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Study objective: Housing instability is prevalent among emergency department (ED) patients and is known to adversely affect health. We aim to determine the incidence and timing of homeless shelter entry after an ED visit among patients who are not currently homeless.

Methods: We conducted a random-sample survey of ED patients at an urban public hospital from November 2016 to September 2017. Patients provided identifying information and gave informed consent for us to link their survey data with the New York City Department of Homeless Services shelter database. Shelter use was followed prospectively for 12 months after the baseline ED visit. We examined timing of shelter entry in the 12 months after the ED visit, excluding patients who were homeless at baseline.

Results: Of 1,929 unique study participants who were not currently homeless, 96 (5.0%) entered a shelter within 12 months of their baseline ED visit. Much of the shelter entry occurred in the first month after the ED visit, with continued yet slower rates of entry in subsequent months. Patients in our sample who entered a shelter were predominantly men and non-Hispanic black, and commonly had past shelter and frequent ED use.

Conclusion: In this single-center study, 5.0% of urban ED patients who were not currently homeless entered a homeless shelter within the year after their ED visit. Particularly if replicated elsewhere, this finding suggests that ED patients may benefit from efforts to identify housing instability and direct them to homelessness prevention programs. [Ann Emerg Med. 2020;76:462-467.]

Please see page 463 for the Editor's Capsule Summary of this article.

A **podcast** for this article is available at www.annemergmed.com.

INTRODUCTION

Emergency department (ED) patients commonly struggle with homelessness and housing instability. A systematic review found homelessness prevalence among ED patients ranging from 2.5% to 13.8%.[1] Less research has examined housing instability—a broad term encompassing housing needs short of literal homelessness, such as rent burden and frequent moves—but ED studies have reported prevalence of housing instability by various definitions that ranges from 18.1% to 43.8%.[1] Both homelessness and housing instability are associated with poorer health and more frequent ED use,[2,3] and homelessness is associated with 72-hour ED revisits.[4] Although long recognized as a health and social safety net, a growing social emergency medicine movement is reinvigorating the idea that EDs can and should address patients' social needs such as homelessness that have strong effects on health.[5]

To our knowledge, no studies have examined future homelessness among ED patients who are not homeless at their ED visit. Identifying literal homelessness is more straightforward than identifying risk for future homelessness; even housing caseworkers perform poorly in predicting which clients seeking services are most likely to become homeless.[6] Tracking housing status prospectively can be logistically challenging in emergency medicine research because of issues such as loss to follow-up. Instead, research has used various—generally unvalidated—self-reported measures for housing instability.[1] The goal of the current investigation was to examine patients' homeless shelter entry in the year after an ED visit by linking patient survey and longitudinal shelter administrative data.

Editor's Capsule Summary

What is already known on this topic

Homelessness and housing instability adversely affect health and are prevalent among emergency department (ED) patients.

What question this study addressed

This cross-sectional survey of 1,929 patients at an urban safety-net hospital determined how many patients not homeless at the index visit entered a homeless shelter within a year of that visit.

What this study adds to our knowledge

Five percent of housed patients, a majority of whom had previous shelter use, experienced homelessness in the subsequent year.

How this is relevant to clinical practice

Addressing unmet social needs such as housing instability requires better identification of cases. Establishing community partnerships or public health alliances is essential because hospitals and ED providers cannot solve these issues alone.

MATERIALS AND METHODS

Study Design and Setting

We conducted a prospective cohort study of patients presenting to an urban, public, teaching hospital ED and collocated urgent care area (110,000 total visits/year) in New York City (NYC) from November 2016 to September 2017. ED patients completed a baseline survey and were followed prospectively for shelter entry, using NYC administrative data. Participants provided informed consent and received a $15 incentive. NYU School of Medicine's institutional review board approved the study.

Selection of Participants

Research assistants (RAs) were randomly assigned to a starting patient at the beginning of their shifts and then approached patients in a prespecified order, following a numbered map of all potential patient locations. Although staffing was not designed for RAs to approach every patient in the ED, this sampling scheme ensured that any given patient in the ED had an approximately equal chance of being approached by an RA during a given shift. RA shifts were scheduled 7 days a week, at all hours, covering approximately 85 variable hours per week in a distribution designed to cover all time blocks in approximate proportion to ED patient arrival volume, including overnights and weekends.

Patients were eligible if they were aged 18 years or older and spoke English or Spanish. They were ineligible if they were medically unstable or in physical distress, were too intoxicated to participate, were in psychological distress, were in police or prison custody, could not provide consent (eg, dementia), lived outside NYC, or had already participated.

