

Care of Common Medical Conditions in a Managed Care Program for Uninsured Adults

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Abstract

Context: The effects of organized care on management of chronic health conditions in uninsured adults are unknown.

Objective: To evaluate the impact of a primary-care-based, managed care pilot program on uninsured adults with asthma, diabetes mellitus, or hypertension at a university hospital.

Design: Retrospective cohort study.

Main outcome measures: Measures of medical utilization (eg, number of outpatient visits), outcome of care (eg, glycosylated hemoglobin levels) and clinical processes (eg, peak flow monitoring) were examined for a cohort of previously uninsured adults who had asthma, diabetes mellitus, or hypertension and who received care in the pilot program compared with matched cohorts of adult Medicaid patients and continually uninsured adults.

Results: Only 17.1% of patients who had a study condition maintained the same payer and were seen in the university hospital system during both study periods; because these were all criteria for inclusion in this study, sample sizes were small. Primary care visits for enrollees in the managed care program increased significantly across all conditions, by 1.5 to 3.1 visits per capita ($p < 0.0001$). Few statistically significant differences were present in process or outcome measures.

Conclusions: More intensive enrollment efforts or a longer enrollment period may be necessary to statistically support improved quality of care for uninsured adults in a primary-care-based, managed care program. High mobility and frequent changes in insurance status are critical barriers to improving care for this population.

The majority of uninsured patients desire health coverage. In 1995, only 8% of the uninsured said they did not want or need health insurance; uninsured adults were four times more likely than insured adults to report that they did not receive medical care they believed was necessary.² In 2000, more than a third of uninsured, nonelderly adults postponed medical care.¹ In 1995, a quarter had not filled a prescription due to cost.² Most uninsured adults have no consistent source of care; one in six consider an emergency department their regular source of care.¹ The uninsured are much less likely to receive preventive services¹ or early intervention services³ than their insured counterparts, and uninsured people are more likely to be hospitalized for "avoidable conditions"^{4,5} and to suffer adverse outcomes⁶⁻⁸ as a result of delayed care.

Interest in managed care delivery systems for disadvantaged patients has been stimulated by these patients' need for improved access to preventive and early intervention services and by the increasing costs of care delivered in emergency departments and hospitals. As of 1993, 36 states either had or were developing managed care programs for their Medicaid recipients.⁹ As of June 30, 1992, 3.6 million Medicaid beneficiaries were enrolled in managed care plans.⁹ Evaluation of

Background

In 1998, more than 32 million adults in the United States were medically uninsured.¹ The uninsured population has increased by an average of 1 million people per year since 1987.¹ Most uninsured adults are from working families that do not qualify for Medicaid but cannot afford private health insurance.¹ Although more than half of uninsured Ameri-

cans are white, minority groups are disproportionately represented.¹ Many trends contribute to the growing number of uninsured people, including rising costs of health insurance, workers shifting into low-wage or part-time positions where health benefits are not provided, and increased sharing of health care costs with employees.¹

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Medicaid managed care programs has demonstrated reduced use of subspecialists and emergency departments but little change in numbers of primary care visits, quality of care, or overall health care costs.¹⁰⁻²²

Recent legislation has improved access to care for uninsured children by expanding Medicaid programs, developing new insurance mechanisms, and providing incentives to enroll children in private health care systems.^{23,24} However, few initiatives have been developed to improve access to care for uninsured adults. Kaiser Permanente (KP) of Colorado found that 326 previously uninsured children and adults who were enrolled in a program providing subsidized insurance coverage had similar medical utilization and moderately increased costs of care compared with an age- and sex-matched control group of commercially insured patients.²⁵ To our knowledge, however, clinical process and outcome of care measures in other types of managed care programs for uninsured adults have not been systematically evaluated.

In this study, we assessed clinical process and outcome of care measures in a primary-care-based, managed care pilot program for uninsured adults with one or more of three common chronic conditions in adults: asthma, diabetes mellitus, and hypertension. We hypothesize that this program would improve process and outcome of care measures for these patients through enhanced access to primary care services.

