The Impact of Patient-Centered Medical Homes on Safety Net Clinics

Li-Hao Chu, PhD; Michael Tu, MS; Yuan-Chi Lee, MS; Jennifer N. Sayles, MD; and Neeraj Sood, PhD

Safety net clinics play a pivotal role in delivering both primary and specialty care to millions of low-income Californians.[1] These clinics comprise licensed primary care clinics, clinics operated by government entities (eg, counties and cities), and clinics operated by federally recognized Indian tribes or tribal organizations. Safety net clinics provide care to medically underserved populations, regardless of their ability to pay. In 2011, the State of California authorized a section 1115 Medicaid waiver that mandated enrollment of seniors and people with disabilities (SPD) in managed Medicaid plans, which, in turn, led to an influx of patients with chronic conditions into safety net clinics.

The California Medicaid population is associated with frequent hospital admissions and heavy reliance on the emergency department (ED).[2] Medicaid provides insurance to underserved, minority, and low-income patients—the populations most susceptible to fragmented and uncoordinated care. In light of this knowledge, a Los Angeles local health plan initiated a pilot program to transform selected safety net clinics into patient-centered medical homes (PCMHs) in the hopes of improving patient care and alleviating the impact of the SPD influx. Specifically, the intervention of this program focused on providing implementation services on: 1) on-site and virtual technical assistance on topics like optimizing team-based care, patient experience, population health management, care coordination, and patient access to care; 2) workflow analysis and process improvement support; 3) access to subject matter experts on key topics like care coordination; 4) provision of customized coaching training; and 5) administration of the PCMH Assessment.

In a PCMH, each patient has an ongoing relationship with a primary care physician who leads a team that takes collective responsibility for the patient's care. A PCMH model emphasizes enhanced care through open scheduling, expanded hours, and communication among patients, providers, and staff. Care is facilitated by disease registries, health information technology (IT), the exchange of health information among providers, and

ABSTRACT

OBJECTIVES: To evaluate the impact of moving to a patient-centered medical home (PCMH) model in safety net clinics in a managed Medicaid plan.

STUDY DESIGN: Quasi-experimental, difference-in-differences design.

METHODS: The study examined whether the PCMH model reduced emergency department (ED) use and whether the growth in the seniors and people with disabilities (SPDs) population crowds out lower-cost populations. The study compared 7 PCMH safety net clinics (22,870 members) in late 2011 in the greater Los Angeles area with 110 general safety net clinics (143,530 members) between January 2011 and December 2013. During the time from 2011 to 2012, California began transitioning SPDs from fee-for-service Medicaid into managed care systems under a federal waiver.

RESULTS: Among clinics with less than 10% SPD membership, a PCMH model was associated with more office visits and less ED use. In particular, PCMH clinics—relative to non-PCMH clinics—reduced ED visits by an average of 70 visits per 1000 members per year (PTMPY) and reduced avoidable ED visits by 20 visits PTMPY. Neither the change in office visits nor ED visits was evident in clinics with SPD membership greater than 10%.

CONCLUSIONS: Adopting a PCMH model in safety net practices can effectively reduce ED use and increase the use of office visits among Medicaid patients. However, the beneficial effects of the PCMH model can be muted by a sudden influx of high-need users.

Am J Manag Care. 2016;22(8):532-538

other means to ensure that patients receive proper care in a culturally and linguistically appropriate manner.[3] PCMH pilot programs in integrated delivery systems and multi-payer–sponsored initiatives have shown promise in improving the quality of patient care, reducing hospitalization and ED visits, and lowering Medicaid costs.[4-8] More than half of US states have implemented a variety of payment policy changes and other reforms to Medicaid to help primary care providers function as PCMHs.[4,9] Thus far, among those states, Colorado, Minnesota, New York, North Carolina, Oklahoma, South Carolina, and Vermont have reported fewer ED visits, hospitalizations, and costs.[10]

Our research focuses on the impact of PCMHs on a previously untested population: safety net clinics serving the greater Los Angeles area. Los Angles is the largest urban area in California, with approximately half of its population of Hispanic descent. The transition to the PCMH model coincided with the state-mandated switch of SPDs from fee-for-service to a managed Medicaid plan (MMP). This switch created a potential complication: the new, high-use SPD members—with their demand on health services being much higher than regular Medicaid members—could crowd out or delay routine medical services for all other Medicaid recipients at safety net clinics.[11] Therefore, our second research question asks whether the PCMH model was less effective in clinics that experienced a larger influx of heavy users.

METHODS

Study Population

This study was based on a local MMP that initiated a PCMH pilot project. Participation in this initiative was voluntary to safety net clinics. The eligibility criteria included: 1) being located within Los Angeles county, 2) being a safety net provider, 3) being part of contracted provider network, and 4) not participating in another externally–led PCMH program. The detailed selection criteria can be found in **eAppendix A** (eAppendices available at **www.ajmc.com**).

