# The Oregon Health Plan

## Predictors of office-based diabetic quality of care

MALATHI SRINIVASAN, MD
MICHAEL PRZYBYLSKI, PHD
NANCY SWIGONSKI, MD, MPH

**OBJECTIVE** — In 1994, the Oregon Health Plan (OHP) expanded basic Medicaid insurance to residents under the federal poverty limit, adopted a prioritized limited benefits package, and converted to managed care. The quality of care in predominantly Medicaid populations with diabetes has not been previously described. In OHP enrollees, we examined predictors of diabetes care based on American Diabetes Association guidelines and described OHP diabetes care compared with national benchmarks.

**RESEARCH DESIGN AND METHODS** — Chart abstraction and Medicaid data for 1995–1996 yielded 996 nonpregnant diabetic patients who were 18–64 years of age. Using $HbA_{1c}$, lipid panel, and urine protein/microalbumin documentation ordered during the study year, we constructed a standard care (SC) index: SC for all three tests, mixed care (MC) for one to two tests, or no tests documented (NTD).

**RESULTS** — Our sample was predominantly white, 48 ± 11 years of age, 63% women, with 8 ± 5 provider visits. Providers ordered $HbA_{1c}$ (70%), urine microalbumin/protein (57%), and lipid panel (41%) tests. Patients distributed into SC (22%), MC (62%), or NTD (16%). Thirteen variables predicted SC. Patients had a higher likelihood of SC if they were 18–24 years of age, had more clinic visits, were on insulin daily, were in several comorbid groups, were enrolled in salaried or capitated health plans, or lived in counties with more hospital beds. Four studies were used as comparable national benchmarks.

**CONCLUSIONS** — Care provided to OHP patients with diabetes compares favorably with national benchmarks. Yet, most OHP patients with diabetes are still not achieving optimal care. Examining predictors of SC may play an important role in further policy development.

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The quality of care provided to the 36 million Medicaid patients has come under increasing scrutiny as health care providers, governmental agencies, and consumers ask the critical question, "What kind of care are we providing for Medicaid's $280 billion?" (1–4). As administrators of this federal/state insurance program, individual states, through a variety of methods, have sought to improve both medical care and access to care for their low-income residents while controlling rising costs (5,6). In 1994, the State of Oregon sought to provide basic medical coverage to more than 275,000 Oregon residents with incomes below the federal poverty limit by enrolling them into managed care, expanding Medicaid eligibility, and increasing overall provider reimbursement (7,8). The Oregon Health Plan (OHP) was criticized because of concerns that it would compromise patient care, because it explicitly rationed services through a prioritized diagnosis/treatment limited-benefits package (9,10). Further, as Oregon shifted from providing to purchasing medical care (11), concerns about underutilization of medical services increased (5).

Under the OHP, provision of quality care is a complex process, encompassing all aspects of the individual patient's interaction with the health care system. Quality evaluation may be reflected through the health plan infrastructure and resource availability, patient access, patient interactions with provider/ancillary personnel, provider delivery of care, cost, or patient satisfaction, adherence, and clinical outcome (12–15). Recently, practice guidelines from national societies and the advent of mandatory reporting measures have focused on one aspect of quality—delivery of service. Physician disease management is often assessed by evaluating the care of patients with diabetes, due to validated care standards that can reduce cost, morbidity, and mortality. The Health Care Financing Administration (HCFA), which funds Medicare, selected improvement in diabetes care as a national priority. Through the Diabetes Quality Improvement Project in 2000, HCFA will evaluate process of care measures, such as ordering an $HbA_{1c}$ test at least yearly, using the Health Plan Employer Data and Information Set (16, 17). Although medical care of individual patients must be tailored, patterns emerging through population-based evaluation provide insight into the process of care delivery (17). These process benchmarks are only one of an array of quality indicators, but they provide context as measurable provider contributions to quality medical care.

We sought to evaluate one aspect of quality medical care for adult OHP enrollees, using diabetes as a tracer condition. The purpose of our study was threefold: *1)* to determine predictors of standard care (SC) in the OHP in the office setting,

From the Departments of Medicine (M.S.) and Pediatrics (N.S.) and the Bowen Research Center (M.P.), Indiana University School of Medicine; and the Regenstrief Institute (M.S.), Indianapolis, Indiana.

Address correspondence and reprint requests to Malathi Srinivasan, MD, Department of Medicine, 1050 Wishard Blvd., Sixth Floor, Indianapolis, IN 46202. E-mail: msriniva@iupui.edu.