Program Description

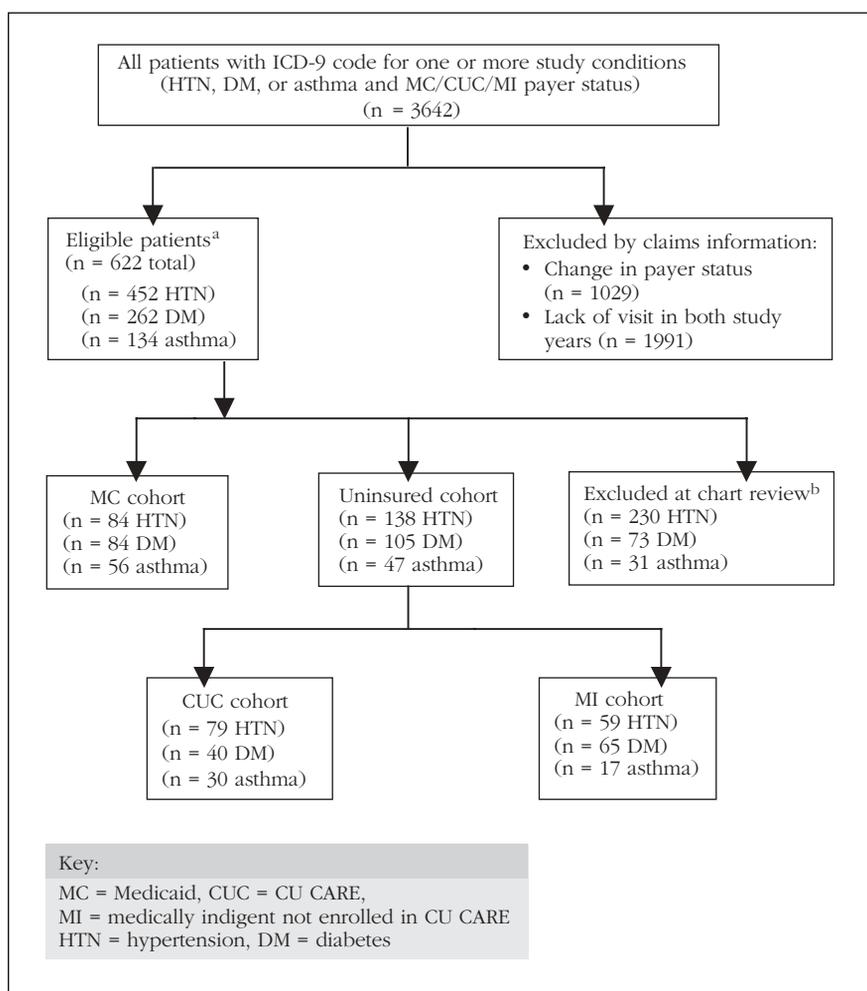
The Colorado Resident Discount Program (CRDP) was implemented in 1983 to provide access to care for uninsured Colorado residents who fail to qualify for federal entitlement programs. The program was intended primarily to provide funds for emergency and hospital care; any remaining funds were to be used for outpatient services, including primary care. Historically, CRDP patients used emergency departments rather than primary care or preventive services for the majority of their care, a pattern that resulted in little continuity of care. At University Hospital (UH) in Denver, Colorado, some limited access to primary care for CRDP patients was provided in resident clinics. Direct referrals from the

emergency department to subspecialty clinics were common, and little continuity or coordination of care existed. UH costs for CRDP patient care escalated rapidly, but there was little information on outcome of care for these patients. In 1992, UH, the School of Medicine at the University of Colorado Health Sciences Center (UCHSC), and KP of Colorado began developing a primary-care-based, managed care pilot program for CRDP patients who already received care at UH. The program, named CU CARE, began in June 1995.

CU CARE patients were mainly from the

five suburban counties surrounding Denver. Two family physicians, two general internists, and four nurse practitioners provided care for almost 12,000 patients at the peak of the program, until market and financial pressures forced a 50% decrease in funding and rapid downsizing in December 1996. More than 90% of CU CARE patients were age 19 through 64 years. Sixty-six percent were white, 57% were female, and 44% were single or never married. The program characteristics, demographics, and chronic disease burden of the CU CARE population have been described elsewhere.^{26,27}

Figure 1. Patient selection process for establishing study cohorts



^a Patients may have had more than one study condition

^b Due to inaccurate diagnosis or missing chart

^c Including 66 MC patients not selected on a random sample of MC hypertensives

Methods

Study Design

We designed a retrospective cohort study to examine change in medical utilization and clinical process and outcome of care measures for adult (aged 18-64 years) CU CARE patients with common chronic health conditions. Randomization was not possible because of UH's desire to rapidly enroll patients in CU CARE. We chose two concurrent comparison groups: 1) UH Medicaid patients, and 2) eligible, but not enrolled, UH uninsured adult patients.

Despite anticipated differences in income and medical comorbidity, Medicaid patients' access to UH primary care services was comparable to access by medically indigent patients, but their access was unaffected by the CU CARE program. We compared medical utilization, clinical process measures, and outcome of care measures for Medicaid (MC) patients to that for medically indigent patients who had made at least one visit to the CU CARE program in its first year (CUC). We used the same factors to compare care of CUC patients to the population of medically indigent (MI) patients who received care from other clinics within UH but who were not yet enrolled in the CUC program. The MI cohort included both patients who were not reached by CUC enrollment personnel and a few patients who declined to be enrolled.

Study Conditions

Three common chronic medical conditions (asthma, diabetes mellitus, and hypertension) were chosen as index conditions for this study on the basis of their prevalence in adult primary care populations, their impact on patient health and medical utilization, and their inclusion in the quality improvement programs of other managed care organizations.

