Quality of Outpatient Care Provided to Diabetic Patients

A health maintenance organization experience

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OBJECTIVE — To document the quality of diabetes care provided to patients in a large health maintenance organization (HMO) from 1 January 1993 to 1 January 1994 and compare it to the standards of the American Diabetes Association (ADA).

RESEARCH DESIGN AND METHODS — To meet a Health Plan and Employer Data Information Set (HEDIS) requirement, a major HMO in California identified 14,539 members with diabetes and randomly selected 384 individuals for review. Charts were available on 353 of these patients, and after obtaining the information for the HEDIS review, additional information was extracted from the charts by an outside chart reviewer. This data set was used for an analysis of the quality of diabetic care provided by the participating medical groups to these HMO members during 1 year. Documentation of follow-up and measures of glycemic and lipid control was examined both for absolute values and for the frequency of measurement over the year. These results were compared to the ADA standards of care.

RESULTS — Although patients averaged 4.5 visits to their primary care physicians (PCPs) over the year, 21% had one or fewer visits per year. Glycated hemoglobin levels were not documented in 56% of patients (ADA recommends two to four measurements per year), and of those with a glycated hemoglobin level measured, 39% had at least one value ≥10%. Fasting plasma glucose concentrations were not documented in 65% of patients (four to six per year recommended). Foot exams (which should be performed at each regular visit) were not documented for 94% of patients. Urine protein measurements were not performed in 52% of patients. Additionally, many patients had elevated and untreated lipid abnormalities.

CONCLUSIONS — In spite of the frequency of PCP visits during the year for many of these patients, diabetes management was inadequate. This lack of adequate preventive care will lead to an increased risk of the development of the acute and chronic complications of diabetes, creating an even greater future burden on the health care system and negative consequences for patients.

Increasing numbers of Americans are receiving their medical care in health maintenance organizations (HMOs) (1). Although information exists on the quality of care provided to patients with diabetes in a traditional fee-for-service setting (2–11), data are lacking on the quality of care provided in HMOs. In one study (12) on the health outcomes for diabetic patients in a variety of health care settings, care provided in an HMO was similar to that provided in a fee-for-service environment. However, the conclusions from the fee-for-service data were that the treatment given to patients with diabetes did not adhere to the recommended standards for providing care to this population (8,11).

HMOs create more structure for guiding physicians' medical practices and provide the opportunity to implement standard follow-up systems for treating patients with chronic diseases (13). Furthermore, HMOs are in a better position to educate their members by sharing with them preventive care guidelines for chronic diseases such as diabetes. Diabetes is second only to hypertension as a cause for outpatient visits for a chronic disease (14). The cost of caring for patients with hypertension and diabetes is so much greater than for "healthy" patients that physicians (and HMOs) can lose money treating them (15), decreasing the incentive to provide quality follow-up care.

The Diabetes Control and Complications Trial (DCCT) (16) clearly proved the benefits of achieving and maintaining near-euglycemia in patients with type I diabetes. It is likely that these results apply to patients with type II diabetes as well (17). However, to achieve good control, follow-up was frequent (weekly phone contact and monthly visits); the application of these techniques to large populations would be quite expensive (18). Yet in 1992, ~14.6% of total U.S. health care expenditures were spent on treating patients with confirmed diabetes who represented only 4.5% of the population (19). Much of the cost is for treatment of chronic (potentially preventable) complications (20). Therefore, something must be done to ensure delivery of high quality care to patients with diabetes in all settings to prevent the development of chronic diabetic complications with their ensuing high personal and societal costs. Additionally, systems for detecting the presence of early complications should be implemented so that specific treatments can be initiated.

As a first step in this process, documentation of the current level of care for diabetic patients must occur to determine whether or not standards of care are being met. To this end, we had access to a large

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ADA, American Diabetes Association; DCCT, Diabetes Control and Complications Trial; HEDIS, Health Plan and Employer Data Information Set; HMO, health maintenance association; ICD, international classification of disease; IHS, Indian Health Service; PCP, primary care physician.

