

# Health Care Use and Spending for Medicaid Enrollees in Federally Qualified Health Centers Versus Other Primary Care Settings

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**Objectives.** To compare health care use and spending of Medicaid enrollees seen at federally qualified health centers versus non-health center settings in a context of significant growth.

**Methods.** Using fee-for-service Medicaid claims from 13 states in 2009, we compared patients receiving the majority of their primary care in federally qualified health centers with propensity score-matched comparison groups receiving primary care in other settings.

**Results.** We found that health center patients had lower use and spending than did non-health center patients across all services, with 22% fewer visits and 33% lower spending on specialty care and 25% fewer admissions and 27% lower spending on inpatient care. Total spending was 24% lower for health center patients.

**Conclusions.** Our analysis of 2009 Medicaid claims, which includes the largest sample of states and more recent data than do previous multistate claims studies, demonstrates that the health center program has provided a cost-efficient setting for primary care for Medicaid enrollees. (*Am J Public Health.* 2016;106:1981–1989. doi:10.2105/AJPH.2016.303341)

A central pillar of the Affordable Care Act (ACA; Pub L No. 111–148) is the expansion of the Medicaid program to include adults younger than 65 years with incomes up to 133% of the federal poverty level. Roughly half of states have formally expanded their Medicaid programs, and even nonexpansion states have seen increased enrollment stemming from greater public awareness and streamlined enrollment processes.<sup>1</sup> Medicaid expansion has raised concerns about the financial sustainability of the program and the availability of health care providers to see the newly insured.<sup>2</sup> To improve access to care for the medically underserved, including the newly insured, the ACA also called for \$11 billion in funding for federally qualified health centers.<sup>3,4</sup>

Federally qualified health centers receive grants under Section 330 of the US Public Health Service Act and currently provide comprehensive primary care to roughly 23

million patients<sup>5</sup> in medically needy areas and roughly 1 out of 7 Medicaid enrollees.<sup>6</sup> For brevity, we will use the term “health center” throughout this article to refer to these federally qualified health centers. Health centers are required to provide nonclinical enabling services that support access to primary care, such as case management and transportation. Health centers are required to be located in, or provide services to, medically underserved

communities, and they are required to have more than half of their governing board be health center patients that represent the population served. Because of the likelihood of an expanded role for health centers in the Medicaid program and ongoing concerns regarding the costs of the program, it is critical to understand whether the setting of primary care for Medicaid recipients has any association with health service utilization and spending.

The design and requirements of the health center program may be particularly well suited to the complex social and primary care needs of Medicaid patients. For example, the enabling services provided by health centers may result in physical and mental health issues being addressed earlier and in a more coordinated manner, resulting in lower health care use and spending for other services. Although the conceptual underpinnings of the program are clear, the empirical evidence regarding the impact of health center care on use and spending has been conflicting. Previous studies of Medicaid enrollees receiving primary care in health centers have found some associations with lower health care use. A study of 2008 Colorado Medicaid data found health center use to be associated with lower likelihoods of emergency department (ED) visit, inpatient

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hospitalization, 90-day readmission, and preventable hospitalization.<sup>7</sup>

Two multistate Medicaid claims studies (a 4-state study using 1994–1995 data and a 5-state study of 1992 data) found health center use to be associated with fewer preventable ED visits and hospitalizations.<sup>8,9</sup> By contrast, other studies have found that health center care was associated with higher use and spending. A 3-state study of 2003–2004 Medicaid claims found greater outpatient and total spending for health center patients compared with physician office care,<sup>10</sup> and a study of 2004–2008 data from a national survey of adults included a subgroup analysis of Medicaid patients that found health center care to be associated with more ED visits than is non-health center care.<sup>11</sup> Overall, the literature on this topic is limited by analyses that capture varying or incomplete utilization and spending outcomes, study a small number of states, use older data that may not reflect current practice patterns, or use limited methods for adjusting for differences in health center and non-health center patient populations.

We compared utilization and spending between health center and non-health center Medicaid enrollees using data from a large number of US states, which can provide important insight because of the variability in Medicaid programs across states. We also examined a broader set of health care services than have previous studies, including primary care, other outpatient care, prescription drugs, ED use, and inpatient care. Finally, we compared health center and non-health center patients with a propensity score-matching approach, which can provide a more robust adjustment for observed differences between health center and non-health center patients.

Although our use of 2009 data does not allow us to analyze the effect of ACA Medicaid expansions that began in 2014, post-ACA claims are not yet available for this data set. Our data year allows us to examine a larger number of Medicaid patients and states than do more recent years. In more recent years of Medicaid claims, the increasing prevalence of Medicaid managed care inhibits cross-plan and cross-state comparison, because these claims do not contain service-level expenditures and vary in data quality across states.

