

# Reduction of Emergency Department Use in People With Disabilities

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**M**edicaid beneficiaries who qualify for services on the basis of having a disability represent a relatively small fraction of total Medicaid enrollees: in 2011, they made up 15% of all beneficiaries nationwide.<sup>1,2</sup> Despite their small numbers, however, they account for 42% of total Medicaid spending.<sup>3</sup> Compared with other states, California tops the nation in the discrepancy between disabled beneficiaries' relative proportion and costs, as they make up 9% of all beneficiaries but constitute 41% of spending.<sup>1,3</sup> Rising expenditures for beneficiaries with disabilities have been the focus for cost-cutting measures for decades.<sup>4</sup> On the heels of the Affordable Care Act, California was one of the first states to build a reform portfolio through submission of the "Bridge to Reform" Medicaid 1115 waiver in 2010. One component of the waiver implemented a mandatory transition of seniors and persons with disabilities (SPD) from traditional fee-for-service (FFS) plans to managed care from 2011 to 2012. This waiver provision was designed to improve cost efficiency through the development of coordinated systems of care. Another major component included support for reform of safety-net facilities.<sup>5</sup>

Medicaid beneficiaries with disabilities often have complex healthcare needs requiring a wide array of specialists and specialized facilities.<sup>6</sup> They qualify for Medicaid based on a variety of conditions, including serious mental illness and behavioral health diagnoses, developmental disorders, severe chronic illnesses, and disabling brain or spinal cord injuries. Despite high levels of spending for these groups, they continue to frequently experience unmet needs for healthcare services, especially under FFS payment models. In a survey of working-age Medicaid beneficiaries with disabilities under FFS, more than 38% reported an unmet health need, commonly citing availability, accessibility, and language as barriers.<sup>7</sup> To successfully transition such complex beneficiary groups to managed care requires a multifaceted approach that provides access to needed medical care and other supports and services and addresses access barriers specific to these populations, all while achieving improved cost efficiency.

Coordinated care delivery models are needed to provide effective, efficient, and patient-centered care for SPD enrolled in Medicaid.

## ABSTRACT

**OBJECTIVES:** To examine emergency department (ED) use by individuals with disabilities in safety-net clinics that have adopted the patient-centered medical home (PCMH) model.

**STUDY DESIGN:** This is a retrospective matched cohort study. Prior to matching, we identified 2269 nonelderly Medicaid beneficiaries with disabilities from a Los Angeles Medicaid managed care plan in PCMH clinics and 21,897 in non-PCMH clinics.

**METHODS:** To minimize self-selection bias from clinics and individuals, we created 3 comparison groups through a series of propensity score matching schemes that included matching clinics with similar health service utilization per patient and matching individuals with similar demographic characteristics and underlying health conditions. Rates of having at least 1 ED visit per year and excess ED use (defined as  $\geq 2$  ED visits per year) were compared across beneficiaries who received care from PCMH clinics and matched comparisons using logistic regression analyses.

**RESULTS:** After matching on clinic- and individual-level characteristics, the adjusted odds ratio (OR) of excess ED use was 25% to 33% lower ( $P < .05$ ) in the PCMH group compared with the non-PCMH group. When limiting the study population to patients with at least 1 office visit, the OR of having at least 1 ED visit decreased by 21% ( $P < .05$ ) for the PCMH group. Similarly, the OR of having excess ED use decreased by 38% ( $P < .05$ ) for the PCMH group.

**CONCLUSIONS:** Our study highlights that the adoption of the PCMH model in safety-net clinics was associated with reduced ED use in Medicaid beneficiaries with disabilities.

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**TAKEAWAY POINTS**

Our study results suggest that adoption of the patient-centered medical home (PCMH) model in safety-net clinics can effectively reduce emergency department (ED) use in Medicaid beneficiaries with disabilities. Furthermore, the impact of the PCMH model on reducing ED use is greater among individuals with at least 1 office visit.