Table 1—*Patient demographics*

Sex	
Male	197
Female	154
Not listed	2
Age (years)	52.2 ± 0.4
Type of diabetes	
I	30
II	274
Secondary	6
Not listed	43
Duration of diabetes (years)	8.1 ± 0.7
Weight (lbs)	
Initial (n = 324)	199.5 ± 2.4
Final (n = 314)	199.1 ± 2.4
Race/ethnicity	
Non-Hispanic white	80
Hispanic	25
Asian	6
Black	13
Not listed	229

Data are n or means ± SE. Duration of diabetes is given for the end of the study; 33 patients had newly onset type II diabetes during the year and were counted as having a diabetes duration of 0.5 years.

database of diabetic patients supplied by one of the major HMOs in the state of California. From this database, we were able to extract data on the frequency and quality of outpatient care provided by primary care physicians (PCPs) participating as providers within this HMO. These data were then compared with the standards recommended by the American Diabetes Association (ADA) (21), raising the challenge of how to meet the needs of patients with diabetes in a cost-conscious medical era.

RESEARCH DESIGN AND METHODS

— In early 1994, to fulfill a Health Plan and Employer Data Information Set (HEDIS 2.0) requirement, Health Net, an independent physicians association/network type HMO in California, had to document the frequency of retinal exams performed during the prior year (1993) in their diabetic patients. This HMO contracts with ~165 medical group entities with ~27,000 primary care and specialty physicians located throughout the state of California. This represents approximately one-half of the privately practicing physicians in California. These contracting groups ranged from independent physician associations to well-established medical groups and academic centers. In these groups, physicians also see fee-for-service patients. The practitioners spanned the entire spectrum of health care delivery in California—from rural to urban and from small medical communicates to large academic medical schools (although it was not possible to separate out the individual site locations for data analysis). The median percentage (range) of capitated patients within these groups was 42% (1–100%). At all of these sites, for the HMO contract, the designated PCP was responsible for coordinating all of the medical care for each patient. It was the PCP's chart that was audited and presumably contained the details of the patient's medical activity in the system throughout the year.

The patients audited had been continuously enrolled in the HMO for at least 2 years (1992 and 1993) and were 30–65 years of age. A total of 289,164 patients met these criteria. Diabetic patients were identified in two ways. First, the HMO's claims and encounters database was searched for patients with the following international classification of disease (ICD)-9 diagnosis codes reported between 1 January 1993 and 31 December 1994: *1*) 250.xx (diabetes), 2) 357.2x (neuropathy) with 250.xx, 3) 362.0x (diabetic retinopathy), or 4) 366.41 (diabetic cataract). This audit found 12,782 patients with one of the ICD-9 codes noted above. Next, the pharmacy database was searched for patients who had filled prescriptions for insulin and/or a sulfonylurea agent. This identified 7,036 patients, some of whom were included in the ICD-9 code audit. The total number of unique HMO members identified as having diabetes by these two methods was 14,539, which represents ~5% of the total HMO population, indicating that most patients with diabetes were identified (19). From this total group, a random sample of 384 patients was selected using the random numbers generating function of the SAS program (SAS Institute, Cary, NC).

The sections of the outpatient charts covering 1 January 1993 until 1 January 1994 for each of the 384 patients were copied. Chart entries 3–4 months before 1 January 1993 and after 1 January 1994 were also copied to ensure the completeness of the data. Fifteen charts could not be located, and 16 were miscoded for diabetes, leaving 353 outpatient charts for review for a retrieval rate of 92%. A total of 275 PCPs were represented by this group of patients (although the PCP was indeterminable for 22 patients).

The charts were first audited for the data required for the HEDIS survey. After these data were extracted, the charts were re-reviewed in a comprehensive manner by an outside trained chart reviewer. This reviewer was not told of the intent of the project. The form used to obtain information was developed by us as an audit tool for another research study that was occurring concurrently and was designed to capture as much information as possible about diabetes-related outpatient activity. The reviewer consulted with one of us (A.L.P.) with any questions or problems interpreting the information found in the charts. At the time the chart review was occurring, this author did not know that the data would be made available to her for further analysis and was therefore also unaware of the purpose of the data collection.

Several different subsets of data were collected. For all of the parameters measured, the frequency (per patient) over the year was noted (e.g., the number of glycated hemoglobin levels obtained

Table 2—*Diabetes medications*

	Type of diabetes			
Therapy	Type I	Type II	Secondary	Type not listed
Diet alone	—	33 (12)	1 (17)	—
Sulfonylurea agent alone	—	163 (60)	—	—
Insulin alone	30 (100)	41 (15)	—	6 (14)
Insulin plus a sulfonylurea agent	—	34 (12)	—	—
Not listed	0	3 (1)	5 (83)	37 (86)

Data are n (%).

