

Service Utilization by High-Need, High-Cost Patients Following Emergency Department Visits

Nadereh Pourat, PhD, MSPH; Connie Lu, MPH; Menbere Haile, PhD; Helen Yu-Lefler, DrPH; Benjamin Picillo, MPH; Minh Wendt, PhD; Troyana Benjamin, MS; Hank Hoang, PharmD; and Alek Sripipatana, PhD

Efforts to improve population health and costs of care have increasingly focused on reducing emergency department (ED) visits, yet the rates continue to rise, reaching 130 million (40 visits per 100 noninstitutionalized persons) in 2020.^{1,2} Approximately 75% of ED visits (97,000,000) result in discharge as opposed to admission to the hospital, and up to 27% are classified as potentially avoidable and unnecessary.^{3,4} Estimates indicate that reducing such visits could yield a cost savings of \$4.4 billion annually to the US health care system if these visits were managed at outpatient sites.⁵

Interventions to reduce ED visits have targeted patients with high need and high costs (HNHC), defined as individuals with multiple ED visits or hospitalizations; those with a complex health profile indicated by multiple comorbidities, high-morbidity conditions, serious mental illness, or substance use disorders (SUDs); or persons experiencing homelessness or recently incarcerated. The reasons for repeat ED visits by patients with HNHC are multifactorial, but a key aspect is limited access to outpatient care.⁶

Approaches to reduce avoidable ED visits have focused on better care coordination and management, including improved screening of health conditions and connection to specialty care, mental health care, substance use treatment, or social services within primary care settings.⁶ However, these interventions frequently occur after multiple ED visits or hospitalizations and when a patient's health is more complex.⁶⁻⁸ Therefore, the effectiveness of these approaches depends largely on timely receipt of outpatient services following discharge from the ED.

Professional guidelines recommend that outpatient providers follow up with patients within 7 days of ED discharge to reduce ED readmissions or hospitalizations.^{1,9,10} ED readmissions or hospitalizations within 30 days of the initial visit are considered negative outcomes.¹⁰

Additionally, patients with HNHC are frequently low income, covered by Medicaid, and receive care from safety-net providers including Health Resources and Services Administration–funded health centers (hereafter, *health centers*).^{11,12} These organizations are unique because they provide affordable, accessible, and high-quality

ABSTRACT

OBJECTIVE: To compare the likelihood of timely outpatient follow-up care and repeat emergency department (ED) visits and hospitalization among patients with high need and high costs (HNHC) across 4 primary care provider (PCP) types.

STUDY DESIGN: Our cross-sectional study analyzed 2018 eligibility and claims data of patients with HNHC enrolled in California Medicaid managed care (N = 164,543).

METHODS: Outcomes were outpatient follow-up visits for primary care, specialty care, mental health, or substance use disorder (SUD) within 7 days and ED readmission and all-cause hospitalization within 30 days of the first ED visit (index ED). Our independent variable was PCP type, categorized as Health Resources and Services Administration–funded health centers, group practices, solo practices, and other community clinics. Multivariable logistic regression models examined follow-up care utilization by PCP type.

RESULTS: One-third of index ED visits were followed by a primary care (30.3%) or specialty care (31.8%) visit within 7 days. Within 30 days of the ED index visit, approximately 22% had a repeat ED visit and 6% had a hospitalization. Health center patients were more likely to have a primary care, mental health, or SUD follow-up visit than patients of other PCPs and were less likely to have a follow-up specialty visit, ED readmission, or hospitalization.

CONCLUSIONS: Findings indicate that health centers have been successful in linking patients to outpatient services that may reduce costly hospitalizations and repeat ED visits but could improve on linkage to specialty care. Improved process-of-care approaches may reduce repeat ED visits and hospitalizations across all PCP types.

Am J Manag Care. 2025;31(11):665–671. doi:10.37765/ajmc.2025.89818

TAKEAWAY POINTS

Findings indicate that health centers have been successful in linking patients to outpatient services that may reduce the need for costly hospitalizations and repeat emergency department (ED) visits but could improve on linkage to specialty care.

- ▶ Improved care coordination and integration of specialty care may better address specialty needs of health center patients.
- ▶ Improved process-of-care approaches may reduce repeat ED visits and hospitalizations across all primary care provider types.

Dependent Variable

We created several dependent variables to reflect timely follow-up care after the index ED visit. Timely follow-up of outpatient services was defined as any primary care, specialty care, mental health, or SUD visit within 7 days (vs later or no follow-up care). We also created indicators for other follow-up care or ED visits or hospitalizations within 30 days from the index ED visit.¹⁰

primary care services to medically underserved populations regardless of their ability to pay, and they have the potential to reduce ED visits by removing financial barriers to primary care access.^{2,13} Studies comparing health center patients with those of other primary care providers (PCPs) have shown that the former have fewer hospitalizations, ED visits, and primary care visits overall compared with patients of private practice or hospital outpatient clinics.¹⁴⁻¹⁶

There is a dearth of evidence to show the pattern of health care use following ED visits among patients with HNHC. This lack of evidence hinders the formation of better solutions to improve HNHC patients' health outcomes and reduce costs associated with potentially unnecessary acute care. We addressed this gap in the literature by examining the likelihood of timely outpatient follow-up care, including primary, specialty, mental health, and SUD care, for patients with HNHC who received their care from health centers and other PCPs. We also assessed the likelihood of repeat ED visits or hospitalizations in the longer term or 30 days following the visit. For health center patients, we anticipated timelier follow-up of most outpatient visits and less acute care use because health centers offer comprehensive primary care, frequently offer integrated behavioral health services, and employ case managers and care coordinators.¹⁷ However, we anticipated fewer follow-up specialty visits for health center patients because of limited availability of specialists at health centers compared with PCPs in multispecialty groups.¹⁸

METHODS

Our cross-sectional study used 2018 California Medicaid enrollment and claims data for managed care beneficiaries eligible for the Health Homes Program (HHP) created under Section 2703 of the Affordable Care Act, which provided care coordination to high utilizers of acute care.¹⁹ Additional details on HHP and eligibility are available in the [eAppendix](#) (available at [ajmc.com](#)).

To select our sample, we identified the index ED visit as the first 2018 ED claim followed by discharge. We then included beneficiaries 18 years and older who had at least 1 PCP visit before the index ED visit and excluded those who were not enrolled in the month following the index ED visit. Our final sample included 164,543 adult patients with HNHC. Additional detail on exclusion criteria is noted in the [eAppendix](#).

Independent Variable

Our main variable of interest was PCP type for each Medicaid beneficiary, categorized as health centers, group practices, solo practice physicians, and other community clinics. We defined PCPs as those in general practice, family medicine, pediatrics, internal medicine, or subspecialties in adult health and geriatric medicine. Additional details on assigning PCP type are noted in the [eAppendix](#).

Covariates

We included several patient- and visit-level covariates that can conceptually influence follow-up care utilization.²⁰ Patient-level covariates included patient demographics (eg, age, sex, race/ethnicity), health status (eg, physical health conditions such as diabetes, mental health conditions such as depression), health care utilization prior to the index ED visit, and a measure of risk for high expenditures. We controlled for the index ED visit characteristics to better understand the reason for the visit and to predict likelihood of follow-up care utilization using *Current Procedural Terminology (CPT)* codes to indicate intensity of services provided as a proxy for severity and to identify weekend (vs weekday) index ED visits as a proxy for weekend access to primary care. See the [eAppendix](#) for additional details on these variables.

