JAOA SPECIAL COMMUNICATION

Physicians' Role in Eye Care of Patients With Diabetes Mellitus—Are We Doing What We Need To?

Mark I. Crosby, DO
Victoria Shuman, DO

Context: The American Diabetes Association and the American Academy of Ophthalmology recommend that a dilated eye examination be performed on patients with diabetes mellitus during an initial assessment and at least annually thereafter.

Objectives: (1) To determine the extent to which patients with diabetes mellitus are aware that their condition can lead to ocular problems; (2) to determine the percentage of patients with diabetes mellitus who receive annual dilated eye examinations; (3) to discover reasons why patients with diabetes mellitus may not receive annual dilated eye examinations; and (4) to raise awareness among patients with diabetes mellitus of the importance of controlling their condition and of receiving frequent dilated eye examinations.

Methods: A 9-question oral survey of individuals with type 2 diabetes mellitus was administered in 2 clinical medical settings and 1 community setting in Harrison County, West Virginia, between April 7, 2007, and May 15, 2007. Questions covered participant knowledge of diabetes mellitus complications, frequency of receiving eye examinations, and other aspects of diabetes mellitus. Responses were statistically analyzed for correlations between participant knowledge and receiving eye examinations in the past year.

Results: A total of 147 individuals with diabetes mellitus participated in the survey. Among the various conditions that diabetes mellitus can lead to, the surveyed individuals were most aware that diabetes mellitus can lead to eye disease, followed by kidney problems, ulcers, and heart problems. Approximately 70% of survey respondents received a dilated eye examination in the past year. The most common reasons given by the 30% of respondents who did not receive an eye examination were—in order of frequency—procrastination, having never been told it was necessary, and financial issues.

Conclusion: Roughly 1 of every 4 surveyed patients with diabetes mellitus in this West Virginia study who did not receive an annual dilated eye examination was not aware of the need to do so. As osteopathic physicians, we can do more to optimize compliance with current recommendations for good health by continually educating our patients with diabetes mellitus about the need for eye examinations.

J Am Osteopath Assoc. 2011;111(2):97-101

An estimated 23.6 million people in the United States (7.8% of the population) have diabetes mellitus, a serious, lifelong condition.[1] Type 2 diabetes mellitus (T2DM) is frequently not diagnosed until complications appear. In approximately one-fourth of all individuals with diabetes mellitus, the condition may be undiagnosed.[2] Prevalence of diabetes mellitus in West Virginia has escalated to epidemic proportions, with an estimated 12% of the state's population having this disease. Approximately 171,000 West Virginian adults have been diagnosed as having diabetes mellitus, and an estimated 85,000 others have diabetes mellitus that is undiagnosed.[3] West Virginia ranks third in diabetes prevalence among all 50 states.[4]

Diabetes mellitus may lead to a number of ocular effects (eg, cataracts, changes in refractive status, glaucoma), the most disabling of which is diabetic retinopathy. Diabetic retinopathy is a common cause of blindness and accounts for almost one-fourth of blind registrations in the Western world. In addition, diabetic retinopathy is estimated to be the most frequent cause of new cases of blindness among adults aged 20 to 74 years.[2]

Because of the established efficacy of laser photocoagulation surgery in preventing visual loss, the American Diabetes Association (ADA) has suggested that dilated eye examinations for patients with diabetes mellitus be repeated annually by an ophthalmologist or optometrist.[2] Several national clinical trials sponsored by the National Eye Institute have demonstrated that with appropriate referral and effective treatment

From the Naval Air Station/Joint Reserve Base, New Orleans-Belle Chasse, in Louisiana (Dr Crosby) and the United Hospital Center, Family Medicine Residency, in Clarksburg, West Virginia (Dr Shuman).

The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, the Department of Defense, or the United States government.

Financial Disclosures: None reported.

Address correspondence to Mark I. Crosby, DO, Aeromedical Officer, Naval Air Station/Joint Reserve Base, New Orleans-Belle Chasse, 400 Russell Ave, Bldg 41, New Orleans, LA 70143-5077.

E-mail: markicrosby@gmail.com

Submitted March 17, 2010; revision received July 15, 2010; accepted July 20, 2010.

with panretinal or focal laser photocoagulation surgery, the incidence of severe visual loss can be reduced by at least 50%—and perhaps by as much as 90%—in patients with retinopathy secondary to diabetes mellitus.[5]

In the present article, we discuss results of a survey of individuals with diabetes mellitus to reveal information on patient knowledge of diabetes complications and the importance of dilated eye examinations.