Table 3—*Lipid medications*

Therapy	Number of patients
HMG CoA-reductase inhibitor	15
Resin	0
Niacin	6
Gemfibrozil	18
Niacin plus gemfibrozil	2

HMG, 3-hydroxy-3-methylglutaryl.

throughout the year or the number of PCP visits). The values obtained for glycated hemoglobin levels, finger-stick blood glucose concentrations, and blood pressure determinations were recorded each time they were measured. For the other variables (lipid levels, fasting and random blood glucose concentrations, and tests of renal function), the actual values were recorded only initially (initial labs, defined as the first time the results were available after 1 January 1993) and at the end (final labs, defined as the last set of results in the chart before 1 January 1994). For patients with only one measurement, measurements occurring in the first 6 months of the year were considered initial values and those obtained during the final 6 months were recorded as final values.

After the data collection was complete, it was entered into a relational database designed in Access (Microsoft, Redmond, WA) and queried to answer the questions posed. Data are presented as means ± SE where appropriate.

RESULTS — Table 1 describes the patient population studied. Not all of the data were available in some charts. Tables 2 and 3 provide the treatment breakdown. Of the 274 patients with type II diabetes, 33 were on diet alone, 163 were on a sulfonylurea agent alone, 41 were on insulin alone, and 34 were on a combination of insulin and a sulfonylurea agent (therapy not listed in three charts). Of those with type I diabetes, 6 were on one injection of insulin per day, 16 were on two injections of insulin per day, and 5 were on more than two injections of insulin per day (the insulin regimen was not found in three charts).

Overall, patients averaged 4.5 visits to their PCP. The frequency distribution of PCP visits is shown in Fig. 1. A total of 30 patients did not visit their PCP at all during the year. It was impossible to extract data on the intent of each visit (diabetes is often treated in conjunction with visits for other problems such as hypertension or heart disease). However, blood pressure was measured at least once in 86% of the patients (also occurring in 86% of all visits), whereas a random finger-stick blood glucose measurement was obtained in 20.6% of all visits. Documented foot exams occurred at 6% of all visits (Table 4).

Referrals were not common for diabetes-related problems: 22% were referred to an ophthalmologist, 5% to a podiatrist, and 5% to an endocrinologist (Table 4). A total of 10% were referred to a dietitian (although 38% of patients treated with diet alone were referred at least once to the dietitian), and 8% attended some sort of diabetes education class.

Table 4 also lists the frequency of laboratory evaluations that were performed compared to the standards of care recommended by the ADA (21). A total of 44% of patients had one or more glycated hemoglobin levels measured during the year. Of those patients who had a value measured, 39% had one or more values ≥10%. The initial fasting plasma glucose concentration was 10.6 ± 0.4 mmol/l (191 ± 7 mg/dl) (n = 80) and was essentially the same at the end of the year (10.2 ± 0.4 mmol/l [183 ± 8 mg/dl]) (n = 85). The mean random finger-stick blood glucose level obtained throughout the year (331 measurements from 121 patients) was 11.2 ± 0.2 mmol/l (210 ± 4 mg/dl). The average blood pressure over the year was 134.1 ± 0.5 (systolic) and 82.6 ± 0.6 (diastolic), based on 1,369 measurements in 305 patients.

Lipid measurements were analyzed as the number of patients not on lipid-lowering medications who had an initial and/or final level above a certain target range. Out of 175 patients not on cholesterol-lowering agents who had a total cholesterol value measured, the level was ≥5.2 mmol/l (200 mg/dl) in 105 patients (60%) and ≥6.2 mmol/l (240 mg/dl) in 51 patients (29%). A fasting triglyceride level was recorded for 157 patients not on triglyceride-lowering agents. In 20 patients (13%), at least one value was ≥4.5 mmol/l (400 mg/dl). In 55 patients (35%) not on triglyceride-lowering agents, at least one fasting triglyceride level was between 2.2 and 4.5 mmol/l (200–399 mg/dl).