Among 11 PCMH-certified safety net clinics in the greater Los Angeles area in early 2012, 7 clinics were included in the study because they contracted with at least 300 of the plan's members.[12] The comparison group was 110 safety net clinics with at least 300 of the plan's members; these clinics were located in Los Angeles County, but prior to 2013, were not recognized as PCMHs by the National Committee for Quality Assurance (NCQA), Utilization Review Accreditation Committee, and Joint Commission.

We focused on the non-SPD population younger than 65 years old, given that the SPD population did not complete the transition to an MMP until mid-2012. In addition, we excluded patients

TAKE-AWAY POINTS

▸ This study shows that implementing the patient-centered medical home (PCMH) model in safety net clinics can have a meaningful impact on reducing the use of emergency departments (EDs). However, the extent to which a PCMH can successfully reduce ED visits may depend on the capacity of clinics to increase access to primary care. We found that the effects of PCMHs on reducing ED visits were smaller in clinics that experienced a greater increase in seniors and individuals with disabilities.

who switched between the PCMH and comparison group during the study. Lastly, we required a 10-month minimum Medicaid eligibility during each study year for both groups to ensure sufficient exposure or interaction between patients and their primary care physicians. The study cohort derivation flow is provided in **eAppendix B**.

Data Source

We used a local MMP's administrative claims data from January 1, 2011, through December 31, 2013, in the analysis. The study timeframe spanned pre- and post-PCMH transformation. Under an MMP, all members are required to select, or are otherwise assigned to, a primary care physician. The PCMH cohort included members served by a primary care provider affiliated with a PCMH clinic, and the non-PCMH cohort included those served by a primary care provider affiliated with non-PCMH clinics. We also included data on the members' demographics (age, gender, race/ethnicity, and enrollment history); service dates; episodes (hospital admission and ED visit); *International Classification of Diseases, Ninth Revision, Clinical Modification* diagnosis codes; procedure codes; and pharmacy claims.

We identified comorbidities using the Medicaid Rx model, a pharmacy-based risk adjustment model to adjust capitated payments to health plans that enroll Medicaid beneficiaries.[13]

Outcome of Interest

Hospital admissions, ED visits, and office visits were measured using NCQA standard definitions.[14] To more thoroughly examine the impact of PCMHs on ED visits, we also included avoidable ED visits, as defined by the California Department of Health Services Collaborative.[15] All utilization rates are presented as per 1000 members per year (PTMPY).

Statistical Analysis

Observable characteristics between the PCMH and non-PCMH groups were compared using the Kruskal-Wallis and χ^2 tests for continuous and categorical variables, respectively. For the main outcomes of interest, difference-in-differences (DID) analyses were conducted by fitting generalized estimating equations with negative binomial distributions and robust standard errors to account for heteroscedasticity and clustering of patients within

METHODS

TABLE 1. Annual Demographics and Health Resource Utilization in Pre-PCMH Period (year 2011)

	All Clinics				Clinics with <10% SPD Membership				Clinics with ≥10% SPD Membership			
	PCMH N = 22,870	Non-PCMH N = 143,530	Total N = 166,400	P	PCMH N = 4676	Non-PCMH N = 62,481	Total N = 67,157	P	PCMH N = 18,194	Non-PCMH N = 81,049	Total N = 99,243	P
Population characteristics												
Age, years: %				<.0001				<.0001				<.0001
≤11	50.6	49.5	49.6		52.6	52.5	52.5		50.1	47.1	47.7	
12-17	21.1	20.2	20.3		20.7	21	21		21.2	19.6	19.9	
18-29	14.4	13.3	13.5		13.8	12.2	12.3		14.6	14.2	14.3	
30-44	9	10.5	10.3		8.1	8.5	8.5		9.2	12	11.5	
45-64	4.9	6.5	6.3		4.7	5.8	5.7		4.9	7	6.6	
Female, %	55.9	55.8	55.8	.6987	54.8	55	55	.7571	56.2	56.4	56.3	.6933
Hispanic, %	66.5	73.6	72.7	<.0001	94.5	80	81	<.0001	59.4	68.7	67	<.0001
Comorbidity, mean (SD)	0.3 (0.37)	0.3 (0.38)	0.3 (0.37)	.0085	0.3 (0.38)	0.3 (0.38)	0.3 (0.38)	.1993	0.3 (0.37)	0.3 (0.38)	0.3 (0.37)	<.0001
Comorbidity groups,[a] %				<.0001				.6743				<.0001
1	16	17.4	17.2		15.3	15.3	15.3		16.2	19	18.5	
2	23.9	23.4	23.5		23.9	23.7	23.8		24	23.1	23.3	
3	38.4	37.8	37.8		39.4	38.8	38.8		38.1	37	37.2	
4	21.7	21.5	21.5		21.4	22.2	22.2		21.7	20.9	21.1	

PCMH indicates patient-centered medical home; SPD, seniors and people with disabilities.
[a]Comorbidity groups were based on the breakdown of comorbidity scores calculated through the Medicaid MRx model. Group 1: 0.00-0.03; Group 2: 0.04-0.09; Group 3: 0.10-0.39; Group 4: ≥0.40.

practices.[16] Independent variables included indicators for years 2012 and 2013 (with 2011 serving as a reference), members' demographics and comorbidities, and interactions between time periods and PCMH/non-PCMH status. A 2-tailed *P* value <.05 was treated as significant in all statistical tests. All the data management and analyses were conducted using SAS version 9.3 (SAS Institute, Cary, North Carolina).

