

Federal Medical and Disability Program Costs Associated with Diabetes, 2005

Summary of Methods and Key Findings

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An abbreviated summary of the findings from this analysis (Table 2) is included in a report by the authors for the National Changing Diabetes Program entitled "An Opportunity for Federal Leadership in Changing Diabetes: A Study of Federal Spending on Diabetes." However, most of the text is original to this article. In addition, Tables 1 and 3 are entirely new, and Table 4 has been published only in a technical appendix.

STRUCTURED ABSTRACT

Objective: Diabetes is a growing threat to the nation's health that has serious and costly complications. This paper estimates the costs to the federal government that stem from treating diabetes, including (1) federally financed medical care costs and (2) SSI/SSDI disability payments.

Research Design and Methods: We estimated 2005 federal expenditures from national program and population data. Estimated medical costs reflect differences in federal spending on medical treatment for people with and without diabetes. SSI/SSDI disability payments reflect those whose primary cause of disability is diabetes or common diabetes-related complications.

Results: In 2005, the federal government spent \$79.7 billion in additional costs for medical care and disability costs to treat people with diabetes. This includes \$2.5 in disability payments associated with diabetes and \$77.2 billion in increased medical costs. Nearly 80 percent of the federal medical costs were in the Medicare program.

Conclusions: Federal costs related to diabetes will grow with projected increases in life expectancy and diabetes prevalence unless there are enhanced efforts to control blood glucose, reduce the risk of complications, and prevent the onset of diabetes.

Diabetes, particularly type 2 diabetes, is a serious and growing threat to the nation's health. Among people age 20 and older, seven percent have been diagnosed with diabetes, and another three percent have diabetes that is not yet medically diagnosed (National Center for Health Statistics 2006). Between 1980 and 2005, the share of all Americans with diabetes more than doubled, from 2.5 to 5.5 percent, with a particularly rapid increase over the past decade (Centers for Disease Control and Prevention [CDC] 2007a). People with diabetes are much more likely to experience adverse health outcomes (CDC 2007b), and it is the leading cause of new cases of blindness in adults age 20 to 74. Adults with diabetes are two to four times more likely to die of heart disease. Diabetes also accounts for 66 percent of nontraumatic lower-limb amputations and 44 percent of new cases of renal disease. All of these conditions lead to high economic costs, which are well documented (American Diabetes Association [ADA] 2003). Recent studies also suggest that the prevalence rate for complications among diabetics remains very high even after adjusting for other risk factors, thus contributing to costs substantially above what those without diabetes might contribute (American Association of Clinical Endocrinologists 2007).

New Contribution

This paper looks at the national economic implications of diabetes in a new way that complements existing estimates. We examine the specific costs to the taxpayer of treating diabetes and its complications, as reflected in its effects on federal program costs for medical care and disability. Given its rapid rate of growth, diabetes is likely to make increasing demands on an already strained federal budget. Hence, it is important to understand the implications of diabetes for federal medical care expenditures.

RESEARCH DESIGN AND METHODS

The discussion that follows covers our overall approach to estimating medical care costs and what the estimates actually tell us, our detailed approach to developing estimates for public

health programs that pay for diabetes care, and our approach to estimating federal disability costs associated with diabetes. Readers with less interest in detailed methods may want to skip the second section.

Overall Approach to Calculating Federal Medical Care Costs and Its Limitations

Approach. To the extent possible, we used aggregate program data to calculate the differences in per capita costs within federal health financing programs for people with versus people without diabetes (Hodgson 1983; Songer et al. 1998). To estimate aggregate spending, the cost differential of treatment for those with diabetes was multiplied by the estimated number of program enrollees with diabetes. Conceptually, we sought to make the following calculation:

- ([Average annual cost, people with diabetes] – [Average annual cost, people without diabetes])
 - multiplied by the
- [Estimated number of people covered by the program]
 - multiplied by the
- [Estimated prevalence of diabetes in the covered population])

Because demographic profiles, benefits, and other program features vary across federal programs that finance medical care, we developed separate estimates for five major health financing and delivery programs and for a few smaller programs. The major programs include Medicare, Medicaid, the Department of Defense (DOD) health programs, Veteran’s Health Administration programs, and the Federal Employees Health Benefit Program (FEHBP); and the smaller programs include the Indian Health Service, the State Children’s Health Insurance Program (SCHIP), and the health benefits provided to the Public Health Service Commissioned Corps. Because Medicaid and SCHIP are joint federal/state programs, we adjusted the estimated cost to capture only the federal share of spending.