Patient Selection and Study Groups

The approach to selection of patients for this study is shown in Figure 1. Patients who had a UH outpatient ICD-9-CM billing claim for one or more of the index conditions between January 1, 1994 and June 30, 1996 and who were eligible for Medicaid or were rated as medically indigent during the entire time were identified (n = 3642). Patients who changed payor class (CUC, MC, or MI) during this period were excluded from the study (n = 1029). All eligible patients received care from a UH outpatient clinic or emergency department between January 1, 1994 and December 31, 1994 (the calendar year prior to the program) and between July 1, 1995 and June 30, 1996 (the first fiscal year after initiation of the program). Patients who received care in only one of the study years (n = 1991) were thus excluded. Six hundred

... few initiatives have been developed to improve access to care for uninsured adults.

twenty-two (17.1%) of the patients originally identified by billing claims met both criteria.

We reviewed medical records for all eligible MC, CUC, or MI patients who had diabetes or asthma, all eligible CUC and MI patients who had hypertension, and a convenience sample of eli-

gible MC patients who had hypertension. Patients with more than one of the index conditions were reviewed for each condition separately. Patients whose records showed no evidence of any index condition, who had a new diagnosis of the index condition during either study year, or whose medical records could not be retrieved were excluded. Of the 452 patients with hypertension, 66 MC patients were excluded because their medical records were not sampled, and 164 other patients were excluded due to inaccurate diagnosis or a missing chart. Overall, of the 3642 patients initially identified as potentially eligible for inclusion on the basis of billing data alone, chart reviews were completed for 76.9% of patients with asthma, 72.1% of patients with diabetes, and 49.1% of patients with hypertension. Using billing data for initial patient identification undoubtedly failed to detect some patients who had an index condition. However, the patient selection system we used identified cohorts of continuous us-

Table 1. Demographics and comorbidity of study groups

	Hypertension			Diabetes			Asthma		
	Patients enrolled in CU CARE (n = 79)	Medically indigent patients (n = 59)	Medicaid patients (n = 84)	Patients enrolled in CU CARE (n = 40)	Medically indigent patients (n = 65)	Medicaid patients (n = 84)	Patients enrolled in CU CARE (n = 30)	Medically indigent patients (n = 17)	Medicaid patients (n = 56)
Median age, year (5th percentile, 95th percentile)	54.0 (37.0, 62.0) ^a	52.0 (26.0, 63.0)	54.0 (36.0, 64.0)	54.5 (35.0, 63.5)	40.0 ^c (20.0, 63.0)	47.0 ^d (22.0, 63.0)	39.0 (20.0, 56.0)	36.0 (21.0, 56.0)	37.0 (21.0, 58.0)
Women, %	64.6	66.1	69.1	67.5	44.6	83.3	73.3	70.6	92.9 ^e
White, % ^a	67.1	64.4	50.0 ^f	55.0	67.2	57.1	66.7	88.2	64.3
≥ 1 comorbid condition, % ^b	13.9	27.1	33.3 ^g	75.0	56.9	69.1	16.7	0	12.5

Medically indigent patients not enrolled in CU CARE.

^a % indicates percentage of patients.

^b Comorbid conditions considered for hypertension and diabetes were congestive heart failure, renal failure, stroke/transient ischemic attack, and coronary artery disease; additional comorbid conditions considered for diabetes included hyperlipidemia, neuropathy, foot disease, and hypertension; comorbid condition considered for asthma was chronic obstructive pulmonary disease.

^c p = 0.003, compared with diabetic patients enrolled in CU CARE (Wilcoxon rank sum test used)

^d p = 0.02, compared with diabetic patients enrolled in CU CARE (Wilcoxon rank sum test used)

^e p = 0.01, compared with asthmatic patients enrolled in CU CARE (chi-square test used)

^f p = 0.03, compared with hypertensive patients enrolled in CU CARE (chi-square test used)

^g p = 0.004, compared with hypertensive patients enrolled in CU CARE (chi-square test used)

ers of the UH health care system, which was necessary for methodologically sound evaluation of the effects of the CU CARE program.

Selection of Dependent Variables

Measures of quality of care for each index condition were chosen from important clinical processes (eg, home peak flow monitoring for patients with asthma), intermediate outcomes (eg, glycosylated hemoglobin values in patients with diabetes) and available measures used by other organizations. Detailed chart reviews or UH claims data were used to evaluate each measure. Long-term outcomes, such as cardiovascular complications of diabetes or of hypertension, could not be assessed because of the short duration of the pilot program.

Statistical Analysis

Patients were grouped into cohorts by payer (ie, CUC, MC, or MI) for the preprogram (1994) and program (FY1996) years, and cohorts were compared to determine difference in care for patients with each index condition, by payer group. CUC and MC cohorts were compared to assess care of CUC patients in relation to a group of patients who had lower socioeconomic status and higher chronic disease burden but better baseline access to health care. CUC and MI cohorts were compared to assess the effect of CUC enrollment on patients in the population eligible for the program.