Semi-Structured Interviews

We met with leaders of 3 PCMH and 3 non-PCMH clinics (ie, chief executive officer, chief medical officer, and medical directors) and collected their feedback on PCMH models with in-depth, semi-structured interviews. The leaders were asked about clinic operations and their approaches to patient care, including the use of health IT, involving patients in decision making, disease management, measurement of quality, and access to care. The goal was to identify differences in attributes between the 2 cohorts, as well as to seek the opinion of clinic leaders on the plausibility of our study findings and the potential differences in clinic attributes that might explain the study results. The detailed survey questions are presented in **eAppendix C**. This study was approved by the Institutional Review Board at the University of Southern California.

RESULTS

Demographics

Across the 3 years of the study, on average, 23,662 members were in the PCMH group and 138,152 were in the non-PCMH group. The distributions of age categories, gender, and comorbidities in 2011 were similar between the 2 groups, and 70% of the study population was younger than 18 years old. However, the proportion of Hispanics was 6% to 7% higher in the non-PCMH group (**Table 1**). Similarly, we found little or no difference in observed patient characteristics by PCMH status in clinics with SPD membership less than or greater than 10%. The same distribution patterns in 2011 were evident in 2012 and 2013.

Difference-in-Differences Analysis

DID analysis compared the difference in utilization between PCMH and non-PCMH clinics in the pre-PCMH and post-PCMH periods. The results, based on the adjusted regression analysis in **Table 2**, include the analyses on primary aim (ie, the impact of PCMH on all clinics) and the secondary aim (ie, the response of PCMH clinics to different proportions of SPD membership).

In the pre-PCMH period, PCMH clinics had 32 fewer ED visits and 22 fewer avoidable ED visits (all results are PTMPY) (Table 2).

TABLE 2. Adjusted Difference in Utilization Rates Between PCMH and Non-PCMH Groups[a,b]

| Type of Healthcare Utilization	PCMH	2011 Rate (SE)	2012 Rate (SE)	2013 Rate (SE)
A. All Clinics				
Acute hospitalization	Yes	22.51 (3.29)	20.96 (3.01)	18.60 (2.64)
	Diff (PCMH – Non-PCMH)	4.13 (3.43)	3.40 (3.15)	1.64 (2.80)
	DID		−0.73 (4.65)	−2.49 (4.42)
ED visit	Yes	429.50 (14.64)	420.03 (14.03)	408.26 (13.51)
	Diff (PCMH – Non-PCMH)	−32.40 (15.82)	−47.58 (15.37)[c]	−70.32 (15.00)[c]
	DID		−15.18 (22.03)	−37.92 (21.77)[c]
Avoidable ED visit	Yes	98.86 (6.11)	88.89 (5.38)	95.64 (5.73)
	Diff (PCMH – Non-PCMH)	−21.82 (6.74)[c]	−23.34 (6.04)[c]	−23.62 (6.44)[c]
	DID		−1.52 (9.03)	−1.8 (9.31)
Office visit	Yes	1536.83 (28.96)	1600.84 (29.55)	1737.45 (31.88)
	Diff (PCMH – Non-PCMH)	−76.91 (31.10)	242.03 (31.06)[c]	163.17 (33.72)[c]
	DID		318.94 (43.95)[c]	240.08 (45.89)[c]
B. Clinics With <10% SPD Membership				
Acute hospitalization	Yes	22.08 (7.66)	17.47 (6.01)	18.57 (6.58)
	Diff (PCMH – Non-PCMH)	5.42 (7.70)	−0.20 (6.14)	2.21 (6.68)
	DID		−5.62 (9.82)	−3.21 (10.14)
ED visit	Yes	394.53 (30.13)	336.76 (25.38)	367.38 (28.45)
	Diff (PCMH – Non-PCMH)	−62.23 (30.97)	−144.14 (27.12)[c]	−120.76 (30.01)[c]
	DID		−81.91 (41.16)[c]	−58.53 (43.11)
Avoidable ED visit	Yes	107.75 (14.35)	77.41 (10.21)	95.74 (12.95)
	Diff (PCMH – Non-PCMH)	−16.56 (14.76)	−45.31 (11.09)[c]	−28.44 (13.61)[c]
	DID		−28.75 (18.46)	−11.88 (20.06)
Office visit	Yes	1564.93 (64.34)	1882.53 (76.33)	2957.14 (123.27)
	Diff (PCMH – Non-PCMH)	−67.32 (65.85)	421.56 (77.32)[c]	1457.97 (123.55)[c]
	DID		488.88 (101.35)[c]	1525.29 (139.71)[c]
C. Clinics With ≥10% SPD Membership				
Acute hospitalization	Yes	22.55 (3.59)	21.85 (3.41)	18.54 (2.84)
	Diff (PCMH – Non-PCMH)	3.02 (3.84)	4.57 (3.60)	1.40 (3.08)
	DID		1.55 (5.25)	−1.62 (4.91)
ED visit	Yes	437.09 (16.70)	439.35 (16.44)	416.09 (15.29)
	Diff (PCMH – Non-PCMH)	−28.51 (18.61)	−19.90 (18.21)	−55.93 (17.37)[c]
	DID		8.61 (25.99)	−27.42 (25.41)
Avoidable ED visit	Yes	96.66 (6.85)	91.67 (6.36)	95.53 (6.51)
	Diff (PCMH – Non-PCMH)	−21.90 (7.87)[c]	−14.78 (7.19)[c]	−21.09 (7.52)[c]
	DID		7.12 (10.64)	0.81 (10.86)
Office visit	Yes	1533.18 (32.83)	1534.42 (32.13)	1460.98 (30.05)
	Diff (PCMH – Non-PCMH)	−73.86 (36.48)	231.97 (34.47)[c]	−162.35 (34.08)[c]
	DID		305.83 (50.14)[c]	−88.49 (49.89)

