Continuity of Care: Is It Cost Effective?

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Abstract

Objective: **To examine the association between the degree of healthcare provider continuity and healthcare utilization and costs.**

Study Design: **A longitudinal, prospective, observational study.**

Patients and Methods: **Data on patients with arthritis, asthma, epigastric pain/peptic ulcer disease, hypertension, and otitis media were collected at each of 6 health maintenance organizations (HMOs). Outcome variables included the number of prescriptions for the target disease and the cost, total number of prescriptions and the cost, the number of outpatient visits, and the number of hospital admissions. Disease-specific severity of illness, type of visit, and provider information were obtained at each encounter. HMO profit status, visit copay, gatekeeper strictness, formulary limitations, use of multisource (generic) drugs, gender, number of months in the study, age, and severity of illness were controlled in the analyses.**

Results: **There were 12,997 patients followed for more than 99,000 outpatient visits, 1000 hospitalizations, and more than 240,000 prescriptions. Increasing the number of primary or specialty care providers a patient encountered during the study generally was associated with increased utilization and costs when HMO and patient characteristics were controlled. The number of specialty care providers also increased as the number of primary care providers increased. The incremental increase in pharmacy costs per patient per year with each additional provider ranged between $19 in subjects with otitis media to $58 in subjects with hypertension.**

Conclusions: **Continuity of care was associated with a reduction in resource utilization and costs. As healthcare delivery systems are designed, care continuity should be promoted.**

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In 1933 Lee and Jones wrote "good medical care maintains a close and continuing personal relationship between physician and patient."[1] As the science of medicine has increased in complexity through the century, care continuity has remained a central tenet of primary care. Little scientific data exist to lend weight to this philosophical ideal, however.

Several changes in healthcare delivery have occurred in the last decade, secondary to rising healthcare costs. Managed care models ranging from health maintenance organizations (HMOs) to preferred provider organizations now care for an ever-increasing proportion of Americans.[2] In the managed care environment, cost reduction could supersede the maintenance of care continuity. Continuity of care in a managed care setting is potentially disrupted by annual contract changes, restricted provider panels, and impermeable scheduling that forces patients to see different providers at each visit.

This study was undertaken to examine the degree to which healthcare provider continuity is associated with healthcare utilization and costs. We hypothesized that as the number of providers caring for a

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patient increased in a managed care setting, healthcare utilization and costs would also increase.

··· METHODS ···

Managed Care Outcomes Project

This study utilized data obtained from the Managed Care Outcomes Project (MCOP). The MCOP was a longitudinal, prospective study designed to examine variations in clinical outcomes and resource use among HMO patients over a 1-year period. A detailed description of the project is presented in previous publications.[3,4]

Six HMO sites participated in the MCOP study. Three sites were in the eastern United States (New England, Mid-Atlantic, and South Atlantic regions) and 3 were in the western part of the country (1 in the intermountain region and 2 in the Southwest). Enrollments ranged from about 32,000 to 310,000 members.

Study Diseases and Patient Population

Five diseases commonly seen and treated in the outpatient setting were targeted for study. The 5 disease groups with respective ICD-9-CM codes[5,6] are: otitis media (381.00 to 382.9); traumatic joint pain or arthritis (710.0 to 710.9; 711.1 to 716.9; 720.0 to 720.9; 721.0 to 721.6; 721.8 to 721.9; 724.1 to 724.2; and 724.53); epigastric pain or ulcers (530.0 to 530.3; 530.5 to 530.6; 531.0 to 535.6; 536.0 to 536.9; 537.81; and 787.0 to 787.3); hypertension (401.0 to 401.9); and asthma (493.0 to 493.9).

These diseases were selected by the HMOs because of their high prevalence and broad range in severity. A target disease group was assigned to each patient on the basis of the study disease for which the largest number of that patient's visits occurred during the year.

Patients became eligible for the study if they had an ambulatory visit for any 1 of the 5 study diseases during a 4-month enrollment period. All patients meeting the eligibility requirement were accepted. Patient healthcare utilization was followed for the remainder of the 12-month data collection period (approximately calendar year 1992).