Statistical Methods

We conducted descriptive analyses of the sample by PCP types. We then developed logistic regression models to examine the association of PCP type with follow-up visits, controlling for patient and index ED visit characteristics. We included indicators of prior health care utilization that matched the dependent variable of interest in each model (eg, 2 or more prior primary care visits when modeling the likelihood of timely primary care follow-up). We adjusted the SEs in all models to account for the clustering of observations within the same zip codes. We assessed multicollinearity among all variables in our models. We reported predicted probabilities for ease of interpretation using the postestimate *margins* command and *lincom* statement to assess significant differences between health centers and other PCP types. We tested whether our designation of timely outpatient follow-up of 7 days following the index ED visit was biased by measuring such visits within 14 days because wait times and the complexity of patients' needs may result in different follow-up times and behaviors than those suggested by existing

TABLE 1. Sample Characteristics

Characteristics	Total	PCP type			P	
		HRSA-funded health centers	Group practices	Solo practices		Other community clinics
Sample (%)	164,543 (100%)	47,841 (29.1%)	69,557 (42.3%)	21,288 (12.9%)	25,857 (15.7%)	
Follow-up care utilization						
Follow-up outpatient services within 7 days of ED index visit, %						
Any primary care visit	30.3	30.6	30.3	29.7	30.6	.096
Any specialty visit	31.8	28.4	35.3	30.7	29.4	<.001
Any mental health visit	5.9	7.2	5.4	5.0	5.9	<.001
Any SUD visit	5.4	7.9	4.0	3.7	6.1	<.001
Follow-up acute services within 30 days, %						
Any ED visit followed by discharge	22.1	22.5	22.1	21.1	22.5	<.001
Any hospitalization	6.1	5.1	7.0	6.5	5.4	<.001
Covariates						
Patient characteristics, %						
Age in years						
18-45	35.4	37.7	33.7	29.9	40.0	<.001
46-64	50.2	53.0	47.9	51.6	50.3	
≥ 65	14.4	9.3	18.4	18.5	9.6	
Male (vs female)	36.4	37.9	35.9	37.2	34.3	
Race/ethnicity						
Non-Hispanic White	30.2	31.1	29.0	25.8	35.7	<.001
Hispanic/Latino	35.9	36.4	34.9	37.7	35.8	
Non-Hispanic Black/African American	12.4	12.3	13.7	11.8	9.7	
Non-Hispanic Asian and Pacific Islander	8.8	6.8	9.8	12.6	6.8	
Non-Hispanic other race ^a	12.7	13.4	12.6	12.2	12.0	
Preferred language is English (vs not)	72.3	73.0	71.8	66.1	77.1	<.001
Urban (vs rural)	92.6	90.9	96.8	98.1	79.6	<.001
Experiencing homelessness (vs not)	12.8	15.4	11.2	11.5	13.1	<.001

(continued)

guidelines.²¹ In addition, we examined characteristics associated with the first ED visit within 30 days after the index ED visit, including whether it was on a weekend (vs weekday) and service-intensive as indicated by CPT codes. All analyses were performed using R 4.2.3 (R Foundation for Statistical Computing) and Stata 16 (StataCorp LLC), and we reported statistical significance for P values less than .05.

RESULTS

Table 1 shows that the majority of the sample were group practice patients (42.3%), followed by health center patients (29.1%), other community clinic patients (15.7%), and solo practice provider patients (12.9%). One-third of patients received a timely primary care or specialty care visit, and 5.9% and 5.4% received a timely mental health or SUD visit, respectively. Many had an ED visit (22.1%) or hospitalization (6.1%) within 30 days. The rates of timely outpatient and acute care follow-up varied by provider type. Additional

characteristics of patients and variations by PCP type are described in the eAppendix. We did not find multicollinearity among covariates.

Table 2 shows predicted probabilities of follow-up care by PCP type after adjusting for patient- and visit-level covariates. Health center patients had a higher predicted probability of having a timely primary care visit (30.9%) than patients of group practice providers (30.2%) and solo practice providers (29.5%) but a lower predicted probability of a timely specialty visit (29.4%) compared with patients of group practice providers (34.3%) and other community clinics (30.6%). Health center patients also had a higher predicted probability of a timely mental health visit than solo practice provider patients (6.1% vs 5.6%) and a higher predicted probability of a timely SUD visit (6.3%) than patients of all 3 other PCP types. Health center patients had lower predicted probability of any ED visit followed by discharge (21.8%) than group practice provider patients (22.5%) and of hospitalization (5.2%) than patients of all 3 other PCP types. The full regression models can be found in eAppendix Table 1.

TABLE 1. (Continued) Sample Characteristics

Characteristics	Total	PCP type			P	
		HRSA-funded health centers	Group practices	Solo practices		Other community clinics
Covariates (continued)						
Health status, %						
Physical chronic conditions						
Diabetes	39.8	38.3	41.1	43.3	36.5	<.001
COPD	14.9	13.1	15.8	14.9	15.6	<.001
Asthma	17.7	17.4	17.7	15.9	19.7	<.001
Hypertension	49.5	47.2	51.4	52.1	46.6	<.001
Obesity	17.1	18.8	16.3	15.1	17.8	<.001
Cardiovascular disease	24.7	19.7	28.6	27.4	21.1	<.001
Chronic kidney disease	26.0	24.2	28.0	27.4	22.9	<.001
Mental health chronic conditions						
Depression	21.5	24.7	19.7	19.0	22.7	<.001
Anxiety	20.3	23.3	18.4	16.7	23.0	<.001
Mental health and SUD (vs none)						
None	55.6	51.0	58.2	60.3	53.0	<.001
Any mental health condition only	32.3	33.9	31.2	29.4	34.7	
Any SUD only	3.7	4.0	3.5	3.4	4.0	
Any mental health condition and SUD	8.4	11.1	7.1	6.9	8.3	
Health care use 1 year prior to index ED visit, %						
Had 2 or more primary care visits 1 year prior (vs 1)	92.9	93.7	92.5	92.0	93.2	<.001
Had a specialty visit 1 year prior (vs not)	92.8	92.3	93.9	90.7	92.4	<.001
Had a mental health visit 1 year prior (vs not)	31.6	35.6	30.2	29.5	29.8	<.001
Had an SUD visit 1 year prior (vs not)	42.2	59.5	32.0	27.2	50.1	<.001
Had an ED visit followed by discharge (vs not)	56.2	57.2	55.9	52.7	57.9	<.001
Had a hospitalization 1 year prior (vs not)	28.1	25.7	30.4	29.3	25.5	<.001
Index ED visit characteristics, %						
Index ED visit was on a weekend (vs weekday)	25.5	24.9	25.6	25.7	25.9	.004
Classification of index ED visit using CPT codes (procedures and services), %						
Straightforward or low severity	2.8	2.3	3.0	3.5	2.6	<.001
Moderate severity	23.3	26.7	20.4	20.3	27.2	
Moderate to high severity	30.6	32.3	29.7	28.8	31.4	
High severity	36.0	31.7	39.1	38.6	33.5	
Missing	7.3	7.0	7.8	8.9	5.2	

COPD, chronic obstructive pulmonary disease; CPT, Current Procedural Terminology; ED, emergency department; HRSA, Health Resources and Services Administration; PCP, primary care provider; SUD, substance use disorder.

