

# Diabetes in Employer-Sponsored Health Insurance

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**OBJECTIVE** — To examine medical and mental health care expenditures for large numbers of individuals with diabetes enrolled in employment-sponsored insurance plans.

**RESEARCH DESIGN AND METHODS** — Health insurance billing data for ~1.3 million individuals enrolled in health insurance plans sponsored by 862 large self-insured employers nationwide were used to examine employer expenditures and consumer out-of-pocket payments for 20,937 people identified with diabetes. These expenditures were compared with expenditures for individuals with other chronic illnesses. Main outcome measures were covered charges, insurance plan reimbursements, and estimated consumer out-of-pocket payments for both medical and mental health services.

**RESULTS** — A total of 1.7% of enrollees were identified as having diabetes and ~11% of those used at least one mental health service during 1996. Health care expenditures were three times higher for those with diabetes compared with all health care consumers in these insurance plans, but when compared with individuals with other chronic illnesses such as heart disease, HIV/AIDS, cancer, and asthma, those with diabetes were not more expensive for employers' insurance plans. Diabetes accounts for 6.5% of total health plan expenditures.

**CONCLUSIONS** — Diabetes is not more expensive for either consumers or their employer-sponsored insurance plans than other chronic illnesses.

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Several studies on the cost of diabetes have been published (1–10). Many studies follow the traditional cost-of-illness methods of Rice et al. (11) and have generated national cost estimates using data from national surveys of health care use. More recent reports have used administrative data to derive estimates for special populations such as Medicare beneficiaries and Medicaid recipients (6,10) and members of managed care organizations (9). However, the proprietary nature of commercial insurance databases has limited the ability of researchers to

examine the health care expenditures for diabetes from an employer perspective.

Diabetes is becoming an increasingly important concern for many employers. Researchers have found that relative to the overall employed population, employees with diabetes use more health care services (7) and have higher rates of both absenteeism (12) and work disability (13,14). Moreover, the prevalence of diabetes is increasing rapidly, particularly in the population aged <65 years and among minority groups (15). Many of these individuals are employed and cov-

ered by employer-sponsored health insurance programs.

In this study, we used large commercial administrative claims databases to examine the cost and use of medical services for workers and their families who are enrolled in employment-sponsored insurance. We report health care expenditures, including expenditures for mental health care. We estimate the direct financial burden for employers and patients. We also examine the utilization rate for mental health care services by individuals with diabetes. Finally, we compare health care expenditures for persons with diabetes to those for individuals with common chronic illnesses in the same insured population.

## RESEARCH DESIGN AND METHODS

### Data source

Data for this study consist of all insurance claims submitted for medical and mental health (including substance abuse) services received in 1996 by a population of ~1.3 million individuals enrolled in 862 employer-sponsored insurance plans. The identity of the employers is unknown. The plans have an average enrollment of 1,518 individuals. A large national insurer administered all of these plans and was the sole data source. The plans were offered by self-insured employers to their employees and their dependents. There is considerable variation across the plans with respect to the benefit structure, but all plans covered medical/surgical care as well as mental health and substance abuse services. These plans have enrollees across all 50 states.

The findings reported are based on claims-level billing data. Each claim contains information such as plan identifier, patient identifier (scrambled to protect patient confidentiality), patient's relationship to employee (self, spouse, or child), date of birth, dates of incurred service, primary diagnosis by standardized ICD-9-CM code (16) (one diagnosis field is provided on a claim), and patient's sex. All data are contained in a large uniform database. The data fields used in this study are completely populated with ex-

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A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

tremely high internal consistency (i.e., individual values that should be consistent, such as birthdates and sex, are consistent and logical). Data contain all processed claims, including claims that were filed but no insurance payments were made because patients had not yet met their plan's deductible or they had exceeded their available benefit. Because pharmacy claims were handled by a different firm, pharmacy claims were not available from the data source for analysis; therefore, no information is included on the use or cost of medications.

### Enrollment status

The relationship of individuals using services was identified in the data by plan enrollment status: employee, spouse, child, or other dependent. Only 0.2% of consumers were enrolled as "other dependents" and >90% of them were aged <19 years. Therefore, we included all "other dependents" in the "children" category, resulting in three enrollment categories: employee, spouse, and child.