DID indicates difference-in-differences; Diff, difference; ED, emergency department; PCMH, patient-centered medical home; SE, standard error; SPD, seniors and people with disabilities.
[a]Adjusted for age, gender, race, and comorbidities.
[b]All results are presented as expected value (SE).
[c]Significant at P <.05.

FIGURE. Unadjusted Comparison of ED Visit and Avoidable ED Visit Between PCMH and Non-PCMH Groups
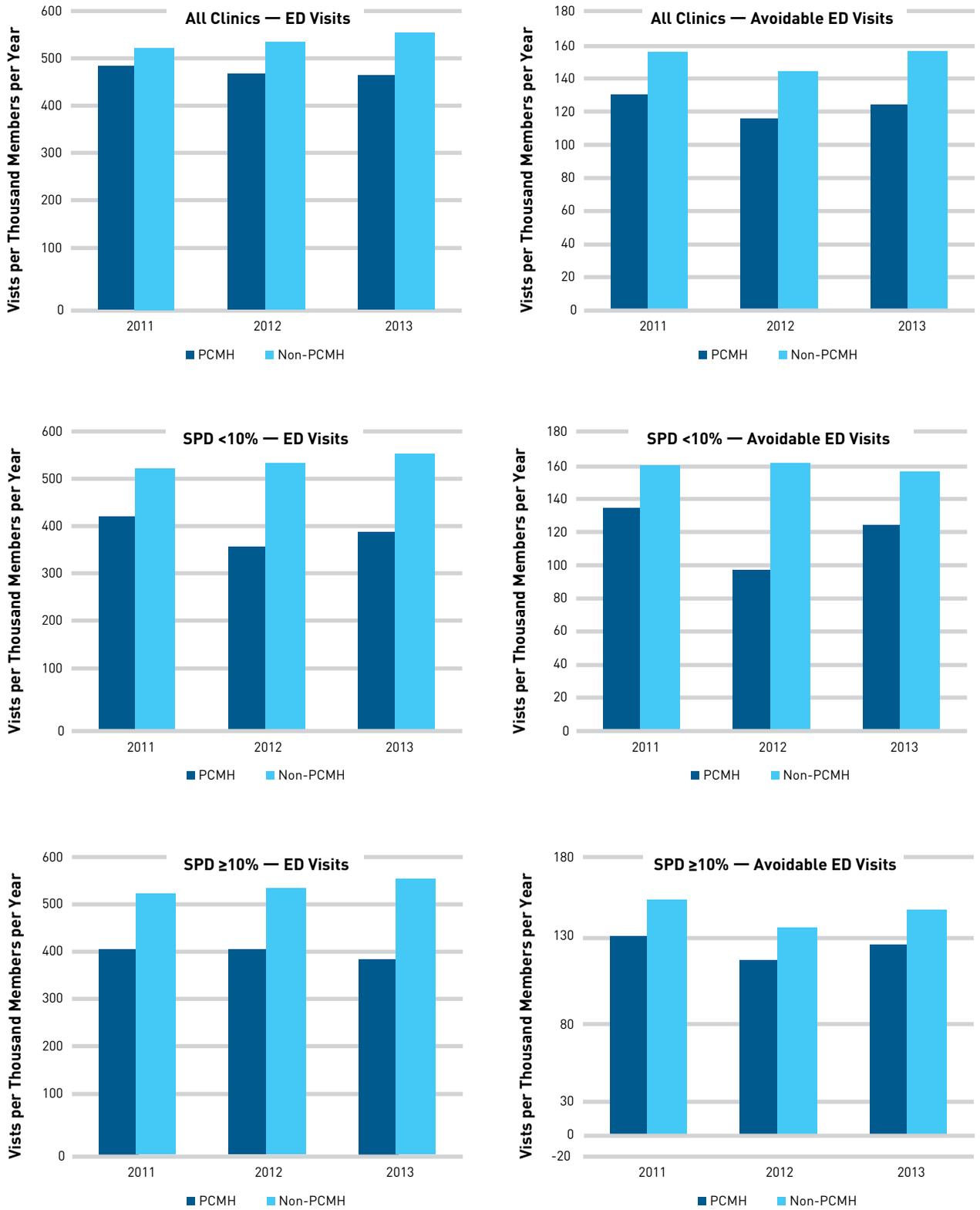
ED indicates emergency department; PCMH, patient-centered medical home; SPD, seniors and people with disabilities.