*Other race included race coded as American Indian/Alaska Native, other, and unreported.

Several covariates also influenced follow-up care utilization. Notably, predicted probabilities of timely primary and specialty care visits were higher for weekend visits, emergent diagnoses, and more intensive services used during the index ED visit (eAppendix Table 2).

Sensitivity analyses using the follow-up outpatient visits within 14 days were consistent with our findings using 7 days (eAppendix Table 3). In particular, results using the 14-day criteria emphasized that health center patients were more likely to have a primary care follow-up and SUD services than patients of all 3 other PCP types

and only less likely to have a timely specialty follow-up compared with group practice patients.

DISCUSSION

The present study provides novel insights into patterns of health care use following ED visits by patients with HNHC from California safety-net PCPs. Our examination revealed that one-third of index ED visits were followed by a timely primary or specialty care outpatient

TABLE 2. Predicted Probabilities of Health Care Utilization Following an Index ED Visit by PCP Type

Utilization	Overall	PCP type			
		HRSA-funded health centers	Group practice	Solo practice	Other community clinics
Follow-up outpatient services within 7 days					
Any primary care visit	30.3%	30.9%	30.2%*	29.5%**	30.5%
Any specialty visit	31.8%	29.4%	34.3%***	30.2%	30.6%*
Any mental health visit	5.9%	6.1%	5.9%	5.6%*	6.0%
Any SUD visit	5.4%	6.3%	4.6%***	4.5%***	5.8%*
Follow-up acute services within 30 days					
Any ED visit followed by discharge	22.1%	21.8%	22.5%**	22.1%	21.9%
Any hospitalization	6.1%	5.2%	6.8%***	6.5%***	5.8%**

ED, emergency department; HRSA, Health Resources and Services Administration; PCP, primary care provider; SUD, substance use disorder.

* $P < .05$; ** $P < .01$; *** $P < .001$ compared with HRSA-funded health centers.

visit, but less than 1 in 10 index ED visits were followed by a timely mental health or SUD visit. These findings were consistent with those of other studies that show a higher rate of outpatient primary care follow-up visits than mental health or SUD visits.^{20,22}

Our findings also showed that health center patients were more likely than patients of other PCP types to have timely primary care follow-up, which may be facilitated by enabling services provided by health centers, such as care coordination and navigation, to improve patient outcomes. Also, the higher likelihood of mental health and SUD visits for health center patients compared with patients of other PCP types likely reflected higher integration of mental health and SUD providers in these organizations.^{23,24} The finding that health center patients were less likely than patients of other PCP types to have follow-up hospitalizations may further reflect the success of health centers' investments in the provision of comprehensive primary care to meet the needs of their patients, thus reducing the need for further acute care.²⁵ The lower hospitalization rates following index ED visits among health center patients are consistent with previous literature.²⁴ This may be due to health centers' higher quality of care and care management of patients with chronic conditions vs other providers, which may lead to decreased downstream hospitalizations.^{26,27}

Despite lower rates of follow-up hospitalizations, we found lower likelihood of timely specialty visits (using either the 7- or 14-day criteria) for health center patients compared with group practice patients. This finding is consistent with evidence that shows that health center patients with Medicaid face barriers to specialty care, such as difficulty finding specialists accepting new patients and the administrative burden required to obtain specialist consultations.²⁸⁻³¹ Our findings are in line with health centers' focus on primary vs specialty care and other research that indicates lower integration of specialty care at health centers.²⁸ This finding could reflect limitations in current specialty care integration efforts by health centers or challenges with establishing agreements with external specialists to serve the unique needs of health center patients or willingness to see Medicaid patients.³² Comparatively,

patients of group practice providers may have fewer challenges to obtain specialty follow-up visits because their PCPs are more likely to practice in multispecialty provider groups.³³

Across all PCP types, the higher likelihood of timely follow-up outpatient visits for patients with HNHC and service-intensive index ED visits indicates greater attention from providers to patients with urgent medical needs and less attention to those HNHC patients with less serious or urgent conditions. These findings may be due to prioritization by the ED to refer patients with more severe needs for follow-up assessment and share information to the PCPs to further coordinate needed care.^{34,35} The finding that timely outpatient follow-up care was higher for weekend index ED visits supports the idea that these patients did not have access to outpatient care on the weekend and had to rely on the ED but followed up with their PCP during regular business hours on the weekdays.³⁶ Furthermore, our finding that a notable number of patients had another ED visit or hospitalization within 30 days likely indicates that some patients' needs were not addressed in the index ED visits or that their conditions worsened. Our analysis of the characteristics of the first ED visit following the index ED visit further corroborated this conclusion.

Limitations

Our study has limitations. We defined the index ED visit as the first ED visit followed by discharge observed in the calendar year, and this visit may be a secondary ED visit for a given patient. However, we controlled for the likelihood of an ED visit in the previous year to partially address this limitation. Our method of attribution of patients to a PCP may be subject to error, and we lacked data on whether patients had switched PCPs during the follow-up period. We also did not have additional information on other characteristics of providers, such as patient management or staffing characteristics, that could impact utilization patterns.

We only assessed the likelihood of 4 types of outpatient care and did not assess whether patients had used other services such as home health that may have kept them from having additional ED

visits or hospitalizations. We also lacked data on the use of social services or other types of support that may have addressed patients' needs following an ED visit.

Our data were restricted to patients with HHNC who were Medicaid managed care beneficiaries in California. Therefore, our data may not be generalizable to patients with HHNC covered by Medicaid living in other states. Our data also did not assess the timely outpatient care or further use of acute care for the universe of patients seen by health centers and other PCPs. Nevertheless, our findings are not complicated by variations in coverage of optional services in Medicaid programs in various states and are highly relevant to Medicaid patients with the most complex needs who are generating the most ED visits and are the focus of intensive efforts to reduce such visits.

CONCLUSIONS

Our findings have implications for policy and practice by PCPs within the safety net. The findings of patients with HHNC visiting the ED on weekends highlight the importance of increasing outpatient access or touchpoints for patients with HHNC when they have acute needs to decrease reliance on costly ED use. One approach may include securing stable and ongoing funding to support health center services for weekend hours or hotlines to provide medical consultations, which have been shown in literature to be effective in reducing ED visits.³⁶ Additionally, other process-of-care approaches—such as ensuring better care transitions, optimizing electronic health record linkages and data sharing between PCPs and EDs, enabling services staff to coordinate care, and using telehealth or telephonic visits—can be considered strategies to improve frequency and timeliness of outpatient follow-up care after an ED visit.³⁷⁻³⁹

