Unsheltered vs. Sheltered Adults Experiencing Homelessness: Health Care Spending and Utilization

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Unsheltered "rough sleepers" are among the most vulnerable members of society.[1] Compared to sheltered homeless individuals, rough sleepers experience higher burdens of physical illness, mental illness, substance use disorders, trauma, and death.[2] Yet, health care spending and utilization patterns among unsheltered individuals remain poorly understood. To our knowledge, no study has used claims data to compare health care spending and utilization among unsheltered and sheltered adults.

METHODS

We used 2013–2015 Massachusetts Medicaid (MassHealth) claims data for patients receiving care from the Boston Health Care for the Homeless Program (BHCHP) who were stably enrolled for at least 1 year in a precursor to the MassHealth accountable care organization program. The data included demographic and socioeconomic characteristics as well as the last known housing status of each patient. Using age, sex, and clinical diagnoses, we calculated a risk score for each individual in each year using the Diagnostic Cost Group (DxCG) model, frequently used by insurers for risk adjustment.

We examined average individual total medical spending, spending and utilization by type of service and by setting using the Berenson-Eggers Type of Service (BETOS) classification.[3] Importantly, claims in which substance use disorder was the primary diagnosis were unavailable from MassHealth due to legal restrictions nationwide.[4]

Statistical Analysis

In unadjusted analyses, we compared average annual spending and utilization between unsheltered and sheltered individuals using two-tailed *t* tests. In adjusted analyses, we compared spending and utilization between these groups adjusted for age, sex, race, primary language, disability status, year fixed effects, and DxCG risk score. Given that sheltered status can be correlated with disease burden, we also analyzed adjusted differences without adjusting for risk score. All spending was inflation adjusted to 2015 U.S. dollars. Analyses were performed using Stata, version 15. This study was approved by the Harvard Medical School Institutional Review Board.

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RESULTS

The characteristics of the study population are shown in Table 1. The unsheltered population had a significantly lower percentage of black and Hispanic adults relative to the sheltered population. Of note, the average risk score of unsheltered adults was almost threefold greater than that of sheltered adults (10.4 vs. 3.7, $p < 0.001$).

Health care spending among unsheltered adults averaged $32,331 per person per year—3.4 times that of the $9648 for sheltered adults (Table 2). The unadjusted difference of $22,682 was modestly attenuated after adjustment for

Table 1 Characteristics of Unsheltered and Sheltered Homeless Adults

Characteristic	Unsheltered (*N*= 96)	Sheltered (*N*= 451)	*p*value
Age (yr)	48.1 ± 8.2	48.0 ± 10.8	0.91
Female (%)	12.5	19.5	0.11
Risk score	10.4 ± 15.6	3.7 ± 6.4	< 0.001
Race (%)			0.004
White	56.3	35.3	
Black	16.7	32.2	
Hispanic	5.2	8.4	
Other	3.1	2.9	
Unknown	18.8	21.3	
Language (%)			0.76
English	95.8	96.7	
Spanish	3.1	2.9	
Other	1.0	0.4	
Income ($/month)			
Mean	356 ± 383	267 ± 514	0.11
Disability (%)	36.5	23.5	0.008
Veteran status (%)	12.5	18.0	0.20

Notes: This table provides the characteristics of unsheltered and sheltered homeless adults who were enrolled for at least 1 year from 2013 through 2015 in the Boston Health Care for the Homeless Program. The risk score was calculated using the Verisk Health Diagnostic Cost Group (DxCG) model, which used age, sex, and diagnoses. Individuals enrolled for over 1 year contributed an average age, risk score, and income across their enrollment period toward these summary statistics

Table 2 Health Care Spending and Utilization Among Unsheltered and Sheltered Homeless Adults

	Unsheltered population (*N*= 96)	Sheltered population (*N*= 451)	Ratio of difference	Unadjusted difference	Adjusted difference			
					Without risk score	*p*value	With risk score	*p*value
Spending ($ per person per year)								
Total spending	32,331	9648	3.4	22,682	18,696	< 0.001	2199	0.15
By type of care								
Medical services	28,579	7776	3.7	20,802	17,699	< 0.001	2342	0.07
Behavioral health*	1772	898	2.0	874	278	0.67	24	0.97
Prescription drugs	1980	974	2.0	1006	719	0.08	− 166	0.68
By setting of care								
Inpatient	12,640	3084	4.1	9556	8354	< 0.001	− 539	0.65
Hospital outpatient	3384	1661	2.0	1723	1189	0.001	− 110	0.72
Emergency department	1387	622	2.2	765	542	0.003	45	0.80
Physician services	13,608	3622	3.8	9986	8067	< 0.001	2858	< 0.001
Utilization (per person per year)								
Inpatient admissions	0.98	0.39	2.5	0.59	0.42	0.004	− 0.23	0.04
Emergency department visits	10.56	5.19	2.0	5.37	3.75	0.002	− 0.28	0.80
Physician visits	2.84	2.36	1.2	0.48	− 0.04	0.93	− 1.09	0.01
Psychotherapy visits	0.52	0.52	1.0	0.01	− 0.24	0.41	− 0.28	0.34

Notes: This table compares the average spending and utilization among unsheltered and sheltered homeless adults who were enrolled for at least 1 year from 2013 through 2015 in the Boston Health Care for the Homeless Program.
**Behavioral Health Services include only 2014 and 2015 data, given that Massachusetts Behavioral Health Partnership claims data were available starting in September 2013*

covariates except risk score ($18,696, $p < 0.001$), but was not significant after including risk score in the adjustment ($2199, $p = 0.15$). This pattern was similar for spending on medical services, which accounted for the majority of spending. Behavioral health and prescription drug spending were also greater for the unsheltered in unadjusted analyses, but the differences were not significant after adjustment. The ratio of unadjusted spending for unsheltered vs. sheltered individuals was 4.1 for inpatient, 2.0 for outpatient, 2.2 for the emergency department, and 3.8 for physician services. These differences were similarly attenuated after adjustment, with risk score adjustment rendering most differences not significant. This pattern was also evident in utilization, in which adjustment for risk attenuated the unadjusted differences and in some cases (inpatient admissions and physician visits) rendered visits lower among the unsheltered individuals. Sensitivity analyses using the inclusion criteria of any enrollment (as opposed to minimum 1-year continuous) yielded qualitatively similar results.

DISCUSSION

Using Medicaid claims data, this study provides novel evidence of substantially greater health care spending and utilization among unsheltered adults relative to their sheltered counterparts. However, these differences were largely explained by the substantially greater underlying disease burden among unsheltered adults—reflected in a risk score almost 3 times that of sheltered adults.

We note several limitations. First, housing status may have varied during the study period, though the last captured housing status was the only status available. Second, the analysis was limited to claims in which substance use disorder was not the primary diagnosis, which may underestimate the differences between the groups. Third, we could not observe the chronicity of homelessness, which may be correlated with shelter status and disease burden and thus confound our findings.[5]

This study may help recipients of federal funding and homeless service providers determine the resources to allocate for homeless populations, as well as motivate the urgency of making preventive health care more available for rough sleepers as a priority.

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Declarations:

Conflict of Interest: *The authors declare that they do not have a conflict of interest.*

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