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Diabetic Retinopathy: Examination and Referral Practices of Primary Care Providers

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Abstract

Objective: To investigate general practitioners' examination and referral practices for diabetic retinopathy.

Methods: A questionnaire survey distributed to doctors working in the Bronx.

Results: Fifty-eight surveys were collected. 48.3% of healthcare providers reported performing annual funduscopic exams and 24.1% of healthcare providers claim that they only perform funduscopic exams on the initial visit. 86.2% of providers do not dilate patient's eye prior to performing funduscopic exams. The majority (91.4%) of providers report that they refer their diabetic patients to an eye care specialists annually. Fifty percent of providers graded their skills in performing a funduscopic exam as satisfactory. Only 25.9% reported having good skills in detecting signs of diabetic retinopathy. Thirty-eight percent of providers estimated that 51 to 75% of their diabetic patients keep their appointments with eye care specialists. Thirty-one percent of general practitioners stated that they receive reports back from eye care specialists less than 25% of the time.

Conclusion: Although there is a wide variation in how often general practitioners perform funduscopic exams, the majority report referring their diabetic patients to an eye care specialist annually. The majority of general practitioners do not feel confident in their abilities to perform thorough eye exams. Providers report that some of the major gaps that exist in their ability to prevent retinal eye disease are patient's compliance with referrals and a lack of communication between general practitioners and eye care specialists.

Introduction

Fourteen million Americans have diabetes mellitus (DM), the majority of which have the Type 2 form of disease. This disease is a major cause of morbidity in the United States, a large percentage of which is attributed to diabetic retinopathy (Fonseca et al., 1996). This complication is the leading cause of blindness in the 20- to 74-year old age group in the United States (Bresnick et al., 2000). The Wisconsin Epidemiologic Study of Diabetic Retinopathy estimated that an ophthalmologist had not examined approximately 36% of patients with Type 2 DM in the preceding two years. In this same group, an ophthalmologist had not seen approximately seven percent of Type 2 DM patients with a vision-threatening form of retinopathy in two years (Fonseca et al., 1996).

It has been shown that referrals to ophthalmologists have the potential to significantly reduce the incidence of visual loss secondary to proliferative diabetic retinopathy (Early Treatment of Diabetic Retinopathy Study Research Group, 1991). Multiple studies have shown that laser photocoagulation of new vessels, performed by ophthalmologists, may significantly reduce the incidence of severe visual loss (Aiello et al., 2000). This treatment method has the potential to reduce the incidence of diabetic blindness by 60% to 80% (Haik et al., 1989). The earlier this procedure is performed the more likely the chances are of reducing the development of blindness (Aiello et al., 2000). Even though it is possible to significantly reduce the incidence of blindness secondary to DM, large numbers of DM patients still experience visual loss due to retinal complications of disease. In a number of patients, development of serious diabetic retinopathy may be asymptomatic. Thus, routine screening and ophthalmologic examinations are vital (Klein et al., 1987). Timely referrals to ophthalmologists have the potential to significantly reduce the incidence of visual loss in patients with diabetes. Numerous studies have elucidated the relationship between inadequate control of blood glucose and increased risk of developing retinopathy. Therefore, intensive DM management to obtain near-euglycemic control can prevent and delay the progression of diabetic retinopathy in patients with DM (Aiello et al., 2000).

This poses a question about what precludes proper prevention and management of diabetic retinopathy. While the ophthalmologist can provide specialized services for patients with diabetic retinopathy, prevention, and control lie largely in the hands of primary care providers (PCPs) as well as patient compliance with physician recommendations (Chen et al., 1995). One of the objectives of this study was to look at the effectiveness of the partnership, if it exists, between primary care and specialized care providers, such as an ophthalmologists. The American Diabetes Association recommends that patients with Type 2 DM should have an initial dilated comprehensive eye examination by an ophthalmologist or optometrist shortly after their diagnosis is made. After the initial eye examination, it is suggested that persons with DM receive eye examinations annually unless more frequent examinations are warranted by the presence of retinal abnormalities (American Diabetes Association, 2000). The National Committee for Quality Assurance has incorporated the above guidelines as a quality performance measure in the Health Plan Employer Data and Information Set (HEDIS). Initial HEDIS reports indicate that