## METHODS

We examined the cross-sectional association between primary care setting and a set of utilization and spending outcomes among fee-for-service Medicaid enrollees in 13 states in 2009. The 13 states in our analysis were Alabama, California, Colorado, Connecticut, Florida, Iowa, Illinois, Mississippi, Montana, North Carolina, Vermont, Texas, and West Virginia (Table 1). We emphasized the following factors when choosing states to include in the analysis: geographic diversity, variation in size, presence of a large number of health centers and health center Medicaid patients, likelihood of claims data being available in a timely manner, and high prevalence of fee-for-service Medicaid claims. The number of states we included was limited by our funds available for data purchase.

### Data Collection

We obtained claims from the Medicaid Analytic eXtract files. We constructed an analytic data set from Medicaid Analytic eXtract files that focused on adult, nonelderly (aged 18–65 years), fee-for-service users of ambulatory primary care services. We excluded all dental, transportation, and long-term care claims from our analysis. Because claims data for utilization and spending data may not be reliable for Medicaid managed care patients, we excluded all claims in months of data when an enrollee was in a medical managed care program. We also excluded single months of fee-for-service data that fell between 2 months of managed care enrollment. Other notable exclusions were patients with restricted benefits anytime during the year, those who delivered a baby during the year, and those who had changing eligibility over the year. (A full listing and description of exclusions are available as a supplement to the online version of this article at <http://www.ajph.org>.)

We examined use or spending for primary care, other (nonprimary) outpatient care, prescription drugs, ED care, inpatient care, and total health care spending, which represents the sum of the previously listed spending categories. Spending for each type of utilization represented the sum of total payments from Medicaid and third-party payers. Our spending variable did not include federal support to health centers that occurs

outside the context of the Medicaid fee-for-service visit, such as federally backed loan guarantees for capital improvement projects and the ability to forgo purchase of private malpractice insurance because the federal government assumes responsibility for malpractice settlement and judgment costs.<sup>12</sup>

Our main independent variable of interest was the type of primary care setting. We categorized patients as either health center or non-health center patients on the basis of whether more than half of their primary care visits occurred in a health center. We also conducted analyses dividing non-health center patients into 3 subgroups: physician office patients, hospital outpatients, and mixed use patients, where the mixed use category comprised those who did not have a majority of primary care visits in any 1 setting. To determine primary care setting, we used the national provider identifier, claim type, and place of service in each claim. We created a listing of health center identifiers from Health Resources and Services Administration databases and Medicare and Medicaid cost reports and linked that information to the National Plan and Provider Enumeration System.<sup>13</sup>

Our adjusted analyses included covariates to account for factors that influenced health care utilization and spending. Covariates were patient demographics (age, race/ethnicity, gender), insurance characteristics (eligibility category, months of eligibility, Temporary Aid for Needy Families program indicator), disease burden, and US state. For disease burden, we used the Chronic Illness and Disability Payment System for Medicaid with the Medicaid Rx model and created binary variables for each category of diagnosis (e.g., cardiovascular, low) and medication group (e.g., diabetes) included in sufficient volume in our study sample.<sup>14,15</sup>

One barrier to adjustment in health center analyses is that Medicaid generally pays health centers on a per-visit (vs fee-for-service) basis. Although health centers are required to use diagnosis codes for billing and quality reporting, the lack of service-level (as opposed to encounter-level) claims may lead to health centers applying a lower volume of diagnosis codes and the potential for underdetection of disease burden for health center patients when using claims-based risk adjustment. Our adjustment method mitigates this risk by drawing from

TABLE 1—Medicaid Enrollee Characteristics by Primary Care Setting: United States, 2009