- ▶ The adoption of the PCMH model in safety-net clinics can effectively reduce ED use by 25% to 33% in Medicaid beneficiaries with disabilities.
- ▶ The reduction of ED use through the PCMH model is greater among individuals with office visits than those without any office visits in a 1-year period.
- ▶ The PCMH model can be an effective strategy to reduce excess ED use, particularly for frequent ED users among the disabled population.

its high-risk disabled population, particularly among those with chronic conditions.<sup>13</sup>

Running concurrently with the implementation of the PCMH model, the mandatory transition of SPD from FFS to managed care in California created a special opportunity that allowed us to evaluate the impact of the PCMH model on the utilization trends of nonelderly Medicaid beneficiaries with disabilities enrolled in a Los Angeles Medicaid Managed Care Plan (MMP).

The patient-centered medical home (PCMH) is an existing model that strives to provide coordinated, accessible, high-quality care tailored to individual needs.<sup>2</sup> This model has been adapted to various healthcare systems and populations (eg, private insurance, Medicare) with mixed results.<sup>8</sup> Despite the somewhat variable evidence, 46 states have adopted the PCMH model to enhance their Medicaid and/or Children’s Health Insurance Program programs as of March 2015.<sup>9</sup> Also notable is the adoption of the PCMH model by safety-net clinics with high numbers of Medicaid patients.<sup>10</sup> Safety-net clinics provide a wide range of services to medically underserved and uninsured populations regardless of their ability to pay.<sup>11</sup> Because Medicaid beneficiaries constitute a significant proportion of the patients who utilize safety-net clinics, building coordinated, effective, and efficient systems of care in safety-net clinics is critical.<sup>12</sup>

With such widespread adoption of the PCMH model throughout Medicaid programs, evaluation of its efficacy is critical. The existing literature on the effectiveness of the PCMH model for Medicaid beneficiaries with disabilities is limited. One of the few existing analyses showed promising results from a care management intervention aligned with PCMH principles in a North Carolina–based Medicaid program. The program yielded significant savings for

**METHODS**

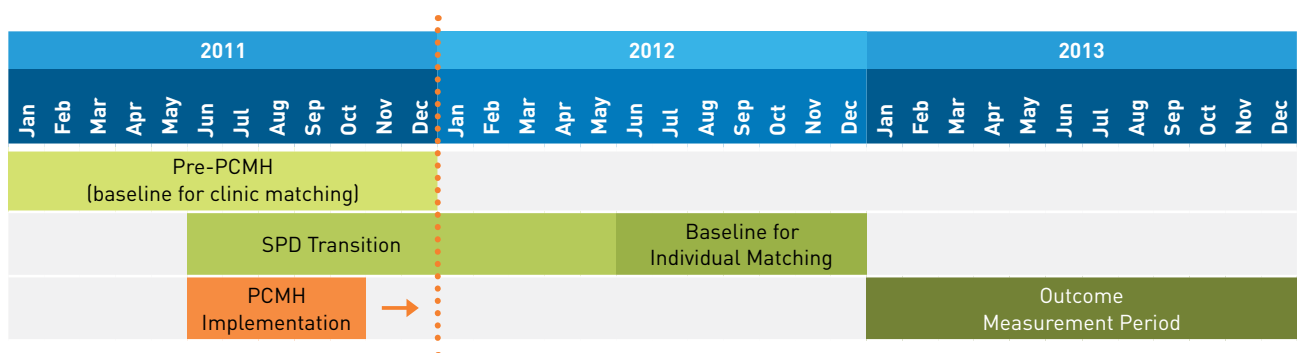
**Study Setting**

California’s transition of Medicaid SPD to managed care took place over a 12-month interval from June 2011 to May 2012. Over the same period, 12 safety-net clinics in Los Angeles County underwent practice transformation into PCMHs, receiving recognition from the National Committee for Quality Assurance (NCQA) as PCMHs in early 2012 (Figure 1).

The disability status of the study population was determined based on the Social Security definition of disability. Individuals must have an impairment, either medical, psychological, or psychiatric in nature, that keeps them from being able to perform substantial gainful activity. Medical records or functional assessments are used by the Social Security Administration to evaluate and determine applicants’ disability status.<sup>14</sup>

Through in-person communications with leaders in these PCMH clinics, we learned that their practices included the following PCMH elements: expanded office hours, adoption of electronic health records, having at least 4 disease management programs, and following at least 2 sets of quality measures (ie, Healthcare

**FIGURE 1.** Timeline of the Transition of Seniors and Persons With Disabilities and the Implementation of the PCMH



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

Effectiveness Data and Information Set and Federally Qualified Health Center quality measures). Comparison clinics were 110 safety-net clinics that were contracted with the same MMP but did not acquire PCMH recognition from NCQA, the Utilization Review Accreditation Committee, or The Joint Commission prior to 2013.