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**Abbreviations:** ADA, American Diabetes Association; AHRQ, Agency for Healthcare Research and Quality; ARF, Area Resource File; BP, blood pressure; CADG, Collapsed Ambulatory Diagnosis Group; HCFA, Health Care Financing Administration; ICD-9, *International Classification of Diseases, Ninth Revision*; MC, mixed care; MCO, managed care organization; NTD, no tests documented; OHP, Oregon Health Plan; OR, odds ratio; SC, standard care.

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A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

2) to compare the provision of different aspects of care, and 3) to benchmark the quality of OHP diabetes care against other published reports. Despite the increasing focus on the quality of care rendered in government-sponsored programs, the quality of diabetes care in predominantly Medicaid and low-income expansion populations has not been previously reported.

## RESEARCH DESIGN AND METHODS

### Model and data sources

To address our study goals, we used the Agency for Healthcare Research and Quality framework for using clinical guidelines in assessing health care quality (18). This model describes commonly accepted relationships between input (e.g., demographic and clinical risk factors), process of care (e.g., diagnostic testing and procedures), and outcome variables (e.g., morbidity and health status). We examined the relationship between input and process, rather than outcome measures such as mortality or hospital admissions. The management of diabetes is rendered primarily on an outpatient basis; therefore, office-based quality of care was determined from chart review, using American Diabetes Association (ADA) standards (19). Provider ordering of three laboratory tests was used to construct an SC index. We also examined correlations between other ADA benchmarks not evaluated in our index. Finally, comparison benchmarks were generated after literature review.

Four data sources from calendar year 1995 were examined: *1*) chart data abstracted for clinical information; *2*) Medicaid encounter data from participating managed care organizations (MCOs) or physician groups for *International Classification of Diseases, Ninth Revision* (ICD-9) and demographic information; *3*) Area Resource File (ARF) (20) for patient county information; and *4*) 1994 site visit data for MCO payment to individual physicians or physician groups.

To ensure reliability, a random sample of patient charts was abstracted by three clinical supervisors (two registered nurses and one medical doctor) from Peer Review Systems of Oregon, and consensus was achieved after group review. Using these "gold standard" chart abstractions, four nurses trained for 80 h over the course of 3 weeks, reaching 90% agreement on abstracted fields. Charts from the primary care physician, identified by the Oregon Office of Medical Assistance Programs, were abstracted in the physician's clinic using scannable records. Clinic staff clarified handwriting and ambiguous comments. Medicaid and chart data were merged though unique patient identifiers. County medical and socioeconomic characteristics were merged using the patient's county of residence. The OHP's management system was tiered, with payment capitated to most participating MCOs. However, payment to individual physicians or physician groups varied and was clarified during a 1994 site visit through interviews with health plan managers and physicians.

### Patient sample

Inclusion criteria were based on ICD-9 coding in Medicaid encounter data and chart abstraction data. All OHP patients were included and sampled if they had at least one ICD-9-*Clinical Modification* diagnosis of diabetes (21–24) (250.xx), were OHP-enrolled for at least 10 of 12 months in 1995, and were 18 years of age or older during the study period from 1 February 1995 to 31 January 1996. There were 1,512 patients who were initially identified and who had chart abstractions performed for all primary care clinic visits during this study period. After chart abstraction, 298 additional patients did not meet inclusion criteria—there was no charted reference to diabetes ($n$ = 175), or they were 65 years of age or older ($n$ = 123), thus making them dually eligible for OHP and Medicare coverage.

Of the remaining 1,214 patients, 219 were excluded because of the following reasons: key dependent variables were missing (69.xx), charts were not produced (32.xx), they were pregnant (18.xx), Medicaid claims data were not available (10.xx), or other miscellaneous reasons (91.xx). No patients were on dialysis. Fourteen additional patients were excluded because of obvious data entry errors—863 office visits in a year, for example. Thus, our final data set comprised 996 patients (82%).

