

ORIGINAL RESEARCH

Evaluating Adherence to Dilated Eye Examination Recommendations Among Patients with Diabetes, Combined with Patient and Provider Perspectives

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BACKGROUND: Diabetes mellitus remains the leading cause of new cases of blindness among US adults. Routine dilated eye examinations can facilitate early detection and intervention for diabetes-related eye disease, providing an opportunity to reduce the risk for diabetes-related blindness in working-aged Americans. The Healthcare Effectiveness Data and Information Set (HEDIS) established criteria for performing dilated eye examination in patients with diabetes.

OBJECTIVES: To obtain information about adherence and nonadherence to diabetic eye examinations among insured patients to understand the barriers to routine dilated eye examinations, and to identify ways to improve the quality of care for these patients.

METHODS: This retrospective claims analysis is based on administrative claims from the HealthCore Integrated Research Database, a broad database representing claims from a large commercially insured population. Patients with diabetes and who had ≥ 1 dilated eye examinations between August 1, 2011, and July 31, 2013, were defined as adherent to the HEDIS recommendations. The analysis was augmented with findings from focus groups. The patient focus groups included adherent and nonadherent patients. The provider focus group participants were general practice or internal medicine physicians and ophthalmologists who provided medical care for the study population. For the administrative claims analysis, comparisons between the adherent and nonadherent patients were performed using *t*-tests for continuous data and chi-square tests for categorical data.

RESULTS: Of 339,646 patients with diabetes identified in a claims data set, 43% were adherent and 57% were nonadherent to the HEDIS eye examination performance measure. The common barriers to routine eye examination cited by 29 patients across 4 focus groups included a lack of understanding of insurance benefits (N = 15), a lack of awareness of the importance of dilated eye examinations (N = 12), and time constraints (N = 12). The common barriers cited by 18 providers included the patient's level of education (N = 13), eye examinations as a lower priority than the management of other diabetes-related health issues (N = 12), and a lack of symptoms (N = 11).

CONCLUSION: Several reasons for patient nonadherence to routine eye examination were identified, including a lack of understanding of insurance benefits, a lack of awareness or low prioritization of having an examination, patient education level, time constraints, and a lack of symptoms. These may be considered by providers and payers when developing programs to increase the rates of eye examinations and improve outcomes among patients with diabetes.

KEY WORDS: adherence, diabetes mellitus, dilated eye examination, HEDIS measures, nonadherence, ophthalmologists, primary care physicians

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KEY POINTS

- Routine dilated eye examinations are recommended to reduce the risk for diabetes-related blindness.
- Previous studies have cited a lack of knowledge, cost, and access to care as barriers to eye examinations in patients with diabetes.
- This retrospective analysis of claims from a large database examined adherence to the HEDIS measure of an eye examination in patients with diabetes.
- Additional perspectives were gained from patient and provider focus groups, including primary care physicians and ophthalmologists.
- In this real-world analysis, only 43% of patients with diabetes had the recommended dilated eye examinations.
- Lacking an understanding of benefits, lacking awareness of the importance of eye examinations, time constraints, and patient-paid costs were the main causes for nonadherence.
- A total of 50% of patients and 45% of physicians suggested that eliminating copays and reducing drug costs would greatly increase adherence to eye examinations.
- Efforts to ensure that patients fully understand their health insurance benefits and to further reduce financial barriers for patients are needed.

The Centers for Disease Control and Prevention (CDC) estimates that approximately 29.1 million people in the United States have diagnosed (21 million) or undiagnosed (8.1 million) diabetes mellitus.¹ The overall prevalence of diabetes in the US population is expected to increase as a result of growing rates of obesity and demographic shifts.² Furthermore, the CDC estimates that even with a leveling of the incidence of diabetes, the prevalence of diabetes will double in the next 20 years, because of the aging US population.³ According to the CDC, the estimated total cost of diabetes in the United States in 2012 was \$245 billion, including \$176 billion for direct medical costs.¹

