Does Improved Access to Care Affect Utilization and Costs for Patients With Chronic Conditions?

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Objective: To determine whether a major improvement in access (ie, implementing an open access system) in a large multispecialty medical group during 2000 was associated with changes in utilization or costs for patients with diabetes, coronary heart disease (CHD), or depression.

Study Design: Multilevel regression analysis of health plan administrative data.

Patients and Methods: Approximately 7000 patients with diabetes, 3800 with CHD, and 6000 with depression who received all of their care in this care system served as the subjects for this study. Utilization and costs between 1999 and 2001 (before and after implementation of open access) were compared for these patients. The main outcome measures were rates of inpatient admissions and various types of outpatient encounters as well as associated costs for these subjects.

Results: Between 1999 and 2001, total office visit changes were small and varied with condition, but the proportion of these visits made to primary care physicians increased significantly by an absolute 5% to 9% and primary care physician continuity increased for each condition. Urgent care visits also decreased significantly by an absolute 5% to 9%, but there was no change in emergency department visits or hospital admissions. Total costs of care for these patients were much larger than those for the overall population of the medical group, but increased at a similar rate.

Conclusion: A major improvement in patient access to primary care clinics was associated with increased use and continuity of primary care for patients with 3 chronic conditions, but did not affect overall resource use.

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The Institute of Medicine's 2001 report *Crossing the Quality Chasm* highlighted the chasm between "the care we have and the care we could have."[1] Serious deficits in quality of healthcare have been further documented by McGlynn et al's study of national adherence to 439 indicators for 30 conditions.[2] The chasm report emphasized the particular need to improve care for patients with chronic conditions and was followed by a 2003 report identifying the 20 priority areas for transforming care.[3] Many of these 20 were common chronic conditions for which improving quality necessarily involves addressing the 6 aims or dimensions of quality identified by the chasm report: safety, timeliness, effectiveness, efficiency, equity, and patient-centeredness.

Each of these dimensions now is receiving increased attention, but it seems that timeliness ("reducing waits and sometimes harmful delays") is actually being improved, at least in terms of access to primary care. Murray and Tantau have been major innovators with respect to access, helping many medical groups to make substantial improvements in access through an approach called Advanced Access or Second Generation Open Access.[4-6] In this approach, the goal is to be able to offer any patient a visit the same day that he or she calls, with the patient's personal physician if that physician is in the office that day.

In theory, a medical practice that can offer this type of access might expect to see a decrease in unnecessary office visits, cancellations, and no-shows; decreased urgent-care and emergency department (ED) visits; decreased hospitalizations because serious illnesses are caught at an earlier stage; greater continuity of care; and perhaps a decrease in total office visits.[4-7] If these changes occur, it seems likely that another of the 6 dimensions, efficiency, might be improved as well, with decreased costs for both the care system and for patients. Whether and to what extent these effects actually occur is unknown, however, because no published studies thoroughly document such changes.

Because so much of the attention to the need for quality improvement has focused on patients with chronic conditions, another open question concerns the effect of access improvement on these frequent and high-cost users of the care delivery system. Murray and Berwick suggest that such patients may fare better with

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prescheduled visits rather than expecting them to simply call for an appointment on the day that their routine follow-up is needed.[4] Others have been concerned that patients with chronic disease may fall through the cracks of a care system that becomes increasingly oriented toward acute and same-day care.

Because our large multispecialty medical group recently greatly improved primary care access using the Advanced Access model of Murray and Tantau,[4-6] we conducted this study to assess the impact of increased access on utilization and cost of care. Over the course of 1 year (2000), primary care access for our patients, measured by third-next-available appointment, improved from an average of 17.8 days in 1999 to 4.2 days in 2001. Murray notes that this is a better measure of real access than the first- or second-next-available appointment because those appointments are more likely to represent random cancellations.[4] The range of third-next-available appointments among 17 primary care clinics in 2001 varied from 1.7 to 6.2 days.

Because we were particularly concerned with the effects on patients with chronic conditions (diabetes, coronary heart disease [CHD], or depression), we focused on those patients to learn whether the overall change in primary care access between 1999 and 2001 was associated with any significant changes in:

- Visits to ambulatory care, primary care, ED, or urgent-care clinic.
- Proportion of all visits that were in primary care and were for the patient's chronic condition.
- Continuity of care with the same physician.
- Hospital admissions and length of stay.
- Total costs of care, including both inpatient and outpatient care.

