Original Scholarship

Medicaid Utilization and Spending among Homeless Adults in New Jersey: Implications for Medicaid-Funded Tenancy Support Services

JOEL C. CANTOR,* SUJOY CHAKRAVARTY,*
JOSE NOVA,* TAIISA KELLY,[†] DEREK DELIA,[‡]
EMMY TIDERINGTON,[§]
and RICHARD W. BROWN[†]

*Rutgers Center for State Health Policy; [†]Monarch Housing Associates;
[‡]Medstar Health Research Institute; [§]Rutgers School of Social Work*

Policy Points:

- Large numbers of homeless adults gained Medicaid coverage under the Affordable Care Act, increasing policymaker interest in strategies to improve care and reduce avoidable hospital costs for homeless populations.
- Compared with nonhomeless adult Medicaid beneficiaries, homeless adult beneficiaries have higher levels of health care needs, due in part to mental health issues and substance use disorders. Homeless adults are also more likely to visit the emergency department or require inpatient admissions.
- Emergency care and inpatient admissions may sometimes be avoided when individuals have high-quality community-based care and healthful living conditions. Offering tenancy support services that help homeless adults achieve stable housing may therefore be a cost-effective strategy for improving the health of this vulnerable population while reducing spending on avoidable health care interventions.
- Medicaid beneficiaries with disabling health conditions and more extensive histories of homelessness experience the most potentially avoidable health care interventions and spending, with the greatest opportunity to offset the cost of offering tenancy support benefits.

Context: Following Medicaid expansion under the Affordable Care Act, the number of homeless adults enrolled in Medicaid has increased. This has spurred interest in developing Medicaid-funded tenancy support services (TSS) for homeless populations as a way to reduce Medicaid spending on health care for these individuals. An emerging body of evidence suggests that such TSS can reduce avoidable health care spending.

Methods: Drawing on linked Homeless Management Information System and Medicaid claims and encounter data, this study describes the characteristics of homeless adults who could be eligible for Medicaid TSS in New Jersey and compares their Medicaid utilization and spending patterns to matched nonhomeless beneficiaries.

Findings: More than 8,400 adults in New Jersey were estimated to be eligible for Medicaid TSS benefits in 2016, including approximately 4,000 living in permanent supportive housing, 800 formally designated as chronically homeless according to federal guidelines, 1,300 who were likely eligible for the chronically homeless designation, and over 2,000 who were at risk of becoming chronically homeless. Homeless adults in our study were disproportionately between the ages of 30 and 64 years, male, and non-Hispanic blacks. The homeless adults we studied also tended to have very high burdens of mental health and substance use disorders, including opioid-related conditions. Medicaid spending for a homeless beneficiary who was potentially eligible for TSS was 10% ($1,362) to 27% ($5,727) more than spending for a nonhomeless Medicaid beneficiary matched on demographic and clinical characteristics. Hospital inpatient and emergency department utilization accounted for at least three-fourths of "excess" Medicaid spending among the homeless groups.

Conclusions: A large group of high-need Medicaid beneficiaries could benefit from TSS, and Medicaid funding for TSS could reduce avoidable Medicaid utilization and spending.

Keywords: Medicaid, homelessness, health care utilization, health expenditures.

S TUDIES HAVE DEMONSTRATED THAT PERMANENT SUPPORTIVE housing (PSH), including tenancy support services (TSS), for certain homeless populations is associated with improved housing stability, fewer hospital emergency department (ED) visits, and less inpatient utilization.[1-4] TSS may include service planning, tenant orientation and move-in assistance, landlord dispute resolution, and other services.[5] With the Affordable Care Act (ACA) Medicaid expansion,

large numbers of low-income adults without dependents became eligible for Medicaid services, greatly increasing the program's responsibility for paying for health care for homeless adults.[6,7] Together, the Medicaid expansion and evidence about the potential benefits of PSH raise the prospect that Medicaid-funded TSS may be a cost-effective strategy for improving the health of this vulnerable population while reducing avoidable health care spending.

Historically, state Medicaid programs have ventured into covering TSS primarily to reduce institutionalization among populations eligible for placement in Medicaid-financed long-term care facilities. Recently, the potential advantages of extending such benefits to address the needs of homeless populations ineligible for nursing home care has gained attention. In 2018, the National Academies of Sciences, Engineering, and Medicine recommended that states "pursue opportunities to expand the use of Medicaid reimbursement for housing-related services to beneficiaries whose medical care cannot be well provided without safe, secure, and stable housing."[8(pp139-140)] States are increasingly exploring such strategies with the encouragement of federal officials.