Drug Utilization Information

All information on patient drug utilization was obtained from computerized pharmacy claims records. Variables in the pharmacy claims database included patient identifier, drug, dose, date, amount of drug dispensed, number of days supplied, therapeutic category, National Drug Code numbers, copayment amount, and whether the drug was a generic or brand-name product. Every study site had a 30-day supply limit on prescriptions. The number of new prescriptions and refills combined to form the prescription number. Two methods were used to evaluate the number of prescriptions: prescription count for all drugs and number of prescriptions specifically for the target disease. No data were obtained on out-of-plan or nonprescription drug use. Data on drug claims at one site could not be matched with the patient-visit data and for this reason the site was dropped from the analyses of drug counts and costs. The prescription cost was determined by assigning the cost from the 1992 Average Wholesale Price List to each prescription.

Data Collection and Independent Variables

Once a patient was enrolled, each inpatient and outpatient encounter was analyzed by trained abstractors; health and provider information was collected at each encounter. The pharmacy claims data were merged with abstracted chart information to obtain pharmacy utilization. Severity of illness for each disease state identified was determined at each encounter. The Ambulatory Patient Severity (APS®) index was used to measure severity for outpatient visits, and the Computerized Severity Index (CSI®) was used for hospital admissions. A continuous APS score, based on biophysical and behavioral derangement scores, was produced for each patient visit in this study. The continuous APS scores for each visit were summed to obtain the severity sum score. A more detailed description of these measures can be found in previously published reports.[3,4,7] The first visit severity score reflects the illness severity at study entry and is used as the independent marker of illness severity in most of the analyses.

Severity of illness, HMO profit status, visit copay, gatekeeper strictness, formulary limitations, use of multisource (generic) drugs, age, gender, and number of months in the study were controlled for in the analyses. Primary care providers included pediatricians, family or general practitioners, and internists; specialists were all others.

Analyses

This study examined 6 outcome measures: number of prescriptions for the target disease and the cost; total number of prescriptions and the cost; number of outpatient visits; and the number of hospital admissions. These measures provide a fundamental picture of healthcare utilization and costs. Numbers of primary care providers and of specialty care providers are the main effect variables.

The target diseases represent a diverse group of pathologic entities; to reduce confounding, each group was analyzed separately. The initial analyses examined the extent of variation using simple frequencies and bivariate tables. Multivariate regression techniques were then used to control for the influence of the independent variables. For the regression analyses, 5 of 6 outcome variables (all except number of hospitalizations) were log transformed to improve linearity and adjust for outlier observations. Hospital admissions were not log transformed because the numbers were so small. In addition, a secondary analysis used the number of unique prescriptions as an outcome variable to assess the effect of having multiple providers on the number of new prescriptions a patient was given.

··· RESULTS ···

A total of 12,997 patients were entered into the study. The number of patients in each disease group varied between 1309 and 3938. These patients accounted for more than 99,000 office visits, 1000 hospitalizations, and 240,000 prescriptions.

The average number of providers seen by patients during the 8- to 12-month study period was 2 to 3 (Table 1). Remarkably, some patients saw as many as 26 different providers during the observation time.

The figure illustrates the number of unique prescriptions provided to patients with moderately

Table 1. Number of Providers Caring for Each Study Patient

	Average Number of Providers	Standard Deviation	Minimum Number	Maximum Number
Hypertension	2.8	1.8	1	15
Otis media	3.2	2	1	14
Arthritis	3.6	2.4	1	26
Peptic ulcer disease	3.3	2	1	17
Asthma	3.4	2.2	1	15

Figure. Percent of Patients with Medium Severity Otitis Media Obtaining Unique Prescriptions During the Study Period (Grouped by Provider Number)