Diabetes continues to be the leading cause of new cases of blindness among US adults aged 20 to 74 years.⁴ According to the CDC, 4.2 million (28.5%) adults with diabetes aged ≥ 40 years had diabetic retinopathy between 2005 and 2008, which included 655,000 (4.4%) patients with advanced diabetic retinopathy that could lead to vision loss.¹ Because patients with type 1 or 2 diabetes have increased risks for diabetic macular edema

and other forms of retinopathy, monitoring and understanding the patterns of care are warranted.⁵ The American Diabetes Association recommends that patients with diabetes have dilated eye examinations performed annually by an ophthalmologist or optometrist to screen for retinopathy, or every 2 to 3 years after ≥ 1 normal examinations.⁶ Yet, adherence to annual eye examinations has been low, with up to 37% of diabetic adults aged ≥ 18 years in the United States not receiving an examination in the past year.³

The Healthcare Effectiveness Data and Information Set (HEDIS) was established by the National Committee for Quality Assurance to evaluate the performance of health plans on identified quality measurements, and to provide benchmarks against which health plans can be compared. HEDIS measures assess whether specific recommended care processes are delivered or care outcomes have been met. One such measure assesses the percentage of adult health plan members (aged 18-75 years) with type 1 or 2 diabetes who had a retinal or dilated eye examination.⁷

Previous studies that have examined the barriers to eye examinations among patients with diabetes reported reasons for lack of such examinations, including a lack of knowledge or education, cost, access to care, and insurance status.^{6,8-10} The purpose of our present study was to obtain information about adherence and nonadherence to diabetic eye examinations, according to the HEDIS measure,⁷ among insured patients diagnosed with diabetes to understand the barriers to dilated eye examinations, and to identify ways to improve the quality of care for these patients.

This study was reviewed and approved by the New England Institutional Review Board.

Study Data and Methods

In this study we utilized administrative claims data from the HealthCore Integrated Research Database (HIRD) for services incurred between August 1, 2011, and July 31, 2013. HIRD is a broad, fully integrated database consisting of eligibility information and medical and pharmacy claims from more than 60 million individuals from multiple geographically dispersed health plans in the United States.¹¹ The HIRD database includes claims information for more than 44 million commercially insured individuals across 14 US states from Anthem's health plans.¹¹

Study Population

Patients who met the HEDIS criteria for diabetes mellitus between August 1, 2011, and July 31, 2013 (a 2-year observation period) were identified. The HEDIS criteria for diabetes were applied based on medical claims

or pharmacy claims in HIRD. Patients had to have at least 2 medical claims with an *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)* diagnostic code for diabetes, polyneuropathy in diabetes, diabetic retinopathy, diabetic cataract, or diabetes in pregnancy. At least 1 of the ICD-9-CM codes had to be for diabetes (ie, 250.xx). The diagnoses had to occur at least 30 days apart. For patients who were identified from medical claims, those with a medical claim for blindness were excluded from the study. Patients were also eligible to participate in the study if they had at least 1 pharmacy claim for an oral antidiabetes drug during the observation period. Among patients who were identified from pharmacy claims, those with a medical claim for secondary diabetes, other specified disorders of pancreatic internal secretion, polycystic ovaries, gestational diabetes, or poisoning by adrenal cortical steroids were excluded. The index date was set to the first medical or pharmacy claim of interest within the intake period.

All participating patients were between the ages of 18 and 75 years on the index date and were required to have continuous enrollment in the health plan for the observation period. Patients were considered to be adherent if they had ≥ 1 eye examinations by an eye care professional (ie, an optometrist or an ophthalmologist) within the 2-year observation period; if they did not, they were classified as nonadherent. Ophthalmologist office visits, including dilated eye examinations, were covered as a medical benefit if the patient had a medical condition requiring an ophthalmologist's care (eg, diabetes, glaucoma, macular degeneration). Routine refraction by an ophthalmologist was not a covered medical benefit, but instead was included under the vision plan for patients who had that benefit. Routine refractions and screenings, as well as dilated eye examinations performed by optometrists, were covered by the vision benefit for participating patients. See **Appendix, Table A** online (at www.AHDBonline.com) for all ICD-9-CM, Generic Product Identifier, *Current Procedural Terminology (CPT)*, and Healthcare Common Procedure Coding System codes.

Focus Groups

The patient focus groups were held in June 2014 in New York, NY, and Los Angeles, CA, with 2 focus groups per city (4 focus groups total). The focus groups candidates were active health plan members who had not opted out of such communications at the time of recruitment, were located near a focus group site, and were able to communicate in the English language. Invitations to participate in the focus groups were made by telephone. Signed consent was obtained before the start of each focus group session. Each session consisted of a 90-minute in-person discussion with 6 to 8 participants

(with a blend of nonadherent and adherent patients) that was facilitated by an experienced moderator.

