in heart disease care was notable. From 1987 to 1997 more than half of the total change in spending associated

EXHIBIT 2

Contribution Of Key Medical Conditions To Inflation-Adjusted Health Care Spending Growth Among Medicare Beneficiaries, 1987-1997, 1997-2006, And 1987-2006



SOURCE Household Component of the 1987 National Medical Expenditure Survey (NMES) and the 1997 and 2006 Medical Expenditure Panel Surveys (MEPS-HC). **NOTES** Conditions were defined using Clinical Classification System (CCS) groupings aggregated into broader disease categories as described in MEPS-HC documentation. Condition-specific spending is imputed by distributing payments per visit across all reported conditions and accumulating per visit payments across service categories to come up with the annual totals. Spending from outpatient, inpatient, office-based, emergency care, prescription medication, and home health services constitutes total spending for a given disease category; spending on vision aids, dental care, other medical equipment, and independent home health provider care for which no condition links are available were omitted from condition-related spending, but were counted in total health care spending. Payments for dental services, medical devices, and vision aids were not explicitly examined. Full data tables are available in the Online Technical Appendix (available by clicking the Online Technical Appendix link in the box to the right of the article online).

with heart disease was driven by increased spending on inpatient services. About a quarter was explained by growth in physician care, and less than 12 percent was explained by growth in

prescription drug usage. In the more recent period, the growth in spending was primarily driven by very large increases in spending for prescription medications, physician visits, and

EXHIBIT 3

Changes In Sources Of Growth For Selected Condition-Specific Spending Among Medicare Beneficiaries, 1987-1997 (Period A) And 1997-2006 (Period B)

	Physician visits (%)		Outpatient visits (%)		Inpatient visits (%)		ED visits (%)		Home health visits (%)		Rx drugs (%)	
	A	B	A	B	A	B	A	B	A	B	A	B
Heart conditions	24.80	217.60	3.10	108.80	53.50	-764.70	8.60	82.40	-1.90	211.80	11.90	244.10
Cancer	75.70	102.20	71.20	19.60	-87.20	-20.70	-1.40	1.90	22.50	-2.80	19.10	-0.10
Diabetes	36.80	24.00	-9.60	3.50	-65.20	4.20	-0.30	0.80	40.50	6.10	97.70	61.40
COPD, asthma	8.60	19.70	5.50	-4.40	59.10	-14.30	1.80	11.10	9.10	16.00	15.80	71.90
Top-ten conditions	24.10	31.80	9.80	3.10	24.20	12.70	3.80	2.80	12.50	4.20	25.50	45.40

SOURCE Household Component of the 1987 National Medical Expenditure Survey (NMES) and the 1997 and 2006 Medical Expenditure Panel Surveys (MEPS-HC). **NOTES** Estimates in each cell capture changes in spending by medical service as a percentage of the total change in condition-related payments over the period. "Inpatient visits" include zero nights' stay. Payments for dental services, medical devices, and vision aids were not explicitly examined. ED is emergency department. COPD is chronic obstructive pulmonary disease.

home health care.

We observed a similar trend for spending on cancer treatments: Lower total outlays for inpatient services were outpaced by increased spending in other settings. Payments for physician care accounted for the largest share of growth for cancer-related spending from 1997 to 2006, a function of frequent office visits. Lung cancer patients, for example, average 8.6 office visits per month, at an average monthly cost of \$2,390.²⁰

LOCATIONS OF CARE Exhibit 4 demonstrates how condition-specific spending has changed by care locations for heart disease and cancer. (Information on all of the top-ten conditions is presented in the Online Technical Appendix.)¹² Changes in spending for inpatient care over the twenty-year period were significant.

Although inpatient care spending remains the largest category of spending by location, spending for inpatient care fell as a percentage of total spending. Physician office visits rose to 21 percent of overall spending and more than tripled as a percentage of top-ten condition spending. The percentage of spending for physician visits nearly doubled for heart disease and quadrupled for cancer.

Spending for physician office visits for other chronic conditions, such as diabetes, hyper-

lipidemia, and kidney disease, similarly rose as a percentage of spending. Prescription medications rose to a quarter of overall spending and 13 percent of spending on the top-ten conditions.