### Study Design

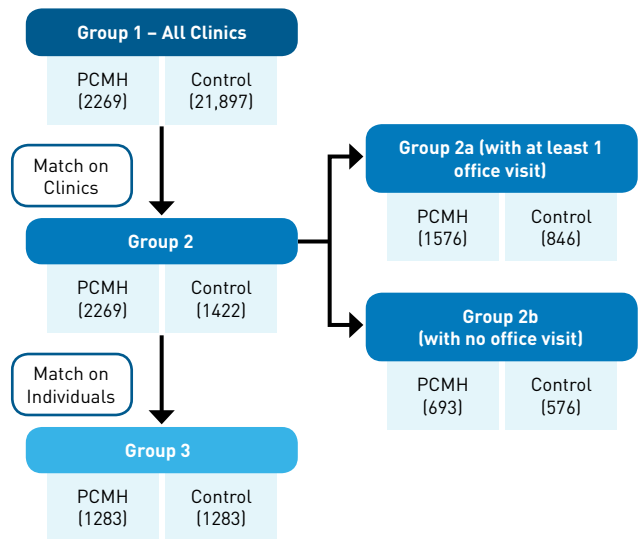
We used a retrospective matched cohort design to compare health-care utilization among Medicaid beneficiaries with disabilities enrolled in a single Los Angeles MMP who were assigned to either PCMH or non-PCMH safety-net clinics. Because clinic transformation and assignment to a PCMH were not completely random for both clinics and Medicaid beneficiaries, we developed a series of matching and stratification schemes in order to account for potential selection bias (Figure 2).

Matched comparison groups were constructed as follows: Group 1 included the entire cohort of Medicaid beneficiaries with disabilities. To identify comparable clinics between non-PCMH and PCMH clinics, Group 2 was created by selecting 12 of the 110 non-PCMH clinics to match 12 PCMH clinics on the basis of the average propensity score of individuals (ie, Medicaid enrollees without disabilities) enrolled prior to the implementation of the PCMH in 2011 in each clinic. This matching aimed to identify non-PCMH clinics whose patient population and performance in managing patients, in particular the healthcare utilization measures (ie, hospitalizations, ED visits, and office visits), were similar to those of PCMH clinics (Table 1). After matching on clinics, there were 2269 and 21,897 individuals with disabilities identified for the PCMH and non-PCMH groups, respectively. In addition, with the assumption that individuals with office visits had more opportunity to benefit from the PCMH model, Group 2 was stratified into individuals with at least 1 office visit (Group 2a) and without any office visit (Group 2b) during the 1-year follow-up period (Figure 2).

Approximately 80% of Medicaid beneficiaries with disabilities were assigned to the PCMH clinics based on an auto-assignment algorithm that chooses physicians solely on the member's proximity to a clinic, age, and primary language. This assignment mechanism can be treated as a randomization process if all 3 factors in the algorithm can be controlled. Therefore, we matched Medicaid beneficiaries with disabilities who were continuously enrolled from June 1, 2012, to December 31, 2012, between non-PCMH and PCMH clinics based on an individual's demographic characteristics. This matching ensured selected individuals between non-PCMH and PCMH clinics had similar baseline characteristics in age, gender, race/ethnicity, and underlying health conditions and yielded 1283 matched dyads in Group 3 (eAppendix 1 [eAppendices available at [ajmc.com](http://ajmc.com)]).

We excluded individuals 65 years or older in order to ensure that this study did not include anyone who received medical coverage through both Medicare and Medicaid. We also excluded individuals who switched from a PCMH clinic to a comparison clinic (0.2%

**FIGURE 2.** Study Group Creation Flow



PCMH indicates patient-centered medical home.

of the sample) and imposed a 10-month continuous enrollment requirement, which excluded 10.2% of the sample.