As of April 2019, eight states were approved for Medicaid §1115 waivers to fund TSS, and the federal government had allowed three others to add these benefits through home- and community-based services state plan amendments.[9] Moreover, in November 2018, US Department of Health and Human Services Secretary Alex Azar signaled that Medicaid may permit hospitals and health systems to directly pay for housing to help mitigate avoidable healthcare spending associated with homelessness, although questions remain about whether direct funding of housing is legally permissible under the Medicaid statute.[10]

Federal demonstration waivers require federal budget neutrality. Regardless of the mechanism through which Medicaid TSS benefits are deemed permissible, interest in covering these services likely stems, at least in part, from the prospect that enabling homeless persons to achieve stable housing will lead to Medicaid savings. While, as noted, studies have documented reduced health care spending from supportive housing for some populations, there are significant gaps in the evidence demonstrating whether Medicaid TSS benefits can be budget neutral.[8(p74),11]

To help address this evidence gap, our study draws on homeless services and Medicaid data to estimate the number and characteristics of adults potentially eligible for Medicaid-financed TSS in New Jersey and quantify their overall and potentially avoidable Medicaid service

utilization and spending. While this study was neither an empirical evaluation of an actual TSS benefit nor a savings forecast, our analysis quantitatively evaluated the level of potentially avoidable utilization and spending associated with homelessness by comparing potentially TSS-eligible Medicaid beneficiaries to demographically and clinically matched beneficiaries who were not experiencing homelessness.

Data and Measures

Linked Administrative Data Sources

The study used individually linked data for 2014 to 2016 from two sources: the state Medicaid Management Information System (MMIS) and the Homeless Management Information System (HMIS). MMIS includes data for all New Jersey Medicaid recipients obtained at enrollment and at each health care encounter, whether paid on a fee-for-service basis or through a managed care organization contracting with the state. Enrollment records provide data on demographic characteristics, including age, sex, and race/ethnicity, as well as enrollment category (aged, blind, and disabled; NJ FamilyCare children and parents; ACA expansion population; and other groups). Encounter records contain information on the type of service used (eg, ED visits, inpatient hospitalizations), dates of service, and detailed diagnostic and procedure codes.

HMIS was established by the US Department of Housing and Urban Development (HUD) to record information about homeless services users and services provided.[12] In New Jersey, 19 of the state's 21 counties use a common statewide HMIS platform, and the other two counties (Middlesex and Bergen) submit data to the statewide system on emergency shelter and safe haven service utilization. Each HMIS record contains information on the type of service used, dates of service, client health and demographic characteristics, sources of client income, and client-reported housing status prior to entry into the service program.

Measures of Medicaid Utilization and Spending

We used five measures of utilization and spending in 2016 for our analysis. While the services we measured may be appropriate or even essential at the time they are delivered, our focus was on measuring utilization that

could be avoided in the presence of high-quality community-based care and healthful living conditions. Thus, we compared rates of potentially avoidable health care use among homeless individuals to comparable nonhomeless populations to examine possible differences in Medicaid utilization attributable to the constellation of circumstances associated with homelessness.

To construct the utilization metrics, we began by measuring rates of ED treat-and-release visits and inpatient admissions. In addition to comparing mean numbers of ED visits and inpatient admissions, we examined the probability of any ED visit or inpatient admission and the likelihood of an individual being a "high user" of these services. We defined ED high use as six or more visits in one year and inpatient high use as three or more admissions in one year.

We also examined ambulatory care sensitive (ACS) admission rates and 30-day all-cause hospital readmission rates. ACS admissions result from short- and long-term complications of chronic and acute medical conditions, such as diabetes, asthma, heart failure, and bacterial pneumonia, and have been shown to occur more frequently when community-based ambulatory care is inadequate, either because it is inaccessible or because it is of poor quality.[13-15] For this metric, we used the validated prevention quality indicators from the federal Agency for Healthcare Research and Quality.[16]

Hospital readmissions may occur when there are gaps in inpatient or outpatient care or when hospital-to-community transitions are poorly managed.[17,18] For example, readmission rates are likely to be higher in the absence of adequate ambulatory follow-up care following discharge. Specifically, this measure captured unplanned all-cause readmissions following hospitalization for any condition.

Next, we examined total Medicaid spending and spending for specific categories of utilization, including the services discussed previously (ED visits, inpatient stays, ACS admissions and 30-day hospital readmissions), other types of ambulatory care, prescription drugs, and all other services. It was important to examine spending on nonemergency ambulatory care and prescription drugs because these services may be underused by people with poor access to care and use and spending in these categories may therefore increase once TSS services are provided. For individuals with less than one year of Medicaid enrollment, we estimated their annual spending amounts by multiplying the given amount spent by the ratio of days in the year to enrolled days.