Because we did not have access to person-level data within each program, we sought credible secondary sources for national program estimates of diabetes prevalence and per capita spending for those with and without diabetes. For programs with highly heterogeneous target populations (such as Medicaid), we sought data on prevalence and spending by key subgroup.

For the most part, program-specific prevalence and cost estimates from the literature are based on claims data. Because claims data reflect only *diagnosed* diabetes, they may understate the true prevalence of diabetes and the difference in costs for those with and without diabetes. However, a diagnosis is likely to have been made by the time serious complications and commensurate high costs arise, so the bias should be reduced. If we could not find per capita cost data specific to programs (in the FEHBP, for example), we sought estimates of aggregate program spending for medical care. While the source data for some estimates is stronger than for others, we judged that it was important to develop an estimate that included all major federal financing programs so that users could judge how changing assumptions might modify the overall estimates.

When program data were not available for 2005, we used the most recent data available and updated the information to 2005. To update prevalence and population, we used data for the most relevant population group from the National Health Interview Survey (NHIS) to calculate the exponential rate of growth from the year in which data were available up to 2005 and applied it to the relevant population.¹ To update health care spending, we used data from the National Health Accounts (issued by CMS) on per capita increases in national health spending over the

¹ These used crude, unadjusted estimates for various years from Appendix III, Table VII of the Series 10 statistical reports. The files can be accessed on the CDC website at www.cdc.gov/nchs/products/pubs/pubd/series/sr10/ser10.htm.

relevant time period (CMS 2005, accessed 2007). Both sets of data are established national sources widely used for purposes similar to ours.

Limitations. While our approach builds on methods first laid out by Rice (1966) and on the ADA's widely cited national estimates of diabetes costs (ADA 2003), the approach has its limitations. The main one is that the estimates show the additional federal costs that are incurred for treating people with diabetes (regardless of the reason for service use), which is not the same as the amount that would be saved if diabetes were eliminated. Including costs for care beyond diabetes makes a lot of sense, given clinical findings on the strong link between diabetes and the risk for conditions such as cardiovascular disease, end-stage renal disease (ESRD), and others. Because of this link, counting only the direct spending in diabetes care would greatly understate the overall federal costs to treat diabetes.

In an ideal world, the analysis here would be complemented by a more rigorous analysis of primary data to estimate how much of the additional federal spending we show as being associated with care for those with diabetes could be saved by eliminating or better controlling diabetes. Such a study would include not only a more refined accounting of costs that influence diabetes but also a policy analysis of how much of this cost could be realistically saved through appropriate intervention. However, we did not have access to the person-level data and resources that would support this form of analysis. In addition, there are challenging analytical issues, given the close relationship between diabetes and other co-occurring conditions, and an incomplete knowledge of the causal process that mediates this relationship. So while an analysis to address these concerns is beyond the scope of this study, the estimates here are program specific and employ subgroup analysis, where feasible, to create demographically similar subgroups with and without diabetes for purposes of cost comparison. While our estimates have their limitations, we believe they provide valuable insight into how diabetes influences federal

spending on medical care and disability, and that they will encourage others to do the additional research called for.

Details on both the data and the analyses behind each estimate are shown in Table 1 and reviewed below.

Details on Estimates of Medical Costs for Specific Programs

Medicare. The core data are based on published estimates for 2002 calculated from Medicare's 0.1 percent sample of fee-for-service claims, a database representative of all beneficiaries, including those with ESRD. Generated by the Medicare Payment Advisory Commission (MedPAC), the estimates were included in MedPAC's June 2004 *Report to Congress* (MedPAC 2004). Estimated mean monthly costs reported for people with diabetes (\$942 versus \$502 for all Medicare beneficiaries) were calculated for beneficiaries with certain diagnostic codes reported from two or more professional visits on separate dates. The 2002 prevalence was updated by using self-reported data on diabetes in the NHIS for people age 65 to 74. This increase was similar for those age 75 and older, so only one adjustment factor was used. While we would have liked to develop estimates separately for Medicare beneficiaries qualifying by virtue of disability (under 65) and the elderly in Medicare, the original source data on Medicare spending did not allow this refinement. We adjusted per capita costs between 2002 and 2005 by a factor (1.205) equal to the ratio of 2005 to 2002 Medicare Per Capita Cost (USPCC), an estimate CMS generates annually (CMS, accessed 2006). Although the source data are based on fee-for-service experience, we did not adjust for the effect of managed care. In 2005, only 12.7 percent of beneficiaries were in managed care, so the amount of error that could be introduced is relatively small (Gold 2005).