CONCLUSION — Prior studies of the quality of diabetes care have been done in fee-for-service settings. In these settings, it has been shown that the care provided to patients with diabetes in the U.S. did not meet the guidelines established by the ADA (2–11). Data were obtained in these studies through one of three methods: physician self-report, patient survey, or medical record review. As would be expected, physician self-report produced more favorable results than did chart review (22). Kenny et al. (7) mailed a survey to physicians nationwide and reported on the responses they received from the 1,434 physicians who returned the survey. Adherence to the ADA guidelines de-

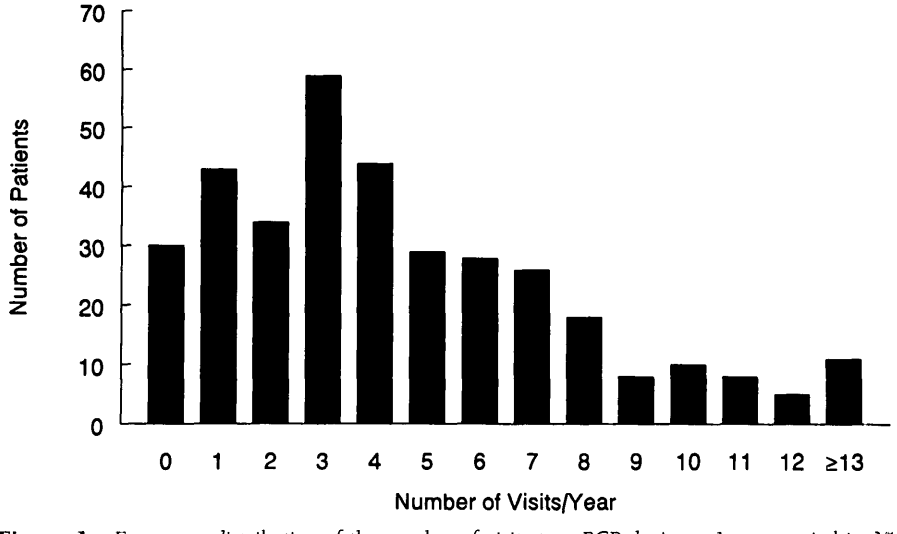

Figure 1—*Frequency distribution of the number of visits to a PCP during a 1-year period in 353 patients cared for in a large HMO.*

Table 4—*Frequency of diabetes-related assessments*

Test	Number of patients tested	Tests per patient per year	ADA standard (tests per patients per year)
Glycated hemoglobin	156 (44)	0.8 (56% had none)	2–4
Fasting plasma glucose	124 (35)	0.8 (65% had none)	4–6
Total cholesterol	198 (56)	—	At initial visit, then as often as needed to achieve treatment goals
Fasting triglycerides	176 (50)	—	As above
HDL cholesterol	113 (32)	—	As above
LDL cholesterol	110 (31)	—	As above
Serum creatinine	192 (54)	—	If proteinuria present
Urine protein	171 (48)	(52% had none)	Yearly
PCP visits (≥2 visits per year)	280 (79)	—	≥2 per year
Blood pressure	305 (86)	3.9	As needed—often 2–4 times per year
Documented foot exam	21 (6)	(92% had none)	At every "regular" visit

Data are *n* (%). By ADA standards, all tests of glycemia are to occur as often as needed to maintain and achieve good control. Values given are a minimum—some patients require weekly phone contact to achieve and maintain near-normal blood glucose levels. The total number of patients with an LDL cholesterol measurement was calculated as patients who had triglyceride, HDL, and total cholesterol measurements obtained, because if the triglyceride level was >400 mg/dl, the calculation of LDL cholesterol was inaccurate and therefore not listed.

creased with increasing physician age. The majority of the physicians (79–94%) reported performing one funduscopic examination per year, and 47–80% of physicians said they performed semiannual foot exams on diabetic patients. Similarly, in a telephone survey of 610 physicians in Pennsylvania (6), ~98% of physicians reported performing foot exams and 99% stated that blood pressure was measured at every visit. The physicians reported obtaining 1.8 glycated hemoglobin levels per year in patients with type I and 1.4 per year in patients with type II diabetes. Geographic differences between rural and urban areas were smaller than expected. In another survey done by provider self-report, a glycated hemoglobin level was obtained in only 43% of diabetic patients (4).

Data reported from patients themselves show slightly poorer results. A group of 440 patients from eight Michigan communities was interviewed and examined (10). Only 61% reported having had an ophthalmologic exam within the past 2 years, and the average glycated hemoglobin level (measured by affinity chromatography) was 10.6% (~11% in patients taking insulin and ~9% in those on sulfonylurea agents). In another study, an extensive chart review was done to measure the quality of care provided during 1992 to 6,959 patients followed in the Indian Health Service (IHS) (8). In the IHS, a diabetes program with specific guidelines had been implemented throughout its various sites. A high rate of adherence for blood pressure measurements was found (87%), but only 53% of diabetic patients had a dilated ophthalmologic exam and only 52% had a comprehensive foot exam during the year. Total cholesterol was measured in 68% and blood glucose levels in 77% (no data were provided on glycated hemoglobin levels). Other large chart reviews of patients cared for in a variety of non–managed care settings show similar results (8).