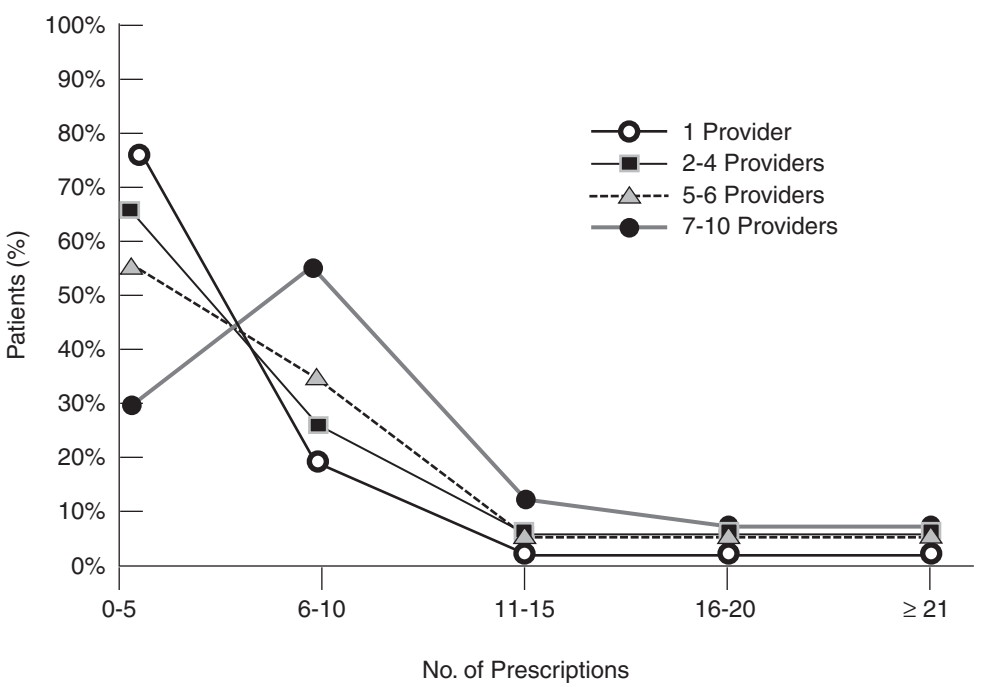

Table 2. Significance of the Effect of Primary Care Provider Number on Outcome Variables by Disease Using First Visit Severity*

	Hypertension	Otitis Media	Arthritis	Peptic Ulcer Disease	Asthma
Number of disease-specific prescriptions†	.14 ‡	.23 ‡	.17 ‡	.23 ‡	.14 ‡
Total number of prescriptions†	.15 ‡	.19 ‡	.17 ‡	.22 ‡	.13 ‡
Disease-specific pharmacy costs†	.13 §	.32 ‡	.06 (.32)	.36 ‡	.09 (.29)
Total pharmacy costs†	.15 ‡	.20 ‡	.19 ‡	.25 ‡	.14 ‡
Number of outpatient visits†	2.06 ‡	1.77 ‡	1.83 ‡	2.15 ‡	1.81 ‡
Hospital admissions	.29 ‡	.56 (.65)	.28 ‡	.09 (.31)	.40 ‡

*Number in the top line is the regression estimate; bottom number is significance level.
†Log scale.
‡$P < 0.001$.
§$P < 0.05$.

Table 3. Significance of the Effect of Primary Care Provider Number in First 30 Days on Outcome Variables by Disease Using First Visit Severity*

	Hypertension	Otitis Media	Arthritis	Peptic Ulcer Disease	Asthma
Number of disease-specific prescriptions†	.19 ‡	.25 ‡	.18 ‡	.28 ‡	.13 §
Total number of prescriptions†	.18 ‡	.22 ‡	.20 ‡	.25 ‡	.17 ‡
Disease-specific pharmacy costs†	.25 (.07)	.38 ‡	–.07 (.63)	.60 ‡	–.05 (.76)
Total pharmacy costs†	.17 ‡	.21 ‡	.19 ‡	.24 ‡	.13 (.06)
Number of outpatient visits†	3.03 ‡	2.02 ‡	3.18 ‡	3.04 ‡	2.32 ‡
Hospital admissions	.19 (.22)	–.02 (.94)	.44 ‡	.31 (.08)	.50 ‖

*Number in the top line is the regression estimate; bottom number is significance level.
†Log scale.
‡$P < 0.001$.
§$P < 0.05$.
‖$P < 0.01$.

severe recurrent otitis media (middle 40% of distribution of severity sum scores for otitis media patients) distributed by the number of providers seen over the study period. Seventy-five percent of subjects seeing only 1 provider received 5 or fewer unique prescriptions versus only 30% of patients seeing 7 to 10 providers. More than half of the subjects who were seen by 7 or more providers received 6 to 10 unique prescriptions, with less than a fifth of the single provider group in this category. The 4 lines are ordered; more providers correlate with more unique prescriptions. Similar findings are observed for all the other severity levels and disease groups.