Descriptive statistics of demographic characteristics and outcomes were produced. Median and selected percentiles were reported for count data and nonnormally distributed continuous data. Mean and 95% confidence intervals were reported for normally distributed continuous data. Statistical significance was defined at $p < 0.05$. Proportions were reported for dichotomous variables. Baseline characteristics of patients—including age, gender, race, and comorbidity (presence of more than one index condition, complications from an index condition, or commonly occurring coexisting medical conditions)—were compared between payer cohorts using the Wilcoxon rank sum test and the chi-square test. Patient age, race, gender, and comorbidity were entered as covariates in all analyses. Because of patient-related clustering effect across years, mixed models were cre-

ated for outcomes of interest. When a variable or its proper transformation was normally distributed (eg, weight and mean systolic blood pressure), a linear mixed model with different intercepts and slopes for payers was fitted.^{28,29} Change of an outcome (during the study years) within a group was tested for significance by examining whether the slope was zero, and the difference of change between groups was tested for significance by examining whether the difference in slopes between groups was zero. Nonlinear mixed models^{30,31} were fitted for count data (eg, number of clinic visits) and for dichotomous data (eg, eye examination). All analyses were conducted using SAS, Version 8.2 (SAS Institute, Inc, Cary, NC).

Results

Table 1 shows demographic and comorbidity data for the study groups. CUC diabetic patients were significantly older than both MI ($p = 0.003$) and MC ($p = 0.02$) diabetic patients. Significantly more MC (than CUC) patients with asthma were female ($p = 0.01$). Significantly fewer MC than CUC hypertensive patients were white ($p = 0.03$), and more MC than CUC hypertensive patients had one or more comorbid medical conditions ($p = 0.004$).

Patients with Asthma

Preprogram and program year data for patients who had asthma are shown in Table 2. Compared with MC patients, CUC patients had significant increases in number of outpatient ($p = 0.02$) and primary care ($p = 0.0007$) visits and significantly fewer specialty visits ($p = 0.016$). CUC patients also were more likely to do peak flow monitoring at home ($p = 0.011$) and to be prescribed inhaled steroids ($p = 0.008$) compared with MC patients.

Compared with MI patients, CUC patients showed trends toward increased primary care and decreased specialty care visits, although neither reached statistical significance. CUC patients were more likely than MI patients to do peak flow monitoring at home ($p = 0.012$).

Patients with Diabetes

Preprogram and program year data for patients with diabetes are shown in Table 3. Compared with MC patients, CUC patients with

diabetes had significantly increased numbers of outpatient ($p = 0.0016$) and primary care ($p = 0.0052$) visits and showed a trend toward more nurse visits. CUC patients with both hypertension and diabetes were more likely to be taking angiotensin-converting enzyme inhibitors ($p = 0.02$) than were MC patients with both hypertension and diabetes.

Compared with MI patients with diabetes, CUC patients with diabetes had significantly increased numbers of outpatient ($p < 0.001$), primary care ($p < 0.001$), specialty, ($p = 0.042$) and nurse ($p = 0.0014$) visits. CUC patients with diabetes were also more likely to have glucose readings recorded in their charts ($p = 0.053$). CUC patients with both hypertension and diabetes were more likely to be taking angiotensin-converting enzyme inhibitors ($p = 0.01$) than MI patients with hypertension and diabetes.

CUC patients with diabetes had greater improvement in HgA1c values in the program year than did MC patients ($p = 0.052$) or MI patients ($p = 0.0047$).

Patients with Hypertension

Preprogram- and program-year data for patients with hypertension are shown in Table 4. Compared with both MC and MI patients, CUC patients had significantly increased numbers of outpatient ($p = 0.007$, $p = 0.0013$) and primary care ($p = 0.0007$, $p < 0.0001$) visits. CUC patients were less likely than were MI patients to have a specialty care visit ($p = 0.016$). However, compared with MC patients, a significantly lower percentage of CUC patients had diastolic blood pressure readings < 90 mm Hg at the end of the program year ($p = 0.019$).

Results Across Cohorts

The CU CARE cohort overall increased the number of visits to the UH facilities by 1.5 to 3.1 visits per capita.

Table 5 shows improvements in 7 of 16 utilization measures for CUC patients compared with MC patients, and 9 of 16 utilization measures for CUC patients compared with MI patients. However, only a few improvements in clinical process or outcome of care measures for CUC patients compared with the MC or MI cohorts (4 of 27 clinical process or outcome measures in each comparison). In one measure—percent-

age of hypertensive patients with diastolic blood pressure <90 mm Hg—the MC cohort did better than the CUC cohort ($p = 0.019$).