Table 1. Sources of Prevalence and Cost Data for Major Federal Medical Care Programs

Program	Population	Diabetes Prevalence	Per Capita Costs	Use of Subgroups in Estimating
Medicare	CMS program data	MedPAC estimates from 2002. Medicare claims data inflated to 2005 using NHIS-reported rate of change in national prevalence for those age 65-74 between 2002 and 2005.	MedPAC estimates from 2002 Medicare claims data on per capita costs for those with diabetes and all beneficiaries. Estimates calculated for those without diabetes. 2002 data inflated to 2005 using rate of change in USPPC over the period.	None—Best source of prevalence and spending data did not have a breakdown
Medicaid	CMS program data	Gilmer estimates from Medicaid Analytic eXtract (MAX) data from 45 states in 2001. Inflated to 2005 using NHIS rate of change in prevalence for Medicaid adults (TANF adults), children, and for 65+ (elderly individuals and those with disabilities).	Gilmer estimates of differences in per capita spending for those with diabetes versus those without from Medicaid claims data from 45 states in 2001. Within subgroup, per capita costs and average months of eligibility calculated for those with 6+ months versus <6 months eligibility to construct average monthly costs for use in annual calculations.	TANF children, TANF adults, people with disabilities, aged
FEHBP	OPM program data	NHIS 2005 estimates for those age 45-64 (active workers), 65-74 (annuitants), and 0-44 (dependents).	ADA estimates showing a 2.4 ratio nationally in costs for those with and without diabetes, applied to aggregate data on total FEHBP spending. Assumes the aggregate share of spending for those with diabetes is the same in 2005 as 2004.	Active workers, annuitants, dependents
TRICARE	DOD Report to Congress	2003 prevalence rates from DOD report inflated to 2005 using NHIS estimates of change over the period for those under age 65 and 65-74 in the period.	ADA estimates showing a 2.4 ratio in costs between those with and those without diabetes to aggregate data on program costs for those under age 65. For those 65+, calculate the same using the 2.1 ratio from the Medicare analysis.	Under 65, 65 and older
VA	VA Program Data	VA-reported 2005 prevalence used for final estimates.	2000 data in the <i>VA Health Care Atlas</i> on prevalence and health care spending for those with diabetes used to generate per capita costs. 2000 costs inflated to 2005 using ratio of national per capita health care spending from 2005 to 2000. Estimates exclude long-term care costs.	None—best source of prevalence and spending data did not have a breakdown

The estimates provided here pre-date the introduction of the Medicare prescription drug benefit in 2006. They therefore understate Medicare costs for all beneficiaries, including those with diabetes who probably use a disproportionate amount of prescription drugs. Although the addition of the drug benefit is partially offset by savings for those in Medicaid who are dually eligible, most Medicare beneficiaries are not dually eligible.

Medicaid. National data on Medicaid spending are limited because it is a joint federal-state program administered by the states, which have wide latitude with respect to modifying benefits and eligibility criteria. Medicaid serves a range of individuals with distinct needs, including low-income children, their parents, those who qualify because of a disability, and low-income aged individuals whose primary acute care coverage is Medicare (Mann 2003).

Because we could not identify any source of national estimates for spending in Medicaid for those with and those without diabetes, we used estimates of diabetes prevalence and selected per capita costs supplied by Dr. Todd Gilmer of the University of California, San Diego (UCSD). These data were drawn from a database developed for the “Faces of Medicaid” study, which includes 2001 Medicaid fee-for-service claims from federal MAX data files from all but six of the 50 states (Arizona, Delaware, Hawaii, Maryland, Oregon and Tennessee). Although some individuals are jointly eligible for Medicare and Medicaid, Medicare is the primary payer, and the Medicaid data include costs incurred only by Medicaid, so they are independent of the Medicare estimates. The MAX data reflect all Medicaid benefits, including pharmacy and long-term care.