METHODS

This study was conducted in a 500-physician multispecialty medical group that is owned by a health plan with 650 000 members. About 240 000 of these members are cared for by the medical group, most in the 17 primary care clinics included in this study. The other 410 000 members receive their care through about 50 medical groups in the region that contract separately with the health plan, and they are not part of this study.

In late 1999, the medical group leadership decided to undertake a major change in the approach to access, hoping to improve patient satisfaction as well as overall efficiency and, possibly, clinician job satisfaction.[8] Therefore, the leadership engaged outside consultants to help conduct a series of full-day sessions during 2000 for representatives from all of its clinics and provided considerable training and consultative resources along with a deadline (January 1, 2001) to achieve full advanced access. This required marked standardization of schedule slots and extra visit time for clinicians to work down the backlog of their appointments, but there was no increase in care personnel or resources during this change. Several other major changes took place during this time period: the appointment-making process was centralized, physician compensation was gradually switched from salary to productivity, and major work flow redesign and cost restructuring were conducted to streamline support processes and reduce overhead.

Adult (age >18 years) patients with either diabetes, CHD, or depression were identified from health plan administrative databases by using algorithms that were modified from a previously described approach and validated against chart audits.[9] For CHD or depression, these algorithms specified that patients have at least 1 inpatient diagnosis or 2 outpatient diagnoses in a given year with specified *International Classification of Diseases, Ninth Revision* codes (see **Table 1**). For diabetes, a patient could have filled a diabetes-specific medication or have had 1 inpatient or 2 outpatient diagnoses. These algorithms have estimated positive predictive values of .96 for diabetes, .95 for CHD, and .90-.95 for depression.

After identifying patients with each condition in each year from 1998 through 2001 who were enrolled for at least 11 months of that year, their utilization and cost data were collected from health plan administrative databases. Continuity of care was calculated based on the "continuity of care" method for the distribution of visits by a patient among different providers in each year.[10] The formula is $\sum(\text{visit}_i^2) - \sum(\text{visit}_i)/[\sum(\text{visit}_i)\times(\sum\text{visit}_i) - 1)]$ (where i = number of visits to a provider). Continuity of care tends to increase as the total number of visits increase, but is unaffected by the sequencing of visits.

Multilevel linear and nonlinear (ie, logistic) regression models were used to compare utilization in 1999 versus 2001 (before and after the change in access) with MLwiN software version 1.10 (Multilevel Models Project, London, UK). The linear models specified a normally distributed dependent variable and used the Iterative Generalised Least Squares estimation method. The nonlinear models specified a binomially or extra-binomially distributed dependent variable (as appropriate) and a logit link function, and used the penalized quasi-likelihood estimation method with first-order linearization. For each dependent variable, an intercept-only model identified the significant random-variance components to be included in the predictive model. A 3-level (time within patient within provider) random-

Table 1. Number of Adults with Selected Chronic Conditions*

Condition	*ICD-9*† Codes	Mean Age, y	No. in 1999	No. in 2001	% Overlap
Coronary heart disease	410.xx to 414.xx	65.9	3555	3802	70.4
Diabetes	250.xx, 357.2, 362.01/.02, 366.41	58.1	6741	7238	41.3
Depression	296.2x, 296.3x, 300.4, 311	45.3	5803	6336	27.5

*If a patient has 2 or more of these conditions, the patient is counted in each category.
†*ICD-9* indicates *International Classification of Diseases, Ninth Revision.*

variance structure was attempted for all variables, although the provider level was omitted if not significant. Up to 2 observations per person (eg, continuity of care measured in 1999 and in 2001) were included in each model. A dummy variable for year (reference = 1999) indicated whether the values for the dependent variable were different by year, and it was the parameter of interest in all models. Sex, age in 1998, and a year-specific Charlson score greater than or equal to 3 (as a measure of disease severity and comorbidities) were included as covariates.[11,12]

"Costs" were measured as paid amounts from health plan administrative data. For contracted care providers, paid amounts are those actually paid by the health plan. For providers within the staff-model medical group (studied here), the paid amounts represent approximately what the health plan would have paid to a contracted provider. Costs were adjusted to year 2000 dollars by using the medical-care component of the consumer price index for all urban consumers. All steps in the development of the identification system, aggregation of data, and data analysis were approved in advance and monitored by the local institutional review board. Because aggregate de-identified claims data were used in the analysis, the institutional review board did not require informed consent.