Primary Care Provider Practice Characteristics	% Respondents
A. Type of General Practitioner	
Family Physician	87.9%
General Internist	10.3%
Licensed Nurse Practitioner	1.7%
B. Years of Practice	
< 5 Years	50.0%
5-10 Years	17.2%
> 15 Years	20.7%
C. Estimated Number of Type 2 DM Patients per PCP	
< 20	44.8%
21-50	29.3%
51-75	8.6%
76-100	6.9%
> 100	10.3%
D. Estimated % of Current Type 2 DM Patients with Diabetic Retinopathy	
< 20	77.6%
21-50	19.0%
51-75	3.4%
> 75%	0.0%

Table 1: PCP practice characteristics.

only 35% to 50% of patients between ages of 30 and 64 actually receive the recommended annual eye examination (Bresnick et al., 2000).

A number of studies have shown limited abilities of PCPs to diagnose diabetic retinopathy. Sussman et al. (1982) showed that when dilated ophthalmoscopic exams were performed by the internists to detect signs of serious retinopathy, the sensitivity was 0.49, and the specificity was 0.84. This is in contrast to a sensitivity of 0.96, and a specificity of 0.93 when ophthalmologists performed the dilated ophthalmoscopic exams.

Nevertheless, our study sought to investigate how PCPs feel about their own ability to provide eye care and whether they think improved skills could improve diagnosis. Will an increase in the level of PCP training to do funduscopic exams lead to better screening and diagnosing of retinal disease in diabetic patients, thus decreasing the number of unnecessary referrals in already overburdened medical system? Or is it more cost-effective to refer earlier and be sure that the disease will be caught early enough to reduce the chance of complications? Since it would be virtually impossible to examine all the factors contributing to the lack of decline in retinal eye disease in diabetic patients, we have concentrated our pilot study on PCPs and tried to focus on their 1) compliance with national guidelines for screening of patients for diabetic retinopathy, 2) ability to perform funduscopic exams and diagnose retinal disease, and 3) referral practices of diabetic patients for regular ophthalmologic exams.

Methods

Data collection was performed with the help of students and faculty members of The Albert Einstein College of Medicine (AECOM), who distributed surveys to medical providers in Bronx, New York. They service a patient population that is mostly Spanish-speaking and of low socioeconomic status. The providers receiving the surveys included family physicians, general internists, and nurse practitioners. Both attending physicians and residents were approached. Medical providers were instructed to fill out a written questionnaire that contained thirteen questions. The surveys were anonymous. The data was collected over a time period of two weeks (from 9/12/00 to 9/28/00). Researchers in the Family Medicine Department of AECOM reviewed the questionnaire before the medical providers were approached.

The survey was designed to examine provider's practices concerning eye screening of diabetic patients. The questionnaire addressed 1) providers' compliance with national guidelines for eye screening of diabetic patients, 2) providers' opinions about the process of referrals for eye screening, 3) providers' ability to perform funduscopic exams, and 4) providers' knowledge of barriers that may exist in preventing patients from receiving proper eye care. To assess general practitioners' compliance with national guidelines, providers were asked how often they perform funduscopic exams on their diabetic patients and how often they send their diabetic patients to eye specialists. To evaluate general practitioners' views on the efficiency of referrals to eye specialists, providers were asked to estimate what percentage of their patients keep their appointments with eye specialists and how often they receive reports back from eye specialists about the visit. To determine general practitioners' ability to do funduscopic exams, providers were asked to grade their skills in performing a funduscopic exam and in their ability to detect signs of diabetic retinopathy. Providers were also asked whether they perform dilated funduscopic exams. In order to assess general practitioners' knowledge of the obstacles preventing diabetic patients from receiving proper eye care, providers were asked about possible reasons preventing them from regularly referring their patients to eye specialists. They were also asked to rate (on a scale from one to five) suggestions that would improve the early diagnosis of diabetic retinopathy in diabetic patients.