Discussion

In this evaluation of a primary-care-based, managed care pilot program for uninsured adults, CU CARE, we found a short-term increase in utilization of primary care services for enrolled patients who had asthma, diabetes mellitus, or hypertension. Clinical process or outcome-of-care measures for CU CARE patients improved only marginally compared with patients receiving Medicaid or compared with uninsured patients who were not enrolled in CU CARE. These results are consistent with published analyses of Medicaid managed care programs, where short-term effects on quality of care were modest.¹⁰⁻²²

However, several findings deserve further

comment. The increase in visits by CUC patients with hypertension may have been driven both by decreased blood pressure control (the percentage of these patients with mean systolic BP <140 mm Hg and mean diastolic BP <90 mm Hg decreased during the study) as well as by increased access to care. Improved glycosylated hemoglobin levels for the CU CARE diabetic patient cohort may result from regression to the mean, and we cannot exclude the possibility that the patients in the three diabetes cohorts differed in duration of illness. The small number in the MI cohort of patients with asthma ($n = 17$) may have limited the ability of the analysis to detect additional differences between CU CARE and MI asthmatic patients.

The percentage of patients with more than one emergency department visit or hospital admission was not significantly different be-

tween CUC and MI cohorts or between CUC and MC cohorts of patients who had diabetes or asthma. However, in a different study, we found overall significantly decreased emergency department visits and hospital admissions in the entire CU CARE cohort compared with a matched MC cohort and a matched cohort of “self-pay” patients who were not enrolled in the Colorado Resident Discount Program for medically indigent patients.³²

Perhaps the most important finding of our study was the difficulty we experienced in identifying a stable population of patients who had no private health insurance and who could be used to assess effectiveness of the CU CARE program. As shown in Figure 1, only 17.1% of patients with a billing claim for asthma, diabetes, or hypertension used the UH system and maintained the same payer over the entire 30-month study period.

Table 2. Medical utilization and clinical process measures for asthmatic patients in baseline year (1994) and in study year (FY1996)

	Patients enrolled in CU CARE (n = 30)		Medically indigent patients (n = 17)		Medicaid patients (n = 56)		p values, ^a change between 1994 and FY1996				
	1994	FY 1996	1994	FY 1996	1994	FY 1996	Patients enrolled in CU CARE	Medically indigent patients	Medicaid patients	Patients enrolled in CU CARE, compared with medically indigent patients	Patients enrolled in CU CARE, compared with Medicaid patients
Medical utilization											
No. of outpatient visits ^b	1 (0, 4)	1.5 (0, 8)	1 (0, 4)	0 (0, 7)	0 (0, 8)	1 (0, 5)	0.011	0.75	0.68	0.11	0.02
No. of primary care visits ^b	0 (0, 4)	1.5 (0, 8)	0 (0, 2)	0 (0, 4)	0 (0, 5)	0 (0, 4)	<0.0001	0.76	0.79	0.082	0.0007
No. of specialty care visits ^b	0 (0, 3)	0 (0, 1)	1 (0, 4)	0 (0, 7)	0 (0, 5)	0 (0, 3)	0.016	0.85	0.52	0.072	0.016
> 1 emergency department visit, % ^c	43.3	26.7	23.5	35.3	21.4	17.9	0.15	0.42	0.65	0.14	0.41
> 1 hospital admission, %	10.0	13.3	5.9	5.9	12.5	17.9	0.68	0.96	0.43	0.87	0.92
Clinical process measures											
Primary care visit with peak flow reading, %	0.0	50.0	8.3	0.0	5.9	14.7	----	----	----	----	----
Home peak flow monitoring, %	6.7	43.3	17.7	11.8	12.5	16.1	0.004	0.51	0.42	0.012	0.011
Using inhaled steroid, %	79.0	94.1	54.6	80.0	73.9	60.0	0.035	0.28	0.74	0.98	0.008
Influenza vaccination during FY1996, %	20.0	10.0	11.8	11.8	21.4	21.4	0.38	0.97	1.00	0.44	0.41
Pneumococcal vaccination before or during study, %	----	10.7	---	0.0	----	3.7	----	----	----	----	----
Smoking cessation efforts, %	60.0	80.0	55.6	50.0	50.0	69.6	0.44	0.90	0.17	0.45	0.73

FY1996 = July 1, 1995 through June 30, 1996. Medically indigent patients not enrolled in CU CARE.

^a Statistical significance in linear and nonlinear mixed models.

^b Values are median (5th percentile, 95th percentile).

^c % indicates percentage of patients.

-- indicates missing data or statistical analysis not done due to missing data and small sample size.

Why did the Program Fail to Show Substantial Improvement in Care?

