ARTICLE

Hospital admission and readmission among homeless patients with neurologic disease

Nicole Rosendale, MD, Elan L. Guterman, MD, John P. Betjemann, MD, S. Andrew Josephson, MD, and Vanja C. Douglas, MD

Correspondence
Dr. Rosendale
nicole.rosendale@ucsf.edu

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Abstract

Objective

To characterize the most common neurologic diagnoses leading to hospitalization for homeless compared to housed individuals and to assess whether homelessness is an independent risk factor for 30-day readmission after an admission for a neurologic illness.

Methods

We performed a retrospective serial cross-sectional study using data from the Healthcare Cost and Utilization Project California State Inpatient Database from 2006 to 2011. Adult patients with a primary neurologic discharge diagnosis were included. The primary outcome was 30-day readmission. We used multilevel logistic regression to examine the association between homelessness and readmission after adjustment for patient factors.

Results

We identified 1,082,347 patients with a neurologic primary diagnosis. The rate of homelessness was 0.37%. The most common indications for hospitalization among homeless patients were seizure and traumatic brain injury, both of which were more common in the homeless compared to housed population (19.3% vs 8.1% and 31.9% vs 9.2%, respectively, $p < 0.001$). A multilevel mixed-effects model controlling for patient age, sex, race, insurance type, comorbid conditions, and clustering on the hospital level found that homelessness was associated with increased 30-day readmission (odds ratio 1.5, 95% confidence interval 1.4–1.6, $p < 0.001$). This association persisted after this analysis was repeated within specific diagnoses (patients with epilepsy, trauma, encephalopathy, and neuromuscular disease).

Conclusion

The most common neurologic reasons for admission among homeless patients are seizure and traumatic brain injury; these patients are at high risk for readmission. Future interventions should target the drivers of readmissions in this vulnerable population.

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Glossary

CCS = Clinical Classification Software; **CI** = confidence interval; **HCUP** = Healthcare Cost and Utilization Project; **ICD-9** = *International Classification of Diseases, 9th revision*; **ICD-9** = *International Classification of Diseases, 9th revision, clinical modification*; **OR** = odds ratio; **SID** = State Inpatient Database; **TBI** = traumatic brain injury.

There are >500,000 homeless individuals in the United States at any given time. This is equivalent to 17 homeless individuals per 10,000 people, which is likely an underestimate.[1] Rates of homelessness have increased recently, with California showing the largest increase of 13.7% in 2017.[1] Homelessness is an independent risk factor for poor health outcomes, increased hospital use, and longer lengths of stay among medical and surgical inpatients.[2–8] It is unclear how homelessness influences inpatient neurologic care.

Homeless patients are theoretically at higher risk of readmission, an important driver of health care costs and reimbursement.[9,10] Previous studies have sought to understand which clinical factors are associated with higher rates of readmission in neurologic patients[11] or focused on risk factors for readmission in specific neurologic pathology such as stroke,[12–14] but we still do not understand if homelessness has a significant influence on readmission rates after neurologic illness more broadly.

The purpose of this study was therefore 2-fold: to characterize the most common neurologic diagnoses leading to hospitalization for homeless individuals compared to housed individuals and to determine whether homelessness is an independent risk factor for 30-day readmission after hospitalization for a neurologic condition.

Methods

Study design

We performed a retrospective serial cross-sectional study of all patients hospitalized with a primary neurologic illness from 2006 to 2011. We identified hospitalizations using primary discharge diagnosis codes from the California State Inpatient Database (SID) of the Healthcare Cost and Utilization Project (HCUP). SID provides data from all acute hospitalizations in California within a given year.[15] We examined rates of homelessness across different neurologic diseases. Our primary outcome was readmission to any California hospital within 30 days of the index discharge. Secondary outcomes included hospital disposition and length of stay.

Standard protocol approvals, registrations, and patient consents

This study was approved by the institutional review board of University of California, San Francisco and was exempt from the need for informed consent because SID contains only deidentified data.