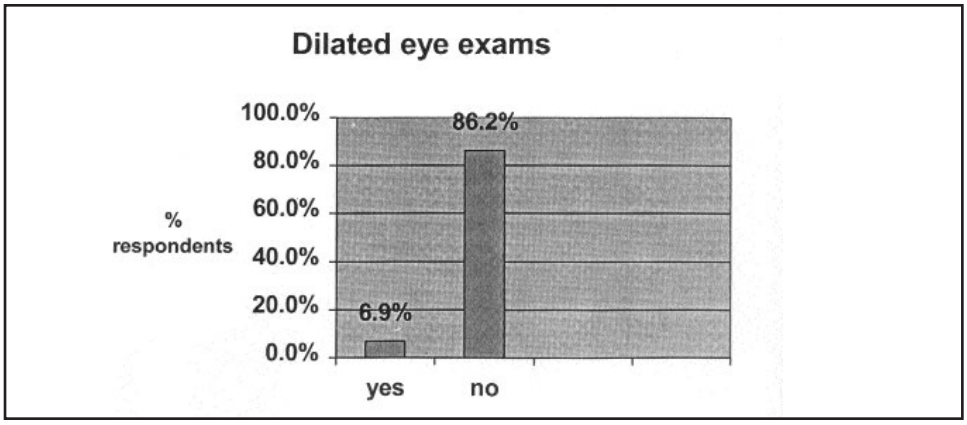

Figure 1: Frequency of performed funduscopic exams.

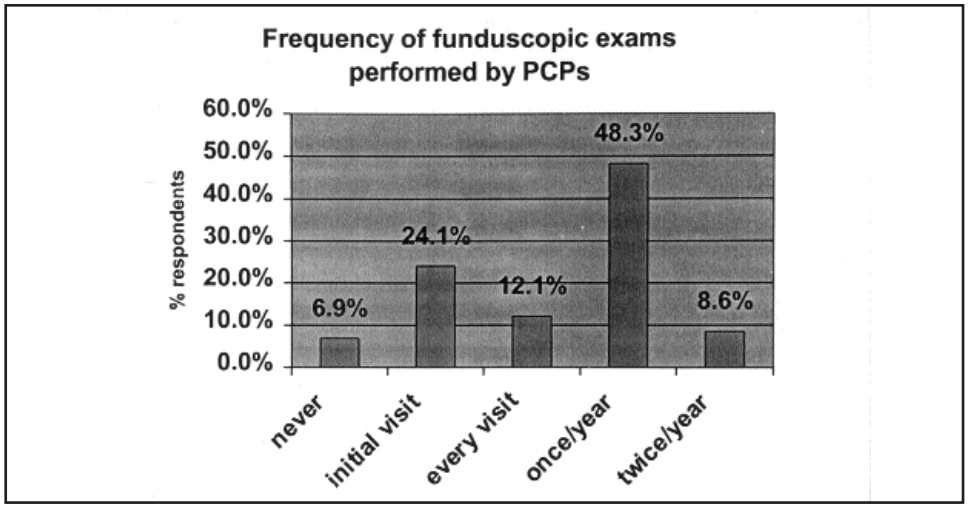

Figure 2: Frequency of funduscopic exams performed by PCPs.

