TRENDS

The Rising Prevalence Of Treated Disease: Effects On Private Health Insurance Spending

To contain spending, the U.S. health care system needs to address rising rates of treated disease instead of requiring higher cost sharing from consumers.

by Kenneth E. Thorpe, Curtis S. Florence, David H. Howard, and Peter Joski

ABSTRACT: In this paper we present a new framework for understanding the factors driving the growth in private health insurance spending. Our analysis estimates how much of the rise in spending is attributable to a rise in treated disease prevalence and spending per treated case. Our results reveal that the rise in treated disease prevalence, rather than the rise in spending per treated case, was the most important determinant of the growth in private insurance spending between 1987 and 2002. A rise in population risk factors and the introduction of new technologies underlie these trends.

BOTH EMPLOYERS AND workers have identified the high and rising costs of health care as a key economic issue facing the United States. The rising cost of health insurance has been associated with a reduction in the share of U.S. workers receiving employment-based coverage.[1] High health care costs have been a major source of labor strikes during the past two years.[2] Recently Rick Wagoner, chairman and chief executive officer (CEO) of General Motors, cited the cost of health care as a key factor reducing the international competitiveness of U.S. business.[3] In light of these factors, slowing the growth of health care spending has taken center stage in the national health policy debate.

Crafting effective policies for slowing the growth in health insurance premiums requires a clear understanding of why spending is rising. Previous analyses have focused on the sources of spending increases by tracking trends in where the dollars are spent (hospitals, drugs, physician services, and so on).[4] Although useful from a national accounting perspective, the data provide little insight into the factors underlying the growth in health care spending. Other attempts to understand the causes of spending growth have quantified the factors responsible for the rise in spending.[5] Most of this literature has concluded that the factors we can explicitly measure—population aging, the spread of insurance, rising income, and administrative costs—account for a small proportion of the overall rise. Instead, technology, which is captured in the residual, is thought to account for most of the growth.[6] Researchers have paid relatively little attention to increases in certain population risk factors (for example, the rise in obesity, changing

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environmental factors such as air pollution and ozone levels, stress, and exposure to aeroallergens) and the growing emphasis in medicine on the early detection of chronic conditions, both of which could lead to a rise in the prevalence of treated medical conditions.

Our analysis presents an alternative framework for understanding the factors responsible for the rise in private health insurance spending. Per capita health care spending is a function of treated disease prevalence and payments per treated case. We can attribute increases in spending growth to increases in either or both of these factors.[7] Payments per treated case are largely driven by technology, and as medical technology has grown more advanced, payments per treated case have risen. Treatment associated with heart disease and heart attacks represent one such example.

Changes in treated disease prevalence are caused by a rise in the population prevalence of disease, changes in clinical thresholds (and awareness) for treating and diagnosing disease, and new technologies that allow physicians to treat additional patients with a particular medical condition. A rise in total disease prevalence (both diagnosed and undiagnosed) is associated with changing population risk factors such as obesity. For instance, among adults ages 20–74, obesity prevalence increased from 14.5 percent (1976–1980) to 30.4 percent twenty years later (1999–2000). During the same period, total diabetes prevalence, which is clinically linked to obesity, increased 53 percent, and diagnosed (treated) diabetes prevalence increased 43 percent.[8] Other risk factors that influence population levels of disease include stress, which has been shown to be associated with several chronic health conditions, illness, and changes in physiological functioning; and aeroallergens (such as dust mites), air pollution, and smoking (both primary and secondhand), which have been shown to be associated with pulmonary conditions, respiratory diseases, and asthma in both children and adults.[9]

Treated disease prevalence may also rise if the clinical threshold for diagnosis and the awareness, detection, and treatment of disease change over time. For example, increased awareness about and recognition of depression among both patients and clinicians has led to a rise in treatment of depression even though total disease prevalence has been constant over time.[10] Treated prevalence of depression has doubled since 1987.[11] Finally, new technologies often allow physicians to treat more patients with a particular condition. The introduction of new pharmacological options for treating high blood pressure and cholesterol has led to substantial increases in cases treated, disproportionately so among obese patients.[12] Physicians may also be more likely to prescribe medications today at lower blood pressure and serum cholesterol thresholds, coinciding with revised guidelines defining what constitutes a "normal" blood pressure level.[13]

Our analysis is designed to identify how much of the rise in private health care spending is attributable to the rise in treated disease prevalence compared with higher spending per treated case. We also examine how changes in one risk factor—obesity—have increased treated disease prevalence over time.