Methods

Between April 7, 2007, and May 15, 2007, face-to-face oral surveys with individuals who had diabetes mellitus were conducted in 2 healthcare settings and 1 public setting in Harrison Country, West Virginia. The public setting was Meadowbrook Mall in Bridgeport, West Virginia. One healthcare setting was United Hospital Center in Clarksburg, West Virginia, where surveys were given to inpatients and outpatients of James D. DeMarco, MD, a nephrologist. The other healthcare setting was the family practice clinic adjacent to United Hospital Center. Permission to conduct this study was obtained from the institutional review boards of both United Hospital Center and the West Virginia School of Osteopathic Medicine in Lewisburg.

At the survey sites, a table was set up with signs reading, "How well do you know your diabetes?," and "Come get some info regarding diabetes and take a brief survey!" At the table were pamphlets regarding diabetes mellitus. When individuals approached the table to look at the available reading material, they were asked, "Do you have diabetes?" Positive responses to that question were followed by an invitation to take the anonymous, voluntary, 9-question survey. The questions in the survey were as follows:

1. Have you been told by a doctor that you have diabetes?
2. How many years have you had diabetes?
3. How do you control your diabetes?
4. From what you know about diabetes, what health problems might someone with diabetes have?
5. In what ways has any doctor provided you with information about diabetes?
6. Have you ever been told by a doctor that diabetes can lead to blindness?
7. When was your last dilated eye exam?
8. Has any doctor ever told you that because you have diabetes you need a yearly dilated eye exam?
9. What's the main reason you haven't received yearly dilated eye exams?

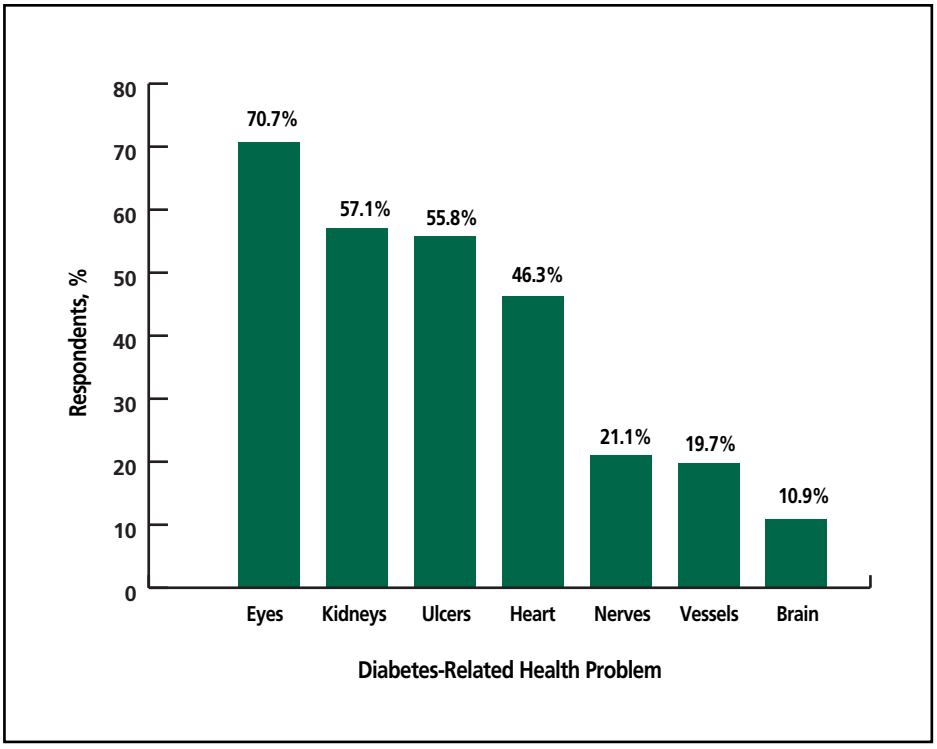

Figure 1. *Answers of survey respondents with diabetes mellitus to the question, "From what you know about diabetes, what health problems might someone with diabetes mellitus have?" (N=147). Responses were coded into 1 of 8 categories: retinopathy or eyes; nephropathy or kidneys; ulcers or amputations; coronary artery disease or heart; neuropathy or nerves or decreased sensation; atherosclerosis or vessel damage; stroke or brain; or other.*

Participants' oral responses to the questions were categorized and recorded on the survey form by the individuals administering the survey (M.I.C. or the individuals mentioned in the acknowledgments section of the present article). Survey results of any participants who reported existing blindness were not included in the analysis of responses. The survey results were analyzed by a statistician at the West Virginia University School of Medicine in Morgantown.