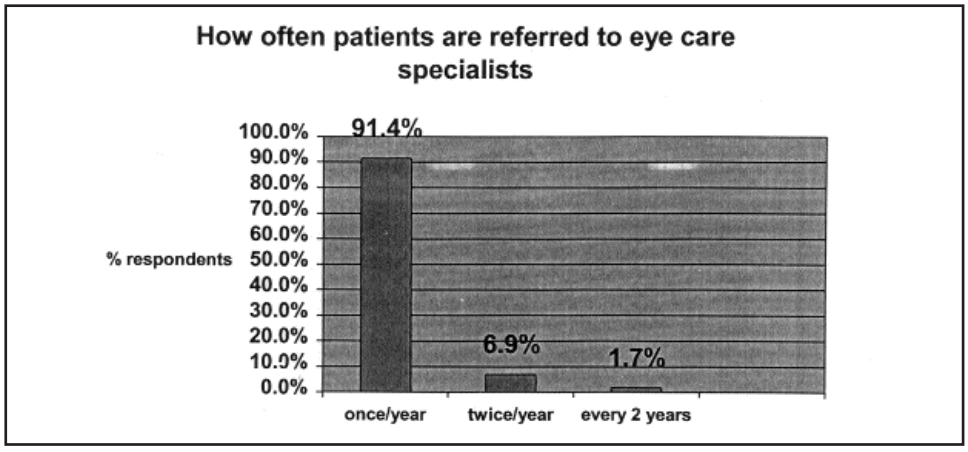

Figure 3: Frequency of referral to eye care specialists of diabetic patients by PCPs.

Results

Surveys were collected from 58 providers over a 2 week period. Of the 58 providers, 51 (87.9%) were family physicians, 6 (10.3%) were general internists, and 1 (1.7%) was a nurse practitioner (Table 1A). Twenty-nine (50.0%) providers reported that they had been practicing medicine for less than 5 years, and 10 (17.2%) said they had been practicing for a time span between 5 to 10 years. Seven (12.1%) providers stated that they had been practicing between 11 and 15 years, and 12 (20.7%) said they had been practicing for a time span of greater than 15 years (Table 1B).

General practitioners were asked to estimate the number of Type 2 diabetic patients that were currently under their care. The majority (44.8%) of providers reported caring for fewer than 25 diabetic patients, and the next largest category (29.3%) were those who cared for between 25 and 50 diabetic patients. The remainder of the providers estimated their diabetic patient population to be either 51 to 75 patients (6.9%) or greater than 75 patients (10.3%) (Table 1C).

In evaluating adherence to national guidelines for eye care for diabetic patients, providers were asked how frequently they perform funduscopic exams. Four (6.9%) providers said that they never perform funduscopic exams; 14 (24.1%) providers reported performing funduscopic exams on a patient's initial visit; 7 (12.1%) said they perform funduscopic exams on every visit; 28 (48.3%) providers reported performing funduscopic exams annually; and 5 (8.6%) reported performing funduscopic exams twice a year (Figure 1). The majority of providers (86.2%) reported not performing dilated eye exams (Figure 2).

The next issue addressed was the frequency of referrals to ophthalmologists by the providers. The majority (91.4%) of providers responded that they refer their diabetic patients to an ophthalmologist/optometrist once a year. Four (6.9%) providers reported sending their diabetic patients to eye specialists twice a year and one (1.7%) provider reported sending diabetic patients once every five years (Figure 3).

In assessing providers' skills in performing funduscopic exams, 29 (50%) providers graded their skills as satisfactory, 12 (20.7%) reported that their skills were poor, 16 (27.6%) providers rated their skills as good, and 1 (1.7%) felt that his/her skills were excellent (Figure 4). Only 15 (25.9%) providers thought that they had good skills in detecting diabetic retinopathy. Twenty-three (39.7%) providers reported having satisfactory skills in detecting diabetic retinopathy, and 19 (32.8%) felt that they had poor skills (Figure 5).

Turning to providers' view of the efficiency of their referrals to eye specialists, there was a wide range of responses from general practitioners as to how many patients referred to an eye specialist keep their appointments. Fifteen (25.9%) providers thought that between 25% and 50% of patients keep their appointments with eye specialists. Twenty-two (37.5%) providers reported that an estimated 51% to 75% of their patients see an eye specialist when referred, and 20 (34.5%) said that greater than 75% of their patients go (Figure 6). Providers gave a wide range of answers when asked how often they receive reports back from ophthalmologists who had seen their diabetic patients. Eighteen (31.0%) providers reported getting back reports less than 25% of the time. Sixteen (27.6%) providers said that they received reports from eye specialists 25% to 50% of the time. Eleven (19.0%) providers claimed that reports were received between 5% to 75% of the time, and 13 (22.4%) providers stated that the rate of receiving reports back from ophthalmologists was greater than 75% (Figure 7).

