

Disparities in Diabetes Care Between Smokers and Nonsmokers

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Smoking is a known risk factor for both macro- and microvascular complications of diabetes, contributing to higher medical costs, lower quality of life, and premature deaths in adults with diabetes who smoke (1–3). Although the prevalence of smoking has decreased over the last decade in the U.S., (4,5) one in six adults with diabetes still smokes (6). Diabetes experts recommend that diabetic smokers be advised about smoking cessation and closely monitored for signs of complications by health care professionals, (7) but diabetic smokers are reportedly less likely to receive the recommended care. A survey of health plan members reported that diabetic smokers were likely to have fewer diabetes care visits and receive less frequent preventive care than diabetic nonsmokers (8). Using data from community-based, statewide diabetes intervention programs, the present study compares five major diabetes care indicators between diabetic smokers and age-, sex-, and race-matched diabetic nonsmokers while controlling for the effects of insurance status.

RESEARCH DESIGN AND METHODS

The data were collected from participants of the New York State Diabetes Coalitions community-based intervention programs, 1999–2004, which were designed to reach the medically underserved (9). All participants were required to complete standardized forms at program registration. The data contained self-reported health status, smoking behavior, diabetes care, and insurance sta-

tus of >16,000 adults (aged ≥ 18 years) with diagnosed diabetes. Participants with <13 months of duration since diagnosis of diabetes were excluded from the study. Then, all current diabetic smokers ($n = 2,261$) were extracted. To minimize the confounding effects of demographic characteristics on smoking, equal numbers of age-, sex-, and race-matched diabetic nonsmokers ($n = 2,261$) were obtained from the same dataset. The age, sex, and race match was based on the 36-cell categories consisting of sex, three age categories, and six race/ethnic categories. Former smokers were regarded as nonsmokers in this study. No information was available on the amount of cigarettes smoked.

The mean age was 54.2 years for diabetic smokers and 54.9 years for diabetic nonsmokers. For both groups, 44.8% were male, and 30.0% were racial/ethnic minorities, of whom 15.3% were non-Hispanic blacks, 11.7% Hispanic, 1.5% American Indian, 0.7% Asian, and 0.8% of other minority categories. Type of diabetes was not assessed, but there were no significant differences in the mean age, current diabetes medication, or years since diabetes diagnosis between the two groups, suggesting that the distribution of type 1 and type 2 diabetes was similar between them. Diabetic smokers were more likely to be without health care coverage (14.7%) or on a government health plan (25.2% Medicare, 24.0% Medicaid) than diabetic nonsmokers (10.7% uninsured, 23.8% Medicare, and 13.9% Medicaid). Diabetic smokers also had a lower

mean BMI (31.9 kg/m^2) than diabetic nonsmokers (32.8 kg/m^2).

Dependent variables were five core measures of diabetes care that are part of the Centers for Disease Control and Prevention's seven diabetes national objectives for state-based diabetes prevention and control programs (10). The measures include an A1C test, dilated eye examination, professional foot examination, influenza vaccination, and pneumococcal vaccination. As a reference, the mean values of the latest A1C tests were also presented. The A1C value was an optional question, and only 43% of the sample responded. Those reporting A1C values were more likely to be older and had longer duration of diabetes compared with those not reporting, but smoking status was not significantly associated with A1C value reporting. Each measure was compared between diabetic smokers and diabetic nonsmokers after adjusting for the effect of insurance status, using the direct standardization method (11). The insurance status distribution (uninsured, government plan, or private plan) for adults with diabetes, obtained from the 2000 New York State Behavioral Risk Factor Surveillance System (12), was used as the standard for the adjustment. For testing statistical significance, the Pearson χ^2 test and one-way ANOVA were used for discrete and continuous measures, respectively.

RESULTS— Diabetic smokers had significantly lower ($P < 0.001$) rates for four diabetes care indicators, including biannual A1C test (48.9 vs. 57.4%), professional foot examination (39.6 vs. 47.8%), annual dilated eye examination (60.9 vs. 68.1%), and flu vaccination (52.2 vs. 62.8%). Only pneumococcal vaccination showed no significant difference (39.0 vs. 42.7%). The average A1C value was also higher among diabetic smokers (8.2%) than diabetic nonsmokers (7.7%) (Table 1).