Study cohort

We included patients ≥18 years of age hospitalized with a primary neurologic discharge diagnosis using ICD-9 codes. We identified homeless patients using the dichotomous homelessness variable, which specifies whether a patient is homeless or not identified to be homeless, the latter of which we categorized as being housed. Hospitals are responsible for the coding decisions for this variable, and it is retained as reported in HCUP. We developed major categories and subcategories of neurologic disease based on previous literature supplemented by the Clinical Classification Software (CCS) supplied by HCUP and consensus opinion of the authoring neurologists.[16–24] We then specified a list of ICD-9 codes that defined each subcategory. Whenever possible, we used groups of ICD-9 codes that have previously been validated for specific disease categories, including acute stroke (430, 431, 433.x1, 434.x1, 436.x1),[20] epilepsy (345),[21] motor neuron disease (335.x),[21] and multiple sclerosis (340).[21] Codes for each disease category are available on request. We excluded patients in whom the disposition was transfer to another acute care hospital because readmission would not apply to these cases.

Statistics

For univariate analysis, we divided the population between homeless and housed patients and then used the Fisher exact test to compare categorical variables with 2 levels. We used the χ^2 test to compare categorical variables with 2 levels. We used the Wilcoxon rank-sum test to compare age because it was not normally distributed.

For multivariate analysis, we examined the association between homelessness and 30-day readmission using a multilevel mixed-effects model that included a random hospital-level intercept to account for clustering within an institution. Our independent variables were age, sex, race, insurance type, admission source, Charlson Comorbidity Index, mental health diagnosis (as defined by CCS codes),[25] substance use disorder diagnosis (as defined by ICD-9-CM codes),[25] and intubation during the hospitalization, which served as a proxy for disease severity. We identified patients undergoing intubation using ICD-9 procedure codes for intubation (ICD-9 code 96.04) and mechanical ventilation (ICD-9 code 96.7x). These codes have a sensitivity of >80% for identifying patients mechanically ventilated at any point during hospitalization.[26,27] We also performed the analysis using both the overall Charlson Comorbidity Index and the individual Charlson comorbidity variables with no difference in the results. To track readmissions, we used verified patient-level identifiers, called the visit link variable. This SID

Table 1 Population characteristics for homeless and housed individuals hospitalized with neurologic disease

	Homeless (n = 3,983)	Housed (n = 1,078,364)	*p* Value
Age, mean (SD), y	50.4 (11.5)	65.1 (17.9)	<0.001
Female, n (%)	655 (16.5)	545,572 (51.1)	<0.001
Race, n (%)			<0.001
White	2,590 (64.9)	772,774 (71.1)	
Black	908 (22.8)	103,827 (9.6)	
Asian/Pacific Islander	72 (1.8)	86,897 (8.0)	
Native American/Aleut	27 (0.7)	3,663 (0.3)	
Other	337 (8.4)	108,080 (10.0)	
Hispanic ethnicity, n (%)	622 (16.3)	195,554 (19.2)	<0.001
Insurance, n (%)			<0.001
Medicare	606 (15.2)	608,203 (56.0)	
Medicaid	1,276 (32.0)	128,258 (11.8)	
Private insurance	92 (2.3)	260,657 (24.0)	
Self-pay	865 (21.7)	38,061 (3.5)	
Other	1,151 (28.9)	51,014 (4.7)	
Admission source, n (%)			<0.001
Emergency department	3,355 (84.0)	768,687 (70.8)	
Acute hospital	91 (2.3)	53,943 (5.0)	
Other health care facility	62 (1.6)	19,773 (1.8)	
Court/law enforcement	24 (0.6)	811 (0.1)	
Routine[a]	460 (11.5)	243,031 (22.4)	
Charlson Comorbidity Index score, median (IQR)	1 (0–3)	0 (0–1)	<0.001
Charlson comorbidities, n (%)			
Acute MI	97 (2.4)	63,562 (5.9)	<0.001
CHF	128 (3.2)	94,515 (8.7)	<0.001
Peripheral vascular disease	32 (0.8)	40,558 (3.7)	<0.001
Stroke	691 (17.3)	515,386 (47.4)	<0.001
Dementia	21 (0.5)	19,337 (1.8)	<0.001
COPD	429 (10.8)	147,004 (13.5)	<0.001
Rheumatologic disease	29 (0.7)	23,804 (2.2)	<0.001
Peptic ulcer disease	28 (0.7)	10,220 (0.9)	0.1
Diabetes mellitus, no complications	396 (9.9)	219,912 (20.2)	<0.001
Diabetes mellitus with complications	33 (0.8)	52,348 (4.8)	<0.001
Hemiplegia/paraplegia	176 (4.4)	105,520 (9.7)	<0.001
Renal disease	121 (3.0)	117,588 (10.8)	<0.001
Mild liver disease	116 (2.9)	7,795 (0.7)	<0.001
Moderate to severe liver disease	261 (6.5)	39,933 (3.7)	<0.001
Cancer	45 (1.1)	43,854 (4.0)	<0.001

