

Implementing Guidelines for Eye Care of Diabetic Patients: Results from an HMO Intervention Study

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Abstract

The objective of this study was to determine the frequency with which diabetic patients 18 years or older enrolled in a health maintenance organization received dilated retinal eye examinations, and whether an intervention strategy could increase that frequency. All 20,782 diabetic patients enrolled in an independent practice association health maintenance organization (more than 2 million members) and their primary care physicians were notified by mail of their prior eye examination status and were informed of the need for annual eye examinations. The main outcome measure was comparison of the percentage of diabetic patients who had had complete eye examinations with ophthalmoscopy through dilated pupils before and after notification (during 1992 and 1993 vs the first 6 months of 1994). During 1992 and 1993, complete eye examinations with ophthalmoscopy through dilated pupils were given to 35.9% and 36.9% of diabetic patients, respectively. The percentage of diabetic patients who received such examinations in 1994 increased to 44.8%, an almost 25% increase over the 1992 frequency, and a 21% increase over the 1993 frequency. The increase in eye examinations was most pronounced in July through October of 1994—the first 4 months after notification—after which it declined to the prenotification frequency. This study demonstrates how a health maintenance organization database can be used to identify at-risk populations, and to improve the compliance of these populations with evidence-based medical guidelines. Additional modification of the intervention strategy should be developed to increase compliance with the guidelines further.

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Diabetes mellitus affects approximately 7 to 11 million people in the United States. Of this population, 5% to 10% have type I (insulin-dependent) diabetes; the remainder have type II (non-insulin-dependent) diabetes.¹

Diabetes is the leading cause of blindness in the United States among persons 20 to 74 years of age.² However, laser photocoagulation therapy applied to advanced diabetic proliferative retinopathy reduces the risk of severe vision loss by 50% or more.³ Moreover, randomized controlled trials and cost-effectiveness analysis have demonstrated that treating diabetic retinopathy early, before symptoms and significant loss of vision have occurred, reduces the risk of visual impairment.⁴

Blindness-prevention guidelines⁵⁻¹¹ emphasize early detection of eye disease in diabetic patients. The American Diabetes Association (ADA),^{12,13} American Optometric Association,¹¹ American College of Physicians,^{12,13} and American Academy of Ophthalmology^{12,13} recommend that both insulin-dependent and noninsulin-dependent diabetic patients receive ophthalmoscopic examination through dilated pupils yearly, for screening for diabetic retinopathy. The only exceptions to this recommendation are insulin-dependent diabetic patients within the first 5 years after diagnosis and children with diabetes before puberty, regardless of the duration of the disease.

Recent studies indicate, however, that about one third of people with diabetes have never had ophthalmologic examinations, and that more than half of this group has eye disease.^{14,15} Furthermore, evidence suggests that only about one third of diabetic patients who are enrolled in managed care health plans undergo a dilated retinal examination on an annual basis, as recommended by the ADA.^{8,16}

With the development of the Health Plan Employer Data and Information Set (HEDIS) and its adoption by several US health plans as a way to become "accountable" to employers, the healthcare sys-

tem has increased its focus on a core set of quality-of-care parameters.¹⁷ One of these measurements is the diabetic retinal examination, defined as the percentage of diabetic patients who have had a retinal examination during the preceding calendar year.

To improve eye care of its diabetic members and prevent blindness, a health maintenance organization (HMO) developed and implemented an outreach program in which each diabetic member and his or her primary care physician were given information about the status of the patient's eye examinations, as well as educational material about the importance of annual dilated retinal examinations and compliance with treatment recommendations. We present the results of this intervention.

... PATIENTS AND METHODS ...