The effect of the number of primary care providers on the outcome variables is illustrated in Table 2. These regression analyses were stratified by disease, while HMO type, patient characteristics, and other cost-control variables were controlled. The number of disease-specific prescriptions, total number of prescriptions, total pharmacy costs, and the number of outpatient visits increased as the number of providers caring for a patient increased for all target diseases. The disease-specific pharmacy costs increased with increasing numbers of providers for patients with hypertension, otitis media, and peptic ulcer disease.

To improve our understanding of the role of the number of primary care providers on the study variables, 2 secondary analyses were performed. The first

captured a period of time immediately after study entry (30 days). The purpose of the short window analyses was to examine the association of the number of primary care providers and the study variables during the initial follow-up of the entry disease (Table 3). The second set of analyses examined the number of primary care providers seen for the entire study period, but limited the visits to those for the target disease (Table 4). The dependent and independent variables were unchanged from Table 2. Results are remarkably similar. Noted differences in the time-limited analyses include a reversal of trend for disease-specific pharmacy costs for arthritis and asthma, and hospital admissions for otitis media (Table 3). Differences for the analyses of the target disease-specific visits include a sign reversal for otitis media hospital admissions.

The overall results suggest that patients who have fewer primary care providers use fewer resources represented by the study variables. The trend reversals noted on secondary analyses are intriguing, but do not meet the level of statistical significance.

Table 5 provides information about the effect of the number of specialist providers on the outcome variables. Numbers of disease-specific prescriptions and of total prescriptions, total pharmacy costs, the number of outpatient visits, and the number of hospital admissions increased for all target diseases. Only disease-specific pharmacy costs for

Table 4. Significance of the Effect of Primary Care Provider Number for the Target Disease on Outcome Variables by Disease Using First Visit Severity*

	Hypertension	Otitis Media	Arthritis	Peptic Ulcer Disease	Asthma
Number of disease-specific prescriptions†	.04 (.18)	.24 ‡	.08 §	.10 (.11)	.17 ‡
Total number of prescriptions†	.00 (.92)	.17 ‡	.06 §	.04 (.35)	.14 ‡
Disease-specific pharmacy costs†	.28 ‡	.41 ‡	.26 ‡	.28 §	.22 §
Total pharmacy costs†	.02 (.43)	.17 ‡	.08 §	.05 (.42)	.15 ‡
Number of outpatient visits†	.89 ‡	1.49 ‡	1.41 ‡	.95 ‡	1.20 ‡
Hospital admissions	.19 §	–.01 (.94)	.35 ‡	.10 (.51)	.31 ‖

*Number in the top line is the regression estimate; bottom number is significance level.
†Log scale.
‡$P < 0.001$.
§$P < 0.05$.
‖$P < 0.01$.

Table 5. Significance of the Effect of Specialist Number on Outcome Variables by Disease Using First Visit Severity*

	Hypertension	Otitis Media	Arthritis	Peptic Ulcer Disease	Asthma
Number of disease-specific prescriptions†	.07 ‡	.16 ‡	.12 ‡	.10 ‖	.13 ‡
Total number of prescriptions†	.11 ‡	.19 ‡	.14 ‡	.13 ‡	.15 ‡
Disease-specific pharmacy costs†	.01 (.86)	.22 ‡	.04 (.42)	.08 ‡	.18 ‡
Total pharmacy costs†	.12 ‡	.26 ‡	.16 §	.18 ‡	.17 ‡
Number of outpatient visits†	2.42 ‡	2.31 ‡	2.70 ‡	2.45 ‡	2.55 ‡
Hospital admissions	.38 ‡	.38 ‖	.26 ‡	.26 ‡	.26 ‡

*Number in the top line is the regression estimate; bottom number is significance level.
†Log scale.
‡$P < 0.001$.
§$P < 0.05$.
‖$P < 0.01$.

hypertension and arthritis did not increase significantly as the number of specialists seen by a patient increased. In summary, for the vast majority of outcomes measured, increasing the number of providers seen, either primary care or specialist, was significantly associated with increased utilization.