Results

A total of 147 individuals with diabetes mellitus participated in the survey. Of this study population, 62 individuals (42.2%) were surveyed at the Meadowbrook Mall, 74 (50.3%) were surveyed at Dr DeMarco's clinic at United Hospital Center, and 11 (7.5%) were surveyed at the family practice clinic adjacent to United Hospital Center.

Respondents' answers to the question, "From what you

know about diabetes, what health problems might someone with diabetes mellitus have?" were coded into 1 of 8 categories: retinopathy or eyes; nephropathy or kidneys; ulcers or amputations; coronary artery disease or heart; neuropathy or nerves or decreased sensation; atherosclerosis or vessel damage; stroke or brain; or other. The most common responses to this question were categorized as retinopathy or eyes (104 [70.7%])—followed by, in order of frequency, nephropathy or kidneys (84 [57.1%]); ulcers or amputations (82 [55.8%]); coronary artery disease or heart (68 [46.3%]); neuropathy or nerves or decreased sensation (31 [21.1%]); atherosclerosis or vessel damage (29 [19.7%]); and stroke or brain (16 [10.9%]) (*Figure 1*).

In an effort to quantify each respondent's knowledge concerning diabetes mellitus, the number of positive responses to the "what health problems might someone with diabetes mellitus have" question was counted for each individual. For example, if an individual replied that diabetes mellitus could affect one's eyes, kidneys, and legs (eg, ulcers), 3 positive responses were counted. A response of only "eyes" was counted as 1 positive response. "Other" responses mentioning liver, pancreas, or muscles or such vague symptoms as headache or fatigue—although related to diabetes complications—did not count as positive points because they are not actual, precise complications of the illness. Individuals who mentioned immune system problems or healing problems were counted in the ulcers category and received a positive response for each answer.

Respondents were also assigned to 1 of 2 groups based on eye examinations: those who had received a dilated eye examination within the past year and those who had not. There were 103 individuals (70.1%) in the group receiving an eye examination (*Figure 2*). These participants gave an average of 3 positive responses to the question on diabetes-related health problems. The 44 individuals (29.9%) who had not received an eye examination in the past year gave an average of 2.6 positive responses to the question. A *t* test revealed that this difference between the 2 respondent groups was not statistically significant (P=.083).

The *Table* presents data on the correlation between positive responses to the question on diabetes-related health problems and responses to the question on having had an eye examination in the past year. For example, 5 of the 8 survey participants (62.5%) who had 0 positive responses had an eye examination in the past year, and 6 of the 10 participants (60%) who had 1 positive response had an eye examination in the past year. Among participants who had 2 or more positive responses to the question on diabetes-related health problems, the percentage of individuals who had eye examinations increased with more positive responses. Thus, the greater the number of positive responses (ie, the greater the respondent's knowledge concerning ill effects of diabetes mellitus), the greater the likelihood of getting an annual dilated eye examination.

The 44 individuals who responded that they had not received an eye examination in the past year were asked to provide the main reason that they had not done so (*Figure 3*). The most common reason given (14 [31.8%] responses) was categorized as, "I just put it off." Any reasons given regarding procrastination or "laziness" (as mentioned by the respondent) were also included in this category. The next most common reason given was, "I was never told an exam was needed" (10 [22.7%])—followed by financial concerns, such as the expense of the examination or lack of insurance (8 [18.2%]); health issues (5 [11.4%]); and forgetting about the examination (2 [4.5%]). Five reasons given did not fit any of these categories.

An analysis was performed to compare the percentage of survey participants who reported "eyes" as a positive response to the percentage of participants who underwent an eye examination in the past year. Results showed that knowledge of diabetes mellitus potentially leading to eye problems had no effect on whether respondents received an eye examination. Of the 103 respondents who received an eye examination within the past year, 74