### Data

Data obtained from a local MMP consisted of member eligibility files, including individual demographics (age, gender, race/ethnicity, enrollment history, primary care provider [PCP] assignment, and location identification [ID] of PCP); administrative claims from January 1, 2011, to December 31, 2013, including service dates; *International Classification of Diseases, Ninth Revision, Clinical Modification* codes; procedure codes; and pharmacy claims. "Gender" and "Hispanic" were each coded as binary variables. Residential zip code was mapped to 2013 Census data to derive the average household income (AHI) for each study subject. Safety-net clinics were identified by matching the location ID of the assigned PCP with the location ID of a list of safety-net clinics provided by the local MMP. Hospital admissions, readmissions, and ED visits were measured using NCQA standard definitions and served as the outcomes of interest.<sup>15</sup> Excessive ED visits were defined as 2 or more ED visits in 1 calendar year.

Underlying health conditions were estimated using 3M Clinical Risk Groups (CRGs), a claims-based disease burden model.<sup>16</sup> We fit the model using member eligibility files and medical and pharmacy claims from 2011 for Group 2 and from the second half of 2012 for Group 3. The CRG system assigns each individual to mutually exclusive and hierarchically ranked risk groups that identify the condition or conditions that best describe the individual's clinical state. Such an assignment relates an individual's historical and underlying clinical characteristics to the amount and type of healthcare resources that the individual will consume in the future. Groups were further

## METHODS

**TABLE 1.** Population Characteristics and Health Resource Utilization for Nondisabled Medicaid Beneficiaries in 2011, PCMH and Non-PCMH Clinics After Matching at the Clinic Level (Group 2)

	PCMH (n = 24,284)	Non-PCMH (n = 12,980)	Total (N = 37,264)	P
Population Characteristics				
Age, years, mean (SD)	15.3 (13.8)	16.6 (14.6)	15.8 (14.1)	.01
Female, %	55.6	56.1	55.8	.67
Hispanic, %	64.2	69.1	65.9	.01
CRG risk category, %				
1	23.7	23.3	23.5	.17
2	37.8	37.6	37.7	
3	22.3	21.3	22	
4	16.2	17.8	16.8	
Income category, %				
<\$30,000	12.8	4.5	9.9	<.01
\$30,000-\$40,000	46.6	34.1	42.2	
\$40,000-\$50,000	31.2	21.5	27.8	
>\$50,000	9.4	39.9	20.1	
Health Resource Utilization				
Acute hospitalization, %	5	4.7	4.9	.78
ED visits, %				.25
1	18.2	18.6	18.3	
2	9.4	9.6	9.5	
≥3	13.6	14.2	13.8	
Office visits, mean (SD)	3.2 (3.49)	3.1 (3.24)	3.2 (3.42)	.17

CRG indicates Clinical Risk Group; ED, emergency department; PCMH, patient-centered medical home.

classified into aggregated level 3 CRG groups based on estimated illness severity. The level of severity was determined based on the presence of multiple comorbidities and the interaction of conditions. We then estimated costs associated with each aggregated level 3 CRG group based on the New York State adult Medicaid program. The cost information was provided by the research team from 3M Health Information Systems. After examining the distribution of aggregated CRG weights, we categorized the population into 4 groups of similar membership count (CRGs 1-4) based on the consideration of severity of illness and resource use intensity.

### Statistical Analysis

To identify clinics with performances similar to PCMH clinics prior to the implementation of the PCMH model, individual-level propensity scores were calculated using pre-PCMH baseline data from nondisabled Medicaid beneficiaries who were enrolled throughout 2011. The matching was done by using a logistic regression model with the dependent variable of PCMH status and the independent variables of age, gender, race/ethnicity, AHI, CRG category, inpatient admission (yes/no), number of ED visits, and number of office

visits.<sup>17</sup> The resulting propensity score was the conditional probability of being assigned to a PCMH clinic. Group 2 clinic-level propensity scores consisted of averaged individual-level scores. The matching was conducted by pair matching without replacement within a caliper distance equaling 0.2 of the standard deviation of the logit of the propensity score. The matching results are presented in Table 1.

