

Comparison of 2 Systems for Clinical Practice Profiling in Diabetic Care: Medical Records Versus Claims and Administrative Data

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Objectives: To (1) describe the rate of glycosylated hemoglobin (HbA_{1c}) testing and control in a primary care clinic at an academic medical center; (2) compare academic medical center and health maintenance organization (HMO) data for a subgroup of the same patients; and (3) discuss the challenges to accurate clinical practice profiling.

Study Design: Retrospective analysis of medical records and claims and administrative data.

Patients and Methods: We reviewed the medical records of 300 patients with diabetes mellitus from the Primary Care practice at an academic medical center (AMC). The HMO and AMC were in the southeastern United States. The study adhered to the National Committee for Quality Assurance's Health Plan Employer Data and Information Set 3.0 (1998) guidelines for collection of the numerator and denominator data.

Results: Overall, 275 (91.7%) of 300 patients underwent a documented HbA_{1c} test (range, 77.8%-98.0% across the 5 Primary Care Associates clinic physicians). Of these 275 patients, 206 (74.9%; range, 52.4%-84.7%) were under "good control" (defined by the National Committee for Quality Assurance as an HbA_{1c} level of $\leq 9.5\%$). The mean (SD) HbA_{1c} level was 8.45% (1.98%). Data from the HMO documented a rate of HbA_{1c} testing of 36.3% (45/124) compared with 92.7% (115/124) based on case note review at the academic medical center.

Conclusions: Current administrative and claims-based information systems have inherent weaknesses if used for performance measurement. Reliance solely on medical record review is time and cost prohibitive. To ensure complete reporting of mandated "quality measures" will necessitate the tracking of data across different healthcare systems.

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An estimated 15.7 million people, or nearly 6% of the population in the United States, have diabetes mellitus, and the disease is the seventh leading cause of death.¹ Diabetes mellitus is the leading cause of blindness in persons aged 20 to 74 years, the leading cause of end-stage renal disease in adults, and a major risk factor for the development of atherosclerotic disease.² The national cost of treating diabetes mellitus, both direct and indirect, is estimated to be \$98 billion per year, and the health-care costs of people with diabetes mellitus are

nearly 4 times those of people without the disease (1997 estimates of per capita costs, \$10,071 vs \$2699, respectively).^{3,4}

One challenge in the management of diabetes mellitus is providing uniform care for all patient groups. Recent studies^{3,5} have demonstrated that improved control of diabetes mellitus can delay or possibly prevent the complications of the disease. One variable that is widely accepted as an indicator of diabetic control is glycosylated hemoglobin (HbA_{1c}) level.⁶ The American Diabetes Association recommends that HbA_{1c} levels be monitored at least once every 3 to 6 months to ensure adequate diabetic control.

In parallel with the American Diabetes Association recommendations, the National Committee for Quality Assurance (NCQA)⁷ has developed and promoted a method to facilitate comparison of diabetic care among healthcare providers. The NCQA's Health Plan Employer Data and Information Set (HEDIS) 3.0 has 6 measures related to diabetes mellitus: 4 are process measures, namely, rates of HbA_{1c} and lipid monitoring and frequency of retinal examination and monitoring for nephropathy, and 2 are outcome measures, namely, levels of control of HbA_{1c} and blood lipid levels. Based on the reported results, individual physicians, group practices, and health maintenance organizations (HMOs) face comparison for the purposes of improving quality of care and increasing physician accountability. Third-party payers are likely to use this information to promote continuous quality improvement (CQI) initiatives; to influence rates of reimbursement for services; and, potentially,

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to determine which physicians will receive accreditation to provide services to plan members. The implications for healthcare providers are significant and complex and include incorporating medical information systems into routine practice, responding to externally generated performance profiles, and, ultimately, changing physician behavior.

... STUDY AIMS ...

1. To describe the rate of HbA_{1c} testing and the level of glycemic control in a primary care clinic at an academic medical center (AMC), as an example of physician profiling.
2. To compare the rate of HbA_{1c} testing documented at an AMC with the rate documented at an HMO for a subgroup of the same patients.
3. To identify and discuss the challenges facing healthcare providers and medical information systems in the conduct of clinical practice profiling.

... METHODS ...

Setting

The site was the Primary Care Associates (PCA) practice at an AMC, which employs 3 board-certified internists and 2 board-certified family practitioners. The PCA practice also has a nutritionist but no certified diabetes mellitus nurse educator. The HMO was the largest health insurer in the state of Georgia.