All individuals 18 years or older who were enrolled in US Healthcare (USHC), a large private-practice-based HMO, for each of the calendar study years (1992 through 1994) were included in this analysis. Using the HMO claims and pharmacy databases, patients were identified as having diabetes by either of the following criteria: (1) any visit to a specialist as an outpatient, with a claim containing a principal code from the *International Classification of Diseases, Ninth Revision, Clinical Modification*, relating to diabetes mellitus (codes 250.xx; 357.2x with 250.xx; 362.0x through 362.2x; and 366.41); or (2) receipt, on an outpatient basis, of insulin or oral hypoglycemic medications during the study period.

To determine whether these patients had had a dilated-eye examination within each of the study years, we identified claims from either ophthalmologists or optometrists, using the Current Procedural Terminology procedure codes (92002, 92004, 92014, 92018, 92019, 92225, and 92226) and two special codes developed by the HMO (EY001 and EY002). These codes reflected direct patient access for an ophthalmologic examination that did not require referral to a primary care physician.

In June 1994, all primary care physicians in the USHC network received a letter explaining the program and current ADA guidelines for dilated retinal examinations. The HMO's diabetic members were categorized by individual primary care office; each USHC office then was mailed a list of the members indicating which patients, according to the HMO claims database, had received an eye examination during the previous 12 months. The primary care physicians also received labels with each patients' name and address, as well as a form letter that could be mailed to the USHC diabetic members containing the physician's recommendation for an annual eye examination.

In addition, USHC contacted its diabetic members directly, by mail. They were given educational materials and a statement explaining their current eye examination status.

We analyzed the number of eye exams in the identified diabetic population by the above-mentioned criteria. We looked at the data from years 1992 through 1994 on a monthly basis.

In the following analysis, the chi square statistic was used to compare differences across years. *P* values of less than 0.05 by a two-sided test were considered indicative of statistical significance. Analyses were performed with the use of Statistical Analysis Software (SAS, Version 6.10; Cary, NC).¹⁸

... RESULTS ...

Table 1 describes the enrollment of diabetic patients, by gender and age group, throughout the study period (1992 through 1994). The 18% increase in eligible diabetic membership from 1992 (16,379 members) to 1993 (19,364 members) was not accompanied by a statistically significant increase in the rate of retinal examinations. However, the significant increase in examinations between 1993 and 1994 corresponds to a proportionately smaller (7%) increase in membership—19,464 members (in 1993) versus 20,782 members (in 1994).

Figure 1 represents the percentage of retinal examinations that all diabetic members received annually during the 3-year period, reflecting an increase in 1994 compared with both 1992 and 1993. The percentages of diabetic patients receiving eye examinations were 44.8% (1994), 36.9% (1993), and 35.9% (1992). The frequency of examination performance during 1993 increased only 2.7% over

Table 1. Members with Diabetes, by Gender and Age

Calendar Year	Female Members	Male Members	Ratio	Age			Total Members
				18-35	36-55	56+	
1992	8,014	8,365	1.00:1.04	1,965	7,599	6,815	16,379
1993	9,230	10,134	1.00:1.10	2,071	9,023	8,270	19,364
1994	9,893	10,889	1.00:1.10	2,040	9,543	9,199	20,782

the 1992 frequency (not significant). Examinations conducted during 1994 increased significantly, revealing 21.4% and 24.8% increases over the number performed during 1993 and 1992, respectively (both $P < 0.0001$).

Figure 2 depicts the overall percentage of diabetic patients who had retinal examinations performed by month for each period. Some members had more than one eye examination per year, hence, the sum of the monthly totals is larger than the annual percentage which counts each patient only once. Nevertheless, the 1992 and 1993 monthly figures illustrate relatively minor fluctuations while the 1994 data clearly reveal a significant increase (of more than 29%) in the percentage of examinations conducted during the 3-month period from July 1994 through September 1994. When aggregated, the data for the periods May through June and July through August indicate that the percentage of examinations performed between these periods decreased in both 1992 and 1993. In contrast, the percentage of examinations performed in 1994 during these months increased, from 10.01% in May through June to 13.51% in July through August.