Characteristic	Health Center, No. (%) or Mean $\pm$ SD	Non-Health Center, No. (%) or Mean $\pm$ SD			
		Combined	Physician Office	Hospital Outpatient	Mixed Use <sup>a</sup>
Enrollees	144 076 (14)	894 898 (86)	460 198 (44)	95 599 (9)	339 101 (33)
Age, y	41.3 $\pm$ 13.1	40.0 $\pm$ 13.7	41.3 $\pm$ 14.0	40.5 $\pm$ 13.4	38.1 $\pm$ 13.3
Female	(67.0)	(67.0)	(69.1)	(62.9)	(65.1)
Race/ethnicity					
Non-Hispanic White	(40.2)	(42.1)	(41.7)	(38.0)	(43.8)
Hispanic or Latino	(23.3)	(22.8)	(25.7)	(21.0)	(19.4)
Non-Hispanic Black	(20.1)	(19.9)	(18.9)	(22.9)	(20.5)
Non-Hispanic Asian	(2.5)	(2.2)	(2.9)	(1.8)	(1.5)
Hispanic or Latino and > 1 race	(2.9)	(0.9)	(0.9)	(1.9)	(0.7)
Non-Hispanic Native Hawaiian	(2.2)	(2.5)	(3.0)	(1.7)	(2.1)
Non-Hispanic American Indian	(0.7)	(0.7)	(0.4)	(0.9)	(1.1)
Non-Hispanic and > 1 race	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)
Unknown	(8.0)	(8.8)	(6.5)	(11.7)	(11.0)
State					
California	(51.4)	(39.2)	(33.1)	(44.0)	(46.1)
Illinois	(7.2)	(5.4)	(5.6)	(3.3)	(5.7)
West Virginia	(7.0)	(5.6)	(7.5)	(2.2)	(3.8)
Florida	(6.9)	(12.7)	(13.5)	(18.2)	(10.0)
Texas	(6.9)	(16.9)	(24.2)	(6.2)	(10.0)
Colorado	(6.0)	(4.9)	(0.7)	(10.3)	(9.3)
Connecticut	(5.9)	(2.4)	(2.5)	(4.7)	(1.7)
Mississippi	(4.9)	(7.7)	(7.3)	(4.0)	(9.3)
Iowa	(2.0)	(2.8)	(2.5)	(4.7)	(2.6)
Vermont	(1.2)	(1.0)	(1.4)	(0.4)	(0.6)
North Carolina	(0.5)	(1.3)	(1.6)	(1.6)	(0.9)
Alabama	(0.1)	(0.1)	(0.1)	(0.3)	(0.1)
Montana	(<0.1)	(<0.1)	(<0.1)	(0.2)	(<0.1)
Medicaid eligibility group					
Cash, adult	(34.7)	(26.4)	(22.4)	(33.0)	(30.0)
Cash, disabled	(42.6)	(51.1)	(51.8)	(44.2)	(52.1)
Medically needy, adult	(6.7)	(7.2)	(8.6)	(4.3)	(6.1)
Medically needy, disabled	(3.1)	(2.7)	(2.6)	(3.9)	(2.6)
Other, adult	(3.1)	(2.4)	(2.5)	(2.2)	(2.3)
Other, disabled	(4.4)	(2.8)	(2.8)	(3.8)	(2.4)
Poverty, adult	(4.3)	(6.5)	(8.6)	(6.9)	(3.5)
Poverty, disabled	(1.2)	(1.0)	(0.8)	(1.7)	(1.0)
TANF eligible <sup>b</sup>	(5.8)	(4.2)	(4.0)	(4.1)	(4.5)
Residing in MSA <sup>c</sup>	(82.2)	(79.9)	(82.2)	(89.2)	(74.2)
Eligible months	9.9 $\pm$ 3.3	9.9 $\pm$ 3.3	9.9 $\pm$ 3.3	9.2 $\pm$ 3.7	10.2 $\pm$ 3.1
Minimum distance from nearest health center, km	4.8 $\pm$ 6.7	9.7 $\pm$ 13.1	9.3 $\pm$ 12.2	7.7 $\pm$ 11.8	10.9 $\pm$ 14.4
CDPS risk score <sup>d</sup>	0.90 $\pm$ 1.00	1.11 $\pm$ 1.34	1.12 $\pm$ 1.34	1.37 $\pm$ 1.78	1.03 $\pm$ 1.18
<b>Use and spending</b>					
Primary care					
Visits, no.	7.6 $\pm$ 7.8	8.6 $\pm$ 8.9	8.5 $\pm$ 8.0	8.2 $\pm$ 10.2	8.9 $\pm$ 9.7
Spending, \$	1 430 $\pm$ 2 312	2 090 $\pm$ 6 687	1 366 $\pm$ 4 656	2 153 $\pm$ 6 383	3 053 $\pm$ 8 686

Continued

TABLE 1—Continued

Characteristic	Health Center, No. (%) or Mean $\pm$ SD	Non-Health Center, No. (%) or Mean $\pm$ SD			
		Combined	Physician Office	Hospital Outpatient	Mixed Use <sup>a</sup>
<b>Other outpatient<sup>e</sup></b>					
Visits, no.	12.2 $\pm$ 39.4	16.7 $\pm$ 45.5	17.8 $\pm$ 49.3	13.2 $\pm$ 36.2	16.1 $\pm$ 42.2
Spending, \$	1 965 $\pm$ 6 820	3 748 $\pm$ 11 278	3 799 $\pm$ 11 611	3 224 $\pm$ 11 283	3 825 $\pm$ 10 804
Prescription drug spending, \$	2 324 $\pm$ 5 457	2 765 $\pm$ 14 540	2 805 $\pm$ 9 469	2 986 $\pm$ 36 839	2 649 $\pm$ 7 324
<b>Emergency department</b>					
Visits, no.	1.2 $\pm$ 3.0	1.4 $\pm$ 3.4	1.1 $\pm$ 2.8	2.7 $\pm$ 5.6	1.3 $\pm$ 3.2
Spending, \$	216 $\pm$ 634	236 $\pm$ 713	181 $\pm$ 559	492 $\pm$ 1 229	240 $\pm$ 686
<b>Inpatient</b>					
Visits, no. (SD)	0.2 $\pm$ 0.8	0.3 $\pm$ 1.2	0.3 $\pm$ 1.0	0.6 $\pm$ 2.0	0.3 $\pm$ 1.0
Length of stay, <sup>f</sup> no. (SD)	0.8 $\pm$ 5.3	1.4 $\pm$ 7.5	1.2 $\pm$ 6.3	3.1 $\pm$ 13.1	1.2 $\pm$ 6.6
Spending, \$ (SD)	1 496 $\pm$ 9 879	2 324 $\pm$ 13 264	1 910 $\pm$ 10 494	5 610 $\pm$ 25 508	1 959 $\pm$ 11 315
Total spending, \$ (SD)	7 518 $\pm$ 15 196	11 306 $\pm$ 26 165	10 189 $\pm$ 21 102	14 699 $\pm$ 49 810	11 865 $\pm$ 22 310

