Trends in the Diabetes Quality Improvement Project Measures in Maine From 1994 to 1999

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OBJECTIVE — To examine changes in the management of patients with diabetes from 1994 to 1999 using the claims-based Diabetes Quality Improvement Project (DQIP) accountability measures.

RESEARCH DESIGN AND METHODS — Administrative claims from an employer-based health insurance cohort in Maine were used to describe the prevalence of claims-based DQIP accountability measures—HbA_{1c} testing, dilated eye examination, lipid profile, and monitoring for diabetic nephropathy—from 1994 ($n = 1,151$) to 1999 ($n = 2,221$) in a 100% sample of adults (18–64 years of age) with diabetes. The Mantel-Haenszel χ^2 test for trend was performed on each measure. Prevalence estimates were also stratified by three insurance products: health maintenance organization (HMO), point of service, and indemnity.

RESULTS — There was a positive trend for all outcome measures ($P < 0.001$). The baseline and final frequencies (percent increase) for lipid testing, HbA_{1c}, dilated eye examination, and screening for diabetic nephropathy were as follows: 13–50% (257%), 37–69% (92%), 30–46% (53%), and 37–50% (36%), respectively. Individuals with diabetes and indemnity insurance were much less likely to receive these measures than individuals with other types of insurance, whereas people in HMOs were more likely to receive HbA_{1c} testing and lipid profiles.

CONCLUSIONS — The proportion of patients with diabetes receiving DQIP accountability measures significantly increased from 1994 to 1999. There is large variation in prevalence among these measures and insurance products. It is urgent to identify effective mechanisms for delivering consistent preventive care that are congruent with defined standards of benefit.

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D iabetes is the seventh ranked cause of death in the U.S. and is present in over 8% of the adult population (1). Direct and indirect costs associated with diabetes approached $100 billion in 1997 (1). Heart disease and stroke cause about 65% of deaths among people with diabetes. These deaths could be reduced by 30% with improved care to control blood pressure and blood glucose and lipid levels (1). Additional sources of the morbidity and mortality associated with diabetes are due to its complications, which include blindness, kidney failure, and nerve damage (2). Studies have shown that complications of diabetes can be slowed or prevented by better management on the part of the health care team and patient (3,4). Improved blood glucose control, regular eye and kidney function examinations, and reduction in cholesterol and blood pressure are some of the practices known to diminish the heavy personal and financial burden attributed to diabetes. However, there is evidence that "usual care" for individuals with diabetes falls short of these ideals (5–14). In response, an expert committee representing public and private entities, physician organizations, and the Veterans Administration developed a unified set of diabetes-specific performance and outcomes measures called the Diabetes Quality Improvement Project (DQIP). There have been several published cross-sectional studies that have examined self-reported DQIP measures use from the Behavioral Risk Factor Surveillance System (BRFSS) surveys (7–11,15). A single study used computerized data records from three managed care organizations to assess the prevalence of HbA_{1c} tests, dilated eye examinations, and urine protein assessments (both microalbuminuria and macroalbuminuria) in patients with diabetes (13). Medicare claims databases have been used to assess rates of HbA_{1c} tests, dilated eye examinations, and lipid panels by hospital referral region across the U.S. (16). The DQIP accountability measures were examined from 1995 to 1997 in the Indian Health Service Diabetes Care and Outcomes Audit, which is a random sampling of medical records from 12 Indian Health Service administrative regions (17).

This study assessed the use of four DQIP accountability measures in a privately insured Maine population with diabetes from 1994 to 1999. We sought to answer two questions: have there been changes in the use of these preventive services over time, and are there differences in use of these services by individuals with diabetes among different insurance products?

Table 1—*MHMC demographic information for individuals with diabetes, 1994–1999*

	1994	1995	1996	1997	1998	1999
Total individuals with diabetes	1,151	1,688	1,731	1,868	1,885	2,221
Sex						
M	150 (44)	885 (52)	895 (52)	1,007 (54)	1,049 (56)	1,225 (55)
F	194 (56)	803 (48)	836 (48)	861 (46)	836 (44)	996 (45)
Age-group (years)						
18–34	162 (14)	192 (11)	185 (11)	184 (10)	176 (9)	231 (10)
35–44	181 (16)	319 (19)	305 (18)	313 (17)	326 (17)	353 (16)
45–54	367 (32)	533 (32)	562 (32)	663 (35)	646 (34)	750 (34)
55–64	441 (38)	644 (38)	679 (39)	708 (38)	737 (39)	887 (40)

Data are *n* or *n* (%).