Covariates

We used key covariates to describe and adjust for factors that are likely to be important drivers of Medicaid utilization and spending that may not be avoidable. Measures of age, sex, race and ethnicity, and Medicaid eligibility group (aged, blind, and disabled; expansion; and other) were collected from MMIS. Additionally, MMIS diagnostic data on Medicaid claims and encounter records were used to calculate each beneficiary's count of physical chronic conditions,[19] and determine whether beneficiaries had been diagnosed with a serious mental illness (SMI), other mental illness, or a substance use disorder (SUD). We separately estimated the prevalence of diagnostic codes indicating opioid use and dependence in our study groups. We also adjusted for the diagnosis-based Chronic Illness and Disability Payment System (CDPS) risk score, a measure of diagnostic mix and burden of illness in which higher values indicate greater disease burden.[20]

Study Population

Populations Potentially Eligible for TSS

Our analysis focused on adults who might have been eligible for Medicaid-funded TSS in 2016 had such benefits been offered that year. Specifically, the analysis included Medicaid-enrolled adults (age 18 years or older) who were homeless or placed in PSH in 2016. We defined homelessness based on use of certain homeless services during the year (as discussed later in this article). Children were excluded from the analysis because they often receive homeless services because their parent or guardian meets service eligibility criteria. Additionally, any beneficiary living in a Medicaid-funded facility, such as a nursing home, at any time during 2016 was not classified as homeless. To achieve stable estimates of Medicaid utilization and spending, we further restricted our study population to adults who were enrolled in Medicaid for at least 10 months in 2016.

Within the study population, we classified individuals who may have been eligible for Medicaid-funded TSS into four groups (A, B, C, and D). Group A comprised adults already placed in PSH in 2016.

Group B included adults who were not placed in PSH but were flagged as "chronically homeless" in HMIS in 2016. This flag is automatically

generated by HMIS when assembled documentation demonstrates that an individual meets HUD criteria for chronic homelessness, making that person eligible for certain PSH placements. To meet these criteria, a person must have both a qualifying disabling condition and a sufficient history of homelessness. Qualifying disabling conditions include developmental disabilities, AIDS and related conditions, and other physical, mental, or emotional impairments that are expected to be long-term, impede individuals' ability to live independently, and could be improved with more suitable housing.[21]

HUD defines a "sufficient history of homelessness" as being homeless for at least 12 continuous months or having four or more episodes of homelessness that add up to 12 months of homelessness over three years. Periods of homelessness may include time spent in emergency shelters, safe havens, certain institutional care facilities, or places "not fit for human habitation" (eg, on the street or in a car).[22] Safe havens are a type of shelter that provide services for "hard-to-reach homeless persons with severe mental illness."[21(p1)]

Group C comprised other individuals who we found to have had a qualifying homeless history and a qualifying disability in our linked 2014-2016 data set but who were not flagged as chronically homeless in HMIS. We included individuals identified by HMIS as receiving disability income or having a disabling condition. Such people may not be flagged as being chronically homeless due to a lack of adequate documentation. In addition, this group included individuals with a qualifying homeless history who were identified in MMIS as having a developmental disability[23] or SMI[24,25] on any Medicaid claim or encounter record in 2014-2019.

Finally, we designated a category of "at-risk" adults as Group D. We determined that these individuals had a qualifying disability, as described previously, but did not have the required homeless history. We included adults who were homeless for 3 to 11 months during the three-year period 2014-2016. A Medicaid TSS benefit might be tailored for such a group to prevent transition to chronic homelessness.

Comparison Population

We generated a comparison group of adults who did not use any homeless services (ie, did not appear in HMIS) during the study period but

otherwise matched the clinical and demographic characteristics of individuals in Groups B, C, and D. To do this, we identified five comparison Medicaid recipients for each Medicaid recipient in these three groups. Because the effects of homelessness were likely mitigated by PSH placement, and evaluation research techniques could directly estimate the effects on utilization and spending of placement in PSH (Group A), we did not include comparisons for that group in our analysis. Matching procedures are discussed in the next section.

Analysis

Our analysis focused on key measures of Medicaid utilization and spending in 2016. We used data from 2014 and 2015 (and sometimes 2016) to adjust for covariates, as explained later. We first described demographic and health differences in our study variables for our TSS-eligible groups (Groups A-D). For reference, we also created distributions for the aged, blind, and disabled, Medicaid expansion, and other Medicaid-enrolled populations that did not match to any HMIS record during the study period, referred to as the "nonhomeless" population.