Several factors may have contributed to the lack of overall improvement in clinical process and outcome of care measures in CU

CARE enrollees, despite an increase of 1.5 to 3.1 health care visits per capita. The program year (FY1996) was the first year of CUC operations, and although enrollment increased rapidly (from 1500 to 9000 patients), only a minor-

ity of the targeted population was identified and enrolled so most patients were not enrolled for the full year. New clinicians, unfamiliar with a managed care environment, were hired and oriented. Many new systems (eg, data tracking

Table 3. Medical utilization, clinical process measures, and outcome measures for diabetic patients in baseline year (1994) and in study year (FY1996)

	Patients enrolled in CU CARE (n = 40)		Medically indigent patients (n = 65)		Medicaid patients (n = 84)		p values, ^a change between 1994 and FY1996				
	1994	FY 1996	1994	FY 1996	1994	FY 1996	Patients enrolled in CU CARE	Medically indigent patients	Medicaid patients	Patients enrolled in CU CARE, compared with medically indigent patients	Patients enrolled in CU CARE, compared with Medicaid patients
Medical utilization											
No. of outpatient visits ^b	2 (0, 9.5)	4.5 (0, 11)	2 (0, 8)	1 (0, 5)	3 (0, 9)	3 (0, 8)	0.0002	<0.0001	0.76	<0.0001	0.0016
No. of primary care visits ^b	0.5 (0, 7)	2.5 (0, 9)	0 (0, 3)	0 (0, 2)	1 (0, 6)	1 (0, 7)	<0.0001	0.0074	0.19	<0.0001	0.0052
No. of specialty care visits ^b	0 (0, 5.5)	0 (0, 6.5)	1 (0, 8)	0 (0, 5)	0 (0, 7)	0 (0, 5)	0.83	<0.0001	0.033	0.042	0.31
> 1 emergency department visit, % ^c	15.0	20.0	9.2	7.7	8.3	11.9	0.51	0.73	0.40	0.48	0.97
> 1 hospital admission, %	10.0	15.0	10.8	7.7	13.1	11.9	0.33	0.34	0.69	0.18	0.31
No. of nutritionist visits ^a	0 (0, 1.5)	0 (0, 1)	0 (0, 2)	0 (0, 1)	0 (0, 1)	0 (0, 1)	0.71	0.04	0.11	0.43	0.58
No. of nurse visits ^b	0 (0, 2)	0 (0, 4.5)	0 (0, 1)	0 (0, 0)	0 (0, 2)	0 (0, 2)	0.0016	0.008	0.99	0.0014	0.069
No. of clinical pharmacist visits ^b	0 (0, 0)	0 (0, 1.5)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	----	----	----	----	----
Clinical process measures											
Smoking cessation effort, %	40.0	46.7	51.9	57.9	46.2	39.1	0.54	0.50	0.58	0.98	0.41
Foot examination, %	75.0	50.0	75.0	73.8	70.3	65.2	0.036	0.87	0.52	0.14	0.16
Eye examination, %	45.0	47.5	44.6	44.6	45.2	50.0	0.80	0.84	0.48	0.74	0.84
Lipid panel, %	57.5	60.0	52.3	55.4	58.3	56.0	0.69	0.87	0.75	0.83	0.61
Urinalysis, %	67.5	65.0	66.2	55.4	72.6	66.7	0.80	0.17	0.32	0.51	0.71
Glucose level measured in clinic, %	89.3	76.3	70.5	66.7	92.2	85.5	0.14	0.33	0.20	0.52	0.71
Home glucose level recorded in chart, %	50.0	63.2	81.8	69.1	65.6	68.1	0.17	0.16	0.58	0.053	0.41
Glycosylated hemoglobin level measured, %	52.5	55.0	61.5	46.2	51.2	46.4	0.80	0.055	0.49	0.16	0.55
Creatinine level measured, %	75.0	82.5	61.5	55.4	76.2	75.0	0.38	0.32	0.85	0.20	0.40
Hypertensive patients using ACE inhibitors, %	47.8	91.3	55.6	63.0	67.4	77.1	0.0016	0.41	0.1	0.01	0.02
Outcome measures											
Mean glycosylated hemoglobin level (CI), % of total hemoglobin	12.5 (10.7-14.4)	8.2 (7.4-9.0)	10.0 (9.2-10.9)	8.8 (7.9-9.7)	10.9 (9.9-11.9)	8.6 (7.9-9.3)	<0.0001	0.1	0.0005	0.0047	0.052
Glycosylated hemoglobin level <8.0, %	9.5	40.9	22.5	50.0	22.5	50.0	0.03	0.02	0.051	0.54	0.33
Mean weight (CI), lb	176.1 (158.6-193.6)	188.8 (175.0-202.6)	181.9 (168.5-195.3)	177.5 (162.2-192.9)	191.7 (177.7-205.7)	188.8 (175.5-202.1)	0.70	0.14	0.96	0.21	0.73
Mean systolic blood pressure (CI), mm Hg	130.2 (123.9-136.5)	134.4 (129.5-139.2)	122.0 (117.9-126.2)	127.0 (121.4-132.7)	127.0 (122.4-131.5)	127.1 (123.2-131.0)	0.039	0.25	0.69	0.41	0.13

ACE = angiotensin-converting enzyme; CI = 95% confidence interval.