Continued

Table 1 Population characteristics for homeless and housed individuals hospitalized with neurologic disease *(continued)*

	Homeless (n = 3,983)	Housed (n = 1,078,364)	*p* Value
Metastases	3 (0.1)	14,074 (1.3)	<0.001
AIDS	51 (1.3)	3,054 (0.3)	<0.001
Mental health diagnosis, n (%)	1,864 (46.7)	335,570 (30.9)	<0.001
Substance use disorder diagnosis, n (%)	2,700 (67.6)	116,785 (10.8)	<0.001
DNR order, n (%)	84 (2.2)	90,040 (8.3)	<0.001
Required intubation during hospitalization	529 (13.3)	64,239 (5.9)	<0.001

Abbreviations: CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; DNR = do not resuscitate; IQR = interquartile range; MI = myocardial infarction.
[a] Routine includes referrals from physicians, clinics, health maintenance organization, etc.

variable allows researchers to track patients across multiple hospitalizations to examine rates of readmission.[28]

To explore the relationship between homelessness and disposition, we created dichotomous outcomes (home, skilled nursing facility, against medical advice, and in-hospital death) and repeated the same multilevel mixed-effects model for each possible disposition. Given the skewed distribution of length of stay, we used 2 different regression models to examine the relationship between homelessness and length of stay: linear regression on untransformed length of stay and a negative binomial regression model to account for overdispersion.

The risk of readmission differs by disease; thus, differences in readmission rate between homeless and housed patients could simply reflect differences in the index admission diagnosis. To isolate the effect of homelessness, we repeated the multivariate analysis including each disease subcategory as an independent variable. This also allowed us to identify which disease subcategories were independently associated with 30-day readmission. Second, we examined the association between homelessness and readmission for the 10 most common disease subcategories among homeless patients using our original multivariate model. We also assessed the percentage of individuals for these 10 most common subcategories readmitted for the same diagnosis. For the overall cohort and the 2 most common admission diagnoses, we assessed time to readmission (≤7, 8–14, or 15–30 days) and most common reason for readmission using the CCS codes supplied by HCUP. Statistical significance was set at $\alpha < 0.05$ for both the univariate and multivariate analyses. Statistical analyses were performed with Stata (version 14, StataCorp, College Station, TX).

Data availability

All data used for this research are publicly available through the Agency for Health Research and Quality, HCUP.

Results

A total of 1,082,347 encounters were included in the final analysis, 3,983 (0.37%) of which were designated as homeless individuals, which is consistent with the overall rate of homelessness in California (342 per 100,000 population).[29] Homeless individuals were younger, more likely to be male and black, and more likely to have Medicaid or no insurance compared to housed individuals (table 1).

The most common indications for hospitalization among homeless patients were seizure and traumatic brain injury (TBI), both of which were more common in the homeless compared to housed population (19.4% vs 8.1% and 31.9% vs 9.2%, respectively, $p < 0.001$) (table 2 and figure).

Homeless patients had a 30-day readmission rate of 26.7%, which was higher than that of the housed population (22.3%, $p < 0.001$) (table 3). Using our multilevel mixed-effects model, we found that homelessness was associated with an overall increased odds of 30-day readmission after a neurologic hospitalization (odds ratio [OR] 1.5, 95% confidence interval [CI] 1.4–1.6, $p < 0.001$). After we repeated the multivariate analysis including each disease subcategory as an independent variable to address the possibility that this effect was explained by homeless patients being hospitalized for neurologic conditions with baseline higher rates of readmission (table 4), homelessness remained associated with an overall increased odds of 30-day readmission (OR 1.5, 95% CI 1.4–1.6). We also repeated the analysis for the subgroups of patients admitted for the 10 most common causes of hospitalization among homeless patients. For those admitted with seizure, TBI, neuropathy, and acute encephalopathy/delirium, homelessness continued to be associated with increased odds of 30-day readmission (table 5).