Next, we examined differences in our use and spending metrics for Groups B, C, and D and their matched comparison groups. For each homeless person in each of the three groups potentially eligible for Medicaid TSS (ie, Groups B, C, and D), we selected five comparison individuals who were similar based on prespecified characteristics that are risk factors for health care utilization. To account for predisposing risk factors for 2016 outcomes, we matched characteristics using 2015 data for individuals with at least ten months of 2015 Medicaid enrollment. For individuals with fewer than ten months Medicaid enrollment in 2015, we matched on 2014 characteristics; we defaulted to 2016 data if matches based on 2015 or 2016 were not possible. Most matching (84%) was done with 2015 data, with the remainder done with data from 2016 (13%) and 2014 (3%).

Matching took place in two steps. First, we selected comparison individuals who were exact matches of homeless individuals in the study based on eight characteristics: Medicaid eligibility category, sex, race/ethnicity, year of data match, mental health diagnosis, SUD diagnosis, SMI diagnosis, and the quartile including the individual's CDPS score. Out of the pool of exactly matched comparison individuals based

on these characteristics, we employed Mahalanobis distance matching to select the five comparison observations who were most similar based on age, number of chronic conditions, number of Medicaid days enrolled, and CDPS score.[26] Mahalanobis matching was conducted using the "mahapick" command in Stata 15.1.[27]

Findings

Study Sample

Table 1 shows how many individuals were in the four groups of adults potentially eligible for Medicaid-funded TSS, as well as the numbers of nonhomeless adults who were in the Medicaid aged, blind, and disabled, expansion, and other enrolled adult populations. Across New Jersey, more than 8,400 individuals were potentially eligible for Medicaid-financed TSS services in 2016. Just under half of them were already placed in a PSH program (Group A), and another 10% were designated chronically homeless in the New Jersey HMIS (Group B). Individuals who were not flagged by HMIS but likely could meet criteria for the chronically homeless designation accounted for 16% of those potentially eligible for TSS (Group C). Finally, about a quarter of those potentially TSS eligible were classified as at risk of chronic homelessness (Group D).

Characteristics of Populations Potentially Eligible for TSS

The four TSS groups as well as the nonhomeless Medicaid expansion population were predominantly between the ages of 30 and 64 years, especially in Groups B and C (Table 2). Most of the study groups exhibited gender parity, except Groups B and C, which were disproportionately male. In comparison to the nonhomeless populations, the four TSS groups had substantially higher proportions of non-Hispanic blacks. The plurality of the PSH population (Group A) was enrolled in Medicaid through the aged, blind, and disabled category. In the other three TSS groups, most individuals were covered under the ACA expansion.

Behavioral health diagnoses were substantially more common in the TSS groups, especially among those not placed in PSH (ie, Groups B, C, and D), than in the nonhomeless populations. About one-half to

Table 1. Study Population

Study Group	Group Definition	N	%
Nonhomeless Medicaid beneficiaries			
Aged, blind, and disabled	Not linked to NJ HMIS, 2014-2016	221,320	26.2
Medicaid expansion		282,649	33.5
Other		339,329	40.2
Total nonhomeless beneficiaries		843,298	100.0
Medicaid beneficiaries potentially eligible for TSS groups			
A: Permanent supportive housing	PSH placement any time in 2016	4,081	48.2
B: HMIS-flagged as chronically homeless	Not in Group A; HMIS flagged as chronically homeless in 2016	849	10.1
C: Probably chronically homeless	Not in Group B; meets 3-year HUD homeless history criteria and has disability consistent with chronic homelessness definition	1,355	16.0
D: At risk of chronic homelessness	Not in Group C; has 3-11 months of homeless history in 2014-2016 and has disability consistent with chronic homeless definition	2,160	25.6
Total potentially eligible for TSS		8,445	100.0

Abbreviations: HUD, US Department of Housing and Urban Development; NJ HMIS, New Jersey Homeless Management Information System; PSH, permanent supportive housing; TSS, tenancy support services.