Propensity score matching was used to identify comparable individuals with disabilities between PCMH and non-PCMH clinics in Group 3. The model setup was to use PCMH status as a dependent variable and age, gender, race/ethnicity, AHI, and CRG category as independent variables. After a 1-to-1 individual match using the caliper limit described earlier, the PCMH and comparison groups included 1283 individuals assigned to 1 of 7 and 5 clinics, respectively. The matching result is presented in eAppendix 1. As a sensitivity test for the matching result of Group 3, we also adopted propensity score weighting to adjust for any potential selection bias. The same set of variables from eAppendix 1 was used to estimate an inverse probability of being in the PCMH group. The synthetic PCMH and non-PCMH groups were then generated by weighting the propensity score to achieve distributional equivalence.<sup>18</sup>

We used simple and multiple logistic regression models to describe the association between PCMH status and utilization outcomes in 2013. Independent variables in the adjusted model included gender, race/ethnicity, AHI (based on zip code), and CRG category. A 2-tailed  $P < .05$  was treated as significant in all statistical tests. All data management and analyses were conducted using SAS version 9.3 (SAS Institute; Cary, North Carolina).

## RESULTS

Group 1 was composed of 2269 individuals with disabilities assigned to PCMH clinics and 21,897 to non-PCMH clinics. In unadjusted analyses, the rate of excess ED visits (≥2 ED visits per person per year) was 12.9% lower in the PCMH group compared with the non-PCMH group ( $P < .05$ ). The adjusted odds ratio (OR) of having excess ED visits was 25% lower in the PCMH group compared with the non-PCMH group ( $P < .05$ ). The rate of excess ED visits was 17% lower in Group 2 when comparing the PCMH group with the non-PCMH group ( $P < .05$ ) and the adjusted OR was 33% lower ( $P < .05$ ).

After limiting individuals to those with at least 1 office visit (Group 2a), in unadjusted analyses, the rates of at least 1 ED visit

and excess ED visits were 14% lower and 28% lower, respectively, in the PCMH group compared with the non-PCMH group ( $P < .05$  for both). The adjusted ORs of having at least 1 ED visit and excess ED visits were 21% lower and 38% lower, respectively, in the PCMH group compared with the non-PCMH group ( $P < .05$  for both). However, there were no significant reductions in ED use found among individuals without any office visits in the PCMH group.

Group 3, a subset of Group 2 after pair-matching based on demographic characteristics and underlying health conditions, had similar results to Group 2. In unadjusted analyses, the rates of at least 1 ED visit and excess ED visits were 3% lower and 16% lower, respectively, in the PCMH group compared with the non-PCMH group ( $P > .05$ ). The adjusted OR of having excess ED visits was 28% lower in the PCMH group ( $P < .05$ ) (Table 2). The sensitivity test of Group 3 using propensity score weighting had similar results to Group 3, where the adjusted OR of at least 1 ED visit was 7% lower (95% CI, 0.79-1.10) and the adjusted OR of at least 2 ED visits was 28% lower (95% CI, 0.58-0.88).

Rates of readmissions or acute hospitalizations were not significantly different between PCMH and non-PCMH groups, aside from Group 2a having a 21% lower rate of acute hospitalization and a 28% lower OR of acute hospitalization in the PCMH group. Readmission rates were consistently lower in the PCMH group across all the matching sets (Table 2).

The stratification analyses of Group 2 to examine the association between patients' characteristics and ED use among those with and without office visits are presented in Table 3 and Table 4. Baseline characteristics including PCMH versus non-PCMH group (OR, 0.79), age (OR, 1.01), female versus male (OR, 1.34), CRG category 4 versus category 1 (OR, 2.08), and household income ranging from \$30,000-\$40,000 versus less than \$30,000 (OR, 1.33) were significantly associated with having at least 1 ED visit among patients with at least 1 office visit. However, among individuals without any office visits, only CRG category was significantly associated with having at least 1 ED visit (Table 3). Similar patterns were found when assessing the association between patients' characteristics and excess ED visits (Table 4).