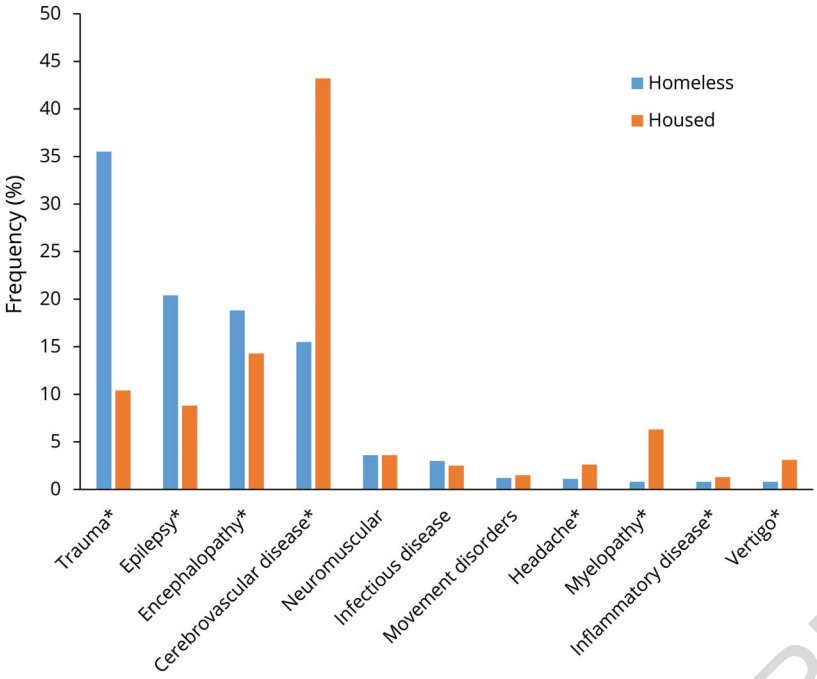
Most individuals were readmitted within 7 days of discharge (table 6). In the entire cohort, the most common diagnostic categories associated with 30-day readmission were rehabilitation care, acute cerebrovascular disease, and septicemia. For both homeless and housed individuals originally admitted for seizure, epilepsy was the most common primary discharge diagnosis for readmission within 30 days. For homeless individuals initially admitted for seizure, schizophrenia/other psychotic disorders and alcohol-related disorders were the second and third most common readmission diagnostic categories,

Table 2 Most common inpatient neurologic diagnoses for homeless and housed individuals with disease subcategories