Discussion

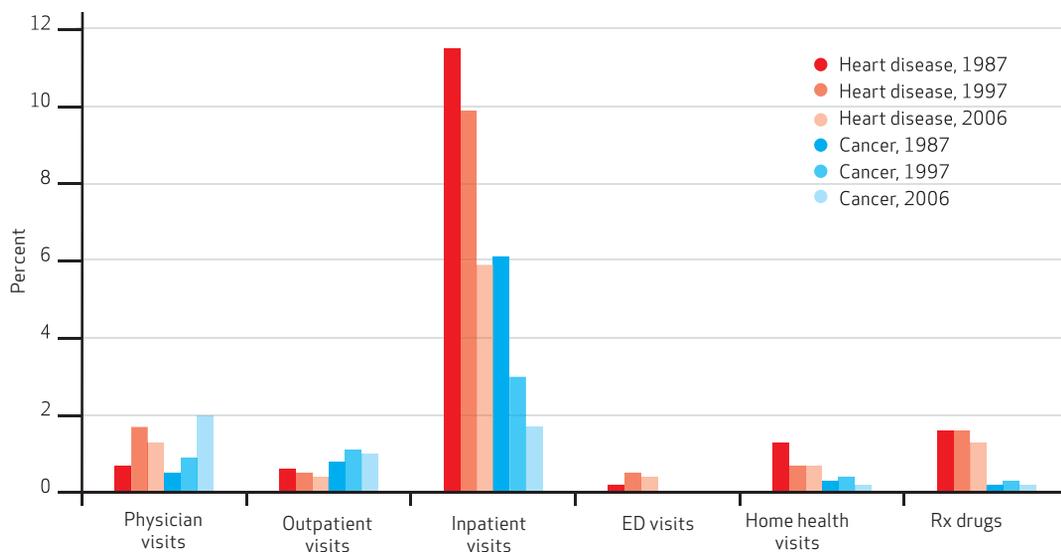
Increased spending on chronic diseases among Medicare beneficiaries is a key factor driving the overall growth in spending in the traditional Medicare program.²¹ Our results highlight important changes in the medical conditions accounting for the rise in spending among beneficiaries over time. The most notable changes were in spending on a handful of chronic conditions: diabetes, kidney disease, hyperlipidemia, hypertension, mental disorders, and arthritis.

STUDY LIMITATIONS Our analysis was limited by several factors. First, we compared point-in-time data for 1987, 1997, and 2006 rather than longitudinal data across the two decades. This could mask nontrivial year-to-year differences across the full period.

Second, because we did not examine conditions, care locations, or spending by individual beneficiaries, we were unable to determine how many beneficiaries are being treated serially for multiple conditions. We did not observe pay-

EXHIBIT 4

Changes In Distribution Of Heart Disease And Cancer Spending Across Care Categories Among Medicare Beneficiaries, 1987, 1997, And 2006



SOURCE Household Component of the 1987 National Medical Expenditure Survey (NMES) and the 1997 and 2006 Medical Expenditure Panel Surveys (MEPS-HC). **NOTES** Estimates represent condition-related payments by type of care as a percentage of total annual health care expenditures; for example, physician visits related to heart conditions accounted for 0.7 percent of total spending in 1987. Care location percentages by year (such as physician visits) do not add to 100 percent because payments for dental services, medical devices, and vision aids were not explicitly examined. Full data tables are available in the Online Technical Appendix (available by clicking the Online Technical Appendix link in the box to the right of the article online).

ments for specific conditions, but rather we imputed them based on the total event expenditures. Our method of allocating costs introduces some bias in estimates of condition-specific spending. However, given that most events are linked to only one diagnosis, we believe that the distribution of spending across chronic conditions is captured fairly accurately.

Third, the share of spending not linked to a specific diagnosis differed among the three years we examined. It is unclear from these point-in-time estimates what implications this might have for our analysis, but at the very least it likely underestimates condition-specific spending.