Before the intervention, the frequency of examinations, by gender and age group, remained relatively constant. As Figure 3 shows, however, the number of examinations increased significantly during the third quarter of 1994—the first quarter after the retinal examination intervention. Total examinations are represented as a percentage of the total diabetic membership during the indicated quarter. Examinations by age group are based on the diabetic membership for the age category during the same period. The frequency of eye examinations after the intervention did not differ significantly within age groups.

... DISCUSSION ...

A targeted mailing campaign to both primary care physicians and their patients in an independent practice association HMO yielded nearly a 25% increase in the utilization of an effective preventive measure relative to utilization during the 2 previous years. This result is consistent with findings in the literature showing that so-called mass media approaches can have a positive effect on outcomes.¹⁹

This intervention represents the ability of a managed care organization to improve its members' compliance with a widely accepted clinical

Figure 1. Percentage of Diabetic Members Receiving An Annual Eye Exam

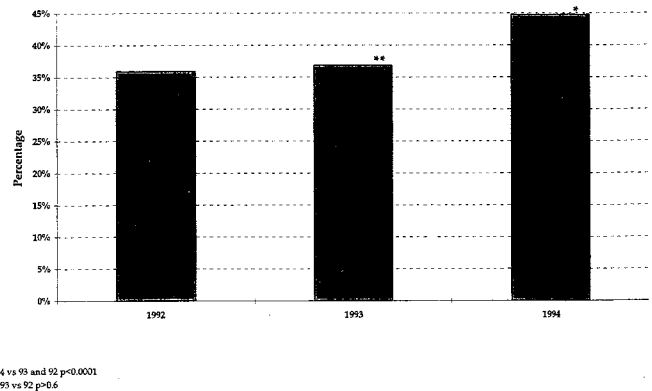


Figure 2. Monthly Total Eye Exams Reflected as Percentage of the Total Diabetic Population

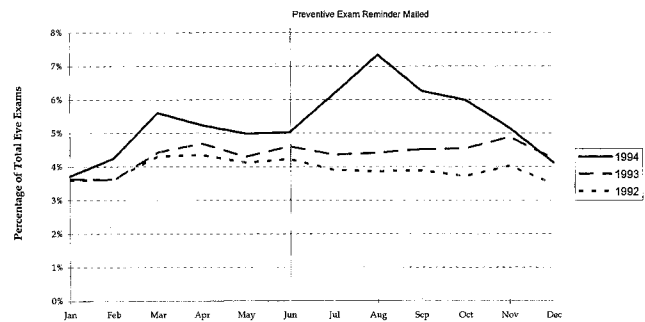
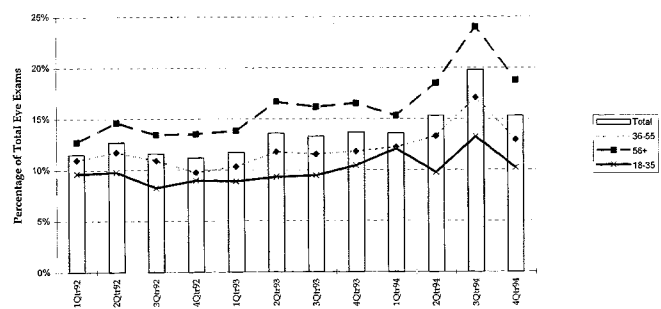


Figure 3. Total Eye Exams as a Percentage of the Diabetic Population with Age Stratification



guideline. A letter to physicians and patients provides a mechanism for population-based prevention targeted to primary care physicians and their patients. The HMO's method sends a message that the organization will act as a colleague, helping physicians in clinical preventive medicine. It also sends a message that it respects the autonomy of its patients, in particular, of the need for its diabetic patients to be major participants in their own healthcare.

The frequency of retinal examinations observed in this study (30% to 45%) is consistent with other frequencies currently reported in the literature. In a retrospective medical record review of approximately 7,000 diabetic patients of the Indian Health Service,²⁰ 53% of the patients complied with recommendations to receive these examinations. However, this rate included dilated examinations recorded by primary care providers. The issue of whether nonophthalmologist physicians are as effective in assessing retinopathy as are ophthalmologists is somewhat controversial. In one report²¹ comparing internists with ophthalmologists, much lower diagnostic sensitivity and specificity was associated with the internists' examinations.