Table 2. Comparison of Demographic, Medicaid Eligibility, and Health Characteristics of the Medicaid Aged, Blind, and Disabled (ABD) and Expansion Populations Not Receiving Homeless Services and Homeless Study Groups, 2016

| | Not Receiving Homeless Services[a] | | Homeless Study Groups Potentially Eligible for TSS | | | | |
| | | | In PSH (Group A) | HMIS-Flagged as CH (Group B) | Probably CH (Group C) | At Risk of CH (Group D) | P |
	ABD	Expansion[b]					
Age group, %							
18–29 years	10.7	30.6	21.5	14.7	13.7	20.5	<0.0001
30–49 years	17.4	31.5	36.1	41.3	43.2	44.0	
50–64 years	25.9	36.9	38.1	40.8	39.2	33.1	
65 years or older	45.9	0.9	4.3	3.2	3.8	2.4	
Sex, %							
Male	40.7	51.1	44.8	67.6	57.3	49.6	<0.0001
Female	59.3	48.9	55.2	32.4	42.7	50.4	
Race/ethnicity, %							
White, non-Hispanic	37.8	31.4	28.3	41.7	41.5	37.7	<0.0001
Black, non-Hispanic	23.3	20.2	59.3	42.5	46.1	50.0	
Hispanic	13.8	16.7	7.6	9.7	9.1	8.3	
Other	25.1	31.7	4.8	6.1	3.2	4.0	
Medicaid eligibility category, %							
ABD	100.0	0.0	43.9	37.0	33.9	27.0	<0.0001
Expansion[b]	0.0	100.0	27.2	56.4	52.1	50.6	
Other	0.0	0.0	28.9	6.6	13.9	22.4	

Table 2. *Continued*

| | Not Receiving Homeless Services[a] | | Homeless Study Groups Potentially Eligible for TSS | | | | |
	ABD	Expansion[b]	In PSH (Group A)	HMIS-Flagged as CH (Group B)	Probably CH (Group C)	At Risk of CH (Group D)	*P*
Behavioral health diagnoses, %							
Any behavioral health diagnosis	48.1	33.5	65.8	90.0	82.9	81.7	<0.0001
Both mental health and SUD	11.0	10.7	31.5	62.9	50.0	48.8	<0.0001
SUD only	4.9	9.7	11.5	13.9	17.4	16.9	<0.0001
Mental health only	32.2	13.1	22.8	13.2	15.5	16.0	<0.0001
Opioid abuse or dependence	3.9	6.3	13.0	32.0	31.0	28.5	<0.0001
SMI	24.1	16.4	47.1	72.2	65.8	64.4	<0.0001
No. of chronic conditions,[c] %							
0	35.9	27.6	32.7	36.0	27.9	48.2	0.0009
1	24.0	24.7	25.2	25.3	18.2	24.6	
2-3	22.7	25.6	25.0	22.9	23.6	17.2	
≥4	17.4	22.1	17.1	15.8	30.3	10.0	

Abbreviations: ABD, aged, blind, and disabled; CH, chronically homeless; HMIS, Homeless Management Information System; PSH, permanent supportive housing; SMI, serious mental illness; SUD, substance use disorder; TSS, tenancy support services
[a] All Medicaid-enrolled adults not linked to the HMIS.
[b] Includes a small number of general assistance recipients who were Medicaid eligible prior to the Affordable Care Act.
[c] Out of 27 nonbehavioral health chronic conditions, based on the Centers for Medicare and Medicaid Services Chronic Condition Warehouse.

two-thirds of individuals in Groups B, C, and D had both mental health and SUD diagnoses. Nearly one in three adults in the non-PSH homeless groups had at least one Medicaid record with a code indicating opioid abuse or dependence code during 2016. The rate was much lower in the PSH group (Group A) and lower still in the nonhomeless study groups.

The prevalence of nonbehavioral health chronic conditions in the potentially TSS-eligible subgroups was higher than in the nonhomeless Medicaid expansion population but lower than in the nonhomeless aged, blind, and disabled population. There were minor differences in the distribution of the number of chronic conditions across the potentially TSS-eligible subgroups.

Utilization and Spending among TSS-Eligible and Matched Ineligible Groups

Table 3 presents hospital utilization and avoidable use metrics for homeless adults potentially eligible for Medicaid TSS benefits (Groups B, C, and D) and their matched comparison groups. In all three potentially TSS-eligible groups, we observed significantly higher use of ED and inpatient services—including greater rates of any use and high use (ie, six or more ED visits or three or more inpatient admissions per year). For these metrics, differences relative to matched comparisons were larger in Group B (those designated in HMIS as chronically homeless) than in Groups C and D. A similar pattern was evident for ACS admission rates: There were large absolute differences between the groups of interest and the respective comparison groups, and the difference was greatest in Group B. We did not observe a significantly higher hospital readmission rate in Group B compared with its matched population, but differences were significant for Groups C and D.