The lower rates of timely primary care follow-up after patients with HHNC visit the ED for less urgent and less service-intensive reasons indicate that the working relationships between hospital EDs and community-based PCPs may need improvement to ensure patients have continuity of care for their health care needs.⁴⁰ Efforts such as electronic notifications to patients at high risk of frequent ED utilization have been shown to reduce ED recidivism.⁴⁰ This is an important strategy because it may reduce acute care utilization and costs if these patients can receive care in other settings, including primary care. PCPs are frequently the gateway to other needed services, and access to specialty care often requires PCP referrals. In turn, PCPs can also increase their efforts to receive notifications when their patients have ED visits and to assess and address their patients' needs. Such follow-up requires a patient-centered orientation, appropriate staffing capacity, and delivery of comprehensive and integrated care. PCPs, such as health centers, that have a greater commitment to providing timely access, employing case managers and care coordinators to outreach to patients, and integrating behavioral health care are better equipped to follow up with patients and ensure timely visits after an ED visit.⁴¹

The challenges of obtaining timely follow-up specialty care, particularly by health center patients vs group practice patients, may indicate the need for multilayered efforts to improve care coordination between PCPs within the safety net and specialists for patients with HHNC. Reducing wait times for specialty referral by health plans and increasing the number of specialists in provider networks within the safety net would reduce systemic barriers of underserved communities not having access to specialty care following an ED visit.^{18,28} Promoting direct relationships between PCPs and specialists using a memorandum of understanding and PCP use of care coordinators can further increase the likelihood of timely specialty visits.^{18,28} Additionally, developing technical assistance resources for PCPs to manage common chronic conditions with specialist consultation may further improve the ability of PCPs within the safety net to provide needed care without waiting for specialist availability.

Lastly, our findings of a higher likelihood of primary care visits within 14 days of the index ED visit further indicate the practical challenges of achieving the 7-day timeline for patients with HHNC on Medicaid, who are likely to have more difficulties obtaining appointments.⁴² Although clinical guidelines have recommended 7 days between ED discharge and outpatient follow-up as the standard for timely follow-up care, there is limited evidence regarding whether this guideline is reasonable for all patient populations.⁴² Future research should investigate further into appropriate follow-up time frames for access to outpatient care, particularly for patients with complex health needs from medically underserved communities. ■

Author Affiliations: Department of Health Policy and Management, UCLA Fielding School of Public Health (NP), Los Angeles, CA; UCLA Center for Health Policy Research (NP, CL, MH), Los Angeles, CA; now with Los Angeles Department of Public Health, Office of Health Assessment and Epidemiology (CL), Los Angeles, CA; now with the Lewin Group (MH), Falls Church, VA; Bureau of Primary Health Care, Health Resources and Services Administration, HHS (HY-L, BP, MW, TB, HH, AS), Rockville, MD; now with Bureau of Health Workforce, Health Resources and Services Administration, HHS (HY-L), Rockville, MD; now with Center for Medicare and Medicaid Innovation, CMS (BP), Baltimore, MD; now with Office of Planning, Analysis, and Evaluation, Health Resources and Services Administration, HHS (MW), Rockville, MD; now an independent researcher (TB), Washington, DC; now with Department of Justice, Drug Enforcement Administration (HH), Springfield, VA.

Source of Funding: This research was funded by the HHS Health Resources and Services Administration (HRSA) under HRSA contract number HHS2502013000231. The views expressed in this publication are solely the opinions of the authors and do not necessarily reflect the official policies of HHS or HRSA, nor does mention of the department or agency names imply endorsement by the US government.

Author Disclosures: The authors report no relationship or financial interest with any entity that would pose a conflict of interest with the subject matter of this article.

Authorship Information: Concept and design (NP, MH, HY-L, BP, MW, TB, HH, AS); analysis and interpretation of data (NP, CL, MH, BP, HH, AS); drafting of the manuscript (NP, CL, AS); critical revision of the manuscript for important intellectual content (NP, CL, HY-L, BP, MW, TB, HH, AS); statistical analysis (MH); provision of patients or study materials (HY-L); obtaining funding (NP); administrative, technical, or logistic support (NP, HY-L, BP, MW); and supervision (NP, HY-L, MW, TB, HH).

Address Correspondence to: Nadereh Pourat, PhD, MSPH, UCLA Center for Health Policy Research, 10960 Wilshire Blvd, Ste 1550, Los Angeles, CA 90024. Email: pourat@ucla.edu.

REFERENCES

1. Kilaru AS, Illenberger N, Meisel ZF, et al. Incidence of timely outpatient follow-up care after emergency department encounters for acute heart failure. *Circ Cardiovasc Qual Outcomes*. 2022;15(9):e009001. doi:10.1161/CIRCOUTCOMES.122.009001