Following implementation of the PCMH model, the use of ED visits declined much faster in PCMH clinics than non-PCMH clinics, and as a result, by 2013, PCMH clinics had 70 fewer ED visits and 24 fewer avoidable ED visits. We found no evidence of differing trends in inpatient hospital care by PCMH status. In contrast to trends in ED visits, PCMH clinics experienced a more rapid increase in office visits. In the pre-PCMH period, PCMH clinics had 77 fewer office visits (Table 2). In 2013, however, this difference reversed, and PCMH clinics had 163 more office visits. Overall, the trends in use suggest that increased access to primary care in PCMH clinics might have resulted in less frequent use of the ED.

Parts B and C of Table 2 shows the trends in utilization stratified by the proportion of SPD membership. Our hypothesis was that the influx of SPDs would constrain the capacity of clinics and reduce the effects of PCMHs on access to care and use of ED visits. The results support the hypothesis, as we see a greater increase in office visits and larger declines in ED visits owing to PCMHs in clinics that experienced a smaller influx of SPDs (Table 2 and the **Figure**).

The unadjusted DID analyses are presented in **eAppendix D**. The results are consistent with the adjusted analysis presented in Table 2 and the Figure: we found a large decrease in ED visits and an increase in office visits at PCMH clinics. Additionally, the effect of PCMH status on the decrease in ED visits is larger in clinics that experienced a smaller influx of SPDs.

Interview Findings

PCMH clinics in the study had extended hours, weekend hours, and a helpline, whereas only 1 non-PCMH clinic had extended hours. PCMH clinics also tend to offer more disease management programs. One PCMH clinic stated that health IT was useful in informing and improving decisions. There were no conclusive findings on the attributes related to quality of care and patient engagement, however. A summary of the major themes identified during the interview is provided in **eAppendix E**.

DISCUSSION

Medicaid beneficiaries use the ED at an almost 2-fold higher rate than the privately insured.[17] Safety net clinics, which stand on the frontlines to provide care for the majority of Medicaid and uninsured patients, can play an important role in reducing the use of emergency care. This study shows that implementing the PCMH model in safety net clinics can have a meaningful impact on reducing the use of EDs; however, the extent to which PCMHs can successfully reduce ED visits may depend on the capacity of clinics to increase access to primary care. We found that the effects of PCMHs on reducing ED visits were smaller in clinics that experienced a greater increase in SPDs.

Previous studies on the impact of the PCMH model have been largely concentrated in integrated health systems and multi-payer models.[4,7,8,18] A few Medicaid-only studies, including those from New York (Priority Community Healthcare Center program), North Carolina (Community Care), Oklahoma, and Vermont, have reported an improvement in ED visit rates ranging from 7.5% to 31%.[10] Our study, which features a heavily Hispanic population, is congruent with these studies, which is an exciting finding because being able to replicate the favorable findings of the PCMH model in populations with different cultures and lifestyles indicates that the standards for PCMH, as recognized by the NCQA, are effective beyond geographic and population boundaries.

According to Sommers et al, widespread inappropriate use of the ED among Medicaid beneficiaries can be attributed, in part, to unmet health needs and lack of access to appropriate primary care.[17] Similarly, our interview results show that when PCMH clinics had improved access to care, the ED use was reduced. In regards to the impact of the adoption of health IT in PCMH clinics, the responses from the interview are in line with the findings from Adler-Milstein et al.[19,20] Clinically focused health IT was widely adopted and applied in PCMH clinics, although the application of patient engagement function was still at a rudimentary stage.

In addition to DID results, the PCMH clinics tended to begin with lower ED rates than the non-PCMH clinics in the pre-implementation period. One possible explanation is that the cutoff dates of the pre- and post periods are somewhat arbitrary; some PCMH clinics began preparing for the PCMH model as early as the beginning of 2011. As a result, the impact of PCMHs on ED use might have started in 2011, rather than 2012 (after the official NCQA recognition). We also cannot rule out the possibility that clinics selected to participate might have had better infrastructure to serve their patients or had already implemented some PCMH elements before official recognition. The DID study design minimizes the impact from the difference in clinic infrastructure between PCMH and non-PCMH groups, as does the focus on the difference from pre-PCMH to post PCMH.