Total Medicaid spending was higher in Groups B, C, and D relative to their matched groups (Table 3). Per-person spending in Group B was 27% greater than its comparison group, a difference of $5,727 in 2016. There was also "excess" spending in Groups C and D relative to their comparisons, but to a lesser degree (16% and 10% greater spending, respectively). ED spending in Group B was 73% higher than in the matched group, and ED spending in Groups C and D was nearly 50% greater compared with their respective matches. Spending on inpatient admissions followed a similar pattern: Group B spending exceeded

Table 3. Hospital Use and Medicaid Spending for Persons Potentially Eligible for Tenancy Support Services and Matched Comparison Groups, 2016

	HMIS-Flagged as Chronically Homeless (Group B)				Probably Chronically Homeless (Group C)				At Risk of Chronic Homelessness (Group D)			
	TSS	Comp	Diff	P	TSS	Comp	Diff	P	TSS	Comp	Diff	P
No. of ED visits												
≥1, %	78.8	54.2	24.6	<0.0001	64.8	50.1	14.7	<0.0001	67.3	51.7	15.6	<0.0001
≥6, %	31.3	7.4	23.9	<0.0001	15.2	6.3	8.9	<0.0001	13.9	6.0	7.9	<0.0001
Mean	6.4	2.0	4.4	<0.0001	3.0	1.6	1.4	<0.0001	2.9	1.5	1.4	<0.0001
No. of inpatient admissions												
≥1, %	39.6	24.7	14.9	<0.0001	26.5	20.2	6.3	<0.0001	25.2	19.0	6.2	<0.0001
≥3, %	12.2	4.2	8.0	<0.0001	5.5	2.9	2.6	<0.0001	3.9	2.3	1.6	0.0001
Mean	1.0	0.5	0.5	<0.0001	0.5	0.4	0.1	<0.0001	0.4	0.3	0.1	<0.0001
No. of ACS admissions per 1,000 adults	90.0	44.1	45.9	<0.0001	55.2	36.8	18.4	0.0033	42.1	28.1	14.0	0.0012
No. of 30-day readmissions per 100 index admissions	20.8	18.9	1.9	0.4501	20.5	15.7	4.8	0.0259	16.2	11.5	4.7	0.0061
Medicaid spending,[a] $												
Total	21,307	15,580	5,727	<0.0001	15,786	13,217	2,569	0.0003	13,545	12,183	1,362	0.0131
Inpatient admissions	7,225	3,848	3,377	<0.0001	4,192	2,842	1,350	0.0002	3,627	2,539	1,088	0.0003
ACS admissions	605	261	344	0.0740	309	210	99	0.1977	339	161	177	0.0371
ED visits	2,546	701	1,845	<0.0001	1,133	589	544	<0.0001	1,048	564	484	<0.0001
Ambulatory care[b]	7,546	6,882	664	0.1577	5,873	6,015	(142)	0.6484	5,467	5,673	(206)	0.4192
Prescription drugs	2,990	3,450	(460)	0.2130	3,779	3,048	731	0.0310	2,527	2,748	(221)	0.2891
All other spending	1,000	699	301	0.0062	809	723	86	0.1641	875	658	217	0.0009

Abbreviations: ACS, ambulatory care sensitive; Comp, matched comparison group; Diff, percentage point difference between homeless group and matched comparisons; ED, emergency department; TSS, tenancy support service group.

[a] Adjusted for time enrolled during the year.

[b] Excludes ED visits; includes outpatient facility, physician, and clinic services.

spending in its comparison group by 47%, and spending in the other groups was on average about 30% more than in their comparisons. Spending on ACS admissions also exhibited a similar pattern, but the differences between Groups B and C and their respective comparison groups were not significant. Prescription drug spending, nonemergent ambulatory spending, and spending on all other services were not notably different for the TSS groups and their respective matched groups.

Discussion

Interest in developing Medicaid-funded TSS for homeless populations is growing due the ACA Medicaid expansion and a body of evidence that such services can reduce avoidable health care spending. This study estimated the number and characteristics of individuals who could be eligible for Medicaid TSS in New Jersey and compared their utilization and Medicaid spending patterns to matched nonhomeless beneficiaries.

To describe the population potentially eligible for Medicaid TSS using linked Medicaid and homeless services data, we examined adults already placed in PSH and applied disability and homeless history eligibility criteria common to PSH to others. Based on these criteria, we found that over 8,400 adults were potentially eligible for TSS in 2016. Nearly half of this group was already placed in PSH. Of the remaining potentially TSS eligible adults, only a small share was designated chronically homeless in New Jersey's HMIS. This finding is not surprising because the formal chronic homelessness designation based on HUD regulations requires case workers to obtain extensive documentation of each individual's disability and homeless histories. Our analysis suggests that the number of chronically homeless adults in New Jersey was likely more than double the number formally flagged in HMIS. In addition, we estimated that more than one-fourth of potential Medicaid TSS recipients had qualifying disabilities but did not have homeless histories sufficient to classify them as chronically homeless. This comparatively large group "at risk" for chronic homelessness may benefit from prevention-oriented TSS services.