2. Lin MP, Baker O, Richardson LD, Schuur JD. Trends in emergency department visits and admission rates among US acute care hospitals. *JAMA Intern Med.* 2018;178(12):1708-1710. doi:10.1001/jamainternmed.2018.4725
3. Children and youth with special health care needs. Health Resources and Services Administration Maternal and Child Health Bureau's National Survey of Children's Health data brief. June 2022. Accessed September 22, 2023. <https://mchb.hrsa.gov/sites/default/files/mchb/programs-impact/nsch-data-brief-children-youth-special-health-care-needs.pdf>
4. Cairns C, Kang K. National Hospital Ambulatory Medical Care Survey: 2020 emergency department summary tables. National Center for Health Statistics. December 13, 2022. Accessed September 22, 2023. <https://stacks.cdc.gov/view/cdc/121911>
5. Weinick RM, Burns RM, Mehrotra A. Many emergency department visits could be managed at urgent care centers and retail clinics. *Health Aff (Millwood).* 2010;29(9):1630-1636. doi:10.1377/hlthaff.2009.0748
6. Moe J, Kirkland SW, Rawe E, et al. Effectiveness of interventions to decrease emergency department visits by adult frequent users: a systematic review. *Acad Emerg Med.* 2017;24(1):40-52. doi:10.1111/acem.13060
7. Chang E, Ali R, Seibert J, Berkman ND. Interventions to improve outcomes for high-need, high-cost patients: a systematic review and meta-analysis. *J Gen Intern Med.* 2023;38(1):185-194. doi:10.1007/s11606-022-07809-6
8. Soril LJ, Leggett LE, Lorenzetti DL, Noseworthy TW, Clement FM. Reducing frequent visits to the emergency department: a systematic review of interventions. *PLoS One.* 2015;10(4):e0123660. doi:10.1371/journal.pone.0123660
9. Horney C, Schmader K, Sanders LL, et al. Health care utilization before and after an outpatient ED visit in older people. *Am J Emerg Med.* 2012;30(1):135-142. doi:10.1016/j.ajem.2010.10.036
10. HEDIS measures and technical resources. National Committee for Quality Assurance. Accessed September 22, 2023. <https://www.ncqa.org/hedis/measures/>
11. Kronick RG, Bella M, Gilmer TP. *The Faces of Medicaid III: Refining the Portrait of People With Multiple Chronic Conditions.* Center for Health Care Strategies Inc; October 2009. Accessed September 22, 2023. https://www.chcs.org/media/Faces_of_Medicaid_III.pdf
12. Berkman ND, Chang E, Seibert J, et al. *Management of High-Need, High-Cost Patients: A "Best Fit" Framework Synthesis, Realist Review, and Systematic Review.* Agency for Healthcare Research and Quality Comparative Effectiveness Review No. 246; October 2021. Accessed October 3, 2025. <https://www.ncbi.nlm.nih.gov/books/NBK575200/>
13. Nath JB, Costigan S, Lin F, Vittinghoff E, Hsia RY. Access to federally qualified health centers and emergency department use among uninsured and Medicaid-insured adults: California, 2005 to 2013. *Acad Emerg Med.* 2019;26(2):129-139. doi:10.1111/acem.13494
14. Laiterapong N, Kirby J, Gao Y, et al. Health care utilization and receipt of preventive care for patients seen at federally funded health centers compared to other sites of primary care. *Health Serv Res.* 2014;49(5):1498-1518. doi:10.1111/1475-6773.12178
15. Nocon RS, Lee SM, Sharma R, et al. Health care use and spending for Medicaid enrollees in federally qualified health centers versus other primary care settings. *Am J Public Health.* 2016;106(11):1981-1989. doi:10.2105/ajph.2016.303341
16. Rothkopf J, Brookler K, Wadhwa S, Sajovetz M. Medicaid patients seen at federally qualified health centers use hospital services less than those seen by private providers. *Health Aff (Millwood).* 2011;30(7):1335-1342. doi:10.1377/hlthaff.2011.0066
17. HRSA behavioral health. Health Resources and Services Administration. Accessed September 22, 2023. <https://web.archive.org/web/20230921115143/https://www.hrsa.gov/behavioral-health>
18. Ezeonwu MC. Specialty-care access for community health clinic patients: processes and barriers. *J Multidiscip Healthc.* 2018;11:109-119. doi:10.2147/jmdh.S152594
19. Health Homes Program. California Department of Health Care Services. Accessed September 22, 2023. <https://www.dhcs.ca.gov/services/Pages/HealthHomesProgram.aspx>
20. Lin MP, Burke RC, Orav EJ, Friend TH, Burke LG. Ambulatory follow-up and outcomes among Medicare beneficiaries after emergency department discharge. *JAMA Netw Open.* 2020;3(10):e2019878. doi:10.1001/jamanetworkopen.2020.19878
21. Jackson C, Shahsahebi M, Wedlake T, DuBard CA. Timeliness of outpatient follow-up: an evidence-based approach for planning after hospital discharge. *Ann Fam Med.* 2015;13(2):115-122. doi:10.1370/afm.1753
22. Geissler KH, Cooper MI, Zeber JE. Association of follow-up after an emergency department visit for mental illness with utilization based outcomes. *Adm Policy Ment Health.* 2021;48(4):718-728. doi:10.1007/s10488-020-01106-2
23. Tang MH, Sengupta N, Longo S, Zuckerman B. Behavioral health integration in a Medicaid accountable care organization: management lessons from a health center. *J Health Care Poor Underserved.* 2019;30(4):1252-1258. doi:10.1353/hpu.2019.0105
24. Pourat N, Chen X, Lee C, et al. Improving outcomes of care for HRSA-funded health center patients who have mental health conditions and substance use disorders. *J Behav Health Serv Res.* 2020;47(2):168-188. doi:10.1007/s11414-019-09665-5
25. What is a health center? Health Resources and Services Administration. Accessed September 22, 2023. <https://bphc.hrsa.gov/about-health-center-program/what-health-center>
26. Knitter AC, Murgesan M, Sautsberry L, et al. Quality of care for US adults with Medicaid insurance and type 2 diabetes in federally qualified health centers compared with other primary care settings. *Med Care.* 2022;60(11):813-820. doi:10.1097/mtr.0000000000001766
27. Bell N, Wilkerson R, Mayfield-Smith K, López-De Fede A. Association of patient-centered medical home designation and quality indicators within HRSA-funded community health center delivery sites. *BMC Health Serv Res.* 2020;20(1):980. doi:10.1186/s12913-020-05826-x
28. Nakamura Y, Laberge M, Davis A, Formoso A. Barriers and strategies for specialty care access through federally qualified health centers: a scoping review. *J Health Care Poor Underserved.* 2019;30(3):910-933. doi:10.1353/hpu.2019.0064
29. Timbie JW, Kranz AM, Mahmud A, Damberg CL. Specialty care access for Medicaid enrollees in expansion states. *Am J Manag Care.* 2019;25(3):e83-e87.
30. Ginde AA, Talley BE, Trent SA, Raja AS, Sullivan AF, Camargo CA Jr. Referral of discharged emergency department patients to primary and specialty care follow-up. *J Emerg Med.* 2012;43(2):e151-e155. doi:10.1016/j.jemermed.2011.05.092
31. Asplin BR, Rhodes KV, Levy H, et al. Insurance status and access to urgent ambulatory care follow-up appointments. *JAMA.* 2005;294(10):1248-1254. doi:10.1001/jama.294.10.1248
32. Boyle RM. *Adding Specialty Services to a California FDHC: Legal and Regulatory Issues.* California HealthCare Foundation; July 2009. Accessed September 22, 2023. <https://www.chcf.org/wp-content/uploads/2017/12/PDF-FDHCspecialtyCareRegs.pdf>
33. Physician acceptance of new Medicaid patients: findings from the National Electronic Health Records Survey, Medicaid and CHIP Payment and Access Commission. June 2021. Accessed September 22, 2023. <https://www.macpac.gov/wp-content/uploads/2021/06/Physician-Acceptance-of-New-Medicaid-Patients-Findings-from-the-National-Electronic-Health-Records-Survey.pdf>
34. Atzema CL, Maclagan LC. The transition of care between emergency department and primary care: a scoping study. *Acad Emerg Med.* 2017;24(2):201-215. doi:10.1111/acem.13125
35. Katz EB, Carrier ER, Umscheid CA, Pines JM. Comparative effectiveness of care coordination interventions in the emergency department: a systematic review. *Ann Emerg Med.* 2012;60(1):12-23.e1. doi:10.1016/j.annemergmed.2012.02.025
36. Vieth TL, Rhodes KV. Nonprice barriers to ambulatory care after an emergency department visit. *Ann Emerg Med.* 2008;51(5):607-613. doi:10.1016/j.annemergmed.2007.10.027
37. Collins SP, Liu D, Jenkins CA, et al. Effect of a self-care intervention on 90-day outcomes in patients with acute heart failure discharged from the emergency department: a randomized clinical trial. *JAMA Cardiol.* 2021;6(2):200-208. doi:10.1001/jamacardio.2020.5763
38. Sloan-Aagard C, Glenn J, Nañez J, Crawford SB, Currey JC, Hartmann E. The impact of community health information exchange usage on time to reutilization of hospital services. *Ann Fam Med.* 2023;21(1):19-26. doi:10.1370/afm.2903
39. Yue D, Pourat N, Chen X, et al. Enabling services improve access to care, preventive services, and satisfaction among health center patients. *Health Aff (Millwood).* 2019;38(9):1468-1474. doi:10.1377/hlthaff.2018.05228
40. Kimmel HJ, Brice YN, Trikalinos TA, Sarkar IN, Ranney ML. Real-time emergency department electronic notifications regarding high-risk patients: a systematic review. *Telemed J E Health.* 2019;25(7):604-618. doi:10.1089/tmj.2018.0117
41. Burke SP, Frank RG, Kennedy PJ, et al. *Tackling America's Mental Health and Addiction Crisis Through Primary Care Integration.* Bipartisan Policy Center; March 2021. Accessed September 22, 2023. https://bipartisanpolicy.org/download/?file=/wp-content/uploads/2021/03/BPC_Behavioral-Health-Integration-report_R02.pdf
42. Chou SC, Deng Y, Smart J, Parwani V, Bernstein SL, Venkatesh AK. Insurance status and access to urgent primary care follow-up after an emergency department visit in 2016. *Ann Emerg Med.* 2018;71(4):487-496.e1. doi:10.1016/j.annemergmed.2017.08.045

