An Intervention for Enhancing Compliance With Screening Recommendations for Diabetic Retinopathy

A bicoastal experience

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OBJECTIVE — To determine whether an intervention at both the provider and patient level can increase the utilization of diabetic retinal examination among diabetic patients and to compare the results from a comparable study conducted on the East Coast.

RESEARCH DESIGN AND METHODS — For the regional intervention study, all diabetic patients 18 years or older who enrolled in a large network-based health maintenance organization (HMO) in California were identified (n = 19,397). The identified diabetic patients received educational materials and a notification of their prior diabetic retinal examination status. Also, their primary care physicians received the current American Diabetes Association (ADA) guidelines for dilated retinal examinations and a list of patients due for diabetic retinal examination.

RESULTS — There were 25 and 27% increases in the percentage of diabetic patients who received diabetic retinal examinations in 1995 compared with the percentages in 1993 and 1994, respectively. The increase in diabetic retinal examinations was most significant after the intervention (odds ratio = 1.4). Furthermore, the improvements in compliance after the intervention were almost identical between the studies implemented on the East and West Coasts.

CONCLUSIONS — This study and the prior study demonstrate that such a "reminder" intervention can improve compliance with diabetic retinal screening recommendations. A generalizable intervention, such as this, may be applicable on a national level. For these programs to be successful, however, HMOs and physicians must have a collaborative relationship.

In spite of the widely accepted guidelines, such as the American Diabetes Association (ADA) guidelines (1) for eye care of diabetic patients, several studies have indicated that many diabetic patients have never had a diabetic retinal examination (DRE) or that they had examinations far less frequently than the recommended intervals (2–4). This low level of compliance indicates that those diabetic patients and their primary care physicians have been remiss in following the guidelines for annual DRE by qualified specialists.

Thus, an intervention is needed to ensure that the recommendations are followed. In 1994, Brooks et al. (5) showed that a large independent practice association (IPA) health maintenance organization (HMO) on the East Coast can implement a "reminder" intervention to improve compliance with screening recommendations for diabetic retinopathy. However, not all reminder systems achieve equal improvements, especially when the intervention is implemented under different medical systems (e.g., network HMO versus IPA HMO) and in different geographic regions (6–8). For instance, due to the difference in organizational structure, physicians in medical group settings may behave differently from the physicians in IPAs (6). Geographic variation also exists, since the clinical judgments of physicians are highly variable across different areas (7,8).

In this study, we present the results of a "reminder" intervention, which is almost identical to Brooks et al.'s (5) intervention, implemented by a large HMO in California. The result of the present study is compared with Brooks et al. (5) to evaluate the ability to reproduce their results with the same kind of reminder intervention.

RESEARCH DESIGN AND METHODS

Study population

The present study includes all diabetic members 18 years or older who were enrolled in Health Net, a large network-based HMO in California (with 1.3 million members), for the calendar study years 1993–1995. Using the HMO claims and pharmacy databases, diabetic members were identified by either of the following criteria: *1)* any outpatient visit with a claim containing a principal diagnosis related to diabetes (*International Classification of Diseases*, 9th revision [ICD-9], codes 250.xx; 357.2x with 250.xx; 362.0 through 362.2x; and 366.41) or *2)* evidence of an outpatient prescription for insulin or oral hypoglycemic medications during the study period.

Intervention

In July 1995, the primary care physicians in the HMO with an identified diabetic

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ADA, American Diabetes Association; CPT, current procedural terminology; DRE, diabetic retinal examination; HMO, health maintenance organization; ICD-9, *International Classification of Diseases*, 9th revision; IPA, independent practice association.

Table 1—*Demographic characteristics of eligible diabetic members and percentages of members receiving an annual DRE: main intervention study*

Sex and age-group	1993	1994	1995
Male			
18–35	231 (3)	410 (3)	517 (3)
36–55	1,903 (22)	3,188 (23)	4,197 (22)
56–64	1,327 (15)	2,065 (15)	2,665 (14)
65+	1,218 (14)	2,056 (15)	3,142 (16)
Total	3,912 (54)	7,719 (55)	10,521 (54)
Female			
18–35	239 (3)	430 (3)	543 (3)
36–55	1,643 (19)	2,552 (18)	3,377 (18)
56–64	1,034 (12)	1,586 (11)	2,011 (10)
65+	996 (12)	1,806 (13)	2,945 (15)
Total	4,679 (46)	6,374 (45)	8,876 (46)
Total members	8,591	14,093	19,397
Diabetic patients receiving an annual DRE (%)	20.9	20.5	26.1

Data are *n* (%).