According to the 1115 waiver, a group of heavy health service users (ie, SPD) was transitioned from fee-for-service Medicaid to a MMP beginning in June 2011 and continuing through May 2012. With FFS, patients visit the doctor or hospital of their choice; switching from FFS to MMP redirects SPD members to seek service through a designated primary care provider. As a result, this transition created a unique situation for this study, such that we could examine how the PCMH model would respond to a sudden influx of a new population of high-need users. Although it is arguable that SPDs might have been served by the same physician before and after the transition, the eligibility data show that less than 4% of SPDs kept their prior affiliation, and 7% to 8% chose their own primary care provider. That said, the majority of SPDs were assigned to a new primary care provider through an auto-assignment algorithm that chooses physicians solely based on proximity to a clinic and the member's age and primary language.

METHODS

As expected, the PCMH clinics less affected by this transition had better results in reducing both ED and avoidable ED visits, whereas other PCMH clinics receiving more than 10% of SPDs had more consistent rates of ED use in the first year of the post-PCMH period and a minor dip in the second year. Our results suggest a potential crowding-out effect, where the introduction of a new population constrains resources that would otherwise be allocated to the existing non-SPD Medicaid beneficiaries.

Limitations

Given that around 70% of our study population was younger than 18 years old, it would be difficult to generalize this finding to other Medicaid programs with a high proportion of adult members. In addition, this study only examined the outcomes from members of a local MMP, not a complete panel served by safety net clinics. Thus, the results may not be generalizable to the uninsured or another subset of populations.

CONCLUSIONS

Our results from a large urban Medicaid population suggest that a PCMH model in safety net practices can effectively reduce ED use and increase the use of office visits among Medicaid patients. We will continue to follow up with this PCMH pilot cohort to focus on the impact to the newly transitioned SPD members. The findings support the effectiveness of the PCMH model that avoids ED use, while also revealing the potential limitations of the PCMH model in response to a sudden influx of high-need healthcare users.

Author Affiliations: LA Care Health Plan (L-HC, MT, Y-CL), Los Angeles, CA; Schaeffer Center for Health Policy and Economics, University of Southern California (L-HC, NS), Rancho Cucamonga, CA; Inland Empire Health Plan (JNS), Los Angeles, CA.

Address Correspondence to: Li-Hao Chu, PhD, LA Care Health Plan, 1055 West 7th St, 10th Fl, Los Angeles, CA 90017. E-mail: lihaochu@usc.edu.

REFERENCES

1. Saviano EC. California's safety-net clinics: a primer. California HealthCare Foundation website. http://www.chcf.org/publications/2009/03/californias-safetynet-clinics-a-primer. Published March 2009. Accessed July 2, 2014.

2. McConville S, Lee H. Emergency department care in California: who uses it and why? Public Policy Institute of California website. http://www.ppic.org/content/pubs/cacounts/CC_808SMCC.pdf. Published August 2008. Accessed July 2, 2014.

3. Stange KC, Nutting PA, Miller WL, et al. Defining and measuring the patient-centered medical home. *J Gen Intern Med.* 2010;25(6):601-612. doi: 10.1007/s11606-010-1291-3.

4. Grumbach K, Grundy P. Outcomes of implementing patient centered medical home interventions. Patient-Centered Primary Care Collaborative website. http://forwww.pcpcc.net/files/evidence_outcomes_in_pcmh_2010.pdf. Updated November 16, 2010. Accessed June 23, 2014.

5. Takach M. Reinventing Medicaid: state innovations to qualify and pay for patient-centered medical homes show promising results. *Health Aff (Millwood).* 2011;30(7):1325-1334. doi: 10.1377/hlthaff.2011.0170.

6. Friedberg MW, Lai DJ, Hussey PS, Schneider EC. A guide to the medical home as a practice-level intervention. *Am J Manag Care.* 2009;15(suppl 10):S291-S299.

7. Gilfillan RJ, Tomcavage J, Rosenthal MB, et al. Value and the medical home: effects of transformed primary care. *Am J Manag Care.* 2010;16(8):607-614.

8. Reid RJ, Coleman K, Johnson EA, et al. The Group Health medical home at year two: cost savings, higher patient satisfaction, and less burnout for providers. *Health Aff (Millwood).* 2010;29(5):835-843. doi: 10.1377/hlthaff.2010.0158.

9. Takach M. About half of the states are implementing patient-centered medical homes for their Medicaid populations. *Health Aff (Millwood).* 2012;31(11):2432-2440. doi: 10.1377/hlthaff.2012.0447.

10. Summary of patient-centered medical home cost and quality results, 2010-2013. Patient-Centered Primary Care Collaborative website. https://www.pcpcc.org/resource/summary-patient-centered-medical-home-cost-and-quality-results-2010-%E2%80%93-2013. Published July 2013. Accessed May 5, 2014.