The provider focus groups candidates were selected from general practitioners, internal medicine physicians, and ophthalmologists who provided medical services for patients identified in the study population within the observation period. Patients with diabetes comprised between 25% and 45% of the population seen at the participating providers' practices. Two provider focus groups were held in each city (ie, New York and Los Angeles, for a total of 4 focus groups). Each session was a 90-minute in-person discussion conducted by an experienced moderator.

The patient and provider focus groups shared their experiences with dilated eye examinations and their reasons for patient adherence or nonadherence. The focus groups also generated insights into the healthcare process, patients' role in decision-making, the impact of healthcare providers' relationships with patients, patients' concerns about screening, barriers related to receiving tests, effective provider-specific and patient-specific interventions aimed at improving adherence to the eye examination, and other topics of importance as identified by the patients and providers. The barriers to receiving eye examinations and the interventions cited to improve adherence were grouped into common themes and were rank ordered.

Data Analysis

For the administrative claims analysis, the descriptive data regarding demographic characteristics were tabulated overall and were stratified by patients with and without dilated eye examination adherence. The comparisons of the patients were performed using *t*-tests for continuous data and chi-square tests for categorical data. All statistical analyses were performed using SAS version 9.1 (SAS Corporation; Cary, NC).

For the focus groups analysis, the qualitative findings from the patient and physician sessions were summarized. The descriptive data were tabulated, but no statistical comparisons were performed. Two individuals reviewed the videotapes of all focus groups; the barriers to receiving a dilated eye examination were grouped into common themes. Although the findings matched between the 2 individual reviewers, any quantification of findings reported from this qualitative research is subjective, because of the qualitative nature of the research.

Study Results

Of the 339,646 patients with diabetes who were observed between August 1, 2011, and July 31, 2013, in HIRD, 144,525 (43%) completed and 195,114 (57%) did not complete at least 1 dilated eye examination

Table 1 Characteristics of Patients with and without a Dilated Eye Examination from the HealthCore Integrated Research Database

Characteristic	All patients, (N = 339,646)		Patients with a dilated eye examination (N = 144,525)		Patients without a dilated eye examination (N = 195,114)		P value
	Age, yrs, mean (SD)	56.47 (11.00)	59.18 (10.52)	54.46 (10.92)	Total patients, N	With an examination, %	
Sex							
Male, N (%)	187,586 (55.23)	75,695 (40.35)	111,891 (52.38)	59.65 (57.35)	111,891	59.65	57.35
Female, N (%)	152,053 (44.77)	68,830 (45.27)	83,223 (47.62)	54.73 (42.65)	83,223	54.73	42.65
Geographic region							
Northeast: CT, ME, NH, and NY, N (%)	59,224 (17.44)	37,258 (62.91)	21,966 (25.78)	37.09 (11.26)	21,966	37.09	11.26
Midwest: IN, MO, OH, and WI, N (%)	126,720 (37.31)	46,992 (37.08)	79,728 (32.51)	62.92 (40.86)	79,728	62.92	40.86
South: GA, VA, DE, and KY, N (%)	92,869 (27.34)	37,213 (40.07)	55,656 (25.75)	59.93 (28.52)	55,656	59.93	28.52
West: NV and CA, N (%)	55,751 (16.41)	21,318 (38.24)	34,433 (14.75)	61.76 (17.65)	34,433	61.76	17.65
Health plan type							
HMO, N (%)	80,570 (23.72)	37,029 (45.96)	43,541 (25.62)	54.04 (22.32)	43,541	54.04	22.32
PPO, N (%)	231,742 (68.23)	97,733 (42.17)	134,009 (67.62)	57.83 (68.68)	134,009	57.83	68.68
Other, N (%)	27,327 (8.05)	9763 (35.73)	17,564 (6.76)	9.00 (9.00)	17,564	64.27	9.00
Vision benefit, N (%)	115,142 (33.90)	50,208 (43.61)	64,934 (34.74)	56.39 (33.28)	64,934	56.39	33.28

NOTES: There were 2 subgroup comparisons: patients with and without an eye examination; t-test was used for continuous variables, and chi-square test was used for categorical variables.

