Productivity and Economic Burden Associated With Diabetes

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A B S T R A C T

Objectives. This report assessed the cost and burden of diabetes in broad terms of economic status, underlying disability, and barriers to health care—that is, as reflected in employment, income, disability days, general health status, and access to medical care.

Methods. We used the 1990 to 1995 Behavioral Risk Factor Survey in Oklahoma to compare persons with diabetes with age-, sex-, and race/ethnicity-matched respondents without diabetes.

Results. Persons with diabetes were significantly and substantially worse off on all economic, disability, and access measures.

Conclusions. Compared with nondiabetic persons, diabetic persons have fewer resources to deal with higher levels of disability and poorer health status. (*Am J Public Health.* 2001;91:129–130)

The American Diabetes Association estimated direct medical expenditures due to diabetes plus the disease's indirect social costs at approximately $98 billion in 1997.[1] Direct medical costs included blood tests, insulin, and treatment for diabetes-related illnesses such as retinopathy. Indirect costs included lost productivity caused by morbidity and premature death. Other studies that used the human capital approach also found costs in the billions.[2–7]

The human capital approach has drawbacks.[8] Attributing income differences solely to the disease may be misleading because characteristics such as age, race/ethnicity, sex, education, employment, disability, and experience also affect income.[9] Also, people perform valuable activities besides employment, such as housekeeping and volunteering.[10,11]

The measure "total disability days" assesses the resource cost of diabetes as the time an individual spends away from his or her usual activities because of physical or mental disability without assuming the value of time lost. Mental disability days are important, because in other studies chronic disease has been linked with depression and other psychologic distress.[12] Because of strong ties between health and productivity, a subjective measure of general health is also important. We treat deviations from well-being—regardless of financial status—as measures of illness effect.

Poor access to medical care may contribute to resource loss. To mitigate disease severity and future costs, people with diabetes need continuous access to health care.[13] Employment and higher income enhance one's ability to increase well-being and reduce disease burden.

The purpose of our study was to move beyond pure cost measures of the burden of diabetes. We tested the following hypotheses: that persons with diabetes had greater disability, less access to care, and poorer economic resources than did persons without diabetes.

Methods

We used the Behavioral Risk Factor Survey from 1990 to 1995 for Oklahoma to match each person with diabetes to 1 randomly selected respondent without diabetes; age group, sex, race/ethnicity, and year of the interview were used as criteria. We matched to remove any effect of age, sex, and race/ethnicity, which are correlated with economic status. We successfully matched 94% of the 425 persons with diabetes in the sample. The 400 matched subjects were used in analyses.

The Behavioral Risk Factor Surveillance System, sponsored by the Centers for Disease Control and Prevention, is a system of state health surveys of the US adult noninstitutionalized civilian population in which telephone interviews are used.[14] State health departments collect uniform data on preventive health practices and risk behaviors that are linked to chronic diseases, injuries, and infectious diseases.

We used the following measures, each based on 1 question from the Behavioral Risk Factor Surveillance System, with some recoding of responses:

1. Impaired physical health (including physical illness and injury) days: number of days out of the last 30
2. Impaired mental health (including stress, depression, and emotional problems) days: number of days out of the last 30
3. Disability days, that is, days one is kept from usual activities because of poor health: number of days out of the last 30
4. General health status: excellent, very good, good, fair, or poor
5. Possession of a health plan: yes or no
6. Inability to pay for a physician when necessary in the last year: yes or no
7. Unemployed (or unable to work) vs all other categories: employed, self-employed, retired, student, or homemaker
8. Annual household income: less than $20 000 vs at least $20 000

To assess statistical significance of the differences between case respondents and their matched comparison respondents, we used the sign test, because all of the measures were binomial or ordinal with only a few categories and because our design called for matched