At our request, the researchers at UCSD used the MAX data to calculate national rates of diabetes prevalence and per capita Medicaid costs for all beneficiaries and for those with diabetes for each of four Medicaid eligibility groups: Temporary Assistance for Needy Families (TANF) adults, TANF children, people with disabilities, and the aged. Because many Medicaid

eligibles are not enrolled for a full year, we also asked the researchers to calculate, within each group, separate estimates for people eligible for less than six months in a year versus six months or more, and the average number of months for which they were covered.

We used these data to construct average per capita monthly spending estimates for individuals with versus those without diabetes for people eligible for six months or more or for less than six months within each of the four Medicaid subgroups. We used a general factor of 1.23 to inflate estimates from 2001 to 2005; this factor was based on research on spending trends in Medicaid (Holohan and Cohen 2006). The adjustment for the increasing prevalence of diabetes between 2001 and 2005 is based on the change in the prevalence of diabetes of similar subgroups in NHIS between 2002 and 2005. For the aged, we adjusted by comparable estimates in NHIS for the aged and assumed that this factor also applied to Medicaid enrollees qualifying because of disability. (No adjustment was made for TANF children because the 2001 rate was very low and NHIS data for children are more limited than for adults.) As with Medicare, we made no adjustment for the use of Medicaid managed care, which is uncommon coverage for elderly Medicaid beneficiaries and those with disabilities, who make up the majority of the diabetics in Medicaid (Vladek 2005). Because our interest was in *federal* diabetes spending, we used 57 percent of the average federal share of aggregate Medicaid spending nationwide (U.S. Department of Health and Human Services [DHHS] 2007). (The remaining Medicaid costs are paid by states based on a formula setting the minimum federal contribution at 50 percent.)

Federal Employees Health Benefits Program (FEHBP). FEHBP covers active federal workers, annuitants, and dependents. The Office of Personnel Management (OPM) indicates that 8.0 million individuals were covered in 2004, including 2.2 million employees, 1.8 million annuitants, and 4.0 million dependents, with net program costs estimated at \$27.535 billion (OPM 2006). Because other FEHBP-specific data were not available, we calculated our estimate

of additional FEHBP spending for those with versus those without diabetes by using other available national population data.

We assumed that 2004 FEHBP workers had the same prevalence of diabetes as 45- to-64-year-olds reported in the 2004 NHIS (9.5 percent), that annuitants had the same rate as NHIS respondents age 65 to 74 (18.1 percent), and that dependents had an average rate equal to those age zero to 44 group (1.2 percent). We estimated federal costs for those in FEHBP with and without diabetes by assuming that the difference in per capita costs between these two subgroups was the same as the national differential in per capita spending (2.4 times greater for those with diabetes) between those with and those without diabetes in the ADA estimates. We used this rate rather than Medicare rates for those 65 and older because FEHBP data on enrollment were not broken down by age. We generated 2005 estimates by assuming that the additional costs of diabetes accounted for the same proportion of FEHBP spending in 2005, when net program costs were reported to be \$26.144 million, as they were in 2004 (OPM 2006).

TRICARE. TRICARE serves those in the Armed Forces, retired military, and their families worldwide. In 2005, it covered 5.66 million people under age 65 and 1.73 million over age 65 in 2005 (U.S. Department of Defense [DoD] 2006).

While prevalence estimates for diabetes in TRICARE have been reported (Schone 2004), they come from surveys with low response rates and do not include dependents. We therefore used general population estimates even though they may understate the prevalence of diabetes in the military population to the extent that this population includes a disproportionate share of racial and ethnic groups at higher risk for diabetes. For those age 65 and older, we used the NHIS rate for those age 65 –to 74, the same data used to adjust the Medicare estimates. For those under 65, we also assumed that national experience held, and we therefore applied the

national 2005 prevalence from an average of the NHIS prevalence rates for those age zero to 44 and for those age 45 to 64.

Because TRICARE data on per capita costs for those with versus those without diabetes were not available, we used the most appropriate national estimates to support our analysis. For people under 65, we used the same national ADA (2003) estimates that we used for FEHBP. For those 65 and older, we used a 2.28 ratio, the amount of the differential in per capita costs for this age group in the Medicare estimates. We applied this ratio to the average annual cost of all beneficiaries to calculate the costs of beneficiaries with diabetes. To calculate TRICARE diabetes-related expenditures in 2005, we applied the cost differential for those with diabetes to our calculated prevalence rates for those under age 65 and those age 65 and older.