HMO indicates health maintenance organization; PPO, preferred provider organization; SD, standard deviation.

during the 2-year study period. The mean age was 59.2 years and 54.5 years, respectively, among patients who completed and those who did not complete an eye examination ($P < .0001$). **Table 1** summarizes the demographic characteristics of the patients with diabetes.

A total of 29 patients participated across 4 focus groups in June 2014, which included adherent and nonadherent patients in New York and in Los Angeles. The groups included 25 (86.2%) patients with type 2 diabetes; 18 (62%) of the total participants were men.

In addition, 2 focus groups of primary care providers (PCPs) and 2 focus groups of ophthalmologists were conducted in June 2014, with 1 group each in New York and in Los Angeles. Of the 18 participating providers, 9 were PCPs and 9 were ophthalmologists. **Table 2** lists the characteristics of the focus groups participants.

The dilated eye examination itself was not a barrier to patients' adherence; of the 29 patients, 12 were unaware of the importance of the examination (**Table 3**). Insurance coverage and out-of-pocket costs were major barriers for some patients, especially because most patients were seeing several specialists simultaneously and were paying copays and coinsurances for each. Approximately 50% of the 29 patients were uncertain whether a visit to an ophthalmologist was covered by their current plan. In all, 10 (50%) patients and 8 (45%) physicians suggested that eliminating insurance copays and reducing medication costs would greatly increase adherence (**Table 3, Table 4**).

The patients and the physicians noted that a lack of education about the importance of the eye examination was a barrier; 12 patients were unaware of the impor-

tance of a dilated eye examination, 9 providers believed that their patients had a lack of understanding or a lack of knowledge of potential eye problems, and 13 providers cited that patients had a low level of education. A lack of understanding or education about the importance of the eye examination was mentioned by 12 patients, and time constraints were also mentioned by 12 patients. A lack of understanding of insurance benefits was the barrier that was mentioned most frequently (by 15 patients).

When asked if transportation to the ophthalmologist's office was a concern, only patients in the Los Angeles focus groups mentioned driving to and from the examination as a challenge. The majority of providers listed the barriers for patients with diabetes to receiving an eye examination as being the patient's level of education (N = 13), patients having a lower priority for the eye examination than for all other health issues they manage (N = 12), and a lack of symptoms (N = 11; Table 4).

Patient education was the most often cited (N = 19) effective means of increasing the adherence of patients with diabetes for receiving annual dilated eye examinations. The patient-suggested methods to improve education about eye examinations included having a managed care advocate or case manager coordinate, track, and inform patients about necessary tests and appointments; having an individualized series of reminders starting 2 to 3 months before the examination, because appointments need to be made in advance (start with postcards and e-mails, and follow up with telephone calls or text messages); programs and sessions with diabetes specialists that are free to the patient or are covered by insurance and are at convenient times (eg, after work); and motivational information on reminder postcards (although acceptable in New York, many patients in Los Angeles viewed these as an invasion of privacy). See **Appendix, Table B** online (at www.AHDBonline.com).

Physicians also suggested methods to educate patients, including pamphlets with pictures that describe retinopathy; providing a clinical checklist of essential examinations as a handout to patients, as well as alerts on an electronic records system for physicians to reinforce reminders; more extensive web-based education, with links that can be publicized in the physician's office; programs, events, and/or health fairs on retinopathy, similar to programs on women's health, that are sponsored by insurance companies; classes and programs on the overall management of diabetes, including nutritionist, podiatrist, and ophthalmologist visits; a DVD or a web link that provides a video of a dilated eye examination and shows the early stages and progression of retinopathy and what is done to correct the condition; and television commercials featuring a celebrity spokesperson who has experience with retinopathy.

Table 2 Focus Groups Characteristics

Characteristic	Total, N	In Los Angeles, N	In New York, N
Providers	18	8	10
Specialty type			
Ophthalmology	9	5	4
Primary care	9	3	6
Sex			
Male	14	7	7
Female	4	1	3
Age range, yrs			
25-34	1	0	1
35-44	2	2	0
45-54	8	3	5
55-64	5	2	3
≥65	2	1	1
Treats patients with diabetes	17	7	10
Does not treat patients with diabetes	1 ^a	1	0
Patients	29	14	15
Sex			
Male	18	10	8
Female	11	4	7
Diabetes type 1	4	2	2
Diabetes type 2	25	12	13
Age range, yrs			
25-34	2	2	0
35-44	6	5	1
45-54	7	3	4
55-64	11	3	8
≥65	3	1	2
Has a claim for an eye examination	17	11	6
Does not have a claim for an eye examination	12	3	9

^aThe provider may have been treating patients with diabetes at the time of the claim, but the provider self-reported as not treating patients with diabetes at the time of the screening.