Study Data And Methods

We estimated the level and change in health care spending among privately insured (those with private insurance at least six months during the year) adults ages 18–64 in 1987 and 2002. We examined spending on the top twenty medical conditions responsible for the greatest (inflation-adjusted) dollar growth in private health insurance spending.[14] Data for our study are from the 1987 National Medical Expenditure Survey (NMES) and the 2002 Medical Expenditure Panel Survey (MEPS).[15] The 1987 NMES surveyed 13,974 people ages 18–64 meeting our definition of "privately insured," while the 2002 MEPS sample included 14,091 people. Both surveys are nationally representative samples of the U.S. civilian noninstitutionalized population. The surveys include detailed information on self-reported medical conditions, monthly markers of health insurance coverage, patient demographics, spending, and use of service. We adjusted the 1987 spending data from charges to payments

using methods developed by the Agency for Healthcare Research and Quality (AHRQ).[16]

Both surveys collect data on respondents' reports of their medical conditions for each medical event. The condition information comes from a specific question that asks respondents directly whether the visit was related to any specific health condition. These data were then subsequently professionally coded using the *International Classification of Diseases*, Ninth Revision (ICD-9). The ICD-9 codes were then collapsed into three-digit codes and grouped into 259 clinically relevant medical conditions using the Clinical Classification System (CCS) developed by AHRQ.[17]

We linked each self-reported medical encounter to one of the 259 CCS groups. Some medical events or visits may be associated with more than one condition. We addressed this issue by tabulating spending per event in the cases with more than one condition reported as well as total spending per event where one condition was reported. For example, we calculated total spending associated with heart disease (when it was the only condition reported) as well as heart disease and hypertension (when two conditions were reported). In the latter case, the ratio of the two spending totals (heart disease spending divided by heart disease and hypertension spending) was used to allocate costs when more than one condition was reported.

To estimate how much of the change in spending is linked to the rise in treated disease prevalence, we began by calculating the (inflation-adjusted) dollar change in spending for each condition between 1987 and 2002. We decomposed the change in spending into three categories: change attributable to a rise in treated medical conditions (treated disease prevalence), the rise in the cost per treated case, and population growth.[18]

To measure obesity's role in increasing private insurance spending, we estimated medical care spending attributable to overweight and obese adults in 1987 and 2002. We used these estimates to calculate the increase in private spending linked to increases in obesity levels. We based these calculations on a two-part regression model estimated on the 1987 and 2002 samples, in which total annual per capita spending was the dependent variable. For controls, we used weight (underweight, normal, overweight, obese categories), age (18–29, 30–39, 40–49, 50–64), smoking (current smoker), sex, region (East, Midwest, South, West), education, race and ethnicity (black, Hispanic), marital status, and income as a percentage of the federal poverty level (under 100 percent, 100–199 percent, 200–399 percent, and 400 percent or more).

For each person in the sample, we calculated predicted (retransformed to dollars) per capita spending by multiplying predicted values from the first and second stages. We then calculated hypothetical per capita spending levels if all adults in the sample were underweight, normal weight, overweight, or obese. These predictions allowed us to net out the impact of observable characteristics included in our model on per capita spending. Standard errors and 95 percent confidence intervals were calculated using 1,000 bootstrap replications.[19]

We calculated attributable spending as the dollar difference between predicted per capita spending for obese and normal-weight adults multiplied by the number of obese adults (weighted using the svymean command in STATA, version 8) and divided by total annual private health care spending. We used the same procedure for overweight adults in each year. We applied this percentage to total private spending to calculate the additional dollar spending linked to the higher use of services among overweight and obese adults.