Visit ajmc.com/link/89818 to download PDF and eAppendix

Supplemental eAppendix: Additional Detail on Methodology and Results

Study Design, Data, and Sample – Health Homes Program Details

The Health Homes Program (HHP) allows states to provide Medicaid health homes to coordinate the physical, behavioral, and long-term health services and supports needed by patients with high need and high costs (HNHC) with specific chronic medical and behavioral health conditions and who were high users of emergency department (ED) and hospital services.¹ Eligible beneficiaries included managed care enrollees with a combination of specific conditions (e.g., chronic obstructive pulmonary disease, diabetes, or hypertension), a severe mental illness (e.g., major depression disorders, bipolar disorders), and an acuity indicator (e.g., three or more ED visits last year, experiencing homelessness). The program was designed as a care management/care coordination intervention focusing on patients with specific chronic conditions, high use of acute services, and experiences of homelessness. A mix of health and behavioral care as well as social service providers were contracted by Medicaid managed care plans to manage the needs of the HHP enrollees.

Study Design, Data, and Sample - Exclusion Criteria

We excluded those under 18 years of age, as reasons for ED visits by pediatric populations were likely to be different from those of adults.² Additional exclusions were index ED visits followed by hospitalization (as there are different risk factors associated with inpatient hospitalizations), and patients without primary care provider (PCP) visits before the index ED visit (as a PCP visit was required for assignment to PCP types).²

Independent Variable – Assigning PCP Type

To assign PCP type, we first identified health centers in both the California Medicaid fee schedule and the 2018 Uniform Data System (UDS).^{3,4} We merged these two data sources to the National Plan and Provider Enumeration System (NPPES) registry using the health center organization's site address, Zone Improvement Plan (ZIP) code, and legal business name if the health center's NPI (National Provider Identifier) was unavailable in UDS data. All other health care organizations on the fee schedule—community center/clinics, rural centers/clinics, or clinic centers—were categorized as other community clinics. We identified solo practice providers by categorizing providers that had the same rendering and billing NPI per claim. We then categorized all other providers as group practice providers.

Covariates – Demographics and Health Status Indicators

Patient characteristics included age (18–45 vs. 46–64 and 65 years and over), sex (male vs. female), race/ethnicity as reported in California Medicaid data (Hispanic/Latino, non-Hispanic

[NH] White, NH Black/African American, NH Asian and Pacific Islander, and NH Other Race [including American Indian/Alaska Native, Other, or Unreported race]), English as the preferred language (vs. not), experiencing homelessness (vs. not), and place of residence (urban vs rural). We did not examine NH Other Race separately due to small sample size. Experiencing homelessness was identified from an algorithm using the beneficiary's address and International Classification of Diseases Tenth Edition diagnosis code Z59.0.⁵ Urban/rural designation was identified using Health Resources and Services Administration's (HRSA) Office of Rural Health Policy definition and the patient's residential ZIP code.⁶

We conceptualized that demographics such as age and gender reflect propensity of the individuals to seek follow up care and race/ethnicity, language, homelessness, and place of residence reflect structural and other barriers to access to follow up care.

We measured physical health status by using chronic condition indicators from the Chronic Conditions Data Warehouse, including diabetes, chronic obstructive pulmonary disease, asthma, hypertension, obesity, cardiovascular disease, and chronic kidney disease. We similarly constructed indicators for substance use disorder (SUD) and mental health conditions, including depression, anxiety, serious mental illness, and other mental health conditions. We lagged these indicators by one year to avoid simultaneity with follow-up care utilization. We further conceptualized that the likelihood of follow up visits differ by specific conditions and severity of those conditions.

We controlled for health care utilization prior to the index ED visit by including one-year lagged dichotomous indicators for 2 or more (vs. 1) primary, and any (vs. none) specialty, mental health, SUD, ED visits without hospitalization, and hospitalizations prior to the index ED visit. We included these variables because we conceptualized that past utilization of services reflect individual propensity to use a higher volume of care or types of care in the future.

We controlled for the index ED visit characteristics to better understand characteristics of the visit and to predict likelihood of follow-up care utilization. We categorized the intensity of procedures within the index visit using the Current Procedural Terminology (CPT) codes as high severity (e.g., unstable chest pain) vs. low severity (e.g., insect bite), moderate severity (e.g., headache), moderate to high severity (e.g., head injury with brief loss of conscience), and missing CPT codes.⁸ We also indicated if the index ED visit occurred on a weekend (vs. weekday). We conceptualized that utilizing ED for urgent and higher intensity care may increase the likelihood of timely follow up care. Similarly, we conceptualized that weekend visits may reflect barriers in access to PCPs.

Results – Additional Characteristics of Patients and Variations by PCP Type

The sample was mostly adults 46–64 years (50.2%), female (63.6%), preferred English language (72.3%), and lived in urban ZIP codes (92.6%). Hispanic/Latino ethnicity was the largest group (35.9%), followed by NH White (30.2%), NH Other Race (12.7%), NH Black/African American

(12.4%) and NH Asian and Pacific Islander (8.8%). Nearly thirteen percent of the sample were experiencing homelessness. Frequent chronic health conditions included hypertension (49.5%), diabetes (39.8%), or has mental health conditions (32.3%). During the year prior to the index ED visits, 92.9% of patients had two or more primary care visits or any specialty care, respectively, while many had at least one mental health (31.6%) and SUD (42.2%) visit. Over half had an ED visit followed by discharge and 28.1% had a hospitalization. Some of the index ED visits occurred on a weekend (25.5%) and many received procedures or services that were considered high severity (36.0%). These characteristics differed by PCP type.

References

1. California Department of Health Services. Health Homes Program. <https://www.dhcs.ca.gov/services/Pages/HealthHomesProgram.aspx>
2. Office of the Assistant Secretary for Planning and Evaluation USDoHHS. *Trends in the Utilization of Emergency Department Services, 2009-2018*. 2021. <https://aspe.hhs.gov/pdf-report/utilization-emergency-department-services>
3. California Department of Health Care Services. FQHC and RHC Current Rates Reports. https://www.dhcs.ca.gov/dataandstats/AI/Documents/FQHC/FQHC_Current_Rates/FQHC_RHC_CURRENT_RATES_12-19-18.pdf
4. Health Resources and Services Administration. Uniform Data System (UDS) Resources. <https://bphc.hrsa.gov/datareporting/reporting/index.html>
5. Pourat N, Yue D, Chen X, Zhou W, O'Masta B. Easy to use and validated predictive models to identify beneficiaries experiencing homelessness in Medicaid administrative data. *Health services research*. Feb 8 2023;doi:10.1111/1475-6773.14143
6. Health Resources and Services Administration. Federal Office of Rural Health Policy (FORHP) Data Files. <https://www.hrsa.gov/rural-health/about-us/what-is-rural/data-files>
7. Lemke KW, Pham K, Ravert DM, Weiner JP. A revised classification algorithm for assessing emergency department visit severity of populations. *The American Journal of Managed Care*. 2020;26(3):119-25.
8. Blue Cross Blue Shield of North Dakota. Coding Guidelines for Emergency Department. <https://www.bcbsnd.com/providers/policies-precertification/reimbursement-policy/coding-guidelines-for-emergency-department>

eAppendix Table 1. Full logistic regression models of indicators of health care utilization following an index emergency department visit