That diabetes is the major cause of blindness in adults is the motivation that the PCPs and ophthalmologists in our study often used to emphasize the importance of the dilated eye examination. Not all of the PCPs or ophthal-

Table 3 Patient Perspectives on Nonadherence to Dilated Eye Examinations

Barrier	Patient response, N (N = 29)
Lack of understanding of benefits	15
Unaware of examination importance	12
Time constraints	12
Out-of-pocket costs	10
Fear of finding something wrong	9
Fear of corrective procedures	6
Too busy	5
Seen as taking time off	3
Medications control the diabetes	1

Table 4 Provider Perspectives on Patient Nonadherence to Dilated Eye Examinations

Barrier	Provider response, N (N = 18)
Patient lack of education	13
Diabetic patients deal with a lot	12
If nothing seems wrong, won't get test	11
Less knowledge of eye problems	9
Lack of understanding of benefits	8
Out-of-pocket costs	8
Fear of finding something wrong	7
Language and communication issues	5

mologists thoroughly explained why such an examination was done or explained options to treat problems if they are found. The patients noted that the examination itself was not a major barrier to adherence, but that the amount of time the examination took, as well as logistic concerns (ie, getting to and from the appointment) often were barriers; 12 patients cited time constraints as a reason for not having an eye examination, and 5 patients stated that they were too busy (Table 3).

The ophthalmologists reported that they often found patients' education about the dilated eye examination lacking, and that they, rather than PCPs, handle the education of patients regarding the importance and urgency of having eye examinations. The PCPs felt that the overall management of the patient was their responsibility. The patients in the study stated that the primary sources of information were their physicians and the Internet. Some patients reported being told simply to "get

an eye examination"; to some patients, this meant getting a vision test at Costco. Most patients said they did not understand their insurance benefits, largely because their insurance benefits had become a "moving target."

The physicians in our study noted that after the first eye examination, ophthalmologists largely took over diabetes-related eye care, including referrals to retinal specialists if needed and annual reminders to patients. The PCPs said that the overall management of the patient was their responsibility, and many noted that they continued to remind patients about their annual eye examinations, even though they knew that ophthalmologists did so as well. Most patients reported having good relationships with their physicians regarding their diabetes diagnosis and treatment. More patients in Los Angeles saw an endocrinologist than patients in New York, who primarily saw their PCP for diabetes management.

Discussion

The goals of this study were to estimate the proportion of commercially insured persons with diabetes who received ≥1 dilated eye examinations over a 2-year study period and to understand the barriers to routine dilated eye examinations from the patient and provider perspectives. The rate of adherence in this analysis was similar to the HEDIS 2014 rates for Anthem commercial plans dilated eye examinations for calendar year 2013 (overall adherence, 49%).

A lack of understanding of insurance benefits was the most common barrier to patient adherence to dilated eye examinations, followed by insufficient awareness of the importance of eye examinations and time constraints. Out-of-pocket costs, including insurance copays and medication costs, were barriers for approximately 33% of patients. Although these common barriers were consistent across both focus groups, regional differences were noted between the patients in Los Angeles and in New York. The patients in Los Angeles required more privacy, and they identified access to transportation to and from the ophthalmologist's office as a potential obstacle to their care; neither of these were concerns for patients in New York.

It should be noted, however, that the number of patients in each focus group was small, so apparent differences across geographic regions may not be indicative of actual contrasts between the 2 groups.

The lack of a sense of urgency among patients about having a dilated eye examination was perhaps the most troubling observation. PCPs were the initial drivers of patients to ophthalmologists for their first diabetes-related eye examination. Therefore, assisting PCPs with presenting the need for and the importance of eye examinations to patients may increase adherence. The

ophthalmologists generally did not expect PCPs to provide patients detailed information about the dilated eye examination. In practice, however, ophthalmologists and optometrists must rely on PCPs to refer patients to them for examinations.