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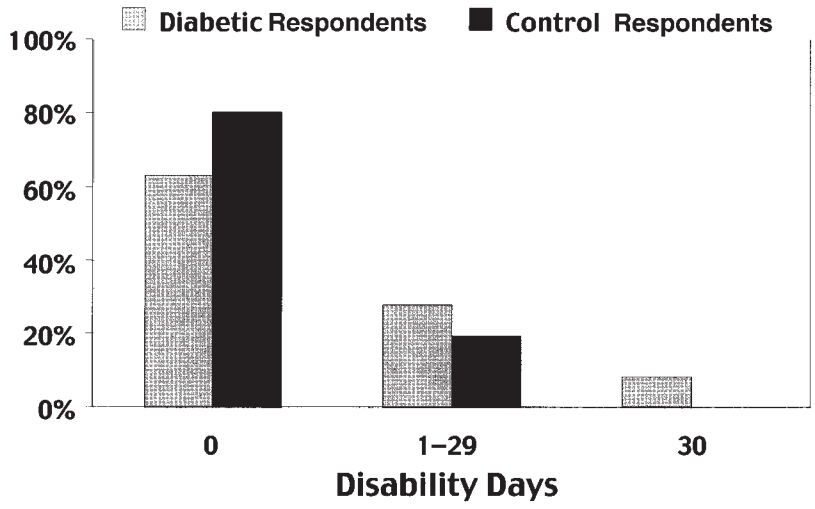

FIGURE 1—Percentage of persons with diabetes and percentage of control subjects for numbers of disability days in the last month caused by either poor physical health or poor mental health: Oklahoma, 1990–1995.

analysis methods. The test is reported as a χ^2_1 statistic.

Results

Persons with diabetes averaged 8.3 days of poor physical health compared with 3.0 days for matched respondents (χ^2=19.4, P=.001). Almost half (47%) of the persons with diabetes reported at least 1 day of poor physical health compared with 23% of the matched respondents.

Persons with diabetes averaged 2.8 days of poor mental health compared with 1.8 days for matched respondents (χ^2=4.4, P=.04). Almost a quarter (24%) of the persons with diabetes reported at least 1 day of poor mental health compared with 16% of the matched respondents.

Persons with diabetes averaged 5.2 days of total disability compared with 1.3 days for matched respondents (χ^2=7.8, P=.005). Figure 1 shows the percentages of persons in each category who had 0, 1 through 29, and 30 disability days.

Persons with diabetes reported lower general health status than did control subjects. Among persons with diabetes, 50% reported fair or poor health compared with 21% of the matched control subjects, and 20% of the persons with diabetes reported excellent or very good health compared with 40% of the matched respondents (χ^2=26.3, P=.001).

On both access measures, persons with diabetes lagged behind matched respondents. Among persons with diabetes, 16% had no health insurance compared with 10% of the matched respondents (χ^2=4.5, P=.03). Twice as many persons with diabetes (22%) as matched respondents (11%) needed a physician but could not pay (χ^2=11.6, P=.001).

The unemployment rate for persons with diabetes was 16% compared with 3% among comparison respondents (χ^2=14.2, P=.001). We found that 71% of the persons with diabetes had an annual income of less than $20 000 compared with 59% of the matched respondents (χ^2=7.3, P=.007).

Discussion

Persons in Oklahoma with diabetes were disadvantaged on all of the measures of well-being: general health status, days of disability and poor health, access to care, and economic burden. Persons with diabetes had higher burdens on multiple aspects of social function, which can affect income and general well-being.

Although we found strong, systematic differences between persons with and without diabetes, our results did not show that diabetes causes these differences. Factors that increase the risk of diabetes also may increase the burden of diabetes. We also did not identify and measure the quantitative relation between social burden and economic burden associated with diabetes. Answers to both of these questions require a longitudinal study.

The success of this method—data collection through a population survey with subsequent case matching, with which we achieved significant results with a relatively small sample—shows that it can be generalized to other small groups such as racial/ethnic minorities or specific age groups. This method is equally applicable to other chronic diseases with low prevalence but high importance to social function. Surveys, carefully designed to elicit necessary information and to cover all members of a population, can assist our understanding of the effect of rare diseases such as stroke and neurologic impairments. □

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