Veterans Health Administration (VHA). The VHA operates the nation's largest integrated health care system, providing direct medical services to veterans through a nationwide network of facilities and clinics. Our analysis of spending for diabetic versus nondiabetic individuals served by the VA built upon 2000 data in *The VA Health Care Atlas*, which indicated that 14 percent of the patients in the VA system had diabetes in 2000, with a reported cost of \$4.76 billion out of a total budget of \$19.5 billion (U.S. Department of Veteran's Affairs 2000). Using these data, we calculated that the average annual VA spending per beneficiary was \$7,708 in 2002, as compared to \$3,887 for those without diabetes.

We developed 2005 estimates of VA spending on diabetes by inflating per capita costs in 2000 to 2005 by using a factor of 1.413, the ratio of annual per capita spending on health care reported for 2005 compared to 2000 from CMS data on the National Health Accounts (CMS 2005, accessed 2007). Using the 20 percent prevalence figure reported by the VA in 2005 (U.S. Department of Veteran's Affairs 2006a, 2006b), we applied the updated difference in per capita spending figures for 2005 for those with diabetes to the estimated 2005 VA population with

diabetes. VA expenditure data exclude long-term care. Published research shows that the incremental costs of long-term care in the VA system are 11 percent of total costs (Yu et al. 2004). However, we did not have enough data to allocate these costs between those with and without diabetes, so we excluded them from our estimates.

Other Programs. Our spending estimates also included what we calculated to be the additional costs from the following three small programs (DHHS 2007).

- ***The Indian Health Service*** provides direct health care services in partnerships with tribes, tribal organizations, and urban Indian health programs to American Indians (AI) and Alaska Natives (AN). Reported diabetes prevalence is approximately 15 percent. We assumed that 25 percent of the program outlays were spent on people with diabetes, an assumption we viewed as conservative given the ratio of spending for those with diabetes versus without diabetes in the other programs we studied.
- ***SCHIP is a joint federal-state program***, and although states have different eligibility rules, most cover uninsured children under the age of 19 whose families earn up to \$36,200 a year (for a family of four). We assumed that the additional costs for diabetes in this program represented the same share of SCHIP spending program-wide as the estimates of excess federal spending for children on Medicaid.
- ***The Public Health Service Commissioned Corps Retirement Plan*** finances health insurance for its retirees. We assumed that the additional costs per person associated with diabetes were the same as in Medicare.

Federal Costs of Diabetes Due to Disability

The Social Security Administration (SSA) funds two major federal programs that provide cash benefits to people with disabilities: Social Security Disability Insurance (SSDI) and Supplemental Security Income (SSI). The former pays benefits to workers who earn insured status through contributions to the Social Security trust fund based on their work. The latter is a means-tested cash assistance program. SSA does not publish annual statistics on the number of people who collecting benefits due to diabetes or on the benefits paid to them. We therefore based our estimates on data from several sources (SSA 2006, 2005, 2003).

We divided the population receiving disability benefits through SSA into four mutually exclusive groups expected to differ in benefits and diabetes prevalence: (1) those collecting SSDI only, (2) those age 18 to 64 collecting SSDI and SSI, (3) those age 18 to 64 collecting SSI only, and (4) those under age 18 collecting SSI only.

We obtained data on the primary reason for disability for group 1 and for groups 2 and 3 combined, making the assumption that the diabetes prevalence rate for children on SSI (group 4) is the same as for adults (group 3) because separate data for children were not available at the time of the study, and the characteristics of group 3 make them most plausible alternative. Our estimates of the number of people receiving disability insurance because of diabetes include all those whose primary reason for disability was diabetes (SSA primary impairment codes 2500, 2760, and 3570). We accounted for diabetes-related complications that resulted in disability by including 35 percent of those whose primary reason for disability was chronic renal failure (SSA primary impairment code 5850) and 10 percent of those identified with vision impairments (SSA primary impairment codes 3610, 3620, 3650, 3660, 3680, and 3690). The 35 percent come from the U.S. Renal Disease System data, and the 10 percent builds on NIH data on legal blindness among diabetics (National Institutes of Health 2006).

The decision to include end-stage renal disease and vision impairments related to diabetes but not other diabetes-related complications was based upon the process that SSA uses to determine the primary disability. Typically, the medical condition that is identified as the primary disability is the one that is the easiest for the examiner to show meets the SSA criteria. Vision impairments and ESRD are both relatively easy to determine and likely to be the conditions reported as the primary disability. Thus, people with these complications are generally identified in the SSA data as having a primary diagnosis of diabetes and are included in our estimates.