Study Results

Between 1987 and 2002, inflation-adjusted per capita private health insurance spending increased nearly 60 percent, or 3.1 percent per year. Exhibit 1 presents the twenty medical conditions accounting for the largest portion of the rise in private health care spending during this period. In 1987 these conditions accounted for 42 percent of private insurance spending; by 2002, they accounted for 53 percent. The twenty conditions also accounted

EXHIBIT 1
The Rise In Treated Disease Prevalence And Its Impact On Private Insurance Spending, 1987–2002

	Treated prevalence per 100,000		Cost per treated case ($)			
Medical condition	**1987**	**2002**	**1987**	**2002**	**Percent contribution to total growth in spending, 1987–2002**	**Percent change in spending due to change in treated prevalence[a]**
Newborn and maternity care	3,406	2,940	773	3,950	8.1	–21
Cancer	2,710	3,666	3,081	3,999	6.4	61
Pulmonary conditions	9,294	17,699	507	639	6.3	81
Arthritis	4,573	7,640	701	1,282	6.1	60
Mental disorders	4,658	10,984	1,242	972	4.9	126
Hyperlipidemia	1,383	7,427	278	618	3.7	89
Hypertension	9,372	11,988	456	664	3.7	47
Lupus	4,177	6,535	470	868	3.5	55
Back problems	4,581	8,144	1,457	1,202	3.4	138
Upper gastrointestinal	2,618	7,042	854	769	3.0	107
Diabetes	2,420	3,972	1,293	1,551	3.0	79
Kidney problems	662	1,318	3,918	4,101	2.7	96
Infectious disease	5,858	5,793	268	726	2.5	–2
Heart disease	4,610	5,002	2,734	2,753	2.3	92
Skin disorders	6,695	9,144	344	471	2.0	58
Bronchitis	13,400	11,685	146	282	1.4	–36
Endocrine disorders	6,402	7,906	389	467	1.3	58.2
Other gastrointestinal diseases	1,280	2,461	664	848	1.2	81
Bone disorders	620	2,030	555	700	1.0	91.7
Cerebrovascular disease	132	345	7,812	4,742	0.6	166.8

SOURCE: Tabulations from 1987 NMES and 2002 MEPS.

NOTE: The twenty conditions together contributed 66.8 percent to the growth in total spending.

[a] Ratio of the percentage of total spending growth linked to a rise in treated prevalence to the percentage linked to treated prevalence and cost per case combined.

for 67 percent of the growth in private health insurance spending during the period. We found similar results in a study of changes in spending levels for all age groups.[20] Spending on newborn and maternity care was the condition accounting for the largest increase in spending: more than 8 percent of total growth between 1987 and 2002.

Exhibit 1 also provides a clear answer to our first question. For sixteen of these conditions, the rise in treated disease prevalence, rather than a rise in the cost per treated case, accounted for more than half of the growth in health care spending.[21] This is particularly true for several of the conditions that are clinically linked to obesity. For instance, treated prevalence of diabetes increased 64 percent; as a result, nearly 80 percent of the rise in spending was attributable to a rise in treated prevalence. Similarly, the treated prevalence of hyperlipidemia increased fivefold, accounting for nearly 90 percent of the rise in spending for this condition.

■ **Role of rising obesity and treated disease prevalence.** The substantial rise in treated disease prevalence among privately insured adults is, in part, affected by two trends: the substantial rise in the share of privately insured adults classified as obese, and a rise in the share of obese patients receiving medical treatment. Exhibit 2 examines treated disease prevalence among medical conditions clinically linked to body mass index (BMI) in 1987 and 2002. We sorted the data into three groups: obese (BMI of 30 or more), overweight (BMI between 25 and 30) and normal-weight adults (BMI between 20 and 25).

Three important results are presented in

EXHIBIT 2
Treated Disease Prevalence By Body Mass Index (BMI) Category, 1987 And 2002

	Obese (%)		Overweight (%)		Normal (%)	
Medical condition	**1987**	**2002**	**1987**	**2002**	**1987**	**2002**
Arthritis	9.2[a]	12.0[b,c]	5.5[a]	7.5[b,c]	3.3	5.3[c]
Asthma	2.1[a]	5.3[b,c]	1.4	3.3[b,c]	0.9	2.3[c]
Back problems	6.2[a]	9.9[b,c]	5.0	8.9[b,c]	4.1	6.9[c]
Diabetes	7.3[a]	9.2[b,d]	3.0[a]	3.4[b]	1.1	1.3
Heart disease	7.1[a]	7.5[b]	5.7[a]	4.7	3.4	3.7
Hyperlipidemia	1.7[a]	11.3[b,c]	2.0[a]	9.0[c]	1.1	3.9[c]
Hypertension	24.3[a]	23.4[b]	12.9[a]	12.5[b]	4.6	4.9
Mental disorders	5.1	14.9[b,c]	4.1	9.6[c]	5.0	9.6[c]
Other pulmonary conditions	10.1	16.9[b,c]	7.9	14.4[c]	7.9	13.0[c]
Upper gastrointestinal	2.9	11.2[b,c]	3.0	7.3[b,c]	2.4	4.4[c]