### SC index

We constructed an SC index with three tests recommended by the ADA in 1993 for ongoing management (19) of diabetes: $HbA_{1c}$, lipid panel, and urine microalbumin or protein. We chose 1993 as our reference year to allow 2 years for diffusion of these care standards into the Oregon medical community for study years 1995–1996. We chose test ordering as our process measure for three reasons. First, assessing adequacy of glycemic control ($HbA_{1c}$), presence of hyperlipidemia (lipid panel), and presence of renal insufficiency (urine microalbumin or protein) are standard components of diabetes management. Second, the medical community accepts these tests as valuable, with published comparisons across other populations. And finally, to order a test, a physician must document an order—with resultant data capture. If the quality indicator was not documented in the chart (e.g., consultant's letter, discharge summary, laboratory result, or clinician's note or order), we posited that the primary physician had not ordered the test and was not aware of test results from another source. Any evidence of the test (order or results) was coded as having met that standard. One health plan used fructosamine as an $HbA_{1c}$ equivalent and, for this study, was considered an acceptable alternative. Ordering $HbA_{1c}$ once during the study year was considered a conservative standard. SC was defined as all three tests ordered, mixed care (MC) was defined as one or two tests, and no tests documented (NTD) was defined as none of the tests ordered during the study year.

### Predictor variables

Based on the AHRQ framework, patient clinical and demographic variables were considered model inputs. From Medicaid enrollment data, we determined the patient's age, sex, and ethnicity. From ICD-9 codes, collapsed ambulatory diagnosis groups (CADGs) were constructed and used as comorbid risk adjusters (25,26). CADGs arrange ICD-9 codes by disease severity and chronicity into 12 diagnostic groups, such as "acute unstable" or "chronic stable," which provides a more succinct summary of disease burden than individual diagnoses, such as bronchitis or hypertension (27). From the chart review, the number of visits (1–40) and diabetes treatment type were determined.

Four variables used dummy coding. Age, by deciles, compared older groups, who were likely to have higher proportions of patients with type 2 diabetes (35–44, 45–54, or 55–65 years of age), to the youngest age-group (18–34 years of age), who are more likely to have type 1 diabetes (28). African-American, Asian, Native American, and Hispanic patients were compared with non-Hispanic white

patients. Patients on dietary control, oral medication, or intermittent use of insulin were compared with patients using insulin daily. Patients using multiple treatments were categorized into the more intensive treatment group. For instance, a patient taking oral hypoglycemic agents and insulin daily was categorized as using insulin daily. From the site visit, MCO payment to physicians or groups was coded as salaried, capitated, or a mixture of categories, in comparison to fee-for-service payment.

From the ARF, four variables described the health care environment in the patient's county of residence: median household income, proportion of inpatient days paid by Medicaid, proportion of population with less than a ninth grade education, and an urban/rural index ranging from 0 to 9, in which 0 is most urban.

Multilogit regression was performed on SAS version 6.12 with the three-level SC index (SC, MC, and NTD) as the outcome variable. A three-level dependent outcome was chosen over a dichotomous outcome (such as standard vs. nonstandard care), since we hypothesized a clinical difference between SC, MC, and NTD. In total, 10 predictor variable sets were included.

### Other aspects of diabetes care

Our index uses disease screening via test ordering as an indicator of quality of care. However, laboratory tests are easy to order, are not provider time-intensive, and necessitate documentation for order completion. Other ADA recommended aspects of patient care, such as patient education, are similarly important, but are more time-intensive and may not be as frequently performed or documented. To explore the relationship between other ADA recommended activities, we used odds ratios (ORs) to determine relevant clinical associations: *1*) documentation of physical examination (e.g., blood pressure [BP], weight, and foot examination) with patient counseling or referrals (dietitian or diabetes educator), *2*) hypertension documentation (high BP, hypertension, or BP >140/90) with ordering serum creatinine and patient education (e.g., tobacco, diet, and diabetes), *3*) documentation of patient's ability to participate in his or her treatment plan with patient education, and *4*) documentation of treatment goal with documentation of physical examination. Absence of a BP or weight at any visit during the study period was considered nonstandard care.

### Quality indicators across published benchmarks

To determine the quality of outpatient care of OHP patients relative to that administered to other populations with diabetes, we examined relevant studies with similar populations and methodology. MEDLINE searches using Ovid (November 1999) were performed using both MeSH headings and text word keys, including the following terms: diabetes mellitus, Medicaid, Medicare, low-income, poverty, federal poverty limit, primary care, outpatient clinic, managed care, managed care organization, health maintenance organization, benchmarks, quality of care, or standard(s) of care. We included studies using chart review or test ordering from U.S. hospital databases from 1993 to the present and excluded studies using patient self-report. Bibliographies were examined for additional references, and authors were contacted as necessary for additional data. Four studies were chosen as representative national benchmarks for low-income patients in a variety of outpatient settings: community health centers (24), staff-model health maintenance organizations in two states (29,30), and a mixed socioeconomic base in a university clinic (31). With use of this searching methodology, no other published reports on medical care standards for diabetic patients were found that included a large percentage of Medicaid patients.