11. Graham CL, Kurtovich E, Ivey SL, Neuhauser L. Fee-for-service and managed care for seniors and people with disabilities on Medicaid: implications for the managed care mandate in California. *J Health Care Poor Underserved.* 2011;22(4):1413-1423. doi: 10.1353/hpu.2011.0141.

12. Patient-centered medical home recognition. National Committee for Quality Assurance website. http://www.ncqa.org/Programs/Recognition/Practices/PatientCenteredMedicalHomePCMH.aspx. Accessed July 2, 2014.

13. Gilmer T, Kronick R, Fishman P, Ganiats TG. The Medicaid Rx model: pharmacy-based risk adjustment for public programs. *Med Care.* 2001;39(11):1188-1202.

14. HEDIS 2013, volume 2: summary table of measures, product lines and changes. National Committee for Quality Assurance website. http://www.ncqa.org/Portals/0/HEDISQM/HEDIS2013/List_of_HEDIS_2013_Measures_7.2.12.pdf. Accessed January 11, 2014.

15. Statewide Collaborative Quality Improvement Project: reducing avoidable emergency room visits. California Department of Health Care Services website. http://www.dhcs.ca.gov/dataandstats/reports/Documents/MMCD_Qual_Rpts/EQRO_QIPs/CA2011-12_QIP_Coll_ER_Remeasure_Report.pdf. Published June 2012. Accessed July 5, 2014.

16. Zeger SL, Liang KY. Longitudinal data analysis for discrete and continuous outcomes. *Biometrics.* 1986;42(1):121-130.

17. Sommers AS, Boukus ER, Carrier E. Dispelling myths about emergency department use: majority of Medicaid visits are for urgent or more serious symptoms. *Res Brief.* 2012;(23):1-10, 11-13.

18. Takach M. About half of the states are implementing patient-centered medical homes for their Medicaid populations. *Health Aff (Millwood).* 2012;31(11):2432-2440. doi: 10.1377/hlthaff.2012.0447.

19. Adler-Milstein J, Cohen GR. Implementing the IT infrastructure for health reform: adoption of health IT among patient-centered medical home practices. *AMIA Annu Symp Proc.* 2013;2013:11-16.

20. Adler-Milstein J, Cohen GR, Markovitz A, Paustian M. The impact of HIT on cost and quality in patient-centered medical home practices. *AMIA Annu Symp Proc.* 2014;2014:232-239. ∎

www.ajmc.com   Full text and PDF

eAppendix A. The Selection Criteria to Participate in a Patient-Centered Medical Home Model

1. In good standing with credentialing requirements.
2. Passing score of 80% or above for Facility Site Review.
3. Passing score of 80% or above on the critical elements of physical accessibility site assessment.
4. Passing score on most recent provider network operations after-hour assessment.
5. Commitment to serving patients with complex and chronic conditions and to improving quality of care for these populations.
6. Adopted, or have plans to implement, a disease registry or an electronic health record system before July 1, 2011.

eAppendix B. Study Cohort (year 2011) Derivation Table

	PCMH		Non-PCMH		Total
Starting total	37,066	100.0%	236,882	100.0%	273,948
Include non-SPD only	35,213	95.0%	227,644	96.1%	262,857
Continuous eligibility ≥10 months	24,297	65.6%	154,115	65.1%	178,412
Aged <65 years	23,892	64.5%	147,984	62.5%	171,876
Clinic size >300 members	22,936	61.9%	145,024	61.2%	167,960
Stay in the same clinics during the study period	22,870	61.7%	143,530	60.6%	166,400

PCMH indicates patient-centered medical home; SPD, seniors and people with disabilities.

eAppendix C. The Distribution of SPD Membership in PCMH Clinics in 2012

PCMH Clinic ID	% of SPD members	Total Members
1	7.60%	2502
2	8.80%	310
3	8.90%	2161
4	11.80%	5901
5	12.10%	2854
6	12.60%	1532
7	14.00%	8034

PCMH indicates patient-centered medical home; SPD, seniors and people with disabilities.

eAppendix D. Unadjusted Difference in Utilization Rates Between PCMH and Non-PCMH Groups