NEED FOR CHRONIC CARE The changing mix of medical conditions driving the rise in Medicare spending had consequential effects on the distribution of spending across providers, with sharp reductions in the share of growth attributable to inpatient hospital services. Spending on ambulatory care services and prescription drugs now accounts for most of the rising spending among Medicare patients.

Nearly all Medicare beneficiaries receive these services. In 2005, among community-dwelling beneficiaries, 96.4 percent had at least one outpatient health service (such as a doctor visit); 93.4 percent received prescription medicines; and 74.7 percent had at least one outpatient hospital visit.²² More than half of beneficiaries are treated for five or more chronic conditions each year,⁸ and a typical Medicare beneficiary sees two primary care physicians and five specialists working in four different practices.²³ System

fragmentation means that chronically ill patients receive episodic care from multiple providers who rarely coordinate the care they deliver. Because of this structural deficiency, patients with chronic illnesses receive only 56 percent of clinically recommended medical care.²⁴ That gap in care may explain a nontrivial portion of morbidity and excess mortality.²⁵

Over the past decade, chronic disease management programs have proliferated in the private sector and are common in the Medicaid and Medicare Advantage programs. But they are notably absent in traditional fee-for-service (FFS) Medicare—a crucial gap, given that 81 percent of Medicare beneficiaries are enrolled in FFS Medicare and account for about 79 percent of the program's overall health care spending.²⁶

POLICY IMPLICATIONS The U.S. health system remains predicated on providing acute, episodic care that is inadequate to address the altered patterns of disease now facing the American public. Our results highlight the need for prevention and care outside doctors' offices and hospitals designed to address the changing needs of patients at risk for or living with chronic disease and, often, multiple comorbidities. As Congress and the Obama administration, along with providers, insurers, and consumers, continue their efforts to reshape the U.S. health system, they must address these changed health needs through evidence-based preventive care in the community, care coordination, and support for patient self-management. ■

This research is part of a larger project funded by the Peter G. Peterson Foundation that analyzes factors responsible for the rise in federal

entitlement spending; links new approaches in financing, payment, and care delivery for achieving better value; and outlines options for policy makers.

The authors gratefully acknowledge the foundation's support. [Published online 18 February 2010.]

NOTES

- 1 Congressional Budget Office. The budget and economic outlook: fiscal years 2008 to 2018 [Internet]. Washington (DC): CBO; 2008 [cited 2010 Feb 9]. Available from: http://www.cbo.gov/ftpdocs/89xx/doc8917/01-23-2008_BudgetOutlook.pdf
- 2 White C. Why did Medicare spending growth slow down? *Health Aff (Millwood)*. 2008;27(3):793–802.
- 3 Johnson RW. Changing the age of Medicare eligibility: implications for older adults, employers, and the government. Washington (DC): Urban Institute; 2003.
- 4 Pauly MV. Means-testing in Medicare. *Health Aff (Millwood)*. 2004; 23:w4-546.
- 5 Neumann PJ, Kamae MS, Palmer JA. Medicare's national coverage decisions for technologies, 1999–2007. *Health Aff (Millwood)*. 2008;27(6): 1620–31.
- 6 See, for example, Heffler S, Smith S, Keehan S, Borger C, Clemens MK, Truffer C. U.S. health spending projections for 2004–2014. *Health Aff (Millwood)*. 2005;24:w5-74.
- 7 See, for example, Baker LC, Atlas SW, Afendulis CC. Expanded use of imaging technology and the challenge of measuring value. *Health Aff (Millwood)*. 2008;27(6):1467–78.
- 8 Thorpe KE, Howard DH. The rise in spending among Medicare beneficiaries: the role of chronic disease prevalence and changes in treatment intensity. *Health Aff (Millwood)*. 2006;25(5):w378–88.
- 9 A population largely over age sixty-five, with the exception of nonelderly disabled people, representing 9.3 percent, 10.9 percent, and 13.7 percent of observations in 1987, 1997, and 2006, respectively.
- 10 Stagnitti MN, Beauregard K, Solis A. Design, methods, and field results of the Medical Expenditure Panel Survey Medical Provider Component (MEPS MPC)—2006 calendar year data [Internet]. Methodology Report no. 23. Rockville (MD): Agency for Healthcare Research and Quality; 2008 [cited 2010 Feb 9]. Available from: http://www.meps.ahrq.gov/mepsweb/data_files/publications/mr23/mr23.pdf
- 11 Zuvekas SH, Cohen JW. A guide to comparing health care expenditures in the 1996 MEPS to the 1987 NMES. *Inquiry*. 2002;39(1):76–86.
- 12 For more information on the technical aspects of the methods we used to adjust the survey data, please see the Online Technical Appendix,