	Follow-up outpatient services within 7 days						Follow-up acute services within 30 days					
	Any primary care visit		Any specialty visit		Any mental health visit		Any SUD visit ^a		Any ED visit followed by discharge ^a		Any hospitalization	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Sample size	164,543											
<i>PCP Type (ref. HRSA-funded health centers)^a</i>												
Group practice	0.97*	[0.94,1.00]	1.26***	[1.22,1.31]	0.98	[0.92,1.03]	0.70***	[0.66,0.74]	1.04	[1.01,1.08]	1.34***	[1.26,1.41]
Solo practice	0.93**	[0.90,0.97]	1.04	[1.00,1.08]	0.91**	[0.84,0.99]	0.69***	[0.63,0.75]	1.02	[0.98,1.07]	1.28***	[1.19,1.37]
Other community clinics	0.98	[0.94,1.03]	1.06*	[1.02,1.10]	0.99	[0.91,1.07]	0.90*	[0.84,0.97]	1.01	[0.97,1.05]	1.12**	[1.04,1.20]
<i>Patient characteristics</i>												
Age (ref. 18-45 years)												
46-64 years	1.11***	[1.08,1.14]	1.04*	[1.01,1.07]	0.94*	[0.89,0.99]	1	[0.95,1.05]	0.85***	[0.83,0.88]	1.02	[0.97,1.08]
65 years and over	1.20***	[1.16,1.27]	1.20***	[1.15,1.25]	1.07	[0.97,1.18]	0.69***	[0.62,0.77]	0.90***	[0.85,0.94]	0.97	[0.89,1.06]
Male (vs. female)	1	[0.98,1.03]	0.99*	[0.97,1.02]	1.06	[1.01,1.12]	1.06*	[1.01,1.12]	1.04*	[1.02,1.07]	1.18***	[1.13,1.23]
Race/ethnicity (ref. NH White)^a												
Hispanic/Latino	1.06***	[1.03,1.10]	0.93***	[0.90,0.97]	0.97	[0.91,1.03]	1.05	[0.99,1.12]	0.99	[0.95,1.02]	0.88***	[0.83,0.93]
NH Black/African American ^a	0.85***	[0.82,0.88]	0.91***	[0.88,0.95]	0.90**	[0.83,0.96]	0.94	[0.87,1.02]	1.03	[0.98,1.07]	0.87***	[0.81,0.93]
NH Asian and Pacific Islander ^a	1.14***	[1.09,1.19]	1.03	[0.99,1.08]	1.13	[1.03,1.25]	1.05	[0.94,1.17]	0.83***	[0.79,0.88]	0.86**	[0.79,0.95]
NH Other Race ^{a,b}	1.03	[0.99,1.06]	1.02	[0.99,1.06]	1.11**	[1.04,1.18]	1.01	[0.94,1.08]	0.95*	[0.91,0.99]	0.85***	[0.79,0.91]
Preferred language is English (vs. not)	1.14***	[1.10,1.17]	1.04**	[1.01,1.07]	0.92*	[0.86,0.99]	0.89**	[0.83,0.96]	0.90***	[0.87,0.93]	1	[0.94,1.06]
Urban (vs. rural)	0.82***	[0.77,0.87]	1.08**	[1.02,1.15]	1.20**	[1.08,1.33]	0.92	[0.84,1.02]	0.90***	[0.85,0.95]	1.06	[0.95,1.17]
Experiencing homelessness (vs. not)	0.92***	[0.89,0.95]	1.03	[1.00,1.07]	1.18***	[1.11,1.25]	1.18***	[1.11,1.26]	1.45***	[1.40,1.51]	1.64***	[1.55,1.73]

	Follow-up outpatient services within 7 days								Follow-up acute services within 30 days			
	Any primary care visit		Any specialty visit		Any mental health visit		Any SUD visit ^a		Any ED visit followed by discharge ^a		Any hospitalization	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Sample size	164,543											
Health status												
<i>Physical chronic conditions</i>												
Has diabetes	1.05***	[1.02,1.08]	0.96*	[0.94,0.99]	0.99	[0.93,1.04]	0.94*	[0.88,0.99]	0.98	[0.95,1.01]	0.97	[0.92,1.02]
Has chronic obstructive pulmonary disease	1.08***	[1.04,1.11]	1.07***	[1.04,1.11]	0.96	[0.90,1.03]	1.10**	[1.03,1.17]	1.11***	[1.07,1.15]	1.28***	[1.21,1.35]
Has asthma	1.01	[0.98,1.04]	1.01	[0.98,1.04]	0.93*	[0.88,0.99]	0.93*	[0.88,0.99]	1.11***	[1.08,1.15]	0.85***	[0.80,0.91]
Has hypertension	1.09***	[1.07,1.12]	1.04**	[1.01,1.06]	0.91**	[0.87,0.96]	0.99	[0.94,1.04]	1.02	[0.99,1.05]	0.98	[0.93,1.03]
Has obesity	1.10***	[1.07,1.13]	1.02	[0.99,1.05]	0.96	[0.90,1.02]	1.01	[0.95,1.08]	0.99	[0.95,1.02]	0.93*	[0.88,0.99]
Has cardiovascular disease	1.13***	[1.10,1.16]	1.31***	[1.28,1.35]	0.88***	[0.83,0.93]	0.92**	[0.86,0.98]	1.10***	[1.07,1.14]	1.52***	[1.44,1.61]
Has chronic kidney disease	1.09***	[1.06,1.12]	1.23***	[1.20,1.27]	0.93*	[0.88,1.00]	0.95	[0.89,1.02]	1.15***	[1.11,1.18]	1.60***	[1.52,1.69]
<i>Mental health chronic conditions</i>												
Has depression	1.10***	[1.06,1.14]	1.14***	[1.10,1.18]	1.08**	[1.02,1.15]	0.89***	[0.84,0.94]	1	[0.96,1.04]	1.05	[0.99,1.12]
Has anxiety	1.11***	[1.08,1.15]	1.13***	[1.09,1.17]	1.04	[0.99,1.10]	1	[0.94,1.05]	1.16***	[1.12,1.20]	0.97	[0.91,1.04]
Mental health and substance use disorder (vs none)												
Has any mental health condition only	1.00	[0.97,1.03]	0.95**	[0.91,0.98]	2.34***	[2.17,2.52]	1.62***	[1.51,1.75]	1.12***	[1.07,1.16]	1.06	[1.00,1.14]
Has any substance use disorder only	0.87***	[0.82,0.93]	0.93*	[0.88,0.99]	2.62***	[2.33,2.95]	4.31***	[3.90,4.77]	1.27***	[1.20,1.35]	1.45***	[1.32,1.59]
Has any mental health condition and substance use disorder	0.90***	[0.86,0.94]	0.93**	[0.88,0.98]	3.51***	[3.20,3.84]	4.06***	[3.74,4.42]	1.58***	[1.50,1.66]	1.54***	[1.42,1.67]
<i>Health care use 1 year prior to index ED visit^a</i>												