Note. CDPS = Chronic Disability Payment System; MSA = metropolitan statistical area; TANF = Temporary Aid for Needy Families. Characteristics are derived from the setting where >50% of primary care visits occur. Use and spending is expressed in annual values per patient. The sample size was  $n = 1\,038\,974$ .

<sup>a</sup>Mixed use refers to enrollees for whom no single setting accounts for >50% of primary care visits.

<sup>b</sup>Enrollee is eligible for TANF program in any month during the data year.

<sup>c</sup>Patient resides in a MSA.

<sup>d</sup>CDPS risk score derived from concurrent risk weights is shown here as an indicator of severity of illness. These values were not used in the model; rather, we used binary variables for 69 of the individual CDPS diagnoses.

<sup>e</sup>Other outpatient care is defined as all nonprimary care, nontransportation, and nondental outpatient claims activity.

<sup>f</sup>Total annualized inpatient length of stay in days.

claims across all service types (inpatient, nonprimary care outpatient, and prescription drugs) to characterize disease severity. We also controlled for 2 geographic variables: residing in a metropolitan statistical area<sup>16</sup> and the distance from where the patient lived (using the centroid of the residence zip code)<sup>17</sup> to the closest health center delivery site.

## Statistical Analyses

We conducted basic descriptive analyses of patient characteristics, utilization, and spending by assigned primary care setting. Because the characteristics of health center patients are unlike those of patients seen in other settings, we used propensity score methods to balance potential observed confounders.<sup>18</sup> The propensity score–matching method is a technique for selecting non–health center users who are matched with health center users on potentially confounding covariates. This matching approach results in groups that are comparable on the basis of the covariates, regardless of correct model specification of outcomes and covariates, which is required in the standard generalized linear model.

We estimated propensity scores using a logistic regression model in which receiving treatment in a health center is predicted by the covariates we have described. We matched health center patients and non–health center patients with replacement using the nearest neighbor matching method. We then developed a series of generalized linear models to assess the effect of primary care setting on utilization and expense outcomes on the matched sample. We used a log link, assuming negative binomial distribution for utilization and  $\gamma$ -distribution for expenses. (Further details on the propensity score match and statistical models are available as a supplement to the online version of this article at <http://www.ajph.org>.)

We expressed our results in terms of the estimated mean of utilization or spending for each primary care setting and percentage difference in utilization or spending associated with the health center primary care setting relative to the non–health center comparison group. We conducted a main analysis with all states pooled, comparing health center to non–health center patients. In secondary analyses, we compared health center patients to physician office, hospital outpatients, and mixed use

patients separately. Because Medicaid programs may vary significantly by state, we also performed separate state-by-state analyses. We conducted sensitivity analysis of a range of subgroup populations, including disabled beneficiaries and recipients of Temporary Aid for Needy Families benefits (not shown). We considered results to be statistically significant using a threshold of  $P < .005$  on the basis of the Bonferroni method of correction for multiple comparisons.<sup>19</sup> We carried out all analyses with SAS version 9.4 (SAS Institute, Cary, NC). All reported  $P$  values are 2-sided.

## RESULTS

Our final analyses included 144 076 health center Medicaid patients and 894 898 non–health center patients (Table 1). Roughly two thirds of patients were female, and they had an average age of 41 years. Most patients were from racial/ethnic minority groups. On an unadjusted basis, health center patients had lower levels of utilization and expense across all service types.

Before propensity score matching, health center and non-health center users differed substantially across several covariates, including state, Medicaid eligibility category, distance from the nearest health center site, and disease burden. After matching, observed confounders were balanced (data available as a supplement to the online version of this article at <http://www.ajph.org>).

When compared with non-health center patients, patients receiving most of their primary care in health centers experienced lower utilization and spending for all services examined (Table 2). The largest differences were in other outpatient visits (15.7 vs 12.2; -22% difference; CI = -21%, -24%) and spending (\$2948 vs \$1964; -33% difference; CI = -32%, -35%) as well as inpatient admissions (0.25 vs 0.19; -25% difference; CI = -22%, -27%) and spending (\$2047 vs \$1496; -27% difference; CI = -24%, -30%). Total spending was lower for health center patients (\$9889 vs \$7518; -24% difference; CI = -23%, -25%). Differences in ED services were smaller in magnitude, although health center patients still had lower ED use (1.3 vs 1.2 visits; -11% difference; CI = -10%, -13%)

and spending (\$244 vs \$216; -11% difference; CI = -10%, -13%).