**TABLE 2.** Unadjusted and Adjusted Comparison of Health Resource Utilization Between PCMH and Non-PCMH Medicaid Beneficiaries With Disabilities in Groups 1-3

	PCMH	Non-PCMH	Δ <sup>a</sup>	% of Δ	OR <sup>b</sup> (95% CI)
Group 1	n = 2269	n = 21,897			
ED visits, %					
≥1	33.8	33.7	0.1	0.2	0.90 (0.82-0.99)
≥2	15.6	18.0	-2.3 <sup>c</sup>	-12.9	0.75 (0.67-0.85) <sup>c</sup>
Readmission, %	1.5	1.6	-0.1	-9.0	0.98 (0.68-1.42)
Acute hospitalization, %	10.5	10.7	-0.2	-1.9	1.06 (0.87-1.18)
Group 2	n = 2269	n = 1422			
ED visits, %					
≥1	33.8	34.2	-0.4	-1.2	0.91 (0.78-1.06)
≥2	15.6	18.8	-3.2 <sup>c</sup>	-17.0	0.67 (0.55-0.81) <sup>c</sup>
Readmission, %	1.5	1.7	-0.2	-11.8	0.82 (0.45-1.49)
Acute hospitalization, %	10.5	11.6	-1.1	-9.5	0.80 (0.60-1.04)
Group 2a	n = 1576	n = 846			
ED visits, %					
≥1	41.1	47.9	-6.8 <sup>c</sup>	-14.1	0.79 (0.65-0.96) <sup>c</sup>
≥2	20.6	28.4	-7.8 <sup>c</sup>	-27.5	0.62 (0.49-0.77) <sup>c</sup>
Readmission, %	2.1	2.8	-0.7	-25.1	0.92 (0.52-1.63)
Acute hospitalization, %	14.3	18.2	-3.9 <sup>c</sup>	-21.4	0.72 (0.54-0.96) <sup>c</sup>
Group 2b	n = 693	n = 576			
ED visits, %					
≥1	17.0	14.2	2.8	19.7	1.08 (0.75-1.56)
≥2	4.5	4.7	-0.2	-4.3	0.84 (0.44-1.58) <sup>c</sup>
Readmission, %	0.14	0	0.1	N/A	N/A
Acute hospitalization, %	1.7	1.9	-0.2	-10.5	1.05 (0.38-2.94)
Group 3	n = 1283	n = 1283			
ED visits, %					
≥1	33.7	34.7	-1.0	-2.9	0.93 (0.79-1.11)
≥2	15.8	18.9	-3.0 <sup>c</sup>	-16.1	0.72 (0.58-0.90) <sup>c</sup>
Readmission, %	1.7	1.8	-0.1	-4.4	0.88 (0.48-1.63)
Acute hospitalization, %	10.4	9.6	0.8	8.1	1.02 (0.77-1.35)

ED indicates emergency department; N/A, not applicable; OR, odds ratio; PCMH, patient-centered medical home.

<sup>a</sup>Δ indicates unadjusted difference between PCMH and non-PCMH groups.

<sup>b</sup>OR was derived from logistic regression models by adjusting for age, gender, race/ethnicity, average household income, and comorbidity.

<sup>c</sup> $P < .05$ .

## DISCUSSION

Research findings have shown that Medicaid beneficiaries in California were associated with frequent hospital admissions and heavy reliance on the ED compared with the commercially insured population.<sup>19</sup> The ED use rate in California Medicaid grew between 2005 and 2010, increasing from 572 to 651 visits per 1000 enrollees.<sup>19</sup> This rate was 4 times higher than that among privately insured enrollees and 2.5 times higher than that among the uninsured. In addition, Medicaid patients consistently had the highest rates of



## METHODS

**TABLE 3.** Multivariable Logistic Regression Analysis of Associations Among Patients' Characteristics and Having At Least 1 ED Visit

	Group 2 (n = 3691)	Group 2a (n = 2422)	Group 2b (n = 1269)
	OR <sup>a</sup> (95% CI)	OR <sup>a</sup> (95% CI)	OR <sup>a</sup> (95% CI)
PCMH	0.91 (0.78-1.06)	0.79 (0.65-0.96) <sup>b</sup>	1.08 (0.75-1.56)
Age, years, mean (SD)	1.01 (1.01-1.01) <sup>b</sup>	1.01 (1.01-1.02) <sup>b</sup>	1.00 (0.99-1.01)
Female, %	1.34 (1.16-1.55) <sup>b</sup>	1.32 (1.12-1.57) <sup>b</sup>	1.26 (0.92-1.73)
Hispanic, %	0.86 (0.74-1.00)	0.84 (0.71-1.00)	0.62 (0.42-0.92)
CRG risk category, %			
2 vs 1	1.96 (1.56-2.46) <sup>b</sup>	1.17 (0.86-1.61)	2.09 (1.46-3.00) <sup>b</sup>
3 vs 1	2.17 (1.71-2.75) <sup>b</sup>	1.13 (0.83-1.56)	1.57 (0.96-2.56)
4 vs 1	4.36 (3.47-5.49) <sup>b</sup>	2.08 (1.53-2.82) <sup>b</sup>	2.66 (1.52-4.66) <sup>b</sup>
Household income category, %			
\$30,000-\$40,000 vs <\$30,000	1.24 (1.03-1.49) <sup>b</sup>	1.33 (1.08-1.63) <sup>b</sup>	1.02 (0.69-1.52)
\$40,000-\$50,000 vs <\$30,000	1.08 (0.82-1.41)	1.21 (0.88-1.66)	0.76 (0.41-1.41)
>\$50,000 vs <\$30,000	1.06 (0.84-1.35)	1.09 (0.83-1.44)	0.90 (0.54-1.50)