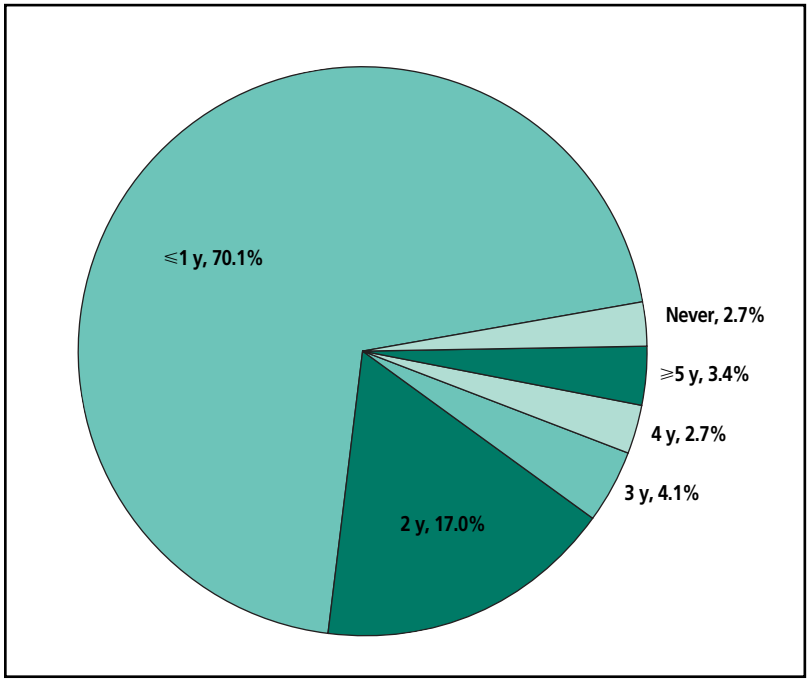

Figure 2. *Numbers and percentages of survey respondents with diabetes mellitus who received a dilated eye examination, according to number of years since receiving the examination (≤1 to ≥5 years, or never) (N=147).*

Table.
Correlation Between Positive Responses to Survey Question on Diabetes Mellitus-Related Health Problems vs Responses to Survey Question on Receiving Eye Examination in the Past Year (N=147)

Positive Responses, No.*	0	1	2	3	4	5	6	Total
Total Respondents Reporting Each Number of Positive Responses, No.	8	10	38	39	40	11	1	147
Respondents Receiving Eye Exam in Past Year, No. (%)	5 (62.5)	6 (60.0)	24 (63.2)	27 (69.2)	31 (77.5)	9 (81.8)	1 (100)	103 (70.1)
Respondents Not Receiving Eye Exam in Past Year, No. (%)	3 (37.5)	4 (40.0)	1 (36.8)	1 (30.8)	9 (22.5)	2 (18.2)	0 (0)	44 (29.9)

* Positive responses were tabulated to the question, "From what you know about diabetes, what health problems might someone with diabetes have?" Responses were coded into 1 of 8 categories: atherosclerosis or vessel damage; coronary artery disease or heart; nephropathy or kidneys; neuropathy or nerves or decreased sensation; retinopathy or eyes; stroke or brain; ulcers or amputations; or other. For example, if an individual replied that diabetes mellitus could affect one's eyes, kidneys, and legs (eg, ulcers), 3 positive responses were counted. A response of only "eyes" was counted as 1 positive response.

(71.8%) mentioned in the survey that diabetes mellitus could harm the eyes. Of the 44 respondents who did not receive an eye examination within the past year, 31 (70.5%) mentioned that diabetes mellitus could harm the eyes. A χ^2 analysis revealed no statistically significant difference between these 2 results (P=.7961).

Comment

The survey data reported in the present study do not overwhelmingly show that greater awareness of diabetes mellitus complications alone leads to better compliance of patients. The results indicate that some individuals appeared to have much knowledge about the long-term effects of diabetes mellitus (including the fact that it is harmful to the eyes), yet they did not have an eye examination within the past year.

Much of the knowledge about diabetes mellitus among survey participants arose from personal experience. For example, when participants were asked how diabetes mellitus could affect them, it was common for them to reply that they knew it could affect the eyes and heart, because they already had eye and heart problems from diabetes. Many respondents also mentioned that by the time they were told of the importance of taking healthcare precautions (eg, tight glucose control, checking condition of feet, yearly eye examinations), the disease had already progressed to an advanced stage.

Although lack of motivation and financial problems were reasons given by more than half of survey respondents for not getting an eye examination in the past year, almost 25% of respondents said they had never been told of the importance