According to baseline 1993 data collected from the New England HEDIS Coalition, a group of 15 managed care plans, the percentage of patients complying ranged from 19% to 54%²²; many plans were not able to provide data as of the time of data collection.²² The Medicare Develop and Evaluate Methods to Promote Ambulatory Care Quality (DEMPAQ) project collected data showing that 53% of roughly 8,300 patients assessed in private practices in three states between 1990 and 1991 received at least one ophthalmologic examination during the previous year.²³ As with the Indian Health Service report,²⁰ the DEMPAQ data included examination codes entered by nonophthalmologist physicians.

Because our study relies exclusively on information obtained from administrative data sets, it is subject to coding problems. DEMPAQ studies suggest that any bias will be in the form of overreporting the adherence rate; the procedure is more likely to be coded than is the disease diagnosis, so that the numerator (eye examinations) is exaggerated relative to the denominator (patients with diabetes).²³ This effect probably decreases as total visits per patient per year increases, because the likelihood of an appropriate diagnosis code increases with the volume of visits rises.

Our study demonstrates that a simple outreach approach can yield a significant beneficial effect, even though both the baseline and postintervention eye

examination frequencies show that there is still room for improvement. One might expect additional improvement over time, as repeated messages disseminated by public health mass media approaches have a positive impact on patient behavior.²⁴ Other approaches, such as individual or one-on-one physician education programs or continuing medical education lectures, can improve the yield but tend to be more costly and labor intensive than outreach; moreover they target the practitioner only.¹⁹ An advantage of the dual patient/physician approach is that it fosters patients' participation in the process of their own medical care. Such participation is critical, as more than 95% of diabetes care is provided by the individual who has the disease.²⁵

The HMO gave physicians information comprising patient-specific clinical information, a guideline that is accepted as a standard of medical practice for diabetic patients, and a simple mechanism for improving the quality of care provided. By signing the letters they mail to their patients, physicians send a message that the eye examinations are considered the professional norm and identify the HMO as a partner in the patient-care process. Techniques such as this one, which influence social behavior, are valuable in improving compliance with clinical guidelines.¹⁹

... CONCLUSION ...

Diabetes mellitus remains a major cause of morbidity and mortality in the United States. Multiple clinical trials have shown that appropriate screening for and treatment of diabetic retinopathy can reduce diabetic eye complications.²⁶ Even though these landmark studies have been published and circulated worldwide, ample evidence shows that the majority of diabetic patients are not following current ADA recommendations for eye care.

The use of large HMO databases to assist physicians and other providers in patient care is an important component of applied health services research. This study demonstrates how an HMO claims database can be used to identify populations at risk, such as members with diabetes. These data are critical to develop effective outreach programs aimed at enhancing treatment using evidence-based medical guidelines.

We contacted HMO diabetic members directly as well as their primary care physicians, sharing with them current recommendations on eye examinations. The physicians also received a list of their HMO patients who had diabetes indicating when the patients had had their most recent eye examination.

This outreach program gave the physicians a management tool to identify a population at risk—diabetic patients—for a specific HMO, and to increase compliance with an established eye care guideline for diabetic members in their practices. Furthermore, diabetic members were empowered to participate in the process of their own medical care. This relatively simple intervention was associated with an increase in eye examinations for diabetic patients of 25% compared with previous years.

The level with which specific at-risk populations comply with accepted medical guidelines must be determined. Developing guidelines without also establishing appropriate channels of dissemination will achieve little improvement in the quality of medical care. HMOs must actively pursue the development and implementation of outreach programs in coordination with treating physicians and their patients. This partnership is necessary to identify efficient and effective techniques for maximizing compliance with current medical guidelines.

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