^a Statistical significance in linear and nonlinear mixed models.

^b Median (5th percentile, 95th percentile).

^c % indicates percentage of patients, unless otherwise noted.

systems, referral guidelines and authorization systems, medication formularies, practice guidelines, and team-based care) were developed and implemented at different times throughout the program year. A formal quality improvement program was not initiated until March 1996. Although these systems were designed to be part of the CUC program from the outset, their implementation was staged, and clinicians had to learn about them and learn how to incorporate them into their practice during the program year. A one-year observation period may be insufficient to detect change in primary care practice or change in process or outcome of care measures.

Despite the sliding copayment schedule, many patients (particularly those with higher copayments) may not have been able to afford prescription medications, a barrier which could have reduced their adherence to a medication

regimen. In addition, affecting patient lifestyle takes time, and a lag time from lifestyle changes to improved outcome occurs. The period of analysis was probably too short to reflect an effect from change in patient behavior.

Limitations

One important limitation of our study is the inability to generalize our findings to the much larger population of patients without private health insurance and who have one of the study conditions. Only a small proportion of the initial group of patients identified who had these common health conditions was eligible for record review, because we required a UH visit for the study condition in each year and a consistent payer class to establish study eligibility. The same criteria necessary for methodologically sound program evaluation proved hard to satisfy for this population, who often

seek care sporadically or from multiple sites. As a result, the small sample sizes limited the statistical power of the study to detect differences in process or outcome of care measures. The results may also not be generalizable to other medically indigent populations, which may differ from our study population in demographics, prevalence or severity of illness, local system of health care for the uninsured, or primary care provider mix (eg, family practice or internal medicine; physician or nurse practitioner).

The analysis was retrospective, and patients were not randomized into different cohorts. Inclusion in the CUC cohort may have been subject to selection bias, because indigent patients visiting the emergency department were "targeted" for enrollment into the CU CARE program at the time of their visit. The MI cohort included patients who were not

Table 4. Medical utilization, clinical process measures, and outcome measures for hypertensive patients in baseline year (1994) and in study year (FY1996)

	Patients enrolled in CU CARE (n = 79)		Medically indigent patients (n = 59)		Medicaid patients (n = 84)		p values, ^a change between 1994 and FY1996				
	1994	FY 1996	1994	FY 1996	1994	FY 1996	Patients enrolled in CU CARE	Medically indigent patients	Medicaid patients	Patients enrolled in CU CARE, compared with medically indigent patients	Patients enrolled in CU CARE, compared with Medicaid patients
Medical utilization											
No. of outpatient visits ^b	2 (0, 6)	2 (0, 9)	1 (0, 7)	1 (0, 5)	3 (0, 7)	2 (0, 7)	0.005	0.052	0.051	0.0013	0.0007
No. of primary care visits ^b	1 (0, 5)	2 (0, 9)	0 (0, 4)	0 (0, 3)	2 (0, 6)	1 (0, 6)	<0.0001	0.011	0.44	<0.0001	0.0007
No. of specialty care visits ^b	0 (0, 4)	0 (0, 1)	0 (0, 6)	0 (0, 5)	0 (0, 5)	0 (0, 3)	0.004	0.92	0.012	0.016	0.21
Clinical process measures											
Smoking cessation efforts, % ^c	44.0	53.9	42.9	66.7	50.0	60.0	0.53	0.095	0.55	0.32	0.97
Electrolyte levels measured, %	62.0	59.5	67.8	59.3	79.8	70.2	0.68	0.32	0.13	0.62	0.40
Lipid levels measured, %	38.0	53.2	54.2	54.2	59.5	44.1	0.043	1	0.034	0.18	0.004
Outcome measures											
Mean systolic blood pressure (CI), mmHg	140.6 (135.7-145.5)	143.8 (139.8-147.8)	141.3 (135.2-147.4)	141.8 (135.0-148.7)	138.9 (134.8-143.0)	138.3 (134.1-142.6)	0.40	0.9	0.96	0.53	0.56
Mean diastolic blood pressure (CI), mmHg	89.0 (86.0-92.0)	90.6 (88.3-93.0)	86.7 (82.8-90.6)	86.5 (82.1-91.0)	85.6 (82.7-88.4)	82.8 (79.7-85.9)	0.36	0.68	0.18	0.37	0.11
Mean systolic blood pressure <140 mmHg, %	47.7	34.3	50	52.4	51.3	57.1	0.11	0.71	0.48	0.19	0.1
Mean diastolic blood pressure <90 mmHg, %	53.9	40.0	58.7	54.8	62.8	74.3	0.07	0.73	0.12	0.39	0.019

CI = 95% confidence interval. Medically indigent patients not enrolled in CU CARE.