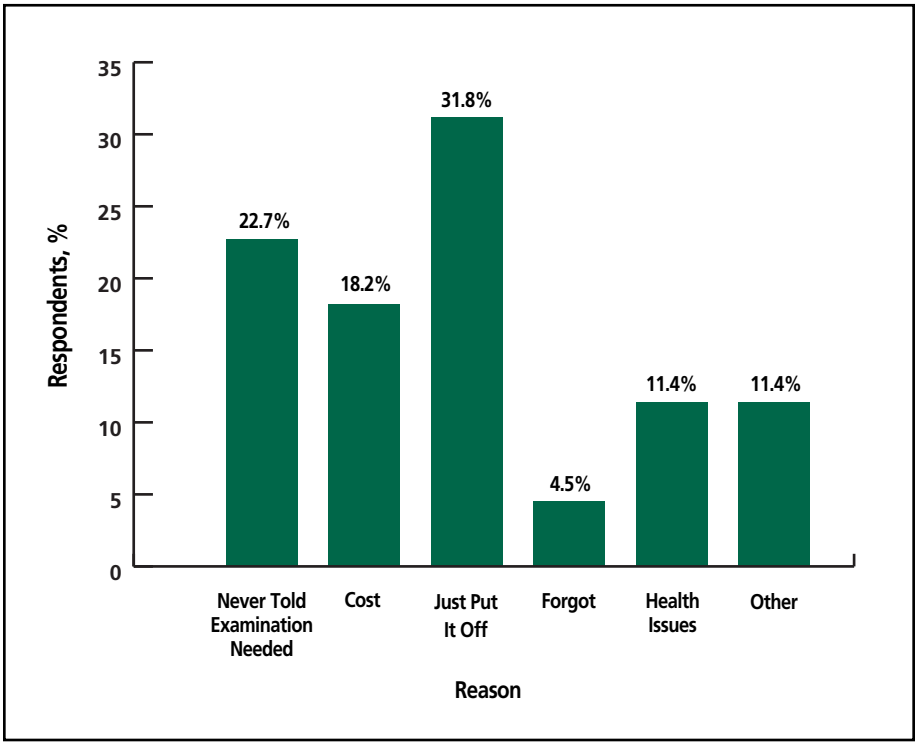

Figure 3. *The main reasons given by 44 survey respondents with diabetes mellitus for not receiving an eye examination in the past year. The most common reason given was, "I just put it off." The next most common reason given was, "I was never told an exam was needed"—followed by financial concerns, health issues, and forgetting about the examination. Five reasons did not fit into any of these categories.*

of, or recommendation for, an annual eye examination. As healthcare providers, we have the opportunity to help a large number of patients with diabetes mellitus who may be in jeopardy of losing their sight by simply recommending that they receive an annual eye examination—and by following up to make sure that they received the examination.

More than half of the surveyed individuals were currently seeing a nephrologist. Thus, the percentage of participants who mentioned kidneys as being affected by diabetes mellitus (57%) was probably higher than it would be in the general population of people with diabetes mellitus.

Conclusion

Roughly 1 of every 4 surveyed individuals with diabetes mellitus in the present West Virginia study who had not undergone an annual eye examination claimed ignorance as an explanation for not getting the examination. As osteopathic physicians, we can optimize patient health by continually educating and encouraging our patients regarding current preventive healthcare recommendations. This goal could be accomplished by training our staff to ask every patient with diabetes mellitus when their last dilated eye examination was performed—or by posting signs in our examination rooms asking the questions, "Do you have diabetes? If so, has an eyecare professional examined your eyes within the past year?"

Once the need for an annual eye examination is identified, we can provide focused education and encouragement to patients. Because laser photocoagulation is generally not beneficial in reversing diminished visual acuity,[2] it is imperative that all physicians encourage patients with diabetes mellitus to visit a qualified eyecare professional before the disease process of diabetes mellitus advances.

Acknowledgments

We thank Jeremy M. Benger, DO; Beth Wheeling Weppner, PA-C; and James C. Paugh, III, DO.

References

1. Centers for Disease Control and Prevention. *National Diabetes Fact Sheet: General Information and National Estimates on Diabetes in the United States, 2007*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention; 2008. http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2007.pdf. Accessed December 10, 2010.

2. American Diabetes Association. Standards of medical care in diabetes—2010. [published correction appears in *Diabetes Care*. 2010;33(3):692]. *Diabetes Care*. 2010;33(suppl 1):S11-S61. http://care.diabetesjournals.org/content/33/Supplement_1/S11.full.pdf+html. Accessed December 10, 2010.

3. Diabetes in West Virginia—Diabetes facts. West Virginia Diabetes Prevention & Control Program Web site. http://www.wvdiabetes.org/Portals/12/DiabetesFactSheet_withfinal7thfloorchanges.pdf. Accessed December 10, 2010.

4. West Virginia Department of Health and Human Resources. *The Burden of Diabetes in West Virginia*. Charleston: West Virginia Department of Health and Human Resources; 2009:12. http://www.wvdiabetes.org/Portals/12/Burden%20of%20Diabetes.pdf. Accessed December 10, 2010.

5. Ocular manifestations of systemic disease. In: Bradford CA, ed. *Basic Ophthalmology*. 8th ed. San Francisco, CA: American Academy of Ophthalmology; 2004:170.