## RESULTS

### Sample description

Our sample of 996 patients was predominantly female (617 subjects [63%]), was 48 ± 10.5 years of age, and made 8 ± 5 visits to their primary care provider during 1995. Patients were non-Hispanic white (825 subjects [83%]), African-American (42 subjects [4.2%]), Hispanic (78 subjects [7.8%]), Asian (36 subjects [6.6%]), or Native-American (15 subjects [1.5%]). Most patients were on oral hypoglycemic agents (478 subjects [47%]) or daily insulin (418 subjects [42%]), with a lesser number on dietary control (100 subjects [10%]) or using insulin intermittently (12 subjects [1.2%]). Using the CADGs as risk adjusters, we found that most patients had "chronic stable" diagnoses (85%), such as stable coronary artery disease, or "likely to recur" diagnoses (53%), such as allergic rhinitis. A smaller percentage of patients had "eye/dental" diagnoses (22%), such as retinopathy, or "psychosocial" diagnoses (21%), such as depression. Patients were enrolled in MCOs that paid their contracted physicians or groups on a capitated (41%) or fee-for-service basis (36%), with a smaller number in salaried plans (9%) or a mixture of the previous plans (14%).

### SC index

Of our sample, 70% had an $HbA_{1c}$ test ordered, 41% had a cholesterol test ordered, and 57% had a urine microalbumin or protein test ordered. With use of our SC index, it was discovered that 22% of patients received SC (i.e., all three tests ordered), 62% received MC (i.e., one to two tests ordered), and 16% had NTD.

### Predictors of SC, MC, and NTD

Usually, in logistic regression with a multilevel dependent variable with j levels (three in our case), a single OR is estimated for each independent variable. However, this assumes proportional odds for each j-1 value of the dependent variable to the reference value, with the constants of proportionality estimated by j-1 intercept terms. Since our model did not meet the score test for the proportional odds assumption, a full multinomial logistic regression was performed (with j-1 = 2 ORs estimated for each independent variable). Yet, multiple ORs per predictor variable are difficult to interpret. Therefore, for all predictor variables whose ORs (MC/SC or NTD/SC) were statistically significant at the $\alpha \leq 0.05$ level, we report another characteristic of the regression: the marginal probability effect (32,33). The marginal probability effect describes the expected change in the probability of each level of the outcome variable (SC, MC, or NTD) for every unit of change in each predictor variable.

For the 13 significant variables, regression results are reported as marginal effects for all three outcome levels in Table 1. Briefly, we found that increasing both the number of clinic visits for a given patient and the number of hospital beds in the patient's county was associated with SC. Conversely, patients 45–54 years of age tend to receive less SC than those 18–24 years of age. Regarding type of payment, salaried plans had the strongest association with SC. Several comorbid medical diagnoses increase the likelihood of SC, whereas psychosocial diagnoses decrease that likelihood. Patients receiving daily insulin are more likely to receive SC than those treated with intermittent

**Table 1—*Marginal effects of predictor variables on SC provided to OHP adults with diabetes***

| Predictors of care* | SC index† ($P \leq 0.05$) | | |
|---|---|---|---|
| | SC (all 3 tests) | MC (1–2 tests) | NTD |
| Continuous variables | | | |
| Clinic visits (for every five visits above sample mean) | 4.0 | 1.0 | −5.0 |
| Hospital beds per 1,000 population (for every 10 beds above county mean) | 1.0 | 3.0 | −4.0 |
| Categorical variables | | | |
| Age of patient 45–55 years (vs. 20–35 years) | −7.0 | — | 5.6 |
| Payment type | | | |
| Salaried | 36.4 | −24.2 | −12.3 |
| Mixture of payment types | −6.6 | — | 8.1 |
| Capitated | 5.2 | — | −4.0 |
| Comorbidity‡ | | | |
| Psychosocial | −6.4 | — | 4.1 |
| Preventive/administrative | — | 3.4 | −4.7 |
| Chronic stable | 8.3 | −13.1 | — |
| Eye/dental | 6.3 | — | −3.8 |
| Likely to recur | 4.7 | — | −4.5 |
| Treatment type | | | |
| Insulin intermittently (vs. daily insulin) | −5.2 | −41.0 | 46.2 |
| Dietary control (vs. daily insulin) | −10.1 | 10.2 | — |

*Performed at every visit; †performed at least once; ‡urine protein only.

insulin or dietary control, whereas oral hypoglycemic agents are unassociated. The overall model fit, as described by C-statistic, was 0.67.