### Health care expenditures

Each claim contains the actual billed amount as well as the amount the insurer deems "covered" by the insurance plan. Because billed amounts vary widely from covered amounts and the covered amounts generally reflect the prices for services agreed upon between insurers and providers, we used the covered charges as the basis for health care expenditures in this study. Health care expenditures are defined as the total covered charges for all health care services covered under the plans. These are divided into two categories: medical expenditures that are the total covered charges for medical and surgical services (hospital, physician, dietitians, and other covered licensed health care providers as well as laboratory and other covered services but excluding pharmacy services); and mental health care expenditures that are the total covered charges for mental health services.

### Plan expenditures

Plan expenditures are amounts actually paid to providers by the insurance plan. These amounts include payments for outpatient and inpatient services to licensed medical providers; they do not include payments for medications. Because all plans in this study are self-insured, plan expenditures are direct employer costs.

### Out-of-pocket payments

Out-of-pocket payments are the difference between covered charges for covered services and the actual insurance plan expenditures and reflect deductibles and cost sharing in the plans. Payments for noncovered services and pharmacy are not captured.

### Identifying diabetes and other illnesses

Individuals were identified as having diabetes if they had at least one insurance claim during the year with an ICD-9-CM code for diabetes listed as the primary diagnosis. After an individual was identified as having diabetes, we reported all health care expenditures incurred in 1996 by that individual. Therefore, an individual may have only one service in the year with diabetes listed as the primary diagnosis on the insurance claim, but we report all their health care expenditures, not just those expenditures on care specifically coded as diabetes. We also identified individuals who had one of four other chronic conditions: cancer, heart disease, HIV/AIDS, or asthma. We selected these chronic conditions because they are important chronic conditions among working-age individuals. Cancer, heart disease, diabetes, and asthma are all common chronic illnesses. HIV/AIDS is less common but expensive and of interest to employers. A complete listing of ICD-9-CM codes used in this study is available from the first author (P.B.P.). Because coding on claims data can vary widely, we do not attempt to discriminate between type 1 and type 2 diabetes.

The primary focus of this study is on health care expenditures among workers and members of their families who have diabetes. Because we could not explicitly identify retirees from workers, we excluded everyone aged  $\geq 65$  years. As a result, 1,180 individuals with diabetes were excluded from the analysis because they were >64 years of age.

### Analysis

Person-level descriptive analysis of the data was performed. Both average and median expenditures were reported, and significance of observed differences between groups was determined using one-way ANOVA, Wilcoxon's rank-sum, median, Kruskal-Wallis, or Brown-Mood tests.

**RESULTS** — A total of  $\sim 1.7\%$  ( $n = 22,117$ ) of the 1.3 million enrollees were identified as having diabetes. However, this rate is slightly higher when only employees are considered; 2.5% of all enrolled employees are identified with diabetes.

After excluding individuals aged  $\geq 65$  years, the distribution of age among the remaining 20,937 individuals with diabetes in our study is shown in Table 1. Most individuals with diabetes are aged >45 years. The overall service use rate for diabetes and age distributions are similar to what has been described elsewhere (7). Among individuals with diabetes, 65% were employees, 30% were spouses, and 5% were children.

Annual health care expenditures for the individuals with diabetes as well as the distribution of payments in this study are shown in Table 2. Overall, the average health care expenditure for individuals with diabetes was \$4,430. This is higher than health care expenditures for all people who used health care ( $P < 0.001$ ). There is no difference in average or median expenditures for diabetes by sex. On average, spouses have higher expenditures than employees and children ( $P = 0.005$ ).

Coinciding with higher health care expenditures, individuals with diabetes also had higher average out-of-pocket expenses (\$365 vs. \$179). But compared with all health care consumers in these plans, those with diabetes paid a smaller ( $P < 0.001$ ) percentage of their health care expenditures out of their own pockets (18 vs. 22%).

A total of 10.7% of all individuals treated for diabetes used some form of specialty mental health services during the year. This use rate was similar to that of all adult health care consumers in these plans. Furthermore, among all individuals treated for diabetes, only 3.4% used mental services for depression.