Results of a regression analysis using the number of specialist providers as the dependent variable are provided in Table 6. Number of primary care providers, first visit severity of illness, HMO and patient characteristics, and other cost-control variables are included as independent variables. For all target diseases except otitis media, as the number of primary care providers caring for a patient increased, so did the number of specialists.

A representative full regression model is included for review (Table 7). Most of the HMO and patient characteristics have a significant effect on total drug costs for study subjects with hypertension. The variables examined account for about a quarter of the variance in total drug costs.

To better quantify the magnitude of the effect observed as the number of providers increases, we examined the variation in pharmacy costs. In this analysis, the additional pharmacy costs associated with each additional provider per patient per year were determined. Each additional provider added $58 in pharmacy costs for patients with hypertension, $19 for otitis media, $44 for arthritis, $30 for peptic ulcer disease, and $52 for asthma. For example, the annual pharmacy costs for a person with hypertension seen 5 times by 1 provider averaged $58. That same person seen by 5 providers would have average annual pharmacy costs of $290.

Table 6. Significance of the Effect of Primary Care Provider Number on Specialist Number*

	Hypertension	Otitis Media	Arthritis	Peptic Ulcer Disease	Asthma
Number of specialist providers	.118 †	.008 (.45)	.075 †	.139 †	.091 †
Number of patients	3158	3349	2382	1366	1227

*First visit severity of illness, type of health maintenance organization, other patient characteristics, and cost-control variables have been controlled for. Number in the top line is the regression estimate; bottom number is significance level.
†$P < 0.001$.

Table 7. Regression Model Examining the Effects of Health Maintenance Organization Characteristics on the Total Drug Costs of Study Subjects with Hypertension*

Variable	Parameter Estimate	Significance Level
Intercept	4.96	0.0001
Formulary limitation	0.59	0.0005
Gender	–0.04	0.35
HMO profit status	0.77	0.0001
Number of months in study	0.11	0.0001
Percent multisource drugs	–1.23	0.0001
Age	0.01	0.0001
Severity of illness (summed)	0.00	0.0001
Number of primary care providers	0.07	0.01
Number of specialists	0.06	0.005
Number of unknown providers	0.01	0.67
Gatekeeper strictness	–0.76	0.0001
Visit copay	–0.06	0.0002

*$R^2 = 0.23$; n = 2546.

··· DISCUSSION ···

This study suggests that for the 5 target diseases, physician continuity was associat-

ed with reduced healthcare utilization. The findings lend credence to our hypothesis that physician continuity, combined with chart and site continuity, is associated with reduced healthcare costs.

The study represents a large-scale, multisite, longitudinal evaluation of healthcare utilization in a managed care environment. The enrollment restriction to patients receiving healthcare through staff or group model health maintenance organizations represents a study limitation.

The extent to which the study's findings can be generalized to other healthcare settings is largely unknown. Our data are supported by several published reports suggesting that the benefits of continuity of care can be seen across healthcare models. These published data examining the impact of care continuity on healthcare utilization and client satisfaction were drawn from nonmanaged healthcare settings.

Valenstein and colleagues[8] evaluated the effect of multiple providers on the ordering patterns of a 20-test chemistry profile in a Veterans Administration (VA) medical center hospital. Physicians ordered 936 profiles for 198 patient admissions. Of these, 254 were judged to be the result of duplicate ordering. The likelihood of duplicate ordering increased as the number of physicians caring for a patient increased; a physician newly assigned to a patient was 3 times as likely to order a duplicate profile than was a physician familiar with the case. These researchers concluded that test ordering by multiple physicians predisposes the patient to unnecessary laboratory examinations.