CRG, Clinical Risk Group; ED, emergency department; OR, odds ratio; PCMH, patient-centered medical home.

<sup>a</sup>OR was derived from logistic regression models by adjusting for age, gender, race/ethnicity, average household income, and comorbidity.

<sup>b</sup>P < .05.

**TABLE 4.** Multivariable Logistic Regression Analysis of Associations Among Patients' Characteristics and Having At Least 2 ED Visits

	Group 2 (n = 3691)	Group 2a (n = 2422)	Group 2b (n = 1269)
	OR <sup>a</sup> (95% CI)	OR <sup>a</sup> (95% CI)	OR <sup>a</sup> (95% CI)
PCMH	0.67 (0.55-0.81) <sup>b</sup>	0.62 (0.49-0.77) <sup>b</sup>	0.84 (0.44-1.58)
Age, years, mean (SD)	1.01 (1.00-1.01) <sup>b</sup>	1.01 (1.00-1.01) <sup>b</sup>	1.00 (0.99-1.02)
Female, %	1.36 (1.13-1.64) <sup>b</sup>	1.45 (1.19-1.78) <sup>b</sup>	0.67 (0.38-1.19)
Hispanic, %	0.91 (0.75-1.10)	0.89 (0.72-1.09)	0.52 (0.25-1.09)
CRG risk category, %			
2 vs 1	2.58 (1.80-3.70) <sup>b</sup>	1.37 (0.89-2.10)	3.75 (1.79-7.88) <sup>b</sup>
3 vs 1	3.31 (2.31-4.74) <sup>b</sup>	1.48 (0.97-2.25)	3.07 (1.22-7.69) <sup>b</sup>
4 vs 1	7.10 (5.02-10.03) <sup>b</sup>	2.80 (1.87-4.19) <sup>b</sup>	8.37 (3.39-20.70) <sup>b</sup>
Household income category, %			
\$30,000-\$40,000 vs <\$30,000	1.31 (1.04-1.65) <sup>b</sup>	1.37 (1.07-1.76) <sup>b</sup>	1.01 (0.50-2.03)
\$40,000-\$50,000 vs <\$30,000	1.09 (0.77-1.54)	1.20 (0.83-1.75)	0.5 (0.14-1.85)
>\$50,000 vs <\$30,000	0.94 (0.69-1.27)	0.91 (0.65-1.26)	1.1 (0.46-2.59)

CRG, Clinical Risk Groups; ED, emergency department; OR, odds ratio; PCMH, patient-centered medical home.

<sup>a</sup>OR was derived from logistic regression models by adjusting for age, gender, race/ethnicity, average household income, and CRG category.

<sup>b</sup>P < .05.

visits for potentially preventable conditions.<sup>20</sup> Medicaid beneficiaries with disabilities can be expected to have even higher rates of ED use.

Our study, through propensity score matching and stratification analysis, demonstrates a consistent finding that safety-net clinics operating under a PCMH model can decrease excess ED use by approximately 30%. The scale of reduction grows when subdividing the study population to those with at least 1 office visit per year. These results provide encouraging evidence that the PCMH model can potentially be an effective strategy to reduce excessive ED use, particularly for frequent users among the disabled population.