Table 2—*Cross-tables of the numbers (odds ratios) of DREs between the first (1 January to 30 June) and the second (1 July to 31 December) half of the year: main intervention study*

Year	Second half		
First half	No	Yes	OR
1993			
No	6,908	818	818/807 = 1.01
Yes	807	199	
1994			
No	11,394	1,294	1,294/1,318 = 0.98
Yes	1,318	318	
1995			
No	14,542	2,599	2,599/1,917 = 1.36
Yes	1,917	622	

For dependent samples, the estimate of odds ratio (OR) is the ratio of two discordant pairs.

member received a letter explaining the program, the current ADA guidelines for dilated retinal examinations, a list of patients due for a DRE, and labels as well as a form letter to assist in mailing notification to their patients who needed a DRE. Furthermore, the diabetic members received educational materials and a report of their current DRE status 2 weeks later directly from the HMO.

Determining the outcome

To determine whether those members had had a DRE within each of the study years (1993–1995), we searched for claims from either ophthalmologists or optometrists using the current procedural terminology (CPT) codes (92002, 92004, 92014, 92018, 92019, 92225 and 92226) for the time period.

Brooks et al.'s study

The study by Brooks et al. (5) also included all diabetic members 18 years or older who enrolled in a large HMO on the East Coast. They identified the diabetic members and determined the outcome through the HMO databases using the algorithms described above. An identical "reminder" intervention was implemented in June 1994.

Statistical analysis

Because we had dependent samples with repeated observations on the outcome for each of the diabetic patients over the study period, McNemar's test was used to examine the differences across the years, and the differences between pre- and postintervention. To assess the interaction effects of the intervention and patient's demographic characteristics, such as sex and age, on the outcome, logistic regression analysis on discordant pairs was used. The χ^2 statistic was used to test the difference between the present study and the study by Brooks et al. (5).

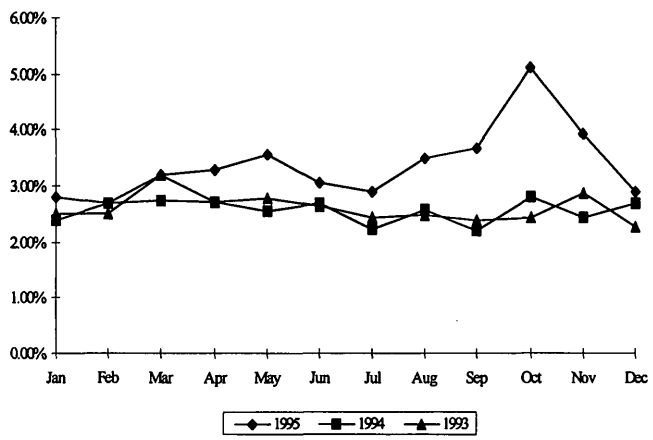

Figure 1—*Monthly total DREs reflected as percentage of the total diabetic population; main intervention study.*

RESULTS

Results of the main intervention study

The analyses were based on the data from 1 January 1993 to 30 December 1995. Table 1 describes the distributions of the eligible diabetic members by sex and by age-group, as well as the percentages of diabetic members who received an annual DRE, throughout the study period. It suggests that the distributions of sex and age appear to be similar across the years. There was a 2% decrease in the percentage of diabetic member receiving DREs from the calendar year of 1993 (20.9%) to the calendar year of 1994 (20.5%), but a 27% increase from the calendar year of 1994 (20.5%) to the calendar year of 1995 (26.1%).

To examine whether the increase in retinal examinations is attributed to the intervention, we examined the monthly DRE percentages for the study population by year (Fig. 1). There was a significant increase in percentages during the period from July through October 1995. Table 2

Table 3—*Results of logistic regressions:* the estimated odds ratios† (95% CI) in the main intervention study*

Age-group (reference group, 65+)	Odds ratio	95% CI
1993 vs. 1994		
18–35	0.93	0.58–1.48
36–55	1.19	0.96–1.48
56–64	1.10	0.88–1.38
Sex (male)	0.88	0 74–1.04
1994 vs. 1995		
18–35	0.85	0.58–1.23
36–55	1.13	0.95–1.34
56–64	0.95	0.95–1.14
Sex (male)	1.02	0 89–1.18

*Dependent variable is the incidence of having a diabetic retinal exam in 1994 (1995 for the second regression). †Odds ratios were calculated based on logistic regression.