RESEARCH DESIGN AND METHODS

— The cohort examined in this study was a census of adults (18–64 years of age) with diabetes receiving employment-related health insurance benefits through employers participating in the Maine Health Management Coalition (MHMC). The MHMC is a partnership of employers dedicated to increasing the value of health care delivery in the state of Maine. This coalition represents 32 employers, including the state's four largest, with >70,000 employees and ~110,000 covered adults (18–64 years of age). There are three types of insurance products offered by these employers: health maintenance organization (HMO), point of service (POS), and indemnity plans. A POS option is a type of plan offered by managed care organizations, including HMOs, that allows people who are willing to pay higher out-of-pocket costs to see out-of-plan providers. Indemnity plans are typically traditional fee-for-service, with no managed care elements.

Individuals with diabetes were identified from the MHMC paid claims databases using criteria developed for the Health Plan Employer Data and Information Set/DQIP. Individuals with diabetes were identified as those enrollees with two face-to-face encounters (using the evaluation and management Common Procedural Terminology codes) with different dates of service in an ambulatory setting or nonacute inpatient setting or one face-to-face encounter in an acute inpatient or emergency room setting during the calendar year with an ICD-9 diagnosis of diabetes. This case definition algorithm did not distinguish between type 1 and type 2 diabetes (women with gestational diabetes were excluded). Additional in-

clusion criteria were that the patient was 18–64 years of age as of December 31 of that calendar year and members must have been enrolled in a plan a minimum of 11 months during the calendar year.

We used the four DQIP accountability measures designed for medical claims: *1*) HbA$_{1c}$ test, *2*) lipid profile, *3*) dilated eye examination, and *4*) monitoring for diabetic nephropathy, which includes screening tests (microalbuminuria and macroalbuminuria) or documentation of existing renal disease (*Diabetes Quality Improvement Project Manual: Medquest Data Abstraction and Analysis System User's Guide*, published by the Texas Medical Foundation, under contract from the Health Care Financing Administration, 4 March 1999 version).

Because of the nature of our data use agreement with the MHMC, age was available as a categorical variable only. The prevalence estimates for each measure in the three subcohorts (HMO, POS, and indemnity) were adjusted to the age

and sex distribution of the MHMC population of individuals with diabetes. Because the state of Maine is 98% white, no adjustments were made for race. The demographic information changed little from 1994 to 1999 for the HMO, POS, and indemnity cohorts; thus, a weighted average of the 6 years of data was calculated. Prevalence estimates were also calculated as a weighted average. The Mantel-Haenszel χ^2 test for trend was performed on each measure for the defined time period in each insurance cohort and the MHMC cohort. All analyses were performed using SAS software (version 8.2; SAS, Cary, NC).

RESULTS — From 1994 to 1999, the number of individuals in the MHMC claims database with a diagnosis of diabetes who fulfilled the enrollment and two outpatient/one inpatient criteria increased from 1,151 to 2,221 (primarily because of the growth of the MHMC membership). Table 1 displays the age

Table 2—*Demographic information for individuals with diabetes in the HMO, POS, and indemnity cohorts (averaged from 1994 to 1999)*

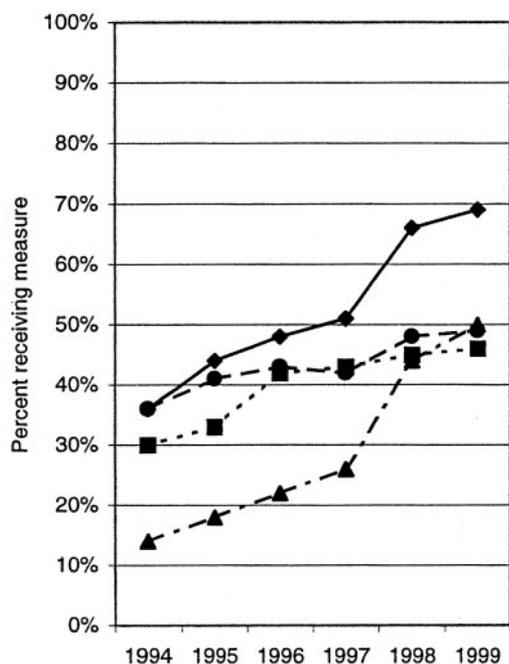|	HMO	POS	Indemnity
Total individuals with diabetes	395	877	486
Sex			
M	212 (54)	491 (56)	244 (50)
F	183 (46)	386 (44)	242 (50)
Age-group (years)			
18–34	57 (14)	70 (8)	64 (13)
35–44	79 (20)	130 (15)	89 (18)
45–54	137 (35)	297 (34)	151 (31)
55–64	122 (31)	380 (43)	182 (38)