SOURCE: Authors' analysis based on National Medical Expenditure Survey (NMES), 1987; and Medical Expenditure Panel Survey (MEPS), 2002.

NOTES: Obese is defined as BMI of 30 or more. Overweight is defined as BMI between 25 and 30. Normal is defined as BMI between 20 and 25.

[a] Statistically different from normal-weight category in 1987, $p < .05$.

[b] Significantly different from normal-weight category in 2002, $p < .05$.

[c] Significantly different within BMI category, 1987 to 2002, $p < .05$.

[d] Significantly different within BMI category, 1987 to 2002, $p < .10$.

Exhibit 2. First, the shares of obese people treated for seven of the top ten medical conditions were statistically greater than those for normal-weight people in 1987. By 2002, the share of obese adults treated was greater for all ten conditions. In addition, the share of overweight people treated for seven of these ten conditions was also higher in 2002 than for normal-weight people. Second, the share of obese people treated for hyperlipidemia, mental disorders, and upper gastrointestinal disorders each increased about ten percentage points. Similarly, the share of obese patients treated for diabetes increased two percentage points during the same period. The faster rise in treatment for diabetes, hypertension, and hyperlipidemia among obese relative to other adults is similar to results found elsewhere.[22] The findings may reflect a greater emphasis on preventive care for overweight and obese patients, more severely ill patients (that is, those with metabolic syndrome), broader treatment options, or all of the above. Third, treated disease prevalence increased in seven of the ten categories for normal-weight adults as well. Increases in the treated prevalence of mental disorders were uniformly large across all three weight groups.

Exhibit 3 presents evidence on the financial implications of the rise in treated disease prevalence and the number of medical conditions treated among privately insured obese adults.[23] To highlight the financial impact of these changes, we estimated the adjusted per capita health care spending among normal-weight, overweight, and obese adults with private health insurance in 1987 and 2002.[24]

In 1987, obese adults with private health insurance spent $272 more per year per person (about 18 percent more) on health care than did normal-weight adults. This raised private health care spending by 2 percent, or $3.6 billion in 1987. By 2002 the relative differences in medical care spending among overweight, obese, morbidly obese, and normal-weight adults had increased substantially. Spending among obese adults averaged $1,244 higher per person (about 56 percent more) than for normal-weight adults.[25] This raised private health spending by nearly 12 percent—more than $36 billion—in 2002.

Per capita private health insurance spending rose between 1987 and 2002 partly because of increases in the proportion of people who

EXHIBIT 3
Additional Health Care Spending Attributable To Obese People Ages 18–64 With Private Insurance, 1987 And 2002

	1987	2002
Number of adults	13,356,677	29,306,677
Percent of adults	12.61	23.83
Spending relative to normal-weight adults attributable to obesity		
Spending per capita (dollars)	272	1,244
Private insurance spending (billions of dollars)	3.6	36.5
Percent of private insurance spending	2.0	11.6

SOURCE: Tabulations derived from two-part regression model; see Note 23 in text.

were obese and partly because increases in the incremental spending associated with being above normal weight. During these fifteen years, the share of the population who was overweight increased approximately five percentage points, while the share of the population who was obese almost doubled. The share of private health care spending attributable to obesity rose from 2 percent to 11.6 percent (from $3.6 billion to $36.5 billion) from 1987 to 2002.