Compared to other Medicaid beneficiaries, the TSS-eligible groups were disproportionately ages 30 to 64 years, male, and non-Hispanic black, findings that reflect the demographics of New Jersey's homeless population.[28] Individuals in these groups tended to have very high

burdens of behavioral health conditions. In the three groups of potentially TSS-eligible homeless adults not placed in PSH (Groups B, C, and D), 80% to 90% had at least one behavioral health condition, and most had co-occurring mental health and SUD diagnoses. In contrast, about two-thirds of adults placed in PSH (Group A) had a behavioral health diagnosis. Rates of SMI were also high across our study groups of homeless adults. It is especially noteworthy that about 30% of the adults in the TSS groups not placed in PSH had a diagnosis of opioid abuse or dependence, a rate nearly three times higher than the rate for individuals living in PSH. Extrapolating from the findings of studies evaluating PSH program outcomes,[8] we believe that lower mental illness and SUD rates for Group A individuals compared with individuals in Groups B, C, and D were almost certainly due to patterns of selection into PSH, rather than improvements in mental health or SUD following PSH placement. Collectively, these statistics suggest that it may be challenging to engage homeless adults who would be categorized in Groups B, C, and D in PSH, and sustaining their tenancy could be difficult.

Our findings also suggest that addressing the needs of chronically homeless adults in New Jersey would require a large expansion of PSH capacity. Depending on program eligibility criteria, up to double the number of placements available to Medicaid beneficiaries would be needed. Such an expansion would likely require new resources for rental subsidies and investments in expanded affordable housing stock in many areas. In most cases, Medicaid funds cannot currently be used for these purposes.[5]

The high burden of behavioral health disorders, including SMI, SUD in general, and opioid dependence specifically, in the groups of homeless adults we studied suggest that PSH models, such as Housing First, are needed. Housing First, which emphasizes placement without preconditions such as abstinence from substance use or engagement in mental health treatment, has documented success enrolling and retaining "difficult to engage" populations in PSH. Housing retention rates in Housing First among those with high needs are reported to be 85% at one-year post-housing[29,30] and up to 80% at two or more years post-housing.[30-32] Multisite randomized controlled trials and a large-scale federal demonstration project administered by HUD and the US Department of Veterans Affairs also show that individuals with high needs who reside in Housing First programs have better housing stability than comparable individuals who receive "care as usual."[33-35] This research provides

further evidence that expansion of PSH to high-needs populations could succeed.

Acknowledging the importance of meeting the needs of homeless populations with behavioral health disorders, HUD has since federal fiscal year 2013 sought to increase the share of supportive housing programs adhering to Housing First principles.[36] Housing First has the potential to address housing needs of people with behavioral health disorders, but the high prevalence of these conditions among Medicaid TSS-eligible populations underscores the importance of ensuring adequate treatment capacity and effective integration of behavioral health services with medical care and TSS; such priorities compound long-standing challenges for Medicaid programs.[37]

Findings from the literature on cost savings from PSH have been mixed, but the strongest studies indicate that reduced spending on hospital services is likely, especially for the highest need patients.[2,4,38] In our study, Medicaid spending in 2016 for high-need homeless adults was substantially higher than for nonhomeless adults matched on demographic and clinical characteristics. Specifically, we found the greatest "excess" spending associated with homelessness was among individuals HMIS documented as chronically homeless (Group B). Per person, Medicaid spending in this group was $5,727 (27%) more than spending in the matched nonhomeless group. Spending differences between Group C (adults not formally classified as chronically homeless but who likely meet those criteria) and Group D (adults with qualifying disabilities but with shorter histories of homelessness) and their matches were smaller: $2,569 (16%) and $1,362 (10%) per beneficiary, respectively. These findings indicate that, for the greatest savings, the most intensive tenancy support resources should be targeted to those already documented as chronically homeless; additionally, service packages for other people at risk of chronic homelessness may plausibly reduce use of Medicaid-financed avoidable hospital services.

Our findings about spending differences between homeless and matched comparison populations should not be interpreted as projections of actual savings if PSH were made available to our study population. Our analysis may not capture important ways that homeless individuals not placed in PSH differ from individuals who are not homeless. For example, while we matched on the presence of SMI, we had no way to control for severity of these conditions.