Design

The study adhered to the NCQA's HEDIS 3.0 (1998) guidelines for collection of the denominator and numerator data. The NCQA method is that used by the southeastern HMO to measure physician practice patterns. This method does not differentiate between type 1 and type 2 diabetes mellitus. To address the first study aim, data were collected retrospectively on the percentage of patients with diabetes in the AMC who had, in their case notes, documentation of an HbA_{1c} test having been conducted and the HbA_{1c} value ("good control" was defined by the NCQA as a value of $\leq 9.5\%$). To address the second study aim, data were collected on the percentage of HMO members with diabetes mellitus in the PCA clinic who had documentation in the HMO's claims data of an HbA_{1c} test having been performed.

Academic Medical Center Data Collection

The study sample was generated from the PCA clinic population ($N \approx 12,000$). Nationally, the

prevalence of diabetes mellitus ranges from 8.2% in persons aged 20 years and older to 18.4% in persons aged 65 years and older.¹ Given the population served by the PCA clinic, we estimated the prevalence of diabetes mellitus to be approximately 12.5% ($n \approx 1500$), from which a convenience sample of 20% of patients with diabetes mellitus ($n = 300$) was selected. Study patients had medically treated type 1 or type 2 diabetes mellitus, were aged 18 to 75 years, and were continuously enrolled in the PCA clinic during the reporting year (1998). To make comparisons with the HMO, we oversampled this subpopulation to ensure 100 patients. The study population was analyzed according to insurance coverage (Medicare, Medicaid, commercial insurance, or no insurance), race (white or black/other), sex, and age (5 groups from 18-75 years).

A hybrid approach adhering to the HEDIS 3.0 method involved retrospective review and comparison of case notes and electronic claims data. To calculate the numerator, we sought HbA_{1c} values for calendar year 1998 from an office file or hospital chart review or a claim/encounter with Current Procedural Terminology code 83036 (hemoglobin, glycosylated).⁸ If no electronic claim or laboratory data were found, the test was assumed not to have been conducted and thus was counted as poor HbA_{1c} control. If there were multiple values for 1998, then the most recent value was used to assess the level of control.

HMO Data Collection

Use of HbA_{1c} testing was not a required measure for HEDIS in 1998-1999; however, it was starting in 2000. A list of HMO members with diabetes mellitus who attended the PCA clinic was matched to the claims data held in the HMO's corporate data warehouse. Claims were identified from the AMC's bill for the HbA_{1c} test using the Current Procedural Terminology code (83036) as a line on the UB92 billing submission. Note that at the time the study was conducted the HMO was not able to access data on the actual laboratory result of an HbA_{1c} (or any other) test. Thus, the study was limited to comparison of the rates of HbA_{1c} testing and omitted comparison of the level of HbA_{1c} control.

... RESULTS ...

Rate of Documentation of HbA_{1c} Testing and Level of Glycemic Control in a Primary Care Clinic at an Academic Medical Center

The demographic profile in this study does not necessarily reflect that of the PCA practice because

we preferentially oversampled HMO patients (\approx one third of the sample) (Table). The female-male ratio was 60:40, and 59% (177/300) of patients were black or another ethnic minority and 41% (123/300) were white. Most patients were aged 45 to 75 years. Of 279 insured patients, 124 were covered by an HMO, 101 by Medicare, 21 by Medicaid, and 33 by another type of insurance (Table).

Overall, 91.7% of patients had a documented HbA_{1c} test (range, 77.8%-98.0% across the 5 PCA clinic physicians). Subgroup analysis revealed male and female testing rates of 92.5% and 91.1%, respectively. Testing rates by race were similar: 90.2% of whites and 92.7% of blacks and other races. All age groups had testing rates of 88.2% to 94.1%. Testing rates by insurance status revealed an HMO rate of 92.7%, a Medicare rate of 94.1%, and a Medicaid rate of 71.4% (Table).