### Association among several aspects of diabetes care

Physicians documented multiple aspects of ADA recommended standards over the course of the year. At every visit, providers documented BP in 804 (81%) patients, weight in 668 (67%) patients, and foot examination in 370 (37%) patients. Of the 407 (41%) patients with hypertension, only 284 (70%) were on ACE inhibitors. Moreover, 215 (22%) patients had a diabetes educator referral, whereas 187 (19%) had a specific dietary referral. The patient's ability or inability to participate in self-management was recorded in 627 (63%) patients, of whom 214 (22%) were noted to be unwilling to follow treatment goals. Specific goals of therapy were recorded in 26 (3%) patients. Smoking status was documented in 547 (55%) patients, and smoking cessation counseling was documented in 156 patients. Dietary instruction was recorded in 690 (69%) patients.

Patients who had BP recorded were more likely to have dietary instruction (OR 3.6 [3.0–4.4]), referrals to dietitians (OR 1.2 [1.1–1.2]), or diabetes educators (OR 1.2 [1.1–1.2]). Patients diagnosed with hypertension were more likely to have serum creatinine ordered (OR 1.4 [1.2–1.9]) or dietary instruction (OR 1.3 [1.1–1.6]). Documentation of patients' lack of ability to participate in self-management was associ-

**Table 2—*Care standards documented in managed care organizations***

| Study characteristics (chart review as primary data source) | Present study | Chin et al. (24) | Ho et al. (31) | | O'Connor et al. (29) (baseline) | Peters et al. (30) | ADA 1993 guidelines |
|---|---|---|---|---|---|---|---|
| *n* | 996 | 2,865 | 112 | | 267 | 353 | — |
| Study period | 1995 | 1995 | 1993 | | 1993 | 1993 | |
| Setting | Oregon MCOs | 55 community health centers 10 midwestern states | Veterans' Administration general medicine clinic vs. diabetes clinic | | Minnesota two staff model health maintenance organizations | California health maintenance organizations | — |
| Primary care physician management† | | | General medicine | Diabetes clinic | | | |
| $HbA_{1c}$ (≥1 time/year) | 70% | 70% | 84% | 100% | 75% (baseline) | 44% | Biannual to quarterly |
| Urine microalbumin or protein ordered/documented | 57% | — | 91%§ | 84%§ | — | 48%‡ | Annually |
| Lipid panel ordered/documented | 41% | — | — | — | — | 56% | Annually |
| BP recorded | 81%* | — | 98%† | 96%† | — | 86%† | At every visit |
| Foot examination documented | 37%* | 32%‖ | 48% | 86% | — | 6% | At every visit |
| Referral for education | 22% | 48% | 18% | 34% | — | 8% | — |
| Referral for dietitian/nutritionist | 19% | 66% | 21% | 28% | — | 10% | — |

*Performed at every visit; †performed at least once in the study year; ‡urine protein only; §urinalysis, type unspecified; ‖foot examination or referral for self–foot care/podiatry.

ated with less tobacco education (OR 0.98 [0.87–0.97]) and weight documentation (OR 0.64 [0.53–0.78]).

### Quality indicators across published benchmarks

Among the four representative comparison studies, sample sizes varied from 126 to 2,865 (Table 2). In nonspecialty clinics, $HbA_{1c}$ tests were performed for 44–84% of patients during the study year, whereas urine protein/microalbumin performance ranged from 48 to 91%. In one study, lipid panel was performed in 56%.

Data from the OHP compare favorably with these benchmarks—at the higher end for $HbA_{1c}$ (70%) and within 15% of lipid panel comparison. In our study, the foot examination criterion (i.e., examination performed at each visit) was more stringent than comparisons—the criterion for which was a foot examination performed at any visit. Thus, the 37% rate of OHP foot examination compares well with the foot examination rates reported by Peters et al. (30) (6%), Ho et al. (31) (48%), and Chin et al. (24) (32%). However, our education (22%) and dietitian/nutritionist (19%) referral rates were at the mid-to-lower end of the comparisons.