When compared with the physician office, hospital outpatient, and mixed use groups (Table 3), the pattern of consistently lower use and spending for all services held for health center patients in comparison with hospital outpatients and mixed use patients. When compared with physician office patients, there was no difference in primary care use for health center patients, and health center patients had higher primary care spending (\$1184 vs \$1430; 21% difference; CI = 18%, 24%), more ED visits (1.0 vs 1.2; 16% difference; CI = 14%, 18%), and more ED spending (\$186 vs \$216; 16% difference; CI = 13%, 18%). Health center patients had lower use and spending across other services and lower total spending.

When comparing health center patients to non-health center patients in each of the 13 study states, we found trends in findings that were generally consistent across states (Table 4). Total spending was lower for health center patients across all 13 states. In 3 states (Connecticut, Illinois, and Texas), health center patients had higher primary care use or

spending, and in Illinois, health center patients had higher ED use.

## DISCUSSION

In this study of fee-for-service adult Medicaid enrollees across 13 states, we found that patients who received the majority of their primary care in health centers had lower total health care use and spending than did matched patients who receive primary care in other settings. The finding of lower total spending for health center patients was robust across all primary care comparison settings and states that we examined.

When comparing the full range of outcomes across states, we found that most states had the same patterns as our main analyses that pooled all states. The general consistency of these findings suggests that there may be a distinct association between health center primary care setting and health care use and spending because each state administers the Medicaid program independently, with variation in financing, management, and care programs. Some individual states did have

**TABLE 2—Use and Expense for Health Center Patients Compared With Matched Non-Health Center Patients: United States, 2009**

Variable	Non-Health Center (n = 144 075), Estimate (95% CI)	Health Center (n = 144 075), Estimate (95% CI)	Difference, <sup>a</sup> % (95% CI)
<b>Primary care</b>			
Visits, no.	8.2 (8.2, 8.3)	7.6 (7.6, 7.7)	-7 (-8, -7)
Spending, \$	1845 (1815, 1876)	1430 (1418, 1442)	-23 (-24, -21)
<b>Other outpatient care<sup>b</sup></b>			
Visits, no.	15.7 (15.5, 15.9)	12.2 (12.0, 12.4)	-22 (-24, -21)
Spending, \$	2948 (2900, 2996)	1964 (1930, 2000)	-33 (-35, -32)
Prescription drug spending, \$	2704 (2664, 2744)	2324 (2296, 2352)	-14 (-16, -12)
<b>Emergency department</b>			
Visits, no.	1.3 (1.3, 1.4)	1.2 (1.2, 1.2)	-11 (-13, -10)
Spending, \$	244 (240, 247)	216 (213, 219)	-11 (-13, -10)
<b>Inpatient</b>			
Admissions, no.	0.25 (0.25, 0.26)	0.19 (0.19, 0.20)	-25 (-27, -22)
Length of stay, <sup>c</sup> d	1.1 (1.1, 1.2)	0.8 (0.8, 0.9)	-26 (-29, -23)
Spending, \$	2047 (1987, 2114)	1496 (1446, 1548)	-27 (-30, -24)
<b>Total spending, \$</b>	<b>9889 (9784, 9996)</b>	<b>7518 (7440, 7597)</b>	<b>-24 (-25, -23)</b>

Note. CI = confidence interval. Primary care setting is determined by where > 50% of primary care visits occur. Use and spending is expressed in annual values per patient. Each health center patient was matched with 1 non-health center patient on the basis of the logit of propensity score, which was estimated using a logistic regression adjusting for patient demographics (age, race/ethnicity, gender), insurance characteristics (Medicaid eligibility category, months of eligibility, Temporary Aid for Needy Families program beneficiary indicator), disease burden (on the basis of binary disease diagnosis variables from the Chronic Illness and Disability Payment System), state, residence in a metropolitan statistical area, and distance from the closest health center delivery site.

<sup>a</sup>A negative percentage difference reflects lower health center utilization or spending.

<sup>b</sup>Other outpatient care is defined as all nonprimary care, nontransportation, and nondental outpatient claims activity.

<sup>c</sup>Total annualized inpatient length of stay in days.

**TABLE 3—Use and Expense for Health Center Patients Compared With Matched Physician Office, Hospital Outpatient, and Mixed Use Patients: United States, 2009**