Rates of testing differed by PCA clinic provider. One provider had a testing rate of 77.8%, which was significantly lower than that of all other providers (90.4%, 91.5%, 97.0%, and 98.0%) ($P = .038$ by Fisher exact test). Because rates of testing differed among providers, analyses were conducted excluding the

provider that had a testing rate of 77.8%. The overall rate of documented testing was 93.0%, and the rates for the remaining 4 physicians did not differ ($P = .293$). Performing subgroup analyses excluding the physician with the lowest testing rate showed that male (92.9%) and female (93.2%) testing rates were similar ($P = .921$) and that white (91.9%) and non-white (93.8%) testing rates were similar ($P = .537$). Differences in rates of testing were not different among age groups ($P = .550$), with rates ranging from 89.3% to 96.1%. Differences in rates of testing by insurance status were found, with those with Medicaid (73.7%) having significantly ($P = .011$) lower rates of testing than those with HMO coverage (95.5%), Medicare (94.6%), other insurance (96.7%), or no insurance (84.2%).

For the subset of 4 physicians, among patients who were tested, 76.8% were under good control (range, 67.4%-84.7%). The data also revealed that of patients who underwent an HbA_{1c} test, the percentage under good control (defined by the NCQA as an HbA_{1c} level of $\leq 9.5\%$) was 74.9% (range, 52.4%-84.7% across the 5 PCA clinic physicians). The mean (SD)

Table. Characteristics of 300 Patients with Diabetes Mellitus*

Characteristic	Patients, No. (%)			
	Total	Documented HbA _{1c} Testing	HbA _{1c} Test Result of "Good Control"	Documented Rate of HbA _{1c} Control, mean (SD), %
Sex				
M	120 (40)	111 (92.5)	75 (67.6)	8.69 (2.09)
F	180 (60)	164 (91.1)	131 (79.9)	8.29 (1.89)
Race				
White	123 (41)	111 (90.2)	88 (79.3)	8.15 (1.63)
Black/other	177 (59)	164 (92.7)	118 (71.9)	8.66 (2.16)
Age group, y				
18-34	14 (5)	13 (92.9)	8 (61.5)	8.45 (1.91)
35-44	40 (13)	37 (92.5)	25 (67.6)	8.96 (2.31)
45-54	85 (28)	75 (88.2)	53 (70.7)	8.55 (2.09)
55-64	85 (28)	80 (94.1)	60 (75.0)	8.57 (1.89)
65-75	76 (25)	70 (92.1)	60 (85.7)	7.94 (1.69)
Insurance status				
HMO	124 (41)	115 (92.7)	87 (75.7)	8.45 (1.82)
Medicare + Medicaid + other	101 (34)	95 (94.1)	74 (77.9)	8.29 (1.73)
Medicaid + other	21 (7)	15 (71.4)	8 (53.3)	8.34 (2.13)
Other	33 (11)	32 (97.0)	21 (65.6)	9.03 (2.89)
No insurance	21 (7)	18 (85.7)	16 (88.9)	8.38 (2.11)
Total	300 (100)	275 (91.7)	206 (74.9)	8.45 (1.98)

*Data are from 5 primary care physicians at an academic medical center (AMC) in the southeast United States. HbA_{1c} = glycosylated hemoglobin; HMO = health maintenance organization.

level of HbA_{1c} control for patients with a documented test was 8.45% (1.98%).

Rate of HbA_{1c} Testing Documented at an Academic Medical Center vs an HMO

Comparison of the documented rates of HbA_{1c} testing between the AMC and the HMO revealed a startling difference. Case note reviews at the AMC recorded 115 (92.7%) of 124 patients undergoing HbA_{1c} testing during the study vs HMO claims data confirming only 45 (36.3%) of 124 patients undergoing testing.

... DISCUSSION ...

The results of this study support the idea that profiling can be undertaken to compare physicians' practices in a primary care setting, provide reassurance about the quality of medical care being delivered to patients with diabetes mellitus, and raise a variety of concerns regarding comparison of data between healthcare organizations.

Based on medical record data, reassurance can be taken from the performance of AMC primary care physicians in terms of the rate of HbA_{1c} testing (91.7%; range, 77.8%-98.0%) and the level of HbA_{1c} control (mean [SD], 8.45% [1.98%] for patients undergoing a test). The authors recognize the generosity of the NCQA in defining good control as an HbA_{1c} of \leq 9.5% when existing research evidence⁵ and best practice recommendations⁹ indicate that the goal should be an HbA_{1c} level of <7.0%, with physician-led intervention when the HbA_{1c} level increases above 8.0%.¹⁰

Comparison of our study results with other public domain data is difficult at present; however, as the NCQA HEDIS method gains wide acceptance, interorganizational and intraorganizational comparisons will become easier. We are also encouraged by the willingness of the physicians involved to address the identified weaknesses. The data do not, however, provide any explanation as to why one physician would have a lower rate of HbA_{1c} measurement or control. This is one of the problems often cited with physician profiling: outliers can be identified, but it is difficult to determine the cause and the effect on patient care or healthcare costs.