Methods of Measurement

Participants completed a baseline survey administered verbally by RAs, with responses recorded with REDCap (Research Electronic Data Capture, Nashville, TN). RAs were bilingual (English/Spanish). The survey was professionally translated into Spanish and back-translated to ensure accuracy. The survey was administered as part of a larger study and contained questions on a wide variety of domains, generally taken from previously validated or widely used questionnaires (see Appendix E1, available online at http://www.annemergmed.com, for full survey). In this article, we report results for basic demographics, self-reported number of visits to any ED in the past year, and other social needs. Participants provided their full name, date of birth, and, if they had one, social security number to allow data linkage.

We used the NYC Department of Homeless Services' CARES database, which includes data on shelter use for more than 70,000 adults using NYC emergency shelters yearly. CARES captures approximately 90% of shelter use in NYC; some specialty shelters operated outside the Department of Homeless Services system are not included. CARES contains dates for shelter entries in the system starting in the mid-1980s. It also includes the reason for homelessness that clients gave at the application for shelter, as categorized and recorded by case workers from a list of 34 discrete categories.

The NYC Center for Innovation through Data Intelligence, an agency conducting cross-sector data analysis in the Office of the Mayor, performed data linkage. The center used SAS Link King (version 7.19) to conduct deterministic and probabilistic matching between a data set containing a unique participant study identification number plus participant identifying information and CARES. Participants with a first and last name and either a full date of birth or social security number were matched with CARES. Approximately 87% of matches were exact matches on all match fields (including date of birth, social security number, or both). SAS Link King uses "fuzzy" matching on names and dates of birth that are closely

related (eg, off by ≥1 character); 13% of matches were inexact matches of this sort, all of which the Center for Innovation through Data Intelligence manually reviewed to confirm the match was accurate. This matched data set was then linked to the ED patient survey data with the unique participant study identification number. A deidentified data set was used for analysis.

Outcome Measures

The primary outcome was homeless shelter entry within 12 months of the baseline ED visit. Time to shelter entry was measured in days from the baseline ED visit to the first subsequent shelter entry recorded in CARES. We excluded patients who were literally homeless at baseline, which we defined as self-report of spending the previous night in a shelter, outdoors on the street, or in another place not meant for human habitation; or any shelter use in the past 7 days, documented in CARES. We chose this definition in accordance with data availability, expert and stakeholder recommendation, and US Department of Housing and Urban Development definitions of literal homelessness and homelessness "episodes."[7] Conservatively, we included shelter stays that started the same day as the ED visit as potentially currently homeless, and therefore excluded them from analyses. Because of NYC's Right to Shelter law, most people experiencing homelessness in NYC are sheltered (>95%).[8]

Primary Data Analysis

We examined number of days to first shelter entry after the baseline ED visit. We used SAS PROC LIFETEST to plot the failure curve (cumulative incidence curve) of shelter entry. We present descriptive statistics for ED patients who entered a homeless shelter within 12 months of their baseline ED visit and those who did not.

RESULTS

RAs approached 6,097 patients, of whom 3,173 (52.0%) were ineligible (most commonly for not speaking English/Spanish [n=489]; in police/prison custody [n=361]; not willing to complete screening questions [n=357]; too ill [n=858], intoxicated [n=496], or psychologically distressed [n=196] to participate; already participated [n=176]; and lived outside NYC [n=157]). Of eligible patients, 2,396 (81.9%) agreed to participate. Duplicate records from patients who participated more than once (n=84) were excluded. Three participants did not give their date of birth or social security number to allow data linkage. Of 2,309 participants whose data could be linked, 316 (13.7%) reported spending the last night

on the streets or in a shelter and 222 (9.6%) had a shelter stay in the past 7 days documented in CARES. The 380 total participants (16.5%) fitting either definition of current homelessness were excluded from further analysis, leaving a final analytic sample of n=1,929. Characteristics for these 380 currently homeless ED patients are described in Table E1 (available online at http://www.annemergmed.com).

Among patients who were not currently homeless, 5.0% (n=96) entered a shelter within 1 year of their baseline ED visit (Figure). The most concentrated shelter entry occurred in the first 30 days after the ED visit (n=37 entries), with other entries spread throughout the rest of the year. Table 1 shows self-reported reasons for shelter entry.

Shelter entrants in our sample were predominantly men, non-Hispanic black, and insured by Medicaid (Table 2). Shelter entrants commonly reported having 4 or more ED visits in the past year. For most individuals, this was not their first episode of homelessness; 56.3% had previous documented NYC shelter use. All study participants, and particularly shelter entrants, commonly reported experiencing other social needs such as food insecurity.