	Follow-up outpatient services within 7 days								Follow-up acute services within 30 days			
	Any primary care visit		Any specialty visit		Any mental health visit		Any SUD visit ^a		Any ED visit followed by discharge ^a		Any hospitalization	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Sample size	164,543											
Had 2 or more primary care visits 1 year prior (vs. 1)	1.57***	[1.50,1.65]	1.02	[0.98,1.07]	0.78***	[0.71,0.85]	0.91	[0.82,0.99]	0.86***	[0.82,0.90]	0.86***	[0.78,0.93]
Had a specialty visit 1 year prior (vs. not)	0.99	[0.94,1.03]	1.73***	[1.64,1.82]	0.79***	[0.78,0.87]	0.86**	[0.78,0.95]	0.90***	[0.85,0.94]	0.85**	[0.77,0.94]
Had a mental health visit 1 year prior (vs. not)	0.98	[0.96,1.01]	1.04*	[1.01,1.06]	10.42***	[9.69,11.19]	2.29***	[2.17,2.41]	0.97**	[0.94,1.00]	0.99*	[0.94,1.04]
Had an SUD visit 1 year prior (vs. not)^a	1.12***	[1.09,1.15]	1.06***	[1.03,1.08]	1.54***	[1.46,1.63]	3.17***	[2.99,3.37]	1.07***	[1.04,1.10]	1.20***	[1.14,1.26]
Had ED visit followed by discharge (vs. not)^a	0.89***	[0.87,0.91]	0.98	[0.96,1.00]	0.90***	[0.86,0.94]	0.95*	[0.91,1.00]	1.64***	[1.60,1.69]	1.02	[0.98,1.07]
Had a hospitalization 1 year prior (vs. not)	1.05*	[1.02,1.07]	1.22***	[1.19,1.25]	1.09**	[1.03,1.15]	1	[0.95,1.05]	1.26***	[1.23,1.30]	2.59***	[2.47,2.73]
<i>Index ED visit characteristics^a</i>												
Index ED visit was on a weekend (vs. weekday)^a	1.04***	[1.02,1.07]	1.02	[0.99,1.04]	1.03	[0.98,1.08]	1.03	[0.97,1.08]	0.98	[0.96,1.01]	1.02	[0.99,1.07]
Classification of index ED visit using CPT (ref. high severity)^a												
Straightforward or low severity	0.70***	[0.65,0.75]	0.60***	[0.56,0.65]	0.94	[0.82,1.07]	0.69***	[0.58,0.83]	1.11**	[1.03,1.21]	0.73***	[0.63,0.83]
Moderate severity	0.65***	[0.63,0.67]	0.51***	[0.49,0.53]	0.79***	[0.74,0.84]	0.83***	[0.78,0.88]	1.14***	[1.10,1.18]	0.58***	[0.55,0.62]
Moderate to high severity	0.75***	[0.73,0.77]	0.68***	[0.66,0.70]	0.90***	[0.86,0.95]	0.95	[0.90,1.01]	1.07***	[1.04,1.11]	0.74***	[0.70,0.78]
Missing	0.73***	[0.70,0.76]	0.74***	[0.70,0.78]	0.81***	[0.74,0.89]	0.77***	[0.70,0.86]	1.29***	[1.23,1.36]	0.84***	[0.77,0.92]

Notes: Statistically significant at *p<0.05; **p<0.01; ***p<0.001

^aAbbreviations: HRSA, Health Resources and Services Administration; PCP, primary care provider; ED, emergency department; NH, Non-Hispanic; CPT, Current Procedural Terminology; SUD, substance use disorder

^bOther Race included race coded as American Indian/Alaska Native, Other, and unreported.

eAppendix Table 2. Predicted probabilities of health care utilization following an index emergency department visit by index emergency department visit characteristics

		Follow-up outpatient services within 7 days				Follow-up acute services within 30 days	
		Any primary care visit	Any specialty visit	Any mental health visit	Any SUD visit ^a	Any ED visit followed by discharge ^a	Any hospitalization
PCP Type^a	Overall	30.3%	31.8%	5.9%	5.4%	22.1%	6.1%
	HRSA-funded health centers (ref.)^a	30.9%	29.4%	6.1%	6.3%	21.8%	5.2%
	Group practices	30.2%*	34.3%***	5.9%	4.6%***	22.5%**	6.8%***
	Solo practice providers	29.5%**	30.2%	5.6%*	4.5%***	22.1%	6.5%***
	Other community clinics	30.5%	30.6%**	6.0%	5.8%*	21.9%	5.8%**
Weekend vs. Weekday	Weekday (ref.)	30.1%	31.7%	5.9%	5.4%	22.2%	6.1%
	Weekend	31%**	32.1%*	6.1%	5.5%	21.0%	6.2%
Classification of index ED visit using CPT (procedures and services)^a	High severity (ref.)	35.0%	38.3%	6.5%	5.8%	20.9%	7.4%
	Straightforward or low severity	27.4%***	27.6%***	6.1%	4.2%***	22.7%**	5.5%***
	Moderate severity	25.9%***	24.3%***	5.3%***	5%***	23.1%***	4.5%***
	Moderate to high severity	28.8%***	29.9%***	6%***	5.6%	22.1%***	5.7%***
	Missing	28.3%***	31.8%***	5.4%***	4.7%***	25.2%***	6.3%***

Notes: Statistically significant compared to the reference group at *p<0.05; **p<0.01; ***p<0.001

^aAbbreviations: HRSA, Health Resources and Services Administration; PCP, primary care provider; ED, emergency department; CPT, Current Procedural Terminology; SUD, substance use disorder.

eAppendix Table 3. Sensitivity Analysis of predicted probabilities of outpatient services within 14 days following an index emergency department (ED) visit by primary care provider type and descriptive analyses of first ED readmission after index ED visit within 30 days

	PCP Type ^a				
	Overall	HRSA-funded health centers ^a	Group practice	Solo practice	Other community clinics
Follow-up outpatient services within 14 days					
Any primary care visit	43.9%	45.2%	43.2%***	42.9%***	44.2%*
Any specialty visit	43.2%	40.7%	46.1%***	41.4%	41.7%*
Any mental health visit	9.1%	9.3%	9.1%	8.7%**	9.3%
Any SUD visit ^a	8.4%	9.8%	7.2%***	6.9%***	9%**
Descriptive of first ED visit among patients that had ED visit within 30 days					
Sample	41,531				
Index ED visit was on a weekend^a					
Weekend visit	25%				
Weekday visit	75%				
Classification of index ED visit using CPT (procedures and services)^a					
Straightforward or low severity	4%				
Moderate severity	22%				
Moderate to high severity	26%				
High severity	37%				
Missing	12%				

Notes: Statistically significant compared to HRSA-funded health centers at *p<0.05; **p<0.01; ***p<0.001

^aAbbreviations: HRSA, Health Resources and Services Administration; PCP, primary care provider; ED, emergency department; CPT, Current Procedural Terminology; SUD, substance use disorder