The PCMH model has shown promising results in managing healthcare utilization for a wide range of populations (eg, members of commercial insurance plans, elderly people, patients with chronic conditions, and children).<sup>21-27</sup> People with disabilities, however, who tend to have a higher need for healthcare services, have not often been the subject of research on the impact of practice transformation on healthcare utilization. Further, examples from other states<sup>13,28</sup> may not reflect the experience of states like California, where most insurers delegate responsibilities, including utilization and chronic disease management, to a contracted independent physician association.

Qualitative evidence on the success of the PCMH model in California's Medicaid program was reported by Chu et al, based on semi-structured interviews.<sup>29</sup> The major areas covered in the interviews included the adoption of information technology, involving patients in decision making, number of disease management programs, and measurement of quality and access to care (eAppendix 2). The findings reported in the study included that PCMH clinics often operate during expanded office hours and offer broader disease management programs that cover more chronic conditions than do non-PCMH clinics. An executive at one PCMH clinic also stated that health information technology was useful in informing and improving decision making. There were no definitive expert opinions on attributes related to quality of care and patient engagement. The interview results pointed

to the importance of access to care in the success of PCMHs and resonated with our findings based on group 2a that the scale of PCMH impact in reducing ED visits was greater among individuals with office visits.

## Limitations

There were several limitations in this study. As we lacked the baseline data of individuals with disabilities, we used nondisabled Medicaid beneficiaries' health service utilization as a proxy for clinics' overall performance. This choice was based on the assumptions that the performance of clinics should stay relatively consistent for nondisabled individuals and individuals with disabilities and that the implementation of the PCMH was the only difference between PCMH and comparison groups. The small number of PCMH clinics and lack of information on staffing and quality performance scores prevented us from conducting analyses with clinics' information directly. In addition, we did not consider fixed effects from clinics in the analysis. However, because we examined the variation of the propensity score of PCMH clinics when adjusting for beneficiaries' demographic characteristics and healthcare resource utilization, the small standard deviation of 0.01, with a mean propensity score of 0.14, indicated that the fixed effects from clinics probably have limited impact on the estimation of standard error. Understanding that selection bias could happen at the clinic level (ie, willingness to apply for the PCMH recognition) and at the individual level (ie, preference of PCP), we conducted a series of propensity score matchings to identify clinics as well as individuals with disabilities who had similar baseline characteristics for the comparison. Although our findings may have limited generalizability due to the multiple matching steps, the potential endogeneity problems should be largely resolved with comparable clinics and study groups after matching.

## CONCLUSIONS

People with disabilities are an understudied population, with higher need for healthcare services than many other populations. With a focus on nonelderly Medicaid beneficiaries with disabilities, our study's findings highlight that the adoption of the PCMH model in safety-net clinics was associated with a reduction of excess ED use. ■

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**eAppendix 1.** Population Characteristics for Medicaid Beneficiaries with Disabilities in 2012, PCMH and Non-PCMH Clinics after Matching at Individual Level (Group 3)

	<b>PCMH N=1283</b>	<b>Non-PCMH N=1283</b>	<b>Total N=2566</b>	<b>p-value</b>
<b>Population Characteristics</b>				
Age, mean (SD), y	34.3 (19.6)	37.0 (18.5)	35.7 (19.1)	0.74
Female, %	46.8	47.2	47	0.92
Hispanic, %	28.1	30.9	29.5	0.38
CRG Risk Category, %				
1	22.9	25.8	24.4	0.73
2	29.1	29.4	29.2	
3	25.5	26.2	25.8	
4	22.5	18.6	20.6	
Income Category, %				
<\$30,000	4.6	3.6	4.1	<0.01
\$30,000 - \$40,000	31.5	31.5	31.5	
\$40,000 - \$50,000	45.9	17.4	31.6	
>\$50,000	18	47.5	32.8	
Abbreviations: PCMH, Patient-Centered Medical Home; CRG, Clinical Risk Groups				



**eAppendix 2.** A list of interview questions during in-person communications with safety net clinic leaders

1. Do you involve patients in decisions about their health care? If yes, can you describe the practices or protocol you use?
2. Does your clinic use clinical decision support tools? If yes, please describe the tools.
3. Does your clinic monitor quality of care? If yes, what metrics do you use? Are there incentives tied to meeting quality thresholds?
4. Does your clinic have any panel management or disease management programs for all patients or high risk patients? If so, please describe.
5. Does your clinic have electronic health records? 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?