Utilization or Cost	Health Center (n = 144 076), Estimate (95% CI)	Physician Office (n = 144 074)		Hospital Outpatient (n = 144 071)		Mixed Use <sup>a</sup> (n = 144 074)	
		Estimate (95% CI)	Difference From Health Center, % (95% CI) <sup>b</sup>	Estimate (95% CI)	Difference From Health Center, % (95% CI) <sup>b</sup>	Estimate (95% CI)	Difference From Health Center, % (95% CI) <sup>b</sup>
<b>Primary care</b>							
Visits, no.	7.6 (7.6, 7.7)	7.6 (7.6, 7.7)	0 (-1, 0)	7.7 (7.7, 7.8)	-1 (-2, -1)	8.6 (8.6, 8.7)	-12 (-12, -11)
Spending, \$	1 430 (1 418, 1 442)	1 184 (1 158, 1 211)	21 (18, 24)	1 974 (1 944, 2 004)	-28 (-29, -26)	2 315 (2 283, 2 347)	-38 (-39, -37)
<b>Other outpatient care<sup>c</sup></b>							
Visits, no.	12.2 (12, 12.5)	14.4 (14.2, 14.7)	-15 (-17, -13)	13.5 (13.3, 13.7)	-9 (-11, -7)	18.5 (18.2, 18.8)	-34 (-35, -32)
Spending, \$	1 970 (1 935, 2 006)	2 842 (2 787, 2 897)	-31 (-32, -29)	3 066 (3 015, 3 117)	-36 (-37, -34)	3 170 (3 125, 3 217)	-38 (-39, -36)
Prescription drug spending, \$	2 324 (2 296, 2 352)	2 716 (2 680, 2 752)	-14 (-16, -13)	3 051 (2 964, 3 140)	-24 (-26, -21)	2 709 (2 673, 2 746)	-14 (-16, -13)
<b>Emergency department</b>							
Visits, no.	1.2 (1.2, 1.2)	1 (1, 1)	16 (14, 18)	2.6 (2.5, 2.6)	-54 (-54, -53)	1.4 (1.4-1.4)	-13 (-15, -12)
Spending, \$	216 (213, 219)	186 (184, 189)	16 (13, 18)	480 (473, 486)	-55 (-56, -54)	249 (245, 252)	-13 (-15, -11)
<b>Inpatient</b>							
Admissions, no.	0.19 (0.19, 0.20)	0.22 (0.21, 0.22)	-11 (-14, -8)	0.60 (0.59, 0.61)	-68 (-69, -67)	0.24 (0.24, 0.25)	-21 (-23, -19)
Length of stay, <sup>d</sup> d	0.8 (0.8, 0.9)	0.9 (0.9, 0.95)	-9 (-13, -4)	2.8 (2.7, 2.9)	-70 (-71, -69)	1.11 (1.1, 1.1)	-24 (-27, -20)
Spending, \$	1 496 (1 446, 1 548)	1 757 (1 702, 1 814)	-15 (-19, -11)	4 908 (4 799, 5 018)	-70 (-71, -68)	1 893 (1 834, 1 953)	-21 (-24, -17)
Total spending, \$	7 530 (7 452, 7 609)	8 791 (8 691, 8 891)	-14 (-16, -13)	13 629 (13 467, 13 793)	-45 (-46, -44)	10 439 (10 337, 10 542)	-28 (-29, -27)

Note. CI = confidence interval. Primary care setting is determined by where > 50% of primary care visits occur. Use and spending is expressed in annual values per patient. Each health center patient was matched with 1 patient from the physician office, hospital outpatient, and mixed use settings on the basis of the logit of propensity score, which was estimated using a multinomial logistic regression adjusting for patient demographics (age, race/ethnicity, gender), insurance characteristics (Medicaid eligibility category, months of eligibility, Temporary Aid for Needy Families program beneficiary indicator), disease burden (on the basis of binary disease diagnosis variables from the Chronic Illness and Disability Payment System), state, residence in a metropolitan statistical area, and distance from the closest health center delivery site.

<sup>a</sup>Mixed use indicates enrollees, where no single setting accounts for > 50% of primary care visits.

<sup>b</sup>The negative percentage difference reflects lower health center utilization or spending.

<sup>c</sup>Other outpatient care is defined as all nonprimary care, nontransportation, and nondental outpatient claims activity.

<sup>d</sup>Total annualized inpatient length of stay in days.

results that varied from the trend observed when all states were pooled. Connecticut, Illinois, and Texas had higher primary care use or spending for health center patients, and Illinois had higher ED use for non-health center patients.

When examining different forms of non-health center primary care settings (physician office, hospital outpatient, and mixed use), we found that most of our main findings held, except that health center patients had more primary care spending and ED use and spending than did physician office patients.

One potential interpretation of our results is that if health centers provide comparable or higher levels of quality, lower spending may mean that they are an efficient form of primary care. Two other recent studies of health center primary care have used data from the Medical Expenditure Panel Survey<sup>11</sup> and Medicare claims,<sup>20</sup> and they similarly found lower overall health care use or spending for health center patients. With respect to quality of care, short-term studies (most often 1–2 years) using administrative or survey data have generally found process-based measures of quality to be comparable or higher among

health centers for similar patient populations.<sup>11,21,22</sup> Studies using ecologic designs have also demonstrated that the establishment or expansion of health centers in an area is associated with long-term declines in mortality.<sup>23,24</sup> Recent high-profile studies of Medicaid have brought intense controversy over the cost of the program.<sup>25</sup> States that are considering expansion of their Medicaid programs are engaged in discussions of how to manage health care spending for newly insured patients. If our observation of lower use and cost among health center patients is owing to health centers providing a more