RESULTS

Table 1 shows the number of patients in the care system with each of the 3 chronic conditions for the years studied, using the identification algorithms described in the Methods section. There is significant overlap for diabetes, but less for CHD and depression. **Table 2** compares office visit utilization rates for these populations between 1999 and 2001 (ie, before and after the access change). Although there were only small and variable changes in total office visits, the proportion of those visits taking place in primary care increased for all 3 conditions, from an absolute 5% for CHD to 8% to 9% for diabetes and depression. Continuity of care with the primary care physician also increased significantly for patients with each condition. The observed values for the proportion of patients with visits to disease-specific specialists went from 11.3% to 10.2% for endocrinology visits and from 73.8% to 70.5% for mental health visits (data not shown). However, the adjusted model demonstrated that 38.8% of CHD patients had a cardiology visit in 1999 and 43.3% did in 2001 (P = .03).

Table 3 shows that the proportion of patients with each condition making urgent-care visits decreased by about one third, but there was little change in the proportion visiting an ED. Overall, referral of patients to urgent care from these clinics because of inability to see them had been increasing up to 1999 (14 573 in 1997, 19 904 in 1998, 21 932 in 1999), but then dropped substantially (17 172 in 2000 and 12 952 in 2001). Slightly fewer CHD patients had hospital admissions (57.3% vs 58.4% adjusted; P = .002) and their length of stays were shorter (3.76 vs 3.82 days; P = .01) after access improvements, but no change in either parameter was noted for patients with diabetes or depression (data not shown). Health plan data for all adults with commercial insurance and care from either the staff-model or all other medical groups showed a decrease of 4.4% in length of stay between 1999 and 2001 with no change in admission rates. These data also showed that ED visits per 1000 population increased by 7.8% for the staff-model medical group and by 13.3% for all contracted medical groups over this time period.

Real healthcare costs (adjusted for medical cost inflation) increased over this time period for this group of patients, as seen in **Table 4**. Total cost increases ranged between 10% and 20% by condition, with increases for almost all cost subcategories for all conditions. The proportion of total costs represented by outpatient care increased for each condition, the most (an absolute 10%) for patients with depression. The percent

Table 2. Adjusted Office Visit Rates per Person Before and After Access Improvement*

	Value (*P*)					
	Heart Disease		Diabetes		Depression Value	
Utilization Type	1999	2001	1999	2001	1999	2001
Office visits (total)	8.2	8.9 (.000)	7.0	7.0 (.22)	11.4	10.9 (.000)
Primary care office visits	4.8	5.7 (.000)	3.9	4.5 (.000)	3.5	4.5 (.000)
Percentage of visits to primary care	62.0%	67.2% (.000)	63.5%	71.7% (.000)	36.9%	46.3% (.000)
Primary care continuity	.66	.72 (.000)	.68	.73 (.000)	.60	.63 (.000)
Primary care office visits for specific chronic disease	1.9	2.1 (.000)	2.4	2.5 (.000)	0.9	1.2 (.000)
Percentage of primary care visits for specific chronic disease	44.9%	42.3% (.002)	64.9%	61.5% (.000)	27.3%	29.3% (.067)

*Adjusted for age, sex, and modified Charlson score. Note that the percentages in the table are not exactly equal to values calculated from the numbers in the table, because some patients had no visits in that year.

increase in total healthcare costs for people with diabetes or CHD was roughly similar to that experienced by the average adult health plan patient of the medical group (9%), although depression patients experienced over twice as much increase. However, the average inflation-adjusted total cost for the average adult health plan member ($1413 in 1999) was far less than was spent per person with any of these conditions.

DISCUSSION

These results suggest that the introduction of a dramatic improvement in access to primary care clinics was associated with relatively little change in either overall utilization or overall costs of care for patients with these chronic conditions. However, improved access was related to increased continuity of care by the primary care provider, and the proportion of office visits occurring in primary care increased significantly, along with primary care visits for the patients' specific chronic conditions. In addition, the proportion of patients with each condition making urgent-care visits decreased substantially, and CHD patients reduced their hospital admissions and length of stay.

Although we do not have enough data about the overall patient population of the medical group to be as definitive about identifying trends, improved access did not appear to be associated with changes in patients' ED visits or hospital admissions. The total cost of care for those with chronic diseases increased by 10% to 20% over the 3-year study period, but the cost of care for all health plan members increased proportionately. It is likely that most of these cost increases reflect national and regional healthcare cost trends, and are not attributable to increased access to primary care.

These results may be disappointing to those who are enthusiastic about access improvement. However, the results are actually reassuring, because some have feared that such changes might decrease access to care for patients with chronic conditions. The access change did appear to be associated with these patients receiving more of their general and disease-specific care in their primary care clinic with the same clinician, apparently with less need to be deferred to urgent-care sites. Also, their overall visit frequency did not decline. Full assessment of the effect of access changes on these patients must await studies of quality-of-care measures.