According to the focus groups responses, more patients in Los Angeles saw an endocrinologist than patients in New York, who primarily saw a PCP. Among the New York–based patients, some had seen an endocrinologist soon after diagnosis but were referred back to their PCP for long-term management. In Los Angeles, more patients continued to see an endocrinologist over the long-term. Patients who see an endocrinologist may have a greater opportunity to receive additional information about the importance of the dilated eye examination, which may increase their compliance. Overall, 50% of physicians in general, and 55% of family practitioners, spend an average of ≤ 16 minutes per patient^{12,13}; only 31% of endocrinologists do so.¹⁴

Nearly 25% of endocrinologists reported spending at least 25 minutes with each patient compared with 13% of physicians in general and 10% of family physicians.¹²⁻¹⁴ In brief office visits, PCPs are unlikely to have time to go into much detail with their patients about eye examinations. As a result, patients, who may be overwhelmed with a considerable amount of information to absorb, appointments to make, and tests to take, may be more likely to place the eye examination at a lower priority than other health-related issues.

The results of this study indicate that many patients do not fully understand their insurance benefits, a finding that has been confirmed by research spanning more than 3 decades.¹⁵⁻²¹ The literature demonstrates that patients generally have little understanding of their health insurance benefits, particularly about their deductibles or copays, and confusion increases with health plan complexity.¹⁵⁻²¹ In our study population, a visit to the ophthalmologist was a covered medical benefit if the member had a medical condition requiring the ophthalmologist's services (eg, glaucoma, diabetes, macular degeneration); otherwise, the visit was covered under the optional vision benefit of the health plan. The vision benefit covered routine refractions and screenings. Dilated eye examinations are a component of this service, and are mostly provided by optometrists. Although a slightly greater percentage of adherent patients had the vision benefit (34.7%) compared with nonadherent patients (33.3%), more than 50% of all patients were uncertain whether an ophthalmologist visit was covered by their health plan. Simplified health plans could improve adherence.

Previous studies have assessed the effectiveness of programs aimed at addressing the barriers to receiving dilated eye examinations that were reported by patients

and providers in this study.²²⁻²⁹ Interventions targeted at patients with diabetes, including case management,²² patient education,^{23,24} telephone and mail reminders,²⁴⁻²⁷ and diabetes care at a free clinic,²⁸ have been shown to significantly increase the rate of dilated eye examinations. However, the rates of dilated eye examinations completed after these interventions have been modest, ranging from 32.9% to 65.7%,²⁹ with the exception of one comprehensive disease management program that increased dilated eye examinations by more than 80%.²²

Of particular importance, our study reports several barriers that are not previously addressed in programs aimed at promoting dilated eye examinations. Further research is warranted to assess interventions that are aimed at addressing the barriers to dilated eye examinations in this study and further improve the rates of dilated eye examinations in patients with diabetes.

The literature demonstrates that patients generally have little understanding of their health insurance benefits, particularly about their deductibles or copays, and confusion increases with health plan complexity.

Limitations

These results are subject to several limitations. Although the claims database was large and geographically dispersed, the number of participants in the focus groups was small, and their views may not be a reflection of the larger US population of patients and providers.

Furthermore, the database contained claims for commercially insured patients. Therefore, the results may not be generalizable to patients with other types of health insurance or those who are living outside of the United States.

Finally, the administrative claims might have contained undetected coding errors that could have influenced the study results.

Conclusion

Many perspectives were identified on patient nonadherence to dilated eye examinations, indicating the complexity of this issue. Providers and payers may want to consider these issues as they develop programs to improve the rates of eye examinations and the outcomes of patients with diabetes.

In this real-world analysis, only 43% of patients with diabetes had the HEDIS-recommended dilated eye examinations. Although patients overall indicated that the eye examination itself was not a barrier, factors such as a lack

of understanding of their insurance benefits, a lack of awareness of the importance of eye examinations, time constraints, and patient-paid costs contributed to nonadherence. Education delivered by the healthcare provider

Education delivered by the healthcare provider regarding the importance of the dilated eye examination among patients with diabetes is addressable through patient interventions, but efforts are also needed to ensure that patients fully understand their health insurance benefits, as well as to reduce remaining financial barriers.

regarding the importance of the dilated eye examination among patients with diabetes is addressable through patient interventions, but efforts are also needed to ensure that patients fully understand their health insurance benefits, as well as to reduce remaining financial barriers. ■

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STAKEHOLDER PERSPECTIVE

Provider and Payer Collaboration Needed to Ensure Adherence to Recommended Eye Examinations in Patients with Diabetes