Diagnosis	Homeless, n (%)	Housed, n (%)	*p* Value
Cerebrovascular disease[a]	619 (15.5)	469,105 (43.2)	<0.001
Ischemic stroke	286 (7.2)	226,262 (20.8)	<0.001
Intracerebral hemorrhage	85 (2.1)	38,705 (3.6)	<0.001
Subarachnoid hemorrhage	17 (0.4)	14,282 (1.3)	<0.001
TIA	40 (1.0)	86,433 (8.0)	<0.001
Epilepsy	816 (20.4)	95,982 (8.8)	<0.001
Seizure	773 (19.4)	88,367 (8.1)	<0.001
Status epilepticus	43 (1.1)	7,615 (0.7)	0.008
Infectious disease[a]	120 (3.0)	27,396 (2.5)	0.055
Meningitis	36 (0.9)	15,338 (1.4)	0.005
Encephalitis	6 (0.2)	3,133 (0.3)	0.135
Inflammatory disease[a]	32 (0.8)	13,544 (1.3)	0.010
Multiple sclerosis/neuromyelitis optica	23 (0.6)	9,834 (0.9)	0.029
CNS tumors	18 (0.5)	34,670 (3.2)	<0.001
Trauma[a]	1,416 (35.5)	113,048 (10.4)	<0.001
Traumatic brain injury	1,275 (31.9)	99,893 (9.2)	<0.001
Spinal cord injury	41 (1.0)	6,390 (0.6)	0.001
Encephalopathy	752 (18.8)	155,054 (14.3)	<0.001
Acute encephalopathy and delirium[b]	676 (16.9)	123,339 (11.3)	<0.001
Anoxic brain injury	9 (0.2)	3,288 (0.3)	0.469
Unspecified coma	0 (0.0)	190 (0.02)	1.000
Hydrocephalus	9 (0.2)	5,639 (0.5)	0.007
Dementia	58 (1.5)	22,598 (2.1)	0.005
Movement disorders[a]	46 (1.2)	16,448 (1.5)	0.068
Parkinson disease	13 (0.3)	7,311 (0.7)	0.005
Myelopathy	31 (0.8)	68,308 (6.3)	<0.001
Neuromuscular[a]	143 (3.6)	38,533 (3.6)	0.898
Neuropathy[c]	88 (2.2)	24,564 (2.3)	0.873
Myasthenia gravis	2 (0.1)	3,356 (0.3)	0.001
Guillain-Barre syndrome	6 (0.2)	3,325 (0.3)	0.083
Myopathy	23 (0.6)	3,280 (0.3)	0.005
Motor neuron disease	5 (0.1)	1,386 (0.1)	1.000
Headache[a]	42 (1.1)	28,117 (2.6)	<0.001
Migraine	17 (0.4)	16,100 (1.5)	<0.001
Vertigo	30 (0.8)	33,596 (3.1)	<0.001

[a] Includes other diagnoses not reflected in subcategories.
[b] Includes any cause not otherwise listed in this table.
[c] Includes cranial neuropathy, mononeuropathies, polyneuropathies, radiculopathies, and plexopathies.

Figure Most common inpatient neurologic diagnoses for homeless and housed individuals



*Statistically significant difference, with $p < 0.05$.

respectively, whereas rehabilitation care and schizophrenia/other psychotic disorders were second and third most common, respectively, for housed individuals originally admitted for seizure. In homeless individuals initially admitted with TBI, the 3 most common 30-day readmission diagnostic categories were intracranial injury, rehabilitation care, and alcohol-related disorders. For housed individuals originally admitted with TBI, the top 3 categories were rehabilitation care, intracranial injury, and acute cerebrovascular disease.

Using the same multilevel mixed-effects model, we found that homeless patients were more likely to be discharged to a skilled nursing facility (OR 1.6, 95% CI 1.5–1.7) or to leave against medical advice (OR 2.0, 95% CI 1.7–2.2) (table 3). Homelessness was negatively associated with in-hospital mortality after adjustment (OR 0.7, 95% CI 0.6–0.9). There was a small difference in length of stay, with longer hospitalizations seen among homeless patients (table 3).

Table 3 Inpatient outcomes for homeless and housed individuals

	Homeless (n = 3,992)	Housed (n-1,086,117)	OR, unadjusted analysis (95% CI)	OR, adjusted analysis (95% CI)
Readmission within 30 d, n (%)	1,144 (26.7)	242,118 (22.3)	1.7 (1.6–1.9)	1.5 (1.4–1.6)
Disposition, n (%)				
Home	2,493 (62.5)	612,668 (56.4)	1.3 (1.2–1.4)	0.7 (0.7–0.8)
Skilled nursing facility	891 (22.3)	275,501 (25.4)	0.8 (0.8–0.9)	1.6 (1.5–1.7)
Against medical advice	359 (9.0)	14,848 (1.4)	7.1 (6.4–8.0)	2.0 (1.7–2.2)
In-hospital mortality	133 (3.3)	47,548 (4.4)	0.8 (0.6–0.9)	0.7 (0.6–0.9)
	Homeless (n = 3,992)	**Housed (n-1,086,117)**	**Coef,[a] unadjusted analysis (95% CI)**	**Coef,[a] Adjusted analysis (95% CI)**
Median length of stay (IQR), d	3 (2–8)	3 (2–6)	0.7 (0.6–0.7)	0.4 (0.4–0.4)

Abbreviations: CI = confidence interval; OR = odds ratio.
[a] Negative binomial regression model coefficient.