**CONCLUSIONS** — Benchmarks for care in predominantly Medicaid and low-income state expansion populations with diabetes have not previously been published. In comparison with other published benchmarks of test ordering, diabetic patients enrolled in the OHP receive a standard of care that compares well with national standards. Yet, over the course of a year, only 22% of OHP patients had three common tests performed that are ADA recommended standards. Similar to studies of other populations, the vast majority of OHP patients are not receiving standard diabetes care. Also, provision of care varied widely in areas such as patient education, screening physical examination, referrals, and smoking assessment—ranging from 19 to 81%. We found 13 variables strongly associated with SC.

In our study, some distinguishing characteristics make provision of SC less likely. Patients with stable chronic conditions, such as hypertension, may need special attention during primary care visits to improve SC. Similarly, having a psychosocial diagnosis such as depression (34) or schizophrenia (35,36) decreases the likelihood of receiving SC and increases the likelihood of having NTD. This finding may reflect either biases about patients with psychosocial diagnoses or the dominance of other priorities during the patient care visits.

Further, analogous to studies on immunization and lead screening, there may be missed opportunities to deliver care to patients with less frequent visits, since a greater number of patient-physician encounters over the course of the year is strongly associated with SC (37,38). OHP patients who were proportionately more likely to have type 1 diabetes (i.e., individuals 20–35 years of age) were more likely to receive SC than patients who were 45–54 years of age. Patients 45–54 years of age may represent patients with type 2 diabetes or long-standing type 1 diabetes. Similarly, patients with less advanced diabetes, as indicated by dietary control alone, may need increased attention to achieve SC. Taken together, these findings might indicate that patients with early type 2 diabetes in the OHP must be more vigorously monitored.

Another at-risk group appears to be patients who are using insulin intermittently, who are less likely to receive SC and are markedly more likely to have NTD. Intermittent insulin use may represent a prescription decision by the provider or a utilization decision by the patient. Whichever the mechanism, this small group of patients would benefit from identification and intervention through patient and/or provider education to ensure more appropriate care.

Other ADA recommended aspects of care provision demonstrated that providers appear to act on recorded information, as illustrated by the increased likelihood of serum creatinine ordering and dietary instruction when hypertension was documented.

Interpreting the impact of plan payment structure on SC becomes more difficult. Our data indicate that the chances of receiving SC improves in OHPs with salaried and capitated payment types. However, the influence of risk assumption by the physician in this complex payment schema was difficult to study as a truly independent variable, without including important organizational structural details (e.g., data management strategies and follow-up procedures) and understanding biases introduced by patient enrollment (39). Although suggestive that payment type influences quality of care delivered, our findings may be proxies for heterogeneity in MCO documentation and information collection. Furthermore, one plan represented all patients in salaried plans, and another plan accounted for 30% of all capitated plans. Physician variables, such as clinical practice experience and aggressive pursuit of continuing medical education, which might have influenced the quality of care, were not available.

To address issues of care provision, reporting marginal effects helps to illustrate the contributions of predictor variables to each level of multilevel indexes. These differences may be important in planning large-scale interventions that aim to incrementally improve care. For instance, if the OHP's programmatic goal was to improve care in the most vulnerable groups (i.e., those without any documented laboratory testing), then targeting patients who are 45–55 years of age or those on an intermittent regimen of insulin might receive the greatest emphasis.

Four study limitations should be acknowledged. First, we may have missed patients who did not have an ICD-9 code for diabetes recorded or who were miscoded. Second, although our data suggest that treatment of patients with type 1 and type 2 diabetes may differ, neither ICD-9 coding nor chart review allowed us to reliably distinguish between these two groups. Third, the clinical rationale for ordering or not ordering a test was not examined. Thus, although we use our index as an indicator of quality care, we recognize that individualized care may not always be consistent with SC. Finally, because of improving—but changing—standards of diabetes care during the early 1990s, we could not reliably track or reasonably compare changes in care delivery before and after OHP implementation in 1994.

In conclusion, comparisons with published benchmarks provide some evidence that diabetic patients in the OHP receive care that compares well with other national standards. Yet only 22% of patients received three commonly accepted tests that are considered standard medical care, and provision of care in other domains such as education, referrals, smoking assessment, and physical examination varied widely—from 19 to 81%. Our study reinforces the need to improve care in a variety of domains and identifies markers for patients at risk for receiving higher and lower standards of medical care. Given the social complexity of Medicaid patients, and the realities of providing primary care to medically complex patients with increasing demands for physi-

cian efficiency, our study points to the need to identify at-risk patients, and to address barriers to optimal management of this progressive chronic disease.

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