For the rate of HbA_{1c} testing, the overall rates of measurement are markedly different between the 2 methods: 92.7% (115/124) from case note review and 36.3% (45/124) from HMO administrative data. Rerunning these analyses to exclude the physician with the lowest documented testing rate hardly alters the difference: 95.5% (107/112) from case

note review and 38.4% (43/112) from the HMO data. Differences in the documented rates of HbA_{1c} testing are not easy to explain; however, they allow for comparison of 2 methods of data collection and data storage. Data collection at the AMC was an extremely time-consuming process; the authors estimate that 200 hours were required for the case note review process. Collection of data from the HMO was much simpler. By entering the Current Procedural Terminology billing codes for HbA_{1c} into the HMO database, the information system was able to determine the percentage of patients with a claim for an HbA_{1c} test.

This study raises the question of whether the method of data collection from the AMC might be more accurate than the HMO method, albeit at a substantial cost in time spent?² One factor contributing to the difference might be that as a state-owned entity, the AMC was constrained by a fiscal year-end balanced budget and thus was unable to generate financial reserves. The end result of this fiscal policy was that the AMC created a "virtual reserve" through increasing the number of "days in accounts receivable," ie, bills were routinely held back for payment. At the time of this study, the number of days in accounts receivable was more than 120 days. Other, alternative reasons might be that the AMC was sending their tests to a nonplan laboratory, again resulting in the HMO having no record of the test, although we doubt that this played a significant role. Whatever the cause, the difference between the 2 sets raises concerns. If HMOs are profiling physician practice patterns based on incomplete data, what will be the impact on future negotiations between HMOs and institutions that are contracting with them?

The limitations of the study center on the completeness and validity of patient information, in particular, the limitations of administrative data and the retrospective study design.¹¹ If patients went outside the AMC to obtain the test, if it was performed by an independent reference laboratory, or if the AMC did not bill for the test on their line item claim (or did not submit a claim at all), then a valid match would not have been found.

One problem that is common to both methods of data collection and profiling in general is the fact that they both provide only a snapshot of the data. To truly evaluate physician or institutional practices, longitudinal data would need to be analyzed. The need for an "information framework" that crosses traditional clinical and service domains is essential for the implementation of healthcare systemwide

CQI activities.¹² Complete reporting of mandated “quality measures” will necessitate the tracking of clinical care data across different healthcare systems.

... CONCLUSIONS ...

As the practice of medicine enters a new century, challenges confront the healthcare profession that our predecessors could have scarcely predicted. In the past, society had faithfully assumed that the care provided by physicians to patients was timely, of high quality, and beneficial. However, patients, employers, state and federal governments, and the insurance industry are now demanding data that demonstrate excellence in clinical practice.

The ethos of CQI has now arrived at the doorstep of the healthcare industry, and it translates at one level to increased individual physician accountability. Physicians cannot ignore this movement; indeed, as a profession, they are obliged to demonstrate that they are providing the highest quality medical care. As this study has shown, third-party administrative and claims-based data have inherent weaknesses,¹³ can be erroneous, and can have negative consequences on many aspects of individual and group medical practice. Health plans need to invest more resources in information technology. Results of a recent survey of almost half the national HMOs suggest that HMOs allocate 61% of information technology costs to enrollment, claims processing, and administration and only 28% to clinical analysis and physician cost.¹⁴ In addition, health plans must, as part of the NCQA HEDIS performance measurement, use a hybrid method incorporating both administrative and claims data and clinical and case note review.

Measuring clinical practice patterns in a hospital or clinic setting is a major challenge and is fraught with problems, including the technical, logistic, fiscal, and human resources necessary to establish information systems to facilitate the process.¹⁵ Despite the fact that medical record review is time and resource intensive, in many healthcare organizations this is the only approach available to undertake CQI activities and performance measurement. Results of our study confirm that the existing information system at the AMC is woefully inadequate and provides an inefficient and ineffective tool for even the simplest CQI initiative. The medical profession can no longer ignore the vital role of information systems in healthcare and must enter the debate at a grass-roots level to understand and participate in efforts to measure healthcare quality and facilitate change.^{16,17}

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