In order to assess the barriers that prevent diabetic patients from receiving proper eye care, providers were asked what obstacles they find in the process of referring patients regularly to eye specialists. Eight (13.8%) providers said that they sometimes are unable to address the issue due to lack of time, and 7 (12.1%) providers said they found problems with insurance coverage. Most providers did not answer this question.

Finally, general practitioners were asked to rate (on a scale of from one to five, one being the least important and five being the most important) suggestions for improving the diagnosis of diabetic retinopathy in their diabetic patients. Thirty-five (60.3%) providers claimed that receiving regular reports from ophthalmologist was very important (grade five). Thirty-three (56.9%) providers reported that having a checklist in diabetic patients' charts as a reminder for the need for referrals was essential (grade five). Twenty-five (43.1%) providers stated that having an ophthalmologist in their practice would be key (grade five). Twenty-three (39.7%) providers said that increasing their training in performing funduscopic exams would be very helpful (grade five). Twenty (34.5%) providers claimed that increasing patients' education in order to enable patients to remind doctors about the need for eye care was very important (grade five).

Discussion

The American Diabetes Association recommends that patients newly diagnosed with Type 2 Diabetes receive an initial funduscopic exam from an ophthalmologist or optometrist. After this initial visit, it is recommended that diabetic patients have an annual funduscopic exam. It is unclear from these recommendations if a general practitioner or an eye care specialist should be performing these annual exams. From our study it seems that general practitioners varied widely in their frequency of performing funduscopic exams. Approximately half of

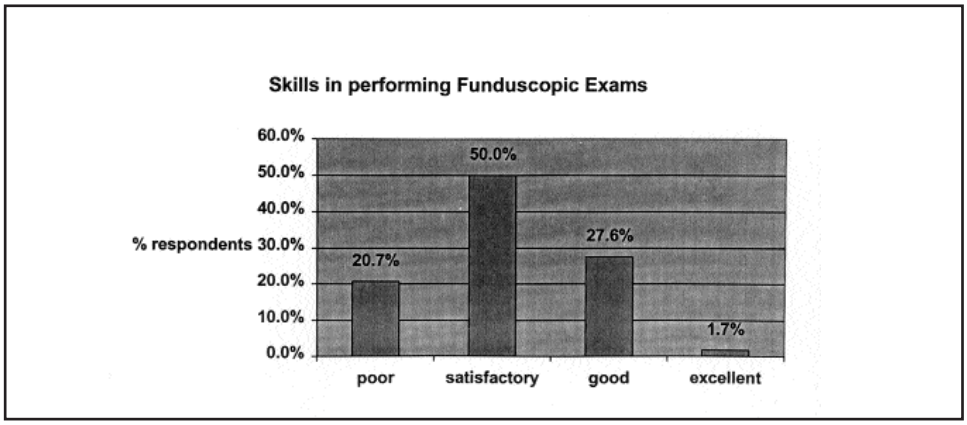

Figure 4: PCPs accessment of their skill in performing funduscopic exams.