Table 4 Association between disease category and 30-day readmission

Increased odds of readmission		No association with readmission		Decreased odds of readmission	
Disease	OR (95% CI)	Disease	OR (95% CI)	Disease	OR (95% CI)
Seizure	2.0 (1.8–2.2)	Ischemic stroke	1.1 (1.0–1.2)	Anoxic brain injury	0.8 (0.7–0.9)
Meningitis	1.5 (1.4–1.6)	Intracerebral hemorrhage	0.9 (0.9–1.0)	Vertigo	0.9 (0.8–0.9)
Encephalitis	2.1 (1.9–2.4)	Subarachnoid hemorrhage	1.0 (0.9–1.1)		
Multiple sclerosis/neuromyelitis optica	1.7 (1.6–1.9)	TIA	1.0 (1.0–1.1)		
CNS tumors	2.1 (1.9–2.2)	Unspecified coma	1.2 (0.7–2.0)		
Traumatic brain injury	1.3 (1.2–1.4)				
Acute encephalopathy	2.8 (2.6–3.0)				
Dementia	2.1 (1.9–2.2)				
Parkinson disease	2.2 (2.0–2.4)				
Myelopathy	1.2 (1.1–1.3)				
Neuropathy	1.5 (1.4–1.6)				
Myasthenia gravis	3.4 (3.1–3.8)				
Motor neuron disease	2.5 (2.1–2.9)				
Myopathy	2.7 (2.4–3.0)				
Migraine	1.5 (1.4–1.6)				

Abbreviations: CI = confidence interval; OR = odds ratio.

Discussion

This study demonstrates that homeless individuals are more likely to be admitted for seizure and TBI compared to housed individuals and that homelessness is an important risk factor for readmission among neurologic patients, independently of the reason for admission.

The transition from the inpatient to outpatient setting is a particularly vulnerable time for all patients, but it is more

Table 5 Association between 30-day readmission and homelessness and reason for readmission within disease subcategories in order of disease frequency among homeless patients

		Readmission for same primary diagnosis, n (%)	
Diagnosis	**OR (95% CI)**	**Homeless**	**Housed**
Traumatic brain injury	1.5 (1.3–1.7)	103 (67.3)	4,528 (53.4)
Seizure	1.8 (1.5–2.1)	144 (67.3)	14,242 (62.4)
Acute encephalopathy and delirium	1.4 (1.2–1.7)	65 (60.2)	14,670 (65.3)
Ischemic stroke	1.3 (1.0–1.6)	20 (55.6)	15,797 (59.1)
Neuropathy	2.7 (1.7–4.3)	4 (57.1)	914 (47.6)
Intracerebral hemorrhage	1.2 (0.7–1.9)	4 (36.4)	1,728 (37.1)
Dementia	1.2 (0.6–2.2)	6 (60.0)	2,142 (52.3)
Status epilepticus	1.5 (0.7–3.0)	2 (11.8)	627 (23.3)
TIA	1.9 (0.9–4.3)	1 (20.0)	3,443 (36.1)
Spinal cord injury	0.3 (0.1–0.7)	1 (33.3)	291 (61.4)

Abbreviations: CI = confidence interval; OR = odds ratio.

Table 6 Time to readmission for all individuals and for those originally admitted for seizure and traumatic brain injury

	Overall, n (%)		Seizure, n (%)		Traumatic brain injury, n (%)	
Time to readmission, d	Homeless (n = 3,992)	Housed (n = 1,086,327)	Homeless (n = 773)	Housed (n = 88,367)	Homeless (n = 1,275)	Housed (n = 99,893)
≤7	737 (18.5)	161,292 (14.9)	123 (15.9)	8,610 (9.7)	187 (14.7)	15,407 (15.4)
8–14	179 (4.5)	32,408 (3.0)	36 (4.7)	3,074 (3.5)	47 (3.7)	2,240 (2.2)
15–30	228 (5.7)	48,418 (4.5)	65 (8.4)	5,027 (5.7)	43 (3.4)	2,936 (2.9)

precarious for homeless individuals. In a recent qualitative study assessing the experience of transitions of care in the homeless community, 56% of respondents were not asked about their housing status during the hospitalization, and 42% of those who delayed seeking care did so out of fear of inability to find shelter after discharge.[30] These findings are consistent with other studies that highlight the unique challenges faced by homeless individuals transitioning from the inpatient to outpatient settings.[31–33] Our study highlights an additional risk that homeless patients with neurologic conditions face: that of readmission.