CONCLUSIONS— The results of this study indicate that diabetic smokers were less likely to receive recommended diabetes care compared with age-, sex-, and race-matched diabetic nonsmokers. Effects of the differences in insurance sta-

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Received for publication 9 January 2007 and accepted in revised form 1 April 2007.

Published ahead of print at <http://care.diabetesjournals.org> on 11 April 2007. DOI: 10.2337/dc07-0047. A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

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Table 1—Comparison of patient profiles, diabetes care indicators, and A1C values between diabetic smokers and age-, sex-, and race-matched diabetic nonsmokers

	Diabetic smoker	Diabetic nonsmoker	P
n	2,261	2,261	—
Demographics			
Age (years)	54.2 ± 13.2	54.9 ± 13.5	0.078
Sex			
Male	44.8	44.8	1.000
Female	55.2	55.2	—
Ethnicity			
Non-Hispanic white	70.0	70.0	1.000
Non-Hispanic black	15.3	15.3	—
American Indian	1.5	1.5	—
Asian and Pacific	0.7	0.7	—
Hispanic	11.7	11.7	—
Other	0.8	0.8	—
Health insurance status			
Uninsured	14.7	10.7	<0.001
Medicare	25.2	23.8	—
Medicaid	24.0	13.9	—
Private plan	36.1	51.6	—
Current diabetes medication			
Oral and insulin	10.9	10.9	0.452
Insulin only	11.3	14.5	—
Oral only	59.3	57.5	—
None	18.5	17.1	—
Years since diabetes diagnosis	6.7 ± 7.2	7.1 ± 8.0	0.079
BMI (kg/m ²)	31.9 ± 7.7	32.8 ± 7.7	<0.001
Diabetes care indicators (insurance status adjusted)			
A1C test last year			
≥2	48.9	57.4	<0.001
1	26.8	22.5	—
0	24.3	20.1	—
Professional foot check last year			
≥2	39.6	47.8	<0.001
1	21.4	21.1	—
0	39.0	31.1	—
Dilated eye exam last year			
Yes	60.9	68.1	<0.001
No	39.1	31.8	—
Flu shot last year			
Yes	52.2	62.8	<0.001
No	47.8	37.1	—
Pneumococcal shot ever			
Yes	38.0	42.7	0.141
No	62.0	57.4	—
Latest A1C value	8.2 ± 2.2	7.7 ± 2.0	<0.001

Data are means ± SD or percentages unless otherwise indicated.

tus, where diabetic smokers were more likely to be uninsured or on a government plan than diabetic nonsmokers, were suppressed in the comparisons.

The present study did not assess smoking cessation advice provided by health care professionals to the diabetic smokers in the sample. We have other data sources that can fill this information

gap. The New York State Adult Tobacco Survey is an annual telephone survey of 8,000 noninstitutionalized adults designed to assess smoking-related knowledge and behavior (13). The survey conducted in 2003–2004 indicated that 80.0% of diabetic smokers ($n = 126$) had been advised to stop smoking by their physicians. Yet only 50.5% of them re-

ported actually attempting to quit. Diabetic smokers were significantly less likely ($P < 0.01$) to acknowledge that smoking causes cardiovascular complications than diabetic nonsmokers (77.5 vs. 92.5%).

These findings suggest that some diabetic smokers were unable or unwilling to acknowledge their increased risk for complications and were also less motivated to follow through with physicians' advice, which may have contributed to the disparities in the recommended care for diabetes. A further study examining knowledge, attitudes, and beliefs about smoking of a sample of diabetic smokers is needed to confirm this hypothesis. Limitations of this study include the recollection bias and social desirability bias associated with self-reports and the lack of income and educational information, which may have additional confounding effects.

In conclusion, we strongly suggest that health care professionals be more active in educating about the risks of smoking and assess smoking status of all diabetic patients, advise diabetic smokers to quit smoking, and pay closer attention to diabetic smokers for signs of complications by making sure that all necessary preventive care and examinations are performed.

Acknowledgments—The study was supported in part by the New York State Department of Health Preventive Health Block Grant State and Local Assistance Funding and the Commissioner's Priority Pool Funding. We thank the New York State Department of Health Bureau of Tobacco Use Prevention and Control for allowing us to use the Adult Tobacco Survey data. The study protocol was approved by the institutional review board at the New York State Department of Health.

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