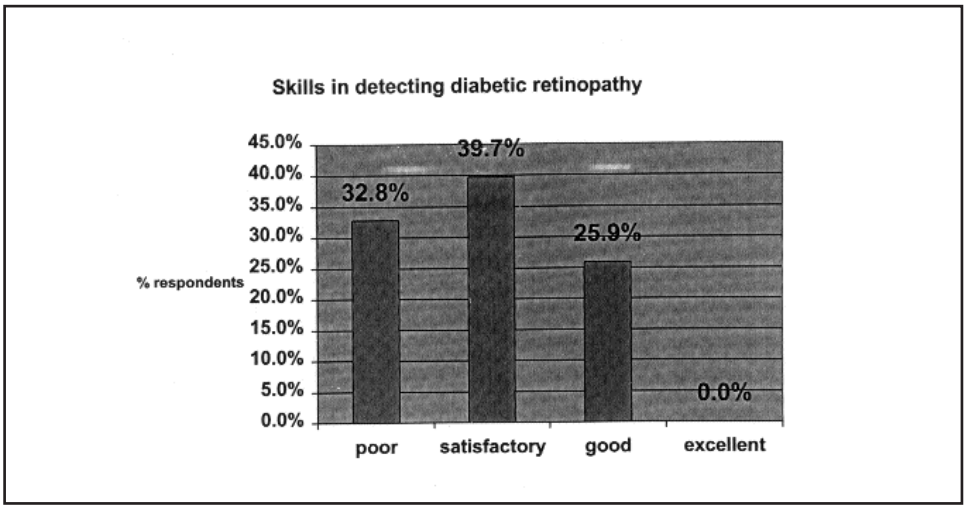

Figure 5: PCPs accessment of their skills at detecing the signs of diabetic retinopathy.

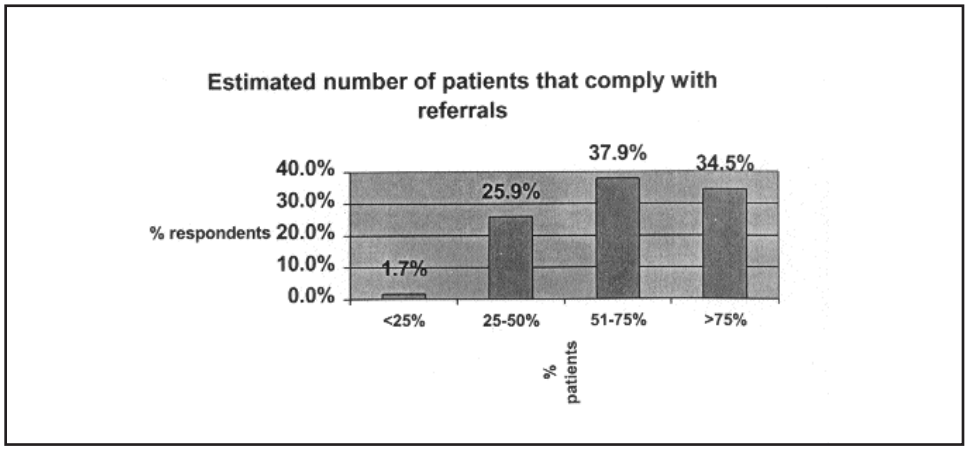

Figure 6: Estimated, by PCPs, number of patients that comply with referrals to eye care specialists.

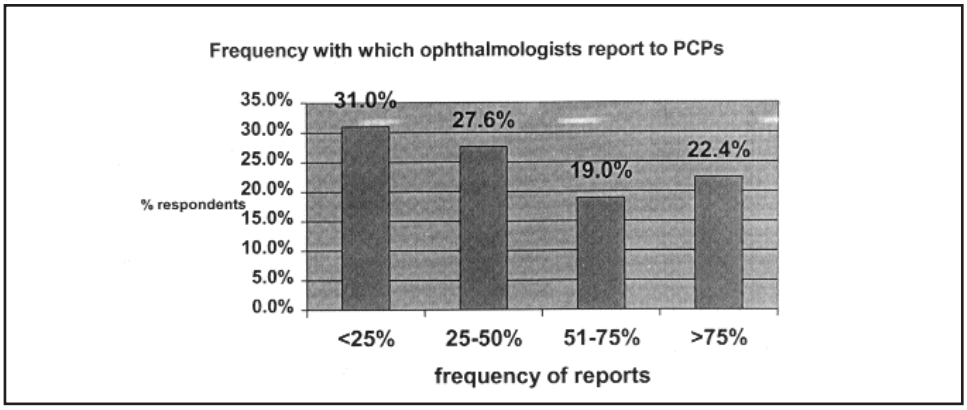

Figure 7: Frequency with which ophthalmologists report to PCPs about referred patients.

the providers said that they performed funduscopic exams annually while one-quarter stated that they performed funduscopic exams on the patient's initial visit only. This may be due to lack of clear guidelines from the The American Diabetes Association as to how often general practitioners should be performing these exams. Alternatively, the majority of providers may not be doing funduscopic exams on diabetic patients, because they do not feel comfortable with their skills in this area.