Data are *n* or *n* (%).

Figure 1—*Percentage of individuals with diabetes in the MHMC receiving four of the DQIP measures from 1994 to 1999.* ◆*, HbA₁c;* ■*, eye examination;* ▲*, lipids;* ●*, monitor for nephropathy*

and sex distribution of this population by year. The sex and age distributions of individuals with diabetes for the HMO, POS, and indemnity products are shown in Table 2 as the weighted averages. The HMO cohort had the largest proportional increase of enrollees with diabetes from 1994 to 1999. The POS cohort is the largest and oldest and has roughly doubled in size from 1994 to 1999. The indemnity cohort, while fluctuating in size, was the smallest in 1998 and 1999.

From 1994 to 1999, there was a statistically significant positive increase in each of the four accountability measures (χ^2 test for trend, $P < 0.001$; Fig. 1). In 1994, lipid profiles had the lowest prevalence of these measures at 13%. In 1999, 50% of this cohort had a lipid profile. This result represents a 257% increase in use, the highest of all the measures. HbA_{1c} testing and monitoring for nephropathy were each performed in 36% of this cohort in 1994. Prevalence increased to 69 and 49%, respectively, representing a 92 and 36% increase in use. Eye examinations increased 53%, from 30 to 46%.

Considerable variation exists in the use of the DQIP measures in individuals with diabetes among the three insurance products (Fig. 2). The indemnity cohort had the lowest prevalence of all the DQIP measures, ranging from 22% for lipid profiles to 39% for HbA_{1c} testing. The HMO cohort had the highest use of HbA_{1c}

testing (69%), lipid profiles (37%), and monitoring for nephropathy (48%).

CONCLUSIONS — From 1994 to 1999, patients with diabetes in the MHMC realized a steady increase in the prevalence of the four DQIP accountability measures examined in this study.

These positive trends were also seen in the three cohorts (HMO, POS, and indemnity) within the MHMC (data not shown), with the exception of HbA_{1c} testing and monitoring for nephropathy in the indemnity cohort. The prevalence of these four DQIP measures in 1999 are consistent with those found in other studies using commercial insurance data (18,19). Individuals with diabetes enrolled in an HMO insurance product were much more likely to receive these preventive services (except eye examinations) than individuals covered by the other two products. This is an important finding, and there are several potential explanations for these differences: *1*) managed care plans have developed effective mechanisms for clinically managing individuals with diabetes according to standard guidelines, *2*) physicians may provide services differently to patients according to the type of insurance coverage and/or reimbursement, *3*) employees insured by an HMO product may have easier access to health care services, and *4*) employees who choose an HMO product may be more compliant with provider recommendations. In the MHMC, the vast majority of POS enrollees are state employees, which includes a group of early retirees (<65 years of age). These insured patients may have different access to care or moti-
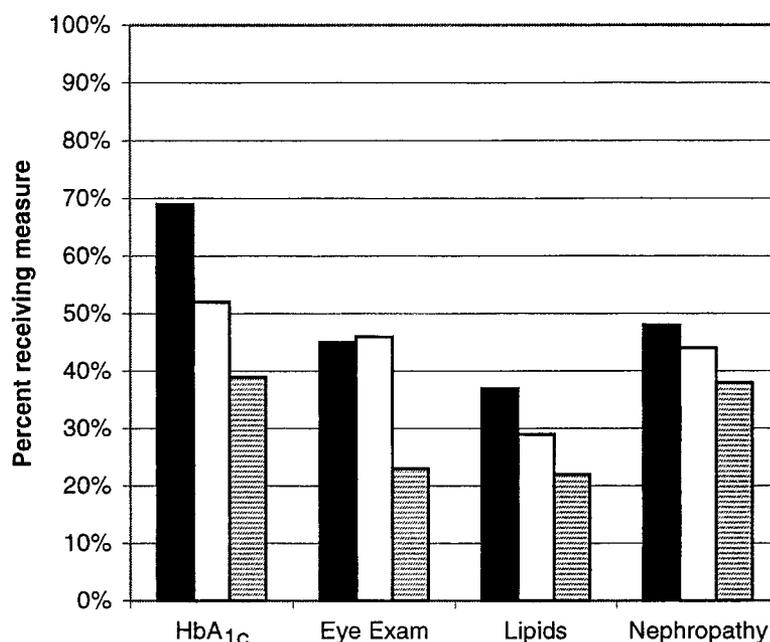