Table 4—*Comparison of the numbers (odds ratios*) of DRE before and after intervention between two studies (the intervention months were excluded to avoid ambiguity)*

	Brooks et al.	Present study	
5 months before intervention	4,950	3,101	$\chi^2 = 2.11$ ($P = 0.147$) OR = 0.96 (0.90–10.2)
5 months after intervention	6,250	3,744	

*For comparing the numbers or proportions of two dependent samples, the estimated odds ratio is the OR in a 2×2 table.

compares the proportions of diabetic members receiving DREs before (1 January to 30 June) and after (1 July to 31 December) the intervention for 1995, and compares the proportions between the first and the second half of the year for 1993 and 1994. It suggests that there was no difference between the first and the second half of the year for 1993 and 1994, and hence no seasonal differences were expected. However, the difference between the first and the second half of the year for 1995 was statistically significant (odds ratio = 1.4, McNemar's $\chi^2 = 102.7$; $P < 0.0001$).

Although older diabetic patients and female diabetic members were more likely to have DREs (data not shown), the results of logistic regression analyses suggest that there was no significant difference in the intervention effect between sexes and among the age-groups (Table 3).

Results of the comparison between two studies

Because a secondary purpose of the analyses was to compare the results from the present study to the results from Brooks et al. (5), the results of the two studies during the intervention year are depicted in Fig. 2. The result patterns of two studies were quite similar. Table 4 compares the numbers of members receiving DREs before and after intervention between the two studies and indicates that there was no significant difference between two studies in terms of the ratios of improvement ($P = 0.147$).

CONCLUSIONS — This study once again confirms the low rate of referral for ophthalmologic evaluation among diabetic patients. This finding is not unique to patients followed in a managed care setting (9). In this study as well as in the prior study (5), a simple reminder intervention is proved to improve compliance with the screening recommendations. However, the effect was short-lived, and the intervention would likely need to be repeated on a periodic basis to have a major impact on the number of diabetic patients referred for DRE each year.

Understanding the barriers to receiving DREs, even after the intervention occurred, might be useful in designing a more effective intervention. Factors that could influence physician referral patterns include age and knowledge of diabetes recommendations (10). Additional factors might also be involved, and a survey of perceived barriers to ophthalmology referrals might be useful.

The intervention used in this study was also effective when used in a similar health plan on the East Coast. In both studies, baseline rates of ophthalmology referral were similar, and nearly identical improvements in outcomes occurred after the intervention was applied. This is encouraging, because it has been shown previously that geographic variations exist in the use of health care services (7,8). An intervention such as this, that is effective on both the East and West Coast, may be effective nationally, rather than on a regional basis only.

Potential limitations in collecting the data in both studies include the use of claims data, which might subject to coding problems. Also, reimbursement for medical services under a capitated environment decreases the completeness and timeliness of the claims data compared to a fee-for-service environment. However, in spite of these limitations, we feel that the data represent an accurate reflection of overall DRE rates in the two large HMOs over 3 years.

In conclusion, DRE rates remain low in spite of an increasing awareness of the need for such examinations. The use of large HMO databases to identify populations at risk is critical to develop cost-effective programs to increase compliance with evidence-based guidelines. For these programs to be successful, however, HMOs and physicians must have a collaborative relationship.

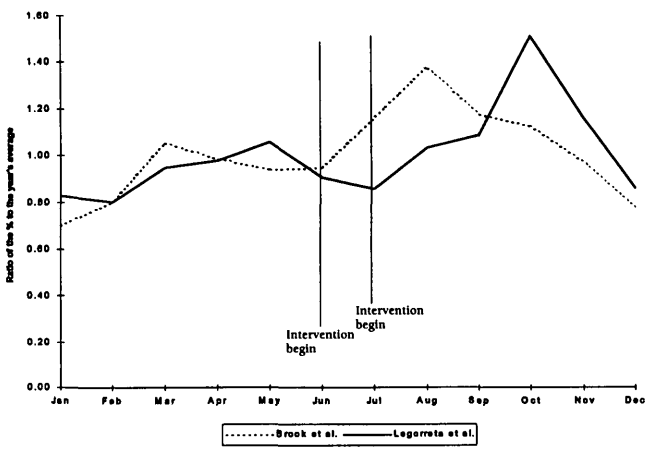

Figure 2—*Comparison of the results from Brooks et al. (5) and the current study. To adjust for the difference in baseline rates, we display the ratios of percentage to the year's average.*

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