Our findings, in a managed care environment, are consistent with prior studies in some areas (e.g., blood pressure measurements) but not in others (e.g., measurement of glycemia and lipid disorders and documentation of foot exams). Therefore, in spite of the inherent limitations of chart review, we were able to document adequate care in terms of blood pressure measurement and treatment compared to the inadequate diabetic care provided. Moreover, if data were missing from the charts for us to review, they were also missing for the PCPs who were coordinating the patient's care and who should have known the results of the lab tests ordered and the referrals made. Therefore, the absence of this information from the chart (if it was obtained but not recorded on the chart) hindered the PCPs in ensuring adequate care for their diabetic patients.

Glycated hemoglobin levels are an objective measure of the success or failure of treatment of a diabetic patient. Although it was not obtained in 56% of patients, it was unacceptably high (≥10%) at least once during the year in 39% of the patients tested. Few patients had foot exams, which are a simple preventive measure that can prevent amputation (23). Urine protein was measured in only 48% of patients, and the lack of this information might have delayed treatment of microalbuminuria and/or proteinuria with ACE inhibitors. Many patients did not have total or HDL cholesterol or fasting triglyceride levels measured; therefore, LDL cholesterol values could not be calculated. Even if these levels were measured, only a few who required treatment received it. Treatment of lipid disorders is of critical importance in patients with diabetes because cardiovascular disease is the leading cause of death and lipid disorders are common, especially in patients with type II diabetes (24). Moreover, a number of patients in this survey were treated with niacin (Table 2), which is known to worsen diabetic control and should be avoided in this population (25).

The results from this study, although from only one large HMO, are likely to be a representative sample of the medical care provided by other HMOs throughout the state of California (as well as in the fee-for-service system). It is very likely that the PCPs did not differentiate between their HMO and fee-for-service patients and rendered suboptimal diabetes care to both groups (as has been previously documented [2–11]). The quality of care did vary from site to site (and more specifically from physician to physician). Some physicians provided high-quality care. However, these were in the minority, and the results of this study reflect the

average care received by diabetic patients in this study. To the extent that patient reimbursements for medications and supplies, copayments, and member education programs do vary among HMOs, the potential for high-quality diabetes care for patients may depend on which HMO plan the patient is enrolled in.

A total of 30 patients were found to have had no PCP activity at all during the year. Although this probably represented a lack of follow-up in most patients, some could have had double insurance coverage (i.e., through a spouse's plan) and could have received their medical care elsewhere. The same could be true in some patients who were seen during the year.

Providing poor-quality preventive care to patients with diabetes will result in a higher risk of developing the acute as well as the long-term complications of diabetes. For example, Medicaid recipients who received infrequent outpatient follow-up were more likely to be admitted to a hospital for diabetic ketoacidosis or coma than those patients with private insurance (26). The cost is not only a medical one: Patients with diabetes use more sick days, have higher rates of disability, and retire at an earlier age than do patients without diabetes because of the increased morbidity associated with the disease (27).

HMOs provide a potentially beneficial environment for treating patients with chronic diseases because care can be centralized and treatment guidelines can be standardized. First, however, there must be a strong financial incentive to provide high-quality care based on the demonstration that the consumption of health care resources associated with diabetes can be lowered by providing adequate and timely diabetic preventive care. Second, cost-effective systems for delivering adequate care must be developed. One approach is to use physician-extenders, such as nurse practitioners, specialty nurses, or physician's assistants, who follow protocols to provide the follow-up that diabetic patients need to achieve near-euglycemia (28).

These data provide a baseline for the quality of documented diabetic care that is currently provided in managed care in California. Clearly there is room for improvement, and one hopes that the situation will not worsen. HMOs must be held accountable to provide data on the quality of care they provide. This is relatively easy in the case of patients with diabetes because glycated hemoglobin and lipid levels reflect the important glycemic and hyperlipidemic outcomes that should be tracked, in terms of both frequency of measurement and elevations above the normal range. Appropriately managing diabetic patients in HMOs is a priority. This care can be established because the structure of HMOs can be used to share evidence-based guidelines with participating physicians as well as to educate patients about their disease. By taking an active role with physicians and members, HMOs can improve medical care for all diabetic members within a cost-effective framework.

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