Although health care expenditures for individuals with diabetes are considerably higher than those for all health care consumers covered by these insurance plans, it is not surprising that individuals with chronic medical conditions have higher health care expenditures than the overall population of health care consumers, most of whom are healthy. To put the expenditure data into a more meaningful context, information on five chronic medical conditions is presented in Table 3 and

Table 1—Consumers with diabetes (n = 20,839) by age group

Age group (years)	No. of consumers	No. of consumers with diabetes	Consumers with diabetes (%)	Distribution of consumers with diabetes (%)
<12	227,882	330	0.1	2
12–18	100,911	439	0.4	2
19–25	81,807	592	0.7	3
26–35	214,672	2,388	1.1	11
36–45	204,086	4,565	2.2	22
46–55	138,662	6,938	5.0	33
55–64	63,989	5,685	8.9	27
Total	1,032,009	20,937	2.0	100

age-adjusted comparisons of cost are presented in Table 4.

Based on these data, individuals with diabetes are not the ones with the most prevalent chronic condition. More people have heart disease and/or asthma than diabetes. On a per-person basis, individuals with diabetes have lower age-adjusted health care expenditures than individuals with cancer, HIV/AIDS, or heart disease but higher expenditures than those with asthma (see Table 4). It is worth noting that health care for individuals with diabetes and end-stage renal disease is very expensive. In this study, 96 diabetic subjects under age 65 years were identified as having end-stage renal disease. These individuals have an annual average expenditure of \$75,309. Regardless, in these health plans, individuals with diabetes account for a much smaller proportion of overall health care expenditures and insurance plan expenditures than individuals with heart disease or cancer.

**DISCUSSION**— This study reports on health care expenditures related to diabetes for a large population of employees

and their families and compares those charges with charges for other selected chronic diseases. Diabetes is not uncommon among enrollees in employer-sponsored health insurance. A total of 1.7% of health plan enrollees were identified as having diabetes, which is similar to the estimated prevalence of diabetes in the general population of employment-age individuals (7). This finding suggests that diabetes is not undertreated in this population.

Previous studies report that expenditures on health care for individuals with diabetes are from two to three times the health care expenditures for the general population (1,5,8). Similar findings have been found for individuals enrolled in managed care (2,9). This holds true in our study population as well. Average (and median) annual health care expenditures for individuals with diabetes were three times higher than those of all health care consumers in this study. However, we believe that such comparisons are misleading, because the costs of care for a population with a given illness are compared with the costs of care for a popula-

tion that is inherently healthy. One could pick any chronic condition at random and make the same argument. The health care expenditures of any person with a chronic condition will be considerably higher than the health care expenditures of the general population. Based on these data, we have found that the expenditures for individuals with diabetes are higher than those for individuals with asthma and lower than those for individuals with cancer, HIV/AIDS, or heart disease. Furthermore, we have found that individuals with diabetes account for a lower proportion of overall health care expenditures than individuals with cancer or heart disease.

Nonetheless, the burden of illness represented by diabetes is not trivial. Health care for individuals with diabetes represents 6.5% of total insurance plan expenditures for employers in this study. In addition, diabetes imposes a significant burden on the individuals who have this disease. The average out-of-pocket payment for health care services by individuals with diabetes is \$365 annually (this amount excludes noncovered services and pharmacy costs). However, consider-

Table 2—Annual mean health care expenditures

Health consumer characteristics	n	Health care expenditures	Expenditures (%)	
			Paid by insurance plan	Paid by consumer
All consumers	1,032,009	\$1,448	78.2	21.8
Consumers with diabetes	20,937	\$4,430	82.1	17.9
Sex				
Men	11,114	\$4,501	81.8	18.1
Women	9,821	\$4,336	82.4	17.6
Enrollment status				
Employees	13,595	\$4,251	82.8	17.2
Spouses	6,358	\$4,919	81.4	18.6
Children	984	\$3,739	78.3	21.7