**TABLE 4—Adjusted Percentage Difference (95% CI) in Utilization and Spending, Health Center Patients Compared With Non-Health Center Patients, by State: United States, 2009**

Variable	AL, % Difference (95% CI)	CA, % Difference (95% CI)	CO, % Difference (95% CI)	CT, % Difference (95% CI)	FL, % Difference (95% CI)	IA, % Difference (95% CI)	IL, % Difference (95% CI)	MS, % Difference (95% CI)	NC, % Difference (95% CI)	TX, % Difference (95% CI)	VT, % Difference (95% CI)	WV, % Difference (95% CI)
Matched health center patients, no.	132	74 028	8640	8481	9947	2945	10 371	7113	748	9909	1728	10 022
<b>Primary care</b>												
Visits	-16 (-36, 10)	-10 (-11, -9)	-17 (-19, -14)	35 (31, 40)	-23 (-25, -21)	-3 (-7, 1)	6 (4, 9)	-10 (-12, -8)	-20 (-27, -12)	-9 (-11, -7)	-1 (-7, 5)	-15 (-16, -13)
Spending	-38 (-60, -5)	-37 (-38, -35)	-11 (-16, -6)	5 (-1, 11)	-31 (-34, -28)	-34 (-40, -26)	11 (5, 18)	-23 (-29, -15)	-33 (-44, -20)	19 (15, 24)	-1 (-11, 12)	-13 (-17, -9)
<b>Other outpatient<sup>a</sup></b>												
Visits	-48 (-77, 15)	-12 (-14, -9)	-25 (-32, -17)	-23 (-28, -18)	-44 (-49, -39)	-6 (-14, 2)	-4 (-11, 4)	1 (-7, 9)	-26 (-41, -6)	-37 (-42, -32)	-19 (-31, -5)	-15 (-20, -10)
Spending	-84 (-94, -51)	-37 (-39, -36)	-42 (-49, -34)	-33 (-40, -26)	-54 (-59, -48)	-26 (-39, -10)	-25 (-30, -19)	-32 (-41, -23)	-33 (-48, -13)	-38 (-42, -34)	-23 (-37, -5)	-24 (-31, -16)
Prescription spending	-30 (-64, 38)	0 (-2, 2)	-31 (-36, -25)	-5 (-9, 0)	-22 (-26, -16)	-12 (-22, -2)	-26 (-36, -14)	-3 (-10, 4)	-35 (-49, -17)	-20 (-26, -15)	-11 (-21, 1)	-18 (-21, -14)
<b>Emergency department</b>												
Visits	11 (-47, 132)	-6 (-9, -3)	-4 (-10, 2)	-1 (-7, 6)	-40 (-43, -36)	-40 (-45, -34)	16 (9, 25)	-3 (-8, 2)	21 (-2, 51)	-9 (-14, -3)	-9 (-21, 5)	-15 (-20, -10)
Spending	16 (-53, 184)	-5 (-8, -2)	-10 (-16, -3)	-3 (-9, 4)	-41 (-45, -37)	-45 (-50, -39)	1 (-7, 10)	-5 (-10, 0)	13 (-10, 41)	-4 (-10, 2)	-6 (-19, 9)	-18 (-23, -12)
<b>Inpatient</b>												
Admissions	No estimate	-17 (-21, -14)	-12 (-23, 1)	-24 (-32, -16)	-28 (-35, -19)	-45 (-56, -33)	-33 (-42, -24)	-19 (-28, -10)	-26 (-48, 6)	-1 (-11, 10)	-24 (-48, 11)	-6 (-15, 4)
Length of stay <sup>b</sup>	No estimate	-15 (-20, -10)	-3 (-23, 24)	-30 (-40, -19)	-24 (-35, -10)	-44 (-58, -27)	-44 (-53, -33)	-10 (-22, 4)	-9 (-42, 44)	-4 (-17, 11)	-13 (-41, 28)	-5 (-17, 10)
Spending	-5 (-24, 19)	-13 (-19, -8)	-9 (-28, 16)	-31 (-40, -20)	-29 (-39, -18)	-41 (-56, -20)	-50 (-59, -39)	-13 (-24, 0)	-23 (-49, 18)	-14 (-27, 1)	-21 (-46, 15)	-11 (-22, 2)
Total spending	-63 (-78, -37)	-22 (-23, -20)	-26 (-30, -21)	-19 (-23, -15)	-32 (-36, -29)	-27 (-32, -21)	-27 (-31, -22)	-19 (-24, -14)	-29 (-40, -15)	-22 (-26, -18)	-15 (-24, -6)	-18 (-21, -14)

Note: CI = confidence interval. "No estimate" means that models for that outcome did not converge and no estimate was reached. Primary care setting was determined by where > 50% of primary care visits occur. Use and spending is expressed in annual values per patient. Each health center patient was matched with 1 non-health center patient on the basis of the logit of propensity score, which was estimated using a logistic regression adjusting for patient demographics (age, race/ethnicity, gender), insurance characteristics (Medicaid eligibility category, months of eligibility, Temporary Aid for Needy Families program beneficiary indicator), disease burden (determined by binary disease diagnosis variables from the Chronic Illness and Disability Payment System), state, residence in a metropolitan statistical area, and distance from the closest health center delivery site. The negative percentage difference reflects lower health center utilization or spending.