Discussion

Our results provide a clear indication that the rise in treated disease prevalence, and not increased cost per case, is the primary factor responsible for the growth in private health care spending. This rise is attributed to three trends. First is the continued rise in the share of privately insured adults classified as obese. For example, the rise in obesity prevalence is associated with a rise in diabetes (diagnosed and undiagnosed) prevalence, and with it treated disease prevalence. Our tabulations from the 1987 NMES and the 2002 MEPS indicate that as of 2002, nearly one-fourth of privately insured Americans ages 18–64 were classified as obese, compared with 12.6 percent in 1987. Other risk factors linked to chronic illness, such as stress among adults, have also been rising during the past decade.[26]

A related trend is the rise in the number of medical conditions treated among overweight and obese patients. This is likely associated with the high and rising number of adults with several risk factors (raised blood pressure, insulin resistance or glucose intolerance, and high triglycerides and cholesterol) known as metabolic syndrome. The American Heart Association (AHA) estimates that forty-seven million adults suffer from this condition.[27] New technologies interact with these trends, as new pharmaceuticals, medical devices, and supplies continue to come to market. These new drugs have targeted chronic illnesses such as asthma, diabetes, hypertension, hyperlipidemia, and cancers common among overweight and obese patients. Our tabulations of NMES and MEPS data found that in 2002, 15.5 percent of obese adults were treated for six or more medical conditions during the year, compared with 8.7 percent of obese adults in 1987. The largest increase in conditions treated occurred among the morbidly obese (BMI over 40). In 2002 a quarter of morbidly obese adults were treated for six or more conditions—an increase of eleven percentage points since 1987.

Second, treated disease prevalence has increased in response to changes in clinical treatment guidelines and standards for treating asymptomatic or mildly symptomatic cases. For example, our results highlight a rise in treatment for hyperlipidemia across all weight groups. This may reflect a change in the clinical decision to treat at lower serum cholesterol thresholds as well as new pharmacologic treatment options. The increased emphasis on early detection and screening for all diseases is associated with a rise in treated prevalence, although not the true clinical prev-

alence.

Finally, the rise in treated disease prevalence may reflect expanded opportunities to treat patients that were either not diagnosed or not treated fifteen years ago. The substantial rise in treated prevalence of mental disease reflects changes in awareness and diagnosis as well as new methods of treatment. Likewise, technological advances for hypertension, hyperlipidemia, and other disorders increase the benefit to patients of undergoing screening and maintaining contact with the health care system after diagnosis.

We believe that a key issue for future work is to identify the factors accounting for the rise in treated disease prevalence. One factor—rising population risk factors such as obesity that produce a rise in population disease prevalence—accounts for a portion of this trend. As a result of the rise in obesity and its associated costs, employers and privately insured families spent more than $36 billion (nearly 12 percent of private insurance spending) treating medical conditions clinically linked to being overweight and obese in 2002. Just fifteen years earlier, employers spent only $2 billion (in 2002 dollars) treating obese adults.

Much of the current cost containment debate has ignored the role of the rise in treated disease prevalence in driving the growth in private health care spending. Efforts by major health plans and larger employers to slow the growth in spending have focused on increasing consumer cost sharing, negotiating discounts with providers, and managing chronic illnesses better. These are largely approaches designed to control the cost per treated case. On the other hand, these interventions do little to control the growth in treated disease prevalence—the leading cause of the rise in private insurance spending. Other analysts have suggested that higher copayments and deductibles and broader use of medical savings accounts will slow the growth in health care spending. Although these approaches may prove useful, they also appear mismatched with respect to the key driver of private health care spending: the rise in treated disease prevalence.

Other aspects of the health care debate have focused on "value"—whether the additional spending for treating diabetes, heart attacks, and depression among other conditions yields substantial improvements in health. Outcomes have improved for many of these conditions, which suggests that the additional spending is worth it. Yet as our analysis indicates, the main driver of higher spending is not a rise in the cost per treated case, but rather the rise in the number of cases treated. As a result, efforts to slow the growth in private insurance spending must target the population risk factors along with other factors that have led to the rise in treated disease prevalence.