We estimated SSDI/SSI total disability payments by using December 2004 data for those collecting payments in each subgroup and multiplying the category-specific benefit amount as of December 2004 by 12 to establish an annual expenditure.

RESULTS

Overall Additional Federal Spending for Diabetes

Using the techniques described above, we estimated that the federal government spent an additional \$79.7 billion in 2005 on care for people with diabetes; this included \$77.2 billion in medical care costs through federal programs that finance medical care and 2.5 billion in SSDI/SSI spending for diabetes-related disabilities (see Table 2). The \$77.2 billion is equal to 12 percent of total federal health spending in 2005 (CMS 2005, accessed 2007).

Table 2. Aggregate Additional Federal Spending for Those With Versus Those Without Diabetes, by Type of Cost, 2005 (in billions)

Program and Type of Cost (billions) All Sources, 2005	\$79.704
Direct Health Care Benefits/Treatment Costs	\$77.244
Medicare	\$61.097
Medicaid (federal share)	\$ 4.669
FEHBP (actives, annuitants, and dependents)	\$ 2.432
DoD (TRICARE)	\$ 3.033
Veteran Affairs Health System	\$ 5.723
Other (SCHIP, Indian Health Service, PHS Corps Retirees) ^a	\$ 0.290
SSDI/SSI Spending for Diabetes-Related Disabilities	\$2.460

Source: Authors' analysis.

^aSCHIP = State Children's Health Insurance Program (CMS); PHS = Public Health Service.

Table 3 details the statistics that underlie the aggregate cost estimates, including program enrollment, the prevalence of diabetes, and associated medical care costs in the five federal programs that account for most federal medical care spending on diabetes. Based on program population, Medicaid is the largest of such programs. However, in terms of federal spending on diabetes, Medicare bears a large share of the additional medical costs associated with diabetes because of its target population—the aged, those with disabilities, and those with ESRD. Almost one in five Medicare beneficiaries (18.8 percent) had diabetes in 2005, and they account for nearly one-third of 2005 Medicare spending (\$108 billion). Of the \$108 billion, \$61.1 billion—18.4 percent of all Medicare spending—reflects the difference in per capita spending within Medicare for those with diabetes compared to those without.

Table 3. Estimated Prevalence, Per Capita and Total Costs for Treating Those With and Without Diabetes in Major Federal Programs, 2005

	Population (millions)	Diabetes Prevalence	Per capita Costs for Those With Diabetes	Per Capita Costs for Those Without Diabetes	Per Capita Difference	Aggregate Additional Program Spending (billions)	Incremental Percent of Program Budget
Medicare	42.4	18.8%	\$13,621	\$5,956	\$7,665	\$61.097	18.4%
Medicaid	49.1		NA ^a	NA ^a	(≥6/<6 mos)	\$4.669 ^b	2.6%
TANF child	24.8	0.2%			\$5,738/\$1,632		
TANF adult	11.3	3.5%			\$5,650/\$1,591		
Disabled	8.3	15.2%			\$3,671/\$918		
Aged	4.7	20.9%			\$2,772/\$699		
FEHBP	8.0	7.3%	\$7,454	\$3,106	\$4,348	\$2.432	9.3%
TRICARE						\$3.03	9.7%
Below 65	5.66	5.4%	\$9,408	\$3,920	\$5,488		
65+	1.73	18.1%	\$7,800	\$3,421	\$4,379		
VA	5.3	20%	\$10,892	\$5,493	\$5,399	\$5.723	16%

Source: Authors' analysis based on a various sources.

^aThe estimated costs cannot be displayed by age group because of how the calculations were performed from original source data for 2001.

^bAggregate estimates for Medicaid include only 57 percent of the total additional cost, the share of such spending paid for by the federal government versus states. (Of the \$8.191 billion additional national spending on diabetes, \$3.833 billion is for individuals with disabilities, \$2.255 billion is for the aged, \$1.865 billion is for TANF adults, and \$0.238 billion is for TANF children.)