<sup>a</sup>Other outpatient care is defined as all nonprimary care, nontransportation, and nondental outpatient claims activity.

<sup>b</sup>Total annualized inpatient length of stay in days.

efficient form of primary care, then health center program growth may provide an avenue for expanding Medicaid in a cost-efficient manner.

A second interpretation is that the patterns of utilization and cost reflect characteristics of the health care network accessed by health center patients—as opposed to aspects of care within the health center. If health center providers tend to refer patients to other care settings that have lower use rates or lower spending (because of access or practice patterns), the nature of those referral networks may lead to the observed differences in use and spending. Although utilization of lower cost specialty and inpatient care networks may be a desirable outcome, policymakers and Medicaid administrators must ensure that it does not limit access to high-quality care. For example, in a recent national survey of health centers conducted in 2009 and 2013, health center leaders reported increasing difficulty obtaining specialty or subspecialty appointments for their Medicaid patients.<sup>26</sup>

A third interpretation is that health center patients may be different from those in physician offices and hospital outpatient practices in ways that we are unable to account for with our data. Our propensity score-matching techniques adjust for confounding stemming from factors such as patient demographics, type of Medicaid insurance, and the disease burden observed in our data. However, we are unable to control for potential confounding because of factors that are not observed in our data set, and we are unaware of any studies that identify factors that drive Medicaid patients' choice of health centers for primary care. In particular, administrative claims data provide limited insight into important patient characteristics that may influence utilization and spending, such as healthy behaviors and lifestyle.

If our findings are driven by health center Medicaid patients being systematically healthier in ways not observable in claims data, this would highlight the importance of ongoing work to improve measurements of health and incorporate them into risk adjustment and payment schemes.<sup>27,28</sup> Health centers have long been known for serving vulnerable populations with high chronic disease burdens and health care needs. As

health centers increasingly participate in accountable care organizations and shared savings arrangements with payers, it will be important for health centers and other providers to thoroughly document the health needs of their patients and communicate that information in a clear and compelling manner to payers and policymakers.

Other limitations in the scope of our analysis are also important to note. Our cross-sectional study cannot provide evidence of a causal relationship between health center care and health care use and spending. Although our study includes a large number of patients across several states, our study sample excludes important groups of enrollees (e.g., Medicaid managed care enrollees, Medicaid-Medicare dual eligible enrollees, long-term care recipients, and children), which limits the generalizability of findings across the Medicaid program. In particular, because Medicaid managed care has grown to become the dominant mode of administration for the Medicaid programs, ongoing study of the association between primary care setting and health care spending in the context of managed care is important.

We examined only Medicaid utilization and spending; we did not assess quality of care and cannot make conclusions about cost effectiveness or overall costs from a societal perspective. For example, health centers receive some federal financial support outside the scope of Medicaid fee-for-service payment, and some programs (such as the 340b drug pricing program, which is prevalent among health centers)<sup>29</sup> may lower Medicaid spending for health center patients. Health centers also receive federally supported technical assistance on quality improvement as well as federal grant funding outside Medicaid payments that we are unable to account for in our analyses. In addition, we cannot account for the unobserved heterogeneity across patients of different settings that is not captured with propensity score adjustment. Finally, although we classified settings of primary care into health center, hospital outpatient, and physician offices, it is important to acknowledge the wide variation in organizational structure and practices within these settings. Future work should analyze the role of organizational characteristics in the relationship between primary care setting and utilization, cost, and quality of care.

Cost reduction will continue to play an important role in ongoing efforts to improve the US health care system. Our analyses showed that Medicaid patients who obtain primary care at health centers had lower use and spending than did similar patients in other primary care settings. Although we hypothesize several potential causes for this association, future studies should work to empirically identify the mechanisms at work that lead to the compelling utilization and cost differences found in this study. As more Medicaid data become available for the years after the implementation of the ACA, it will also be critical to examine whether the associations we observed differ for more recent cohorts. **AJPH**

#### CONTRIBUTORS

R. S. Nocon drafted the article. R. S. Nocon, S. M. Lee, D. B. Mukamel, Y. Gao, and L. M. White conducted data analyses. R. S. Nocon, R. Sharma, Q. Ngo-Metzger, D. B. Mukamel, L. Shi, M. H. Chin, and E. S. Huang conceptualized the study. All authors interpreted results, provided critical revision, and approved the final version of the article.

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#### HUMAN PARTICIPANT PROTECTION

This study was deemed exempt by the University of Chicago, Biological Sciences Division institutional review board.

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