which can be accessed by clicking on the Online Technical Appendix link in the box to the right of the article online.

- 13** Within each type of service, a non-trivial number of person records/share of total spending had no diagnosis links, and the share of spending attributable to events without diagnosis varies greatly across sources of care and over time. For example, in 1987, spending on events without diagnosis amounted to 4.7 percent of total expenditures; in more recent data the share is slightly over 10 percent.
- 14** In 2006, about 80 percent of inpatient care events, 86 percent of emergency department visits, 74 percent of outpatient visits, 67 percent of physician visits, and 89 percent of prescription medication events were linked to only one Clinical Classification System (CCS) diagnosis.
- 15** The CCS codes are heart conditions (CCS 96, 97, 100–108), trauma-related disorders (CCS 225–236, 239, 240, 244), cancer (CCS 11–45), mental disorders (prior to 2006: CCS 65–75; 2006: CCS 650–663), osteoarthritis and other joint disorders (CCS 201–204), hypertension (CCS 98, 99), diabetes mellitus (CCS 49, 50), chronic obstructive pulmonary disease/asthma (CCS 127–134), kidney disease (CCS 156–158, 160, 161), and hyperlipidemia (CCS 53).
- 16** Nominal values were inflated to the 2006 level using the GDP deflator.
- 17** Dubois RW, Dean BB. Evolution of clinical practice guidelines: evidence supporting expanded use of medicines. *Disease Management*. 2006;9(4):210–23.
- 18** Geiss LS, Pan L, Cadwell B, Gregg EW, Benjamin SM, Engelgau MM. Changes in incidence of diabetes in U.S. adults, 1997–2003. *Am J Prev Med*. 2006;30(5):371–7.
- 19** Cowie CC, Rust KF, Byrd-Holt DD, Eberhardt MS, Flegal KM, Engelgau MM, et al. Prevalence of diabetes and impaired fasting glucose in adults in the U.S. population: National Health and Nutrition Examination Survey 1999–2002. *Diabetes Care*. 2006;29(6):1263–8.
- 20** Kutikova L, Bowman L, Chang S, Long SR, Obasaju C, Crown WH. The economic burden of lung cancer and the associated costs of treatment failure in the United States. *Lung Cancer*. 2005;50(2):143–54.
- 21** Riley GF. Long-term trends in the concentration of Medicare spending. *Health Aff (Millwood)*. 2007;26(3):808–16.
- 22** National Center for Health Statistics. Health, United States, 2008, with chartbook. Hyattsville (MD): NCHS; 2009.
- 23** Pham HH, Schrag D, O'Malley AS, Wu B, Bach PB. Care patterns in Medicare and their implications for pay for performance. *N Engl J Med*. 2007;356(11):1130–9.
- 24** McGlynn EA, Asch SM, Adams J, Keesey J, Hicks J, DeCristofaro A, et al. The quality of health care delivered to adults in the United States. *N Engl J Med*. 2003;348(26):2635–45.
- 25** Hoffman C, Schwartz K. Eroding access among nonelderly U.S. adults with chronic conditions: ten years of change. *Health Aff (Millwood)*. 2008;27(5):w340–8.
- 26** Orszag PR. The Medicare Advantage program: enrollment trends and budgetary effects [Internet]. Testimony before the U.S. Senate Committee on Finance. Washington (DC): Congressional Budget Office; 2007 Apr 11 [cited 2010 Feb 9]. Available from: <http://www.cbo.gov/ftpdocs/79xx/doc7994/04-11-MedicareAdvantage.pdf>