Figure 2—*Percentage of individuals with diabetes in the HMO, POS, and indemnity cohorts receiving four of the DQIP measures (averaged from 1994 to 1999).* ■*, HMO;* □*, POS;* ▤*, indemnity.*

vation to seek care, be less compliant with provider recommendations, or have other inherent differences. Indemnity insurance typically does not cover preventive services and deductibles are high; thus, claims are likely not submitted for these measures even if they are received.

Whereas the DQIP measures are not guidelines for care, they were constructed to make the best use of the evidence available for assessing care. This evidence includes, but is not limited to, various guidelines and clinical practice recommendations released before and during this study time period (20). Further reinforcement of these guidelines and recommendations were provided by the Diabetes Control and Complications Trial (4,21) and the U.K. Prospective Diabetes Study (22). The trends shown in this study of increased prevalence for four of the DQIP measures demonstrate that there has been a positive effect on clinical practice of assessing, monitoring, and treating individuals with diabetes. This effect has been particularly striking in the increased use of lipid profiles. This growth may reflect the growing emphasis on the macrovascular complications of diabetes, the evidence of lipid-lowering effects on reducing cardiovascular mortality regardless of whether diabetes is also present, and the efficacy of antihyperlipidemic medications in lowering cholesterol.

The national health objectives for 2000 (23) targeted 70% of all individuals with diabetes $\geq$18 years of age to have an annual dilated eye examination. This target rate has been increased to 75% for the Healthy People 2010 objectives (24). According to the BRFSS data from 1997 to 1999, Maine reported that 76 $\pm$ 8.9% of all individuals with diabetes had received an annual dilated eye examination (10). Data reported here show that in the MHMC overall, as well as in all three insurance subgroups, prevalence of eye examinations has remained below the 2000 target. A target of 50% has been set for all diabetic individuals $\geq$18 years of age to have an annual HbA$_{1c}$ assessment (21). Patients with diabetes in the MHMC have surpassed this objective.

The limitations of this study include those inherent in claims database analyses. Coding errors and omissions as well as changes in coding over time may result in inaccurate estimates. Covered services may differ among plans and thus may or

may not be in the paid claims database. It should be noted that the DQIP measures allow eye screening for diabetic retinal disease, lipid profile testing, and monitoring for diabetic nephropathy every 2 years (in lieu of annually) in patients identified as low risk or having values in predetermined ranges. Because we did not have access to medical records, these analyses were done without subtracting the low-risk patients from the denominator. Data from the MHMC claims database could not be linked to prior years.

Although the trends in the DQIP measures reported here are encouraging, there remains an urgent need to identify effective mechanisms for delivering preventive care that are congruent with defined standards. The results reported here suggest that research is needed to find the determinants of the disparities in prevalence of DQIP measures among types of insurance products. This would include investigations that involve the insurers, provider practices, the providers, and the patients. It would also be useful to confirm these data from administrative databases with those in medical charts. Increased educational efforts targeted at individuals with diabetes, as well as health care providers, may contribute to greater improvement. Efforts may also need to be focused on increasing awareness of the seriousness of diabetes and its complications and the utility of the HbA$_{1c}$ test for defining risk of microvascular and neuropathic complications and for monitoring glucose control status. Interventions and education from the payer level should be integrated with those of the provider(s) to reinforce and complement initiatives focused on the patient. Further investigation should be undertaken to better understand the causes for such wide variation in the prevalence of these DQIP measures and to assess the frequency of use of these components of care to optimal outcomes.

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