It was clear from our study that the majority of surveyed providers did not dilate the patients' eyes before performing the exam. Klein et al. (1987) showed that when undilated ophthalmoscopic exams were done by "experienced technicians" a 0.90 specificity was attained, but the sensitivity reached only 0.50.

The vast majority of providers report sending their diabetic patients to an ophthalmologist or optometrist annually. From this response, it would appear that doctors are doing their part in preventing the development of diabetic retinopathy. In order to confirm these claims, a chart review needs to be done to corroborate that indeed these providers are referring their patients annually.

The next issue addressed was providers' comfort level in performing funduscopic exams. Fifty percent of providers said that their skills were satisfactory, yet approximately one-quarter said their skills were poor. This clearly shows that many medical providers feel that their ability to perform a funduscopic exam is sub-par. Furthermore, only a quarter of the providers felt that they had good skills in detecting signs of diabetic retinopathy. It is apparent from these results that providers feel improperly trained in the performance of a funduscopic exam and specifically in identifying the signs of diabetic retinopathy. Perhaps general practitioners should be better trained to do these exams. This may eliminate the need and cost of referrals to an ophthalmologist or optometrist.

Next we evaluated providers' opinions about the efficiency of referring patients to eye specialists for eye care. Providers' responses about how often they think their patients keep their appointments with the eye care specialist varied widely. Close to half of providers said that more than half of their patients went to the ophthalmologist or optometrist. However, a quarter of the providers claimed that less than half of patients kept their appointments. To further study the validity of these statements, a patient survey and a complete chart review should be done. This may be a major gap that is precluding the prevention of the development of diabetic retinopathy. Perhaps having an eye care specialist on site in a general practitioners office may help to alleviate this issue.

Knowing that a good relationship between a general practitioner and an eye specialist is essential, our study showed a wide range of responses as to how often general practitioners receive reports back from eye specialists. Approximately one third of general practitioners said that they received reports back from eye specialists less than a quarter of the time. According to many providers this is a major impediment for to the proper eye care treatment of diabetic patients. Of the providers surveyed, more than half rated the suggestion of receiving regular reports from eye care specialists as very important in improving the diagnosis of diabetic retinopathy. It is critical for general practitioners, treating their diabetic patients, to have an easier way of communicating with eye care specialists. Close to half of the providers said they would like to see an ophthalmologist on staff. The obvious stumbling blocks to this suggestion are cost and lack of space.

The group of providers we surveyed appears to refer their diabetic patients to ophthalmologist more frequently than what the national statistics show. Even with 91% referral rate, more than half of the providers would like to see a

checklist in diabetic patients' charts as a reminder for the need for referrals. Many providers noted that such a checklist exists. Yet, these checklists are not being actively placed inside the diabetic patients' charts. Putting such a form in a patient's chart is a very easy suggestion to implement into practice. This does not require any additional costs, but it will enable the provider to keep current with the needs of the diabetic patient.

Assuming that general practitioners are diligently referring their patients, the question remains whether patients are following up on those referrals. Of the providers surveyed, a third graded patient education about the need for referrals as being very important. It would be interesting to follow up on providers' methods of education and how receptive patients are to those methods.

Finally, more than a third of the respondents believe that increasing their training in performing funduscopic exams is very important. Our survey showed that majority of providers do not perform dilated funduscopic exams. This is a potential downfall in physicians' screening and diagnosing abilities. Some studies argue that although providers' skills may improve with training, it is still unlikely that the average PCP will be able to provide reliable diagnostic assessment of retinopathy (Bresnick et al., 2000). However, other studies have shown that with the appropriate training, PCPs can screen for retinopathy (Griffith et al., 1993). Thus, availability of a screening protocol in a primary care setting could potentially reduce the number of premature referrals. Future studies should evaluate the availability of such a protocol and provider familiarity with it.