LIMITATIONS

First, the study was conducted at a single NYC public hospital located near a large homeless men's intake shelter. Although a small number of patients with frequent ED use at the study hospital are targeted for care management, patients are not routinely screened for housing instability and it is unlikely that direct referral from the ED to the shelter contributed significantly to our findings. Second, studies like ours that draw their sample from current ED patients will oversample frequent ED users, who may have more difficulties with housing. Furthermore, because of our study's inclusion and exclusion criteria we do not claim to have obtained a representative sample of all ED patients. Third, although our definition of literal homelessness at baseline was aligned with US Department of Housing and Urban Development guidelines, there are other possible ways to define homelessness and using another definition might have produced different results. Fourth, we did not have data on unsheltered homelessness, but our analysis was focused on shelter entry by design. Because of NYC's Right to Shelter law, unsheltered homelessness represents less than 5% of total homelessness.[8] To the extent that ratios of unsheltered to sheltered homelessness differ in other localities, EDs elsewhere might observe different rates of shelter entry after ED use. We do not have data on more "hidden" forms of homelessness such as living with friends or family, or staying in institutions such as prisons or

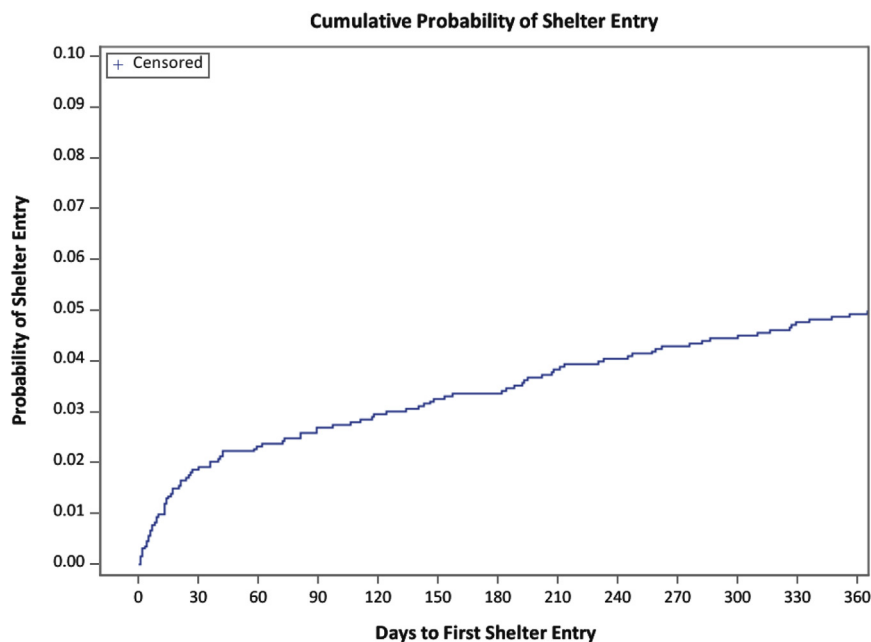**Cumulative Probability of Shelter Entry**

Figure. Timing of homeless shelter entry within 1 year of baseline ED visit.

hospitals. Fifth, we did not have information on whether patients were admitted to the hospital during their baseline ED visit. Examining the role of hospitalization in contributing to new shelter entry is an important topic for future research.

Table 1. Most common reasons for shelter entry among ED patient sample (n=90).*

Reason for Shelter Entry	No. (%)
Discord	25 (27.8)
Other[†]	12 (13.3)
Discharge from nonhospital facility or program[‡]	6 (6.7)
Criminal situation at previous residence	6 (6.7)
Loss of income	6 (6.7)
Entering shelter from street homelessness	6 (6.7)
Eviction or vacate order	6 (6.7)
Crowding	4 (4.4)
Release from jail or prison	4 (4.4)
Left (previous) facility/program on own accord	3 (3.3)
Discharge from medical hospital	2 (2.2)
Discharge from psychiatric hospital	2 (2.2)
Domestic violence	2 (2.2)
Second tenant	2 (2.2)
Vacate order	2 (2.2)

*Reason missing for 6 participants. Not listed: 5 additional reasons with only 1 respondent for each. Reason for homelessness is the reason the client states for why they are applying for shelter, as categorized and recorded by case workers from a list of 34 discrete categories, and therefore encompasses both individual self-report and case worker judgment.
[†]No additional details are available in the administrative data for the "other" category.
[‡]Could include detoxification, nursing home, rehabilitation, or other.