While Medicaid has a larger enrollment than Medicare, the majority of Medicaid enrollees are children or their nondisabled parents, and both populations have a low prevalence of diabetes. Less than one percent of children (0.2 percent) and only 3.5 percent of nondisabled adults in Medicaid have diagnosed diabetes. Even though children make up 50 percent of Medicaid's enrollment, and the additional per capita cost for a child with diabetes compared to one without is \$5,738 (if enrolled for six months or longer), the low prevalence of diabetes in this population resulted in a relatively low additional cost to Medicaid (federal and state) of \$0.24 billion in 2005. For the most part, Medicaid's diabetes-related costs are associated with its aged beneficiaries and those with disabilities, for whom the diabetes prevalence rate is 21 percent and 15 percent, respectively. In total, the difference in spending for Medicaid enrollees with diabetes compared to those without is \$8.2 billion, \$3.8 billion of which is spent for beneficiaries with disabilities and \$2.3 billion for aged beneficiaries. Because states pay an average of 43 percent of Medicaid's costs, the additional federal costs associated with diabetes are less than the total program cost—\$4.7 billion in 2005, or about 2.6 percent of total federal Medicaid spending.

FEHBP, VHA, and TRICARE serve much smaller populations than do Medicare and Medicaid. However, because of demographic mix of enrollees in each program, diabetes affects program costs much more than it does Medicaid costs. Diabetes is particularly relevant for the VHA: 20 percent of those it served were estimated to have diabetes in 2005, at an annual per capita cost of \$10,892 compared to \$5,493 without diabetes. In aggregate, our estimates are that the VA spent about \$5.7 billion in 2005, and that 16 percent of their budget was used for medical care representing the difference in costs for those with versus without diabetes.

Composition of Disability Costs

As reflected in Table 4, approximately 163,000 adults aged 18-64 years, 2.8 percent of all SSDI disabled, received SSDI (Title II) because of a diabetes-related disability. Of the \$2.5 billion spent in SSDI/SSI disability payments due to diabetes, the adults receiving SSDI accounted for \$1.9 billion. The remaining \$0.6 billion was spread among children who receive SSI (Title XVI) due to disability (\$0.09 billion), adults who receive SSI only (\$0.28 billion), and adults who receive both SSDI and SSI payments (\$0.23 billion).

Federal Diabetes-Related Costs Relative to Total Federal Health Spending

While this study focused on federal diabetes spending nationwide, we aimed to put these estimates in context of the most widely cited statistic on the *total additional health spending nationwide* for diabetes across all payers, which is from the ADA (2003). That study found that total national spending in 2002 on direct medical care for those with diabetes compared to those without was \$91.9 billion. To find costs for 2005, we took the 2002 figure and adjusted it to 2005 dollars, for an estimate of \$126.4 billion.² The \$77.2 billion estimate in federal spending in this paper represents 61 percent of the nation's total additional spending for diabetes across all payers—government, the private sector, and individuals.

² First, we adjusted for medical care inflation by increasing the 2002 estimate by 21.1 percent, which was the National Health Expenditure Accounts (NHE) increase in overall per capita health spending between 2002 and 2005. Second, we adjusted for overall population growth by increasing the 2002 estimate by a further 2.9 percent, to reflect population growth between 2002 and 2005. The third adjustment was based on the NHIS-reported changes in diabetes between 2002 and 2005 (10.4 percent), reflecting both increasing incidence of diabetes and population aging. The specific calculation is:

$$\$91.9 \text{ billion (2002)} \times 1.211 \text{ (health care inflation)} \times 1.029 \text{ (population growth)} = \$114.5 \text{ billion}$$

$$\$114.5 \text{ billion} \times [(5.3/4.8)=1.104 \text{ (increasing prevalence)}] = \$126.4 \text{ billion (2005).}$$

Table 4. Estimated Prevalence, Per Capita, and Total Costs of SSDI/SSI for Beneficiaries Disabled Due to Diabetes, 2005

Source Data	Population			
	Title XVI Children ^a	Title XVI Adult ^b	Title II Adult ^c	Title II/Title XVI (concurrent) ^d
Total population (millions)	0.993	2.850	5.756	1.007
Beneficiaries with diabetes-related impairments (millions) ^e	0.015	0.043	0.163	0.028
Average monthly benefit, all	\$506	\$546	\$948	\$655
Calculations				
Average annual beneficiary expenditure ^f	\$6,072	\$6,552	\$11,376	\$7,860
Diabetes prevalence rate ^g	1.52%	1.52%	2.84%	2.84%
Beneficiaries with diabetes	15,096	43,332	163,473	28,620
Results				
Annual expenditures for beneficiaries with diabetes-related disabilities (billions)	\$0.091	\$0.284	\$1.859	\$0.225

Source: Authors' calculations using December 2004 data from the Social Security Administration.