Type of Healthcare Utilization	PCMH	2011 Rate Mean (SE)	2012 Rate Mean (SE)	2013 Rate Mean (SE)
All Clinics				
Acute hospitalization	Yes	27.74 (4.12)	27.40 (3.99)	26.35 (3.79)
	Diff (PCMH – Non-PCMH)	2.81 (4.38)	1.66 (4.29)	1.51 (4.10)
	DID		-1.14 (6.13)	-1.30 (6.00)
ED visit	Yes	482.79 (16.49)	467.87 (15.65)	464.95 (15.41)
	Diff (PCMH – Non-PCMH)	-38.21 (17.96)*	-62.20 (17.33)*	-84.85 (17.27)*
	DID		-23.99 (24.96)	-46.64 (24.92)
Avoidable ED visit	Yes	128.42 (7.97)	112.76 (6.85)	123.62 (7.44)
	Diff (PCMH – Non-PCMH)	-26.07 (8.85)*	-31.20 (7.78)*	-32.02 (8.46)*
	DID		-5.13 (11.78)	-5.96 (12.24)
Office visit	Yes	1771.91 (33.24)	1832.25 (33.71)	2058.71 (36.96)
	Diff (PCMH – Non-PCMH)	-96.41 (36.17)*	190.41 (36.07)*	175.57 (40.35)*
	DID		286.81 (51.08)*	271.98 (54.19)*
Clinics with <10% SPD membership				
Acute hospitalization	Yes	24.13 (8.40)	22.32 (7.65)	22.37 (7.88)
	Diff (PCMH – Non-PCMH)	2.43 (8.66)	-1.78 (8.07)	-0.44 (8.27)
	DID		-4.21 (11.84)	-2.87 (11.97)
ED visit	Yes	415.92 (31.44)	352.90 (26.26)	388.28 (29.79)
	Diff (PCMH – Non-PCMH)	-92.20 (33.15)*	-190.00 (29.08)*	-166.76 (32.36)*
	DID		-97.80 (44.10)*	-74.56 (46.33)
Avoidable ED visit	Yes	133.37 (17.68)	97.37 (12.71)	121.37 (16.33)
	Diff (PCMH – Non-PCMH)	-25.27 (18.60)	-63.31 (14.27)*	-43.07 (17.60)*
	DID		-38.04 (23.44)	-17.80 (25.61)
Office visit	Yes	1884.58 (76.59)	2237.50 (89.51)	3538.12 (145.94)
	Diff (PCMH – Non-PCMH)	4.03 (79.39)	486.74 (92.10)*	1750.90 (147.59)*
	DID		482.71 (121.60)*	1746.87 (167.58)*
Clinics with at least 10% SPD membership				
Acute hospitalization	Yes	28.66 (4.63)	28.68 (4.54)	27.26 (4.23)
	Diff (PCMH – Non-PCMH)	1.24 (5.09)	1.99 (4.96)	1.15 (4.68)
	DID		0.75 (7.11)	-0.09 (6.92)
ED visit	Yes	499.82 (19.15)	496.81 (18.63)	482.43 (17.75)
	Diff (PCMH – Non-PCMH)	-31.09 (21.46)	-25.76 (20.80)	-64.11 (20.31)*
	DID		5.33 (29.89)	-33.02 (29.55)
Avoidable ED visit	Yes	127.16 (9.05)	116.63 (8.12)	124.14 (8.45)
	Diff (PCMH – Non-PCMH)	-24.13 (10.41)*	-17.53 (9.25)	-26.05 (9.87)*
	DID		6.60 (13.92)	-1.92 (14.34)
Office visit	Yes	1743.22 (37.32)	1730.27 (36.25)	1721.39 (35.19)
	Diff (PCMH – Non-PCMH)	-115.7 (41.82)*	152.23 (39.46)*	-221.29 (40.44)*
	DID		267.92 (57.49)*	-105.59 (58.18)

DID indicates difference-in-difference; Diff, difference; ED, emergency department; PCMH, patient-centered medical home; SPD, seniors and people with disabilities. *Significant at $P < .05$.

eAppendix E.

Survey Questions

1. Do you involve patients in decisions about their health care? If yes, can you describe <u>the practices or protocol</u> you use?
2. Does your clinic use <u>clinical decision support tools</u>? If yes, please describe the tools.
3. Does your clinic monitor quality of care? If yes, what metrics do you use? <u>Are there incentives tied to meeting quality thresholds</u>?
4. Does your clinic have any <u>panel management or disease management programs</u> for all patients or high risk patients? If so, please describe.
5. Does your clinic <u>have electronic health records</u>? Is the EHR portable across other providers? Is it helpful in improving decisions?
6. What are your regular hours? Do you have a helpline or extended hours? Do you use email or phone consultation? Who is paying for the extended hours?
7. Can you describe who is in the team of health care providers who routinely take care of patients in the clinic?
8. My research shows that Patient-Centered Medical Home clinics have lower ER use. Do you think this is plausible result? If yes, what are the key drivers of lower ER use?

Summary of Interview Results by Major Themes

	PCMH	Non-PCMH
Number of interviewees	3	3
Electronic medical record	All respondents have EMR in their clinics, and all of them agree that it is helpful.	All respondents have EMR in clinics, and only 1 thought it is helpful.
Access to care & helpline	All have extended office hours and weekend hours	None of them have weekend hours
Patient engagement (through health IT)	One clinic has health IT support, but it's at a rudimentary stage	None
Quality of care	HEDIS[a] & FQHC measures	HEDIS[a] & FQHC measures
Disease/patient management	4-5 DM + home visits	3 DM

DM indicates disease management program; IT, information technology; EMR, electronic medical record; FQHC, Federally Qualified Health Center; PCMH, patient-centered medical home.
[a]HEDIS is a tool used by more than 90% of America's health plans to measure performance on important dimensions of care and service.