DISCUSSION

Five percent of patients in our sample who were not homeless at their ED visit entered a shelter within 1 year, with greater than one third entering in the first month after the ED visit. These findings indicate that a noteworthy number of patients were housing unstable at their ED visit, and build on the small body of previous research finding high rates of self-reported housing instability among ED patients.[1] Approximately 4.1% of Americans report either literal homelessness or living with others in a given year, less than the 1-year prevalence of homeless shelter entry alone observed in our study.[9] Characteristics of ED patients entering shelters, at least from one public hospital adult ED, differed from those of the NYC shelter population at large; ED patients entering shelter were predominantly single men, whereas in NYC overall families with children make up two thirds of the shelter population.[8] The majority entering shelter were black, consistent with known racial disparities in homelessness in the US. ED patients who entered shelter reported a wide variety of reasons for applying for shelter, which has important implications for future prevention efforts.

Homelessness has profound effects on health and health services use.[10] Knowledge of patients' housing status can guide ED clinicians in making appropriate treatment and disposition plans. Our findings also suggest

Table 2. Characteristics of patients who did versus did not enter a homeless shelter within 1 year of the baseline ED visit.

Characteristic	Shelter Entrant n=96, No. (%)	Not Shelter Entrant n=1,833, No. (%)
Age, mean (SD), y	47.7 (13.3)	45.6 (16.7)
Sex		
Men	80 (84.2)	900 (49.2)
Women	14 (14.7)	923 (50.4)
Transgender	1 (1.1)	7 (0.4)
Race/ethnicity		
Hispanic/Latino	28 (29.5)	1,106 (60.7)
Non-Hispanic black	49 (51.6)	320 (17.6)
Non-Hispanic white	10 (10.5)	216 (11.8)
Other	8 (8.4)	181 (9.9)
Has children ≤18 y in household	13 (13.5)	503 (27.5)
History of shelter use*	54 (56.3)	27 (1.5)
Insurance		
Uninsured	8 (8.3)	555 (30.3)
Medicaid[†]	52 (54.2)	564 (30.8)
Medicare	7 (7.3)	133 (7.3)
Dual Medicaid/Medicare	11 (11.5)	160 (8.7)
Private/other	18 (18.8)	418 (22.8)
≥4 ED visits in past year[‡]	41 (42.7)	469 (25.6)
Where reported slept the last night		
Own apartment, subsidized	9 (9.5)	413 (22.5)
Own apartment, not subsidized	28 (29.5)	1,085 (59.2)
Someone else's apartment	28 (29.5)	209 (11.4)
Hotel, single room occupancy, or boarding home	4 (4.2)	9 (0.5)
Institution (hospital, nursing home, etc)	21 (22.1)	84 (4.6)
Other	5 (5.3)	32 (1.7)
Other social needs[§]		
Inability to meet essential expenses	50 (52.1)	642 (35.0)
Employment issues	25 (26.0)	369 (20.1)
Legal issues	29 (30.5)	213 (11.7)
Food insecurity	61 (63.5)	803 (43.8)

Missing data less than or equal to 3% for all variables.

*At least one previous stay in NYC shelter recorded in CARES administrative data, exclusive of the previous 7 days. All other results shown in the table are from patient self-reported surveys.

[†]New York is a Medicaid expansion state, so low-income single adults are eligible for Medicaid. Undocumented immigrants, however, are not generally eligible for regular Medicaid in New York.

[‡]By self-report, including current visit.

[§]Past 12 months. The question on ability to meet household expenses was taken from the Survey of Income and Program Participation Wave 9 (2008). Questions on employment and legal issues asked whether participant "had any issues or needed help" and were modified from Aidala et al.[11] Food insecurity represents a positive response to any of 4 questions from the United States Department of Agriculture's US Food Security Survey. The full study survey is shown in Appendix E1, available online at http://www.annemergmed.com.

that the ED visit may be a critical juncture for interventions to prevent homelessness and its subsequent negative downstream health effects. For example, ED patients could be screened for risk of future homelessness and directed to community resources designed to provide housing stability supports. A total of 16.5% of patients were literally homeless at baseline; they were excluded from analyses for this study. This, in addition to the fact that more than half of the patients in our study who entered a shelter in the next year had been homeless in

the past, suggests that attention to episodic and chronic patterns of homelessness is also needed for ED patients. We plan to use our linked data set to conduct more detailed analyses and to develop screening tools for homelessness risk. Such efforts are aligned with increasing health system focus on social determinants of health.

Our methods may be useful for other researchers. To our knowledge, we are the first group that has linked survey data collected from ED patients with homeless services administrative data. This unique data linkage allowed us to follow patient outcomes prospectively without having to contact patients after their initial study enrollment or baseline ED visit. Such methods may be useful for emergency medicine researchers because ED patients can be challenging to contact for follow-up visits. Furthermore, our methods highlight the feasibility of combining data across different sectors to enhance our understanding of ED patients.

In summary, we found that a notable number of patients enter homeless shelters in the weeks and months after their ED visits. Future research is warranted on the ED's potential role in screening for and intervening in regard to housing instability.

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