Table 3—Annual health care expenditures and insurance expenditures by illness

	N	Total expenditure	Mean health care expenditure	Mean insurance plan expenditure	Total insurance plan expenditure (%)
All health care consumers	1,032,009	\$1,494,031,073	\$1,448	\$1,268	100.00
Chronic illness	159,562	\$603,099,730	\$3,780	\$3,442	42.0
Diabetes	20,937	\$92,747,775	\$4,430	\$4,065	6.5
Cancer	16,600	\$160,530,487	\$9,671	\$9,039	11.5
Heart disease	104,868	\$439,947,988	\$4,195	\$3,839	30.8
HIV/AIDS	1,457	\$16,583,316	\$11,382	\$10,698	1.2
Asthma	32,026	\$75,582,333	\$2,360	\$2,102	5.1

ing the distribution of expenditures, this burden is not distributed evenly among those with diabetes. For instance, when the lower and the upper deciles of out-of-pocket payments were considered, we found that 10% of individuals with diabetes incurred annual out-of-pocket payments  $\leq$  \$20, whereas 10% of individuals with diabetes incurred payments  $>$  \$875.

The findings in this study corroborate those reported by Laditka et al. (7) in the only other study on diabetes in an employed population. However, our findings suggest that the relative burden of diabetes is lower than they report: 6% of total plan expenditures compared with 9% (neither study includes pharmacy costs). Per capita expenditures also seem to be markedly lower. Several factors may account for this difference. This report represents the experience of a large number of insurance plans with a national reach in 1996. The report of Laditka et al. (7) was focused on the experience of one insurer in one state in 1996. The identification of subjects with diabetes also differed between the studies.

### Limitations

This study could not examine all of the costs associated with diabetes for employers. We could only examine issues related to health care expenditures; we could not examine other issues that are of concern

Table 4—Age-adjusted annual mean health care expenditures

Chronic illness	Age-adjusted mean expenditure
Diabetes	\$3,832
Cancer	\$10,528
Heart disease	\$5,703
HIV	\$11,599
Asthma	\$2,484

to employers, such as absenteeism and disability rates. In addition, the plans included in this study are not a representative sample of health plans; instead, they were a convenience sample. It is possible that their benefits are richer than those offered by a typical employer. Furthermore, these are individuals enrolled in employer-offered insurance plans, and therefore, they are expected to be healthier than individuals in a community-based sample. In addition, using this administrative insurance claims database has certain inherent limitations. First, reported costs are exclusive of pharmacy costs, and therefore, health care expenditures reported in this study are underestimated. Median direct pharmacy costs in 1996 for individuals with diabetes has been estimated to be \$979 (17). Without pharmacy costs, both plan expenditures and, therefore, employer costs (because many of the employers did provide pharmacy benefits) as well as out-of-pocket payments are underestimated. Given the importance of pharmacological treatments in diabetes, the lack of pharmacy costs is meaningful. Second, only expenditures associated with filed claims are captured in this study. These accurately reflect employers' expenditures on diabetes but do not capture expenditures that are not the responsibility of the health plans. Third, identifying individuals with a specific disorder using insurance billing claims does not constitute a clinical diagnosis. Diagnostic coding errors and medical visits related to screening for diabetes can result in erroneous identification. These claims contain only the primary diagnosis listed for the health service use. This may result in an undercount of individuals with diabetes. Finally, diabetes is a leading cause for eye, kidney, and heart disease as well as lower limb amputations. Diabetes may not be listed as the primary

diagnosis for individuals with these complications associated with the disease. Furthermore, our characterization of individuals with heart disease may include some who also have diabetes.

**CONCLUSIONS**— Diabetes is a chronic illness that seems to be increasing among working-age individuals. This has important implications for employers, because individuals with diabetes frequently use ongoing medical services at greater rates than individuals without diabetes. In this study of 1.3 million insurance enrollees, 1.7% were identified as using medical services for diabetes. These 1.7% of enrollees accounted for 6.5% of total insurance plan expenditures on health care. However, the relative burden of diabetes may not be as large as suggested by this comparison and others in the literature. As demonstrated by these data, diabetes is neither the most common nor the most expensive chronic illness for either individuals with diabetes or their insurers.

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