In conclusion, the purpose of this study was not to provide definitive answers to the question of why so many diabetic patients are developing retinal eye disease. The purpose of this study was to pinpoint possible gaps and downfalls in screening and prevention of diabetic retinopathy. Some of the perceived obstacles, we found in our study, that contribute to the lack of decline in retinal eye disease included 1) PCPs' lack of confidence in performing funduscopic exams; 2) providers are not performing dilated exams; 3) unsatisfactory patient follow up with referrals; and 4) lack of proper communication between PCPs and eye care specialists.

The limitation of this study was its subjectivity. Providers may underreport on some issues and exaggerate on other issues. What this study was able to do was to open up further topics for discussion. Our recommendations for further studies include a chart review to further examine general practitioner referral practices, patient compliance with referrals and reporting practices of eye care specialists. Patients and eye care specialists remain the missing variables in this equation. Surveying them would be an equally important step and should be integrated into future studies.

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References

American Diabetes Association. (2000) Standards of Care for Patients with Diabetes Mellitus. *Diabetes Care* **23:** S32-S42.

Aiello, L.P., Gardner, T.W., King, G.L., Blankenship G., Cavallerano J.D., Ferris, F.L., 3rd, and Klein, R. (1998) Diabetic Retinopathy. *Diabetes Care* **21:**143-156.

Appiah, A.P., Ganthier, R., Jr, and Watkins, N. (1991) Delayed diagnosis of diabetic retinopathy in black and Hispanic patients with diabetes mellitus. Ann. *Ophthalmol*. **23:**156-158.

Bresnick, G.H., Mukamel, D.B., Dickinson, J.C., and Cole, D.R. (2000) A screening approach to the surveillance of patients with diabetes for the presence of vision-threatening retinopathy. *Ophthalmol.* **107:**19-24.

Chen, C.J., Herring, J., and Chen, A.S. (1995) Managing diabetic retinopathy: the partnership between ophthalmologist and primary care physician. *J. Miss. State Med. Assoc.* **36:** 201-208.

Early Treatment of Diabetic Retinopathy Study Research Group. (1991) Early photocoagulation of diabetic retinopathy: ETDRS report number 9. *Ophthalmol.* **98:** 766-785

Fonseca, V., Munshi, M., Merin, L.M., and Bradford, J.D. (1996) Diabetic retinopathy: a review for the primary care physician. *South Med. J.* **89:** 839-850.

Griffith, S.P., Freeman, W.L., Shaw, C.J., Mitchell W.H., Olden C.R., Figgs L.D., Kinyoun J.L., Underwood D.L., and Will, J.C. (1993) Screening for diabetic retinopathy in a clinical setting: a comparison of direct ophthalmoscopy by primary care physicians with fundus photography. *J. Fam. Pract.* **37:**49-56.

Haik, G.M., Jr., Terrel, W.L. 3rd, and Haik, G.M., Sr. (1989) Diabetic Retinopathy: a leading cause of new blindness. *South Med. J.* **82:** 575-579.

Klein, R., Klein, B.E., Neider, M.W., Hubbard, L.D., Meuer, S.M., and Brothers, R.J. (1985) Diabetic retinopathy as detected using ophthalmoscopy, a nonmydriatic camera and a standard fundus camera. *Ophthalmol.* **92:** 485-491.

Klein, R., Moss, S.E., and Klein B.E. (1987) New management concepts for timely diagnosis of diabetic retinopathy treatable by photocoagulation. *Diabetes Care* **10:** 633-638.

Merimee, T.J. (1990) Diabetic retinopathy, a synthesis of perspectives. *N. Engl. J. Med.* **322:** 978-983.

Sussman, E.J, Tsiaras, W.G., and Soper, K.A. (1982) Diagnosis of diabetic eye disease. *J. Amer. Med. Assoc.* **247:** 3231-3234.