^a Statistical significance in linear and nonlinear mixed models

^b Median (5th percentile, 95th percentile)

^c % indicates percentage of patients

reached by CUC enrollment personnel as well as a few who declined to be enrolled in CU CARE. This distinction is important, because patients who declined enrollment may have differed in health status or views on health care from patients who were not reached. Table 1 shows some demographic and clinical differences between CUC enrollees and the control group of MC patients. Unmeasured differences may well have existed between groups as well. For example, CUC patients may have sought care at other institutions, thus making it difficult to control for the potentially confounding influence of lack of continuity of care. Because claims data were used to identify patients who had the study conditions, some patients who had one or more of these conditions but who did not have an ICD-9-coded visit for that condition would have been excluded from the study. However, lack of feasibility of a randomized trial in this setting realistically reflects the constraints in assessing program effectiveness in practice. We therefore believe our findings are relevant to policymakers who are considering systems of care for the medically uninsured.

The analysis did reveal some statistically significant improvement in process and outcome of care measures, although because of multiple comparisons, some of the improvement could possibly have occurred by chance alone. However, the purpose of this analysis was to look for trends in care of adults with chronic conditions, and no short-term systematic trends toward improved process or outcome measures were evident for any of the three health conditions studied. The possibility still exists that with a longer

period of analysis, a larger sample size, and a more mature delivery system, significant improvements may be realized.

Conclusions

Table 6 summarizes the important conclusions from this study. Our evaluation showed that the CU CARE program increased utilization of primary care services by uninsured adults who maintained continuity of care within the UH system. However, CU CARE did not lead to consistent short-term improvement in process or outcome of care measures for patients with three common medical conditions. CU CARE program personnel were unable to reach most of the people who may have benefited from enrollment because of high mobility and frequent transition of insurance status in the uninsured population. We conclude that increases in pri-

mary care utilization alone do not automatically lead to short-term improvement in quality of care for medically indigent populations, which is consistent with the results of quality-of-care assessment in Medicaid managed care programs.¹⁴⁻¹⁶

Programs providing primary care to uninsured populations should recognize that their efforts to improve process and outcome of care measures may need to be continued for prolonged periods to demonstrate benefit. Such programs should also consider strategies for reaching beyond the small proportion of patients who have one or more specific health conditions and who maintain continuity of care into the larger population of people who have the health condition or conditions of interest. In fact, high mobility of the patient populations that programs such as the CU CARE program attempt to serve, lack of continuity of care, and inability to enroll many eligible patients remain fundamental obstacles to improving quality of care for these populations. ❖

Table 5. Summary of improvement in clinical process measures and in outcome measures between patients enrolled in CU CARE and Medicaid patients; and between patients enrolled in CU CARE and medically indigent patients who were not enrolled in CU CARE

Medical condition	Patients enrolled in CU CARE, compared with Medicaid patients			Patients enrolled in CU CARE, compared with medically indigent patients		
	Favors patients enrolled in CU CARE	Favors Medicaid patients	No difference	Favors patients enrolled in CU CARE	Favors medically indigent patients	No difference
Asthma (n = 11 comparisons)						
No. of utilization measures	3	0	2	2	0	3
No. of process/outcome measures	2	0	4	1	0	5
Total no. for patients with asthma	5	0	6	3	0	7
Diabetes mellitus (n = 22 comparisons)						
No. of utilization measures	2	0	6	4	0	4
No. of process/outcome measures	2	0	12	3	0	11
Total no. for patients with diabetes mellitus	4	0	18	7	0	15
Hypertension (n = 10 comparisons)						
No. of utilization measures	2	0	1	3	0	0
No. of process/outcome measures	0	1	6	0	0	7
Total no. for patients with hypertension	2	1	7	3	0	7
Total all three conditions (n = 43 comparisons)						
No. of utilization measures	7	0	9	9	0	7
No. of process/outcome measures	4	1	22	4	0	23
Total no. for all patients in study	11	1	31	13	0	30

Medically indigent patients were not enrolled in CU CARE.

We conclude that increases in primary care utilization alone do not automatically lead to short-term improvement in quality of care for medically indigent populations ...

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Table 6. Practice Tips

In the first year of CU CARE (a primary care pilot program for the medically uninsured) utilization of primary care services increased for continuously enrolled asthmatic, diabetic, and hypertensive patients.
Compared with Medicaid patients and nonenrolled medically indigent patients with each condition, CU CARE patients had few differences in clinical process measures or in outcome measures in the first year of program operation.
Change in primary care practice (especially in new programs) and in patient lifestyle occurs gradually; therefore, a one-year period of observation may be insufficient to detect change in clinical process measures or in outcome measures.
Increased primary care utilization alone does not automatically lead to improved quality of care for medically indigent populations.
To improve quality of care, programs focusing on providing primary care to medically uninsured populations may need to reach out to the large group of people who do not receive continuous care.