Nevertheless, patterns of utilization and spending by type of service in our study are largely consistent with findings of experimental and quasi-experimental studies of PSH interventions.[2,3] Like most PSH evaluations, we found that inpatient admission and ED visit rates were much higher for individuals in TSS-eligible groups relative to matched nonhomeless individuals. Illustrating this pattern, per-patient hospital spending on behalf of adults designated as chronically homeless (Group B) was $3,377 higher than in the comparison group. That amount was roughly equivalent to estimated Medicaid inpatient savings from housing placement in one large study of PSH placement for individuals with SMI in New Your City ($2,825 in 1999 dollars, equivalent to about $4,070 in 2016).[4] Also consistent with the literature, we did not find large amounts of "excess" spending for nonemergency ambulatory care and prescription drugs among TSS-eligible adults.

In sum, although our study did not formally forecast savings from PSH, the extant evaluative literature suggests that savings of a magnitude similar to our estimates may be possible. While our study suggests that health care spending reductions could offset the cost of targeted Medicaid-funded tenancy support benefits, our estimates do not constitute formal budget neutrality estimates and could not be used for federal approval of state demonstration waivers authorizing coverage of such services.[39]

We did not observe significant differences in ambulatory care spending between groups of homeless adults and their matched counterparts. Lower ambulatory care spending for homeless adults may have been expected in light of likely barriers to such care in this population. However, differences in disease severity or acuity, which we cannot account for in our matching procedures, may affect the relative need for such care among homeless compared with nonhomeless adults. Future research analyzing components of ambulatory care (eg, primary and preventive care, specialty services, physical therapy) or using richer clinical data is needed to shed light on ambulatory care utilization patterns in this population.

Finally, our results suggest that improving ambulatory care can address only a small portion of the unmet needs of high-morbidity homeless adults. While patterns of ACS admissions and spending across our potentially TSS-eligible groups mirrored those of hospital spending overall, ACS admissions represented less than 10% of total hospital spending, and ACS-related spending was not always significantly different between

TSS-eligible and matched groups. Additionally, 30-day inpatient readmissions represent only a small portion of potentially avoidable hospital use in our study groups.

Limitations

Our study was limited to a single state. We note, however, that New Jersey is demographically and economically diverse, and our findings may therefore be applicable to other jurisdictions.[40]

Our study focused only on possible savings to Medicaid from expanded TSS, but the literature clearly shows that effective PSH programs can have other economic benefits, including savings from reduced shelter use and reduced criminal justice involvement.[2,38] If we were able to account for such costs, the possible return on investment from expanded TSS would certainly be greater than our estimates suggest.

While linked Medicaid and homeless services data provide a rich source of information, administrative data have limitations.[41] Claims data do not capture undiagnosed illnesses or services paid for by other sources such as Medicare. Additionally, our data did not have direct measures of disabilities, outside of those that can be derived from diagnostic data.

Furthermore, while NJ HMIS captures shelter and safe haven use statewide, two mainly suburban counties do not contribute data on other homeless services. This gap likely biased downward our estimates of time spent in places "not fit for human habitation," a data field that is recorded on some record types that the two counties do not contribute to the state HMIS. Another limitation was that homeless persons in New Jersey may receive housing services in neighboring states (eg, in New York City, Philadelphia, or other jurisdictions), and we could not capture this in our data. In contrast, Medicaid-funded services delivered out of state were recorded in our data. Additionally, to achieve stable estimates for our population in 2016, we limited our analysis to individuals who were enrolled in Medicaid for at least 10 months that year. Without this exclusion, our study population of TSS-eligible individuals (Groups A-D) would have increased by 21.2% (1,790 excluded individuals). Because of these data limitations, our counts of potentially TSS-eligible individuals should be considered conservative.

We focused on a selected group of homeless persons, adults who use homeless services recorded in the HMIS. Homeless adults not using HMIS-recorded services are beyond the scope of this study. However, evidence suggests that delivering TSS to individuals with the greatest needs will provide the greatest savings[2,38]; thus, the groups we studied are likely to be of particular interest to Medicaid policymakers.

Finally, our matching procedures effectively adjusted for the demographic and health characteristics of the study population in a cross-sectional analysis at a point in time (2016). It is important to note that demographic trends in the homeless population, in particular the rising average age of homeless adults,[42] will likely increase demands on Medicaid programs to develop TSS and care strategies in the future.

Conclusion

In spite of its limitations, this study provides important new information relevant to the design of Medicaid-funded TSS for homeless persons. Using novel linked statewide data, we found that a significant number of very high–need Medicaid enrollees were homeless and could benefit from the expansion of supportive housing programs. Comparisons of homeless populations to demographically and clinically similar nonhomeless populations indicate that new investments in TSS may potentially reduce use of expensive and avoidable hospital services. Additional research on program strategies is needed to identify the extent to which TSS can achieve that potential in this very complex population.

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