Wasson and colleagues[9] examined the influence of care continuity as it related to several healthcare outcomes in a VA outpatient setting. Elderly men who participated in the trial were randomized to receive healthcare in either the provider continuity model or the provider discontinuity model. During the 18-month follow-up period, the men who had been randomized in the continuity group had fewer emergency admissions, had an overall shorter length of stay in the hospital, and spent fewer days in the intensive care unit. In addition, the patients in the continuity group were more satisfied with their healthcare provider and the system of care.

In the current study, the number of providers caring for a patient was strongly associated with pharmacy utilization as measured by number and costs of prescriptions. As the number of providers increased, hospital utilization increased as well. Meyer and colleagues[10] also discovered a significant positive correlation between the number of providers and the number of active prescriptions in a study undertaken to evaluate educational interventions to reduce polypharmacy in the outpatient setting at a VA hospital. The complications of polypharmacy are substantial.[11] As the number of drugs being taken increases, so do drug-related side effects such as adverse drug reactions and drug-drug interactions. Costs increase as well, in part related to medication costs and also indirectly related to hospitalization and other treatments for adverse drug events. In addition, compliance with medication regimens decreases as the number of drugs and therapies increases.

Charney and colleagues[12] examined the association of provider continuity and medication compliance in a group of children receiving penicillin for the treatment of Group A β-hemolytic streptococcus. They discovered that children were more likely to receive the penicillin if the prescription was written by their usual physician. The association occurred in all 3 group practice study sites, suggesting that medication compliance improves with provider familiarity. The current study did not examine the role of patient compliance or provider and client satisfaction. It is important to realize that improved compliance and patient satisfaction with medical care may contribute substantially to an overall decrease in utilization.

McCombs and colleagues[13] examined the healthcare costs associated with interrupting antihypertensive drug therapy in the first year of treatment. The study, which was conducted in California, utilized claims data from the California Medicaid program. The researchers evaluated 6419 patients with claims data. Remarkably, only 915 (14.3%) patients maintained continuous antihypertensive drug purchases for the first year. Researchers estimated that an additional $873 per patient was consumed in added healthcare resulting from interrupted antihypertensive drug therapy during the first year of therapy.

Becker, Drachman, and Kirscht[14,15] examined the association of care continuity and patient satisfaction, staff satisfaction, and system performance. Results indicated that the entire staff and the clients were satisfied with the care provided in the continuity model. Better patient-practitioner relationships were noted by both the patients and the practitioners as compared with those in the multiple provider group. Unexpectedly, patients in the continuity setting experienced significantly shorter waiting times, yet spent more time with providers. Families participating in the continuity plan were more likely to

report behavior problems in their children to the physician and to keep follow-up appointments than were those in the multiple provider plan.

In summary, physician continuity is associated with several desired outcomes, including provider and client satisfaction, improved compliance with medication regimens, improved efficiency, and cost reductions. No untoward or adverse effects of physician continuity have been described.[16] Because our study was performed within a managed care model, the impact of gatekeeping versus the promotion of provider continuity is largely unknown. In our study, gatekeeper strictness was generally associated with lower drug use and costs and lower visit numbers. For each target disease, gatekeeper strictness and the number of primary care providers caring for a patient were negatively and significantly correlated; thus, the stricter the gatekeeper policy, the lower the primary care provider count ($P < 0.01$). For all diseases except otitis media, gatekeeper strictness and the number of specialty providers caring for a patient were positively and significantly correlated; thus, the stricter the gatekeeper policy, the higher the specialty provider count ($P < 0.001$). However, none of the correlations was so high ($r \leq 0.54$) as to cause concern about including gatekeeper strictness, number of primary care providers, and number of specialists in the analyses.

··· CONCLUSIONS ···

Decreasing the number of primary care and specialist providers was associated with a reduction in resource utilization and costs. The findings from regression analyses show strong statistical asssociation, but causality is difficult to conclude. To further elucidate cause and effect a spectrum of gatekeeping practices and outcomes could be examined.

Published data examining the effects of care continuity support our findings surrounding the overall benefits found in the continuity model. The move to a continuity model requires organizational change and administrative support but does not necessarily require large monetary outlays. We suggest that our data supports the promotion of care continuity as healthcare delivery systems are designed and restructured.

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