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PATIENTS: Diabetic retinopathy is the most common cause of vision loss among individuals with diabetes and a leading cause of blindness among adults aged 25 to 74 years.¹ Diabetes-related blindness costs the United States approximately \$500 million annually.² This cost is expected to get worse, as the number of Americans aged ≥ 40 years with diabetic retinopathy and vision-threatening diabetic retinopathy is expected to triple by 2050.³ Controlling diabetes and maintaining good blood pressure level can prevent or delay vision loss. More important, early detection and timely treatment of diabetic retinopathy have been shown to be effective, as well as cost-effective.¹

The American Diabetes Association recommends that patients with diabetes undergo dilated eye examinations annually, and then every 2 to 3 years if the initial examination is normal.¹ However, despite this recommendation, up to 45% of adult patients with diabetes in the United States do not meet this goal.⁴

In this retrospective claims analysis of data from the HealthCore Integrated Research Database, Fisher and colleagues found that only 43% of patients with diabetes in that national, large database had the recommended dilated eye examinations. The authors cite several reasons for patients' nonadherence to routine eye care, including lack of understanding of their insurance benefits, lack of awareness of the importance of eye examinations, time constraints, and patient-paid costs.⁵

PAYERS/PHYSICIANS: This is consistent with previous studies that have examined barriers to eye examination adherence in patients with diabetes.⁶⁻⁸ Those studies cite lack of knowledge or education, cost, access to care, and insurance status as reasons for nonadherence.⁶⁻⁸ These findings suggest that the best way to ad-

dress this serious medical problem is through collaborative efforts between the clinical providers who deliver the care and the insurance companies that manage the payment for patient care. Physicians need to carefully

The American Diabetes Association recommends that patients with diabetes undergo dilated eye examinations annually, and then every 2 to 3 years if the initial examination is normal.

explain the importance of an annual eye examination to all patients with diabetes, and insurance companies must be more transparent regarding their coverage policies for annual eye examinations and other preventive measures and tests for patients with diabetes. ■

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Appendix Table A ICD-9-CM, GPI, CPT, and HCPCS Codes	
Medical diagnosis	ICD-9-CM codes
Diabetes mellitus	250.xx
Polyneuropathy in diabetes	357.2x
Diabetic retinopathy	362.0x
Diabetic cataract	366.41
Diabetes in pregnancy	648.0x, 648.8x
Blindness	369.0x, 369.1x, 369.2x, 369.4x, 369.6x, 369.7x
Secondary diabetes	249.xx
Other specified disorders of pancreatic internal secretion	251.8x
Polycystic ovaries	256.4x
Poisoning by adrenal cortical steroids	962.0x
Antidiabetes medication	GPI codes
Sulfonylureas	2720x
Amino acid derivatives	2723x
Meglitinide analogs	2728x
Diabetic other (glucagon, glucose)	2730x
Alpha-glucosidase inhibitors	2750x
Dipeptidyl peptidase-4 inhibitors	2755x
Insulin-sensitizing agents (thiazolidinedione)	2760x
Antidiabetes combination	2799x
Insulin	2710x
Amylin analogs	2715x
Incretin mimetic agents	2717x
Eye examinations	<p>CPT codes: 67028, 67030, 67031, 67036, 67039-67043, 67101, 67105, 67107, 67108, 67110, 67112, 67113, 67121, 67141, 67145, 67208, 67210, 67218, 67220, 67221, 67227, 67228, 92002, 92004, 92012, 92014, 92018, 92019, 92134, 92225-92228, 92230, 92235, 92240, 92250, 92260, 2022F, 2024F, 2026F, 3072F</p> <p>HCPCS codes: S0620, S0621, S0625, S3000</p> <p>ICD-9 procedure codes: 14.1x-14.5x, 14.9x, 95.02-95.04, 95.11, 95.12, 95.16</p>
<p><i>CPT indicates Current Procedural Terminology; GPI, Generic Product Identifier; HCPCS, Healthcare Common Procedure Coding System; ICD-9-CM, International Classification of Diseases, Ninth Revision, Clinical Modification.</i></p>	

Appendix Table B Patient Perspectives on Interventions to Improve Dilated Eye Examination Compliance	
Preferred intervention	Patients responding, N (N = 29)
Mailer	19
Incentive	3
No response	7