Independently of this study, the health plan conducts yearly satisfaction surveys of a sample of patients with diabetes. During this time period, their overall satisfaction with quality of care and service increased significantly, from 36% to 55% reporting being very satisfied.

The ED data deserve separate comment. Although there was no change in ED use for patients with these

Table 3. Adjusted Nonoffice Utilization Rates per Person Before and After Access Improvement*

	Percentage (P)					
	Heart Disease		Diabetes		Depression	
Utilization Type	1999	2001	1999	2001	1999	2001
≥1 visits to emergency department	51.5	50.9 (.068)	14.4	15.1 (.078)	14.9	16.9 (.15)
≥1 visits to urgent care	13.5	8.6 (.000)	17.5	12.4 (.000)	31.8	22.8 (.000)
≥1 hospital admissions	58.4	57.3 (.002)	9.5	9.7 (.70)	7.7	8.9 (.13)
Length of stay >3 days	55.7	51.9 (.003)	58.2	54.4 (.03)	58.5	58.2 (.60)

*Adjusted for age, sex, and modified Charlson score.

chronic conditions, overall ED use increased for all patients of the staff-model medical group as well as for all contracted groups during this time. That is part of a national trend, with Centers for Disease Control and Prevention data showing an 8% increase in ED visits per 100 population between 1997 and 2001, and a greater increase for individual EDs because many have closed over this time period.[13] Most of this increase also has been demonstrated to be caused by insured patients, not uninsured patients.[14] Thus, the lack of change in ED use for these patients may actually represent a stabilization in the face of a secular trend to increased use.

What might have caused the reduction in urgent-care use, hospitalizations for CHD patients, and possibly ED use? One possibility is the increase in continuity of care. Several studies have found that increasing continuity of care is associated with fewer ED and urgent-care visits, as well as a lower likelihood of hospitalization.[15-17] Raddish et al analyzed data from 6 health maintenance organizations and found continuity also was associated with a decrease in the number of outpatient visits, disease-specific costs, and total pharmacy costs for patients with each of 4 chronic diseases.[16] Of course, the findings in this study also may simply represent the result of easier access for urgent problems. Plauth et al surveyed adult health maintenance organization members who sought care in its urgent-care center.[18] Of the 421 patients responding, 25% said they were unable to get an appointment with their primary care physician and 47% said that they would have preferred to see their primary care physician within 1 or 2 days.

As in any observational study of naturalistic changes over time, we cannot separate the effects of access change from the effects of other concurrent changes in the care delivery system or its patients. It is possible that access effects on utilization and cost were confounded by the concomitant move to a centralized appointment scheduling system or the transition to pro-

Table 4. Health Care Costs per Person Before and After Access Improvement*

	Heart Disease		Diabetes		Depression	
Costs	1999	2001	1999	2001	1999	2001
Total	$16 631	$18 736	$7607	$8407	$6409	$7731
Increase	—	12.6%	—	10.5%	—	20.6%
Inpatient stays	$10 347	$11 497	$3530	$3731	$2499	$3285
Outpatient	$5107	$5970	$3418	$4030	$3327	$3678
Skilled nursing facility	$853	$912	$455	$450	$363	$513

*Measured as paid amounts and inflation-adjusted to 2000. Emergency department care, urgent care, and home health care are included in total costs, but are not shown individually.

ductivity-based physician salaries. The lack of a comparison group that did not experience access improvements also limits our ability to be sure that the access changes were the cause of any changes. Results from this medical group also may not be generalizable to other outpatient settings. Nevertheless, this medical group was able to make a major change in patient access that provided an opportunity to study the effects of that change in access on utilization and costs of healthcare. Finally, we also are limited by not having data about any change in quality of care over this time period.

We conclude that in this study, access improvements had little overall impact on utilization and costs for patients with diabetes, CHD, or depression. Fears that implementation of advanced access will reduce the frequency of primary care visits or increase hospitalizations for patients with chronic disease appear to be unfounded. Instead, there were some potentially important changes in the primary care of these patients that might have had beneficial effects on the dimensions of quality other than timeliness (ie, safety, effectiveness, efficiency, equity, and patient-centeredness) identified by the Institute of Medicine. We hope that others will add to this evaluation with studies that provide additional insight about how changes in access affect healthcare processes and outcomes for a variety of people and conditions.

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