Note: The diabetes-related impairments and their SSA codes captured for the analysis include: diabetes mellitus (2500), diabetic acidosis (2760), and diabetic and other peripheral neuropathy (3570). Since additional complications of diabetes include renal failure and visual impairments, but SSA does not distinguish the underlying cause of the disability, we assumed a portion of these conditions were attributable to diabetes. For chronic renal failure (5850), we assumed 35 percent of cases are diabetes-related. Ten percent of vision impairments are attributed to diabetes. This includes: retinal detachment defects (3610), other retinal disorders/diabetic retinopathy (3620), glaucoma (3650), cataract (3660), visual disturbances (3680), and blindness/low vision (3690).

^aThose beneficiaries collecting only Supplemental Security Income benefits and who are under the age of 18. These amounts also include federally administered state income supplements.

^bThose beneficiaries collecting only Supplemental Security Income benefits and who are ages 18-64. These amounts also include federally administered state income supplements.

^cThose beneficiaries collecting only Social Security Disability Insurance benefits and who are ages 18-64.

^dThose beneficiaries collecting both Social Security Disability Insurance and Supplemental Security Income benefits and who are ages 18-64. These amounts also include federally administered state income supplements for Supplemental Security Income.

^eTitle XVI under 18 came from Table 4 and all information on the remaining beneficiaries came from Table 59 (SSA 2004).

^fBeneficiary monthly benefits were annualized by multiplying by 12.

^gDiabetes prevalence was calculated based on estimates from July 2002 for diabetes-related impairments for Title XVI adults and beneficiaries receiving both Title II and XVI benefits. Program information does not disaggregate Title II and beneficiaries receiving both payments. We assumed that Title XVI beneficiaries under 18 years of age had a prevalence rate similar to Title XVI adults, while Title II and beneficiaries receiving concurrent benefits had the same prevalence rate as the combined population.

CONCLUSIONS

People with diabetes use a disproportionate amount of medical care, and some have disabilities that leave them unable to work. Because complications from diabetes often occur later in life, the federal government bears a disproportionate share of these costs—largely through Medicare—but also through its provision of coverage to older adults who have been in the military or in the federal workforce, and because of the federal role in disability payments.

Our estimates of disability costs due to diabetes measure only the outlay of the federal government for disability programs. Other costs—not estimated here but a valuable focus for future research—include productivity losses in the federal workforce and the impact on federal tax revenue of diabetes-related illness and disability.

Limitations. The estimates are inevitably associated with limitations. Program data were not always available, and simplifying assumptions had to be made. The estimates show only the difference in federal costs for treating those with diabetes compared to those without diabetes, not the share of those costs that could be feasible to save based on what we know about appropriate interventions, the epidemiology of diabetes, and how it relates to other co-occurring conditions. The expenditures are high enough, however, that they would be policy relevant even if only one-third or one-half of those costs could be eliminated. In addition, our estimates represent primarily individuals whose diabetes is diagnosed; people with undiagnosed diabetes are included in the comparison group of “people without diabetes.” Because the estimates also exclude the effects of Medicare’s new prescription drug benefit, they probably are understated.

Policy Implications. Diabetes is not the only cause of many of its costly complications that account for a substantial share of the additional spending by patients with diabetes, but it is an important one. There are two ways to bring down the federal cost of diabetes—reduce its prevalence in the population served by federal programs, and reduce its associated

complications. Doing both is feasible and likely to generate important benefits. Obesity prevention programs, nutrition education, and more physical activity can help to limit the onset of diabetes. Early detection can be an important part of controlling the disease, and better control will lessen its life-long impact and complications. For example, studies show that the complications from diabetes can be reduced with better glycemic control (Diabetes Prevention Program Research Group 2002). National standards for diabetes self-managed education also exist (Mensing et al. 2007). In addition, diabetes is a chronic disease, so changes to the health care system that encourage better care for chronic conditions also is critical to achieving the best outcomes in diabetes detection and control (Glasgow et al. 2001; Villagra 2004)). We believe that a major contribution of our study is to suggest that all of these activities are important not just on clinical grounds, but on economic grounds as well. Improving diabetes prevention and care has the potential not only to enhance the quality of life and extend the lives of those with diabetes, but also to generate important benefits for taxpayers.

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