Readmission rates are known to vary between diagnoses. Because the reasons for admission in our study varied between homeless and housed patients, it is possible that overall differences in readmission rates were driven by differences in admission diagnoses. To address this potential bias, we compared readmission rates in each major disease category and found that homelessness was an independent risk factor for readmission in patients with seizures, TBI, and encephalopathy.

Our observation that homeless individuals are more likely to be admitted for seizures is consistent with prior studies that found higher rates of seizures in homeless populations.[8,34,35] There are many potential explanations. The rate of substance abuse is higher in homeless individuals,[36–40] which could be an underlying trigger for seizures. Homeless individuals, particularly those in unsheltered conditions, may have poor access to and difficulty complying with recommended treatments, raising the concern for medication nonadherence as a contributing factor.[31,41] There is also the possibility of the reverse relationship: epilepsy is associated with impaired ability to work and lower socioeconomic status,[34,42,43] which are risk factors for homelessness.[44]

Higher rates of TBI among homeless individuals have also been described previously.[45,46] Homelessness places individuals at higher risk for victimization, increasing the risk of subsequent TBI.[47] It is also possible that the higher rates of TBI and epilepsy among the homeless are linked in that TBI may lead to posttraumatic epilepsy[48] and epilepsy may lead to higher rates of TBI.

Our study has limitations. The retrospective nature and availability of particular variables in the HCUP database limit our ability to comment on potential causes for our observations. We were not able to review all participant charts; therefore, we are unable to comment on particular patient-level factors that may influence the results. We could not fully account for differences in the severity of illness leading to hospitalization in our cohort, although we attempted to control for this using the Charlson Comorbidity Index and intubation as a surrogate for disease severity. Our reliance on CCS and ICD-9 codes to identify disease categories, comorbid conditions, and reasons for readmission leads to possible misclassification. Some ICD-9 codes were previously validated and can therefore be considered reliable; however, not all ICD-9 codes used in this analysis were validated, and CCS codes supplied by HCUP have not yet been validated, raising the possibility of misclassification. The analysis depended on accurate reporting of the housed status of patients within a variety of hospital systems, raising the potential for misclassification of homelessness, although the rate of homelessness in our study mirrors the overall rate of homeless in California.[29] There may also be limitations to the generalizability of our results outside of California.

This study demonstrates that homelessness is an important social determinant of health for neurologic patients. A number of programs throughout California focus on delivering health care to homeless individuals, both as a broad network through the National Health Care for the Homeless Council and within individual cities across the state.[49] It is unclear, however, which of these programs engage neurologists to address the specific needs of homeless individuals with neurologic illness. Future research should focus on understanding the drivers of readmission in homeless individuals using patient-level data, with the goal of designing targeted interventions to reduce readmission. In our sample, for example, mental health disorders and substance abuse were common primary diagnoses associated with readmission for homeless individuals admitted for seizure and TBI. A potential intervention could be to use the index admission to engage mental health and substance use cessation support for this community. Another strategy could be to incorporate a neurologist into homeless outreach teams to provide ongoing access to neurologic care and to intervene at an earlier stage before readmission. There is also likely not a single solution to this complex issue that would be effective in all situations and locations. For this reason, it is essential for neurologists broadly to recognize the role of homelessness in health use for

neurologic illness and to work to reduce readmissions in this vulnerable population.

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Appendix Authors

Name	Location	Role	Contribution
Nicole Rosendale, MD	University of California, San Francisco	Author	Study concept and design, drafting and critical revision of manuscript for intellectual content
Elan L. Guterman, MD	University of California, San Francisco	Author	Statistical analysis, critical revision of the manuscript for intellectual content
John P. Betjemann, MD	University of California, San Francisco	Author	Critical revision of the manuscript for intellectual content
S. Andrew Josephson, MD	University of California, San Francisco	Author	Review of study design, critical revision of the manuscript for intellectual content
Vanja C. Douglas, MD	University of California, San Francisco	Author	Study concept and design, critical revision of the manuscript for intellectual content

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