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NOTES

1. Each 10 percent increase in the price of health insurance is associated with approximately a 5 percent reduction in coverage. For a summary of these studies, see. S. Glied, D.K. Remler, and J.G. Zivin, "Inside the Sausage Factory: Improving Estimates of the Effects of Health Insurance Expansion Proposals," *Milbank Quarterly* 80, no. 4 (2002): 603–635.
2. See, for example, G. Raine, "Health Care Fight: Insurance at Center of Grocery Strikes," *San Francisco Chronicle*, 5 November 2003. Health care costs have been the major strike contention in each of the major supermarket strikes in California and Hawaii.
3. Rick Wagoner, chairman and CEO, General Motors Corporation, remarks to the Economic Club of Chicago, 10 February 2005. For a different view of the international role of high health care costs, see H.J. Aaron, "Should Public Policy Seek to Control the Growth of Health Care Spending?" *Health Affairs*, 8 January 2003, content.healthaffairs.org/cgi/content/abstract/hlthaff.w3.28 (23 May 2005). Aaron notes that rising employer payments on health care are paid by workers through lower growth in wages, other fringe benefits, or both. Moreover, if profits were lower, less foreign capital would flow to the United States, reducing the value of the dollar. A lower dollar would ultimately improve our trade balance, which runs counters to the view that U.S. business is increasingly less competitive internationally.
4. The yearly tabulations developed by the Depart-

ment of Health and Human Services are the best-known of these estimates. See, for example, Centers for Medicare and Medicaid Services, "National Health Expenditures Projections, 2003–2013," 17 September 2004, www.cms.hhs.gov/statistics/nhe/projections-2003/highlights.asp (23 May 2005).

5. An excellent example of this approach was developed in J.P. Newhouse, "An Iconoclastic View of Health Cost Containment," *Health Affairs* 12 Supp. (1993): 152–171.
6. J.P. Newhouse, "Medical Care Costs: How Much Welfare Loss?" *Journal of Economic Perspectives* 6, no. 3 (1992): 3–21; and V.R. Fuchs, "Economics, Values, and Health Care Reform," *American Economic Review* 86, no. 1 (1996): 1–24. Improvements in technology include new drugs, devices (drug-eluting stents), and procedures (coronary artery bypass graft).
7. The total increase in spending is the change in treated disease prevalence, changes in population (and characteristics of the population), and changes in payment per treated case. Our analysis examined all three factors, but we focused on the role that the rise in treated disease prevalence has assumed in accounting for the rise in private health insurance spending.
8. Trends in obesity prevalence and total diabetes prevalence are presented in E.W. Gregg et al., "Secular Trends in Cardiovascular Disease Risk Factors According to Body Mass Index in U.S. Adults," *Journal of the American Medical Association* 293, no. 15 (2005): 1868–1874. The two roles that technology can assume in increasing spending are outlined in D.M. Cutler and M. McClellan, "Is Technological Change in Medicine Worth It?" *Health Affairs* 20, no. 5 (2001): 11–29. They distinguish between treatment substitution (treating the established patient with newer and more expensive technologies) and treatment expansion (the ability to treat more patients with a given condition). Treatment expansion may also reflect changes in how physicians diagnose illness over time.
9. See, for example, S.G. Adams Jr. et al., "Stress, Depression, and Anxiety Predict Average Symptom Severity and Daily Symptom Fluctuation in Systemic Lupus Erythematosus," *Journal of Behavioral Medicine* 17, no. 5 (1994): 459–477; S.C. Ames et al., "A Prospective Study of the Impact of Stress on Quality of Life: An Investigation of Low-Income Individuals with Hypertension," *Annals of Behavioral Medicine* 23, no. 2 (2001): 112–119; and Institute of Medicine, *Clearing the Air, Asthma and Indoor Air Exposures* (Washington: National Academies Press, 2000).
10. M. Olfson et al., "National Trends in the Outpatient Treatment of Depression," *Journal of the American Medical Association* 287, no. 2 (2002): 203–209; and S. Glied, "Health Care Costs: On the Rise Again," *Journal of Economic Perspectives* 17, no. 2 (2003): 125–148.
11. Olfson, "National Trends."
12. Gregg et al., "Secular Trends."
13. In 2003 the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure developed revised blood pressure guidelines. Although high blood pressure remains defined at 140/90, a new "prehypertensive" category was added for those with blood pressure readings of 120/80. Prior to 2003 these blood pressure readings were viewed as normal. See National Heart, Lung, and Blood Institute, "The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7)," 2003, www.nhlbi.nih.gov/guidelines/hypertension/index.htm (23 May 2005).
14. This follows the work of K.E. Thorpe, C.S. Florence, and P. Joski, "Which Medical Conditions Account for the Rise in Health Care Spending?" *Health Affairs*, 25 August 2004, content.healthaffairs.org/cgi/content/abstract/hlthaff.w4.437 (23 May 2005). Following earlier work as well, we used the gross domestic product (GDP) deflator to adjust for economywide price changes. Data presented in the analysis are in 2002 dollars.
15. Agency for Healthcare Research and Quality, "Overview of the MEPS Web Site," www.ahrq.gov/data/mepsweb.htm (23 May 2005).
16. S.H. Zuvekas and J.W. Cohen, "A Guide to Comparing Health Care Expenditures in the 1996 MEPS to the 1987 NMES," *Inquiry* 39, no. 1 (2002): 76–86.
17. R. Weinick and N. Krauss, "Expenditures by Health Condition, 1987," Pub. no. 97-R094 (Rockville, Md.: AHRQ, September 1997); and N. Krauss and B. Kass, "Comparison of Household and Medical Provider Reports of Medical Conditions" (Paper presented at the Joint Statistical Meetings, Indianapolis, Indiana, August 2000).
18. We divided the change in spending, by condition, into the overall change in national health spending among the noninstitutionalized population. This was done by evaluating the change in spending that would be generated by the observed changes in one of these components, leaving the others constant. Cost in any year (1987 or 2002) is the product of cost per case in that year, treated prevalence in that year, and the population in that year. Change in expenditures is cost in 2002 less cost in 1987, which can be further decomposed as the sum of the following three products (where change in any category—cost per case, treated prevalence, and population—is

simply the difference between 2002 and 1987): 1. Change in cost per case; treated prevalence in 1987; population 1987. 2. Change in treated prevalence; cost per case 2000; population 1987. 3. Change in population; cost per case 2000; treated prevalence 2000. The results in Exhibit 1 are based on the ratio of the percentage of total spending growth linked to a rise in treated prevalence to the percentage linked to treated prevalence and cost per case. This approach holds population growth constant.

19. B. Efron, "Bootstrap Methods: Another Look at the Jackknife," *Annals of Statistics* 7, no. 1 (1979): 1–26. The two-part model is described in W.G. Manning and J. Mullahy, "Estimating Log Models: To Transform or Not to Transform?" *Journal of Health Economics* 20, no. 4 (2001): 461–494. Using the Cook-Weisberg and Park tests, we could not reject the null hypothesis of homoskedasticity in both years. The retransformation relied on the smearing estimator detailed in N. Duan, "Smearing Estimate: A Nonparametric Retransformation Method," *Journal of the American Statistical Association* 78, no. 383 (1983): 605–610.
20. Thorpe et al., "Which Medical Conditions?"
21. The last column in Exhibit 1 displays the change in spending attributable to cases treated divided by the change in spending attributable to cases treated plus spending per treated case. In some cases, the change in spending attributable to a rise in cases treated exceeds 100 percent if the change in cost per treated case declined over time.
22. Gregg et al., "Secular Trends."
23. These results are based on two-part regressions estimating overweight- and obesity-attributable increases in health care spending. For 1987, obese patients incurred $272 more per year in health care spending than normal-weight adults. By 2002, obese patients spent $1,244 more per person. Regression results are available from the authors upon request; send e-mail to kthorpe@sph.emory.edu.
24. These approaches for calculating health care spending attributable to overweight and obese adults is outlined in K.E. Thorpe et al., "The Impact of Obesity on Rising Medical Spending," *Health Affairs*, 20 October 2004, content.healthaffairs.org/cgi/content/abstract/hlthaff.w4.489 (23 May 2005). Regression results (not shown) are available upon request. In 2002, per capita spending for obese adults was $3,454 compared with $2,210 for normal-weight adults ($p < .05$). Per capita spending for overweight adults was $2,427.
25. The difference in spending between obese and normal-weight adults were significantly different ($p < .05$) in both 1987 and 2002.
26. "Self-Reported Frequent Mental Distress among Adults—United States, 1993–2001," *Morbidity and Mortality Weekly Report* 53, no. 41 (2004): 963–966.
27. See American Heart Association, "Metabolic Syndrome," www.americanheart.org/presenter.jhtml?identifier=4756 (23 May 2005).