# Homelessness and Emergency Medicine: A Review of the Literature

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## ABSTRACT

**Objectives:** We aimed to synthesize the available evidence on the demographics, prevalence, clinical characteristics, and evidence-based management of homeless persons in the emergency department (ED). Where appropriate, we highlight knowledge gaps and suggest directions for future research.

**Methods:** We conducted a systematic literature search following databases: PubMed, Ovid, and Google Scholar for articles published between January 1, 1990, and December 31, 2016. We supplemented this search by cross-referencing bibliographies of the retrieved publications. Peer-reviewed studies written in English and conducted in the United States that examined homelessness within the ED setting were included. We used a qualitative approach to synthesize the existing literature.

**Results:** Twenty-eight studies were identified that met the inclusion criteria. Based on our study objectives and the available literature, we grouped articles examining homeless populations in the ED into four broad categories: 1) prevalence and sociodemographic characteristics of homeless ED visits, 2) ED utilization by homeless adults, 3) clinical characteristics of homeless ED visits, and 4) medical education and evidence-based management of homeless ED patients.

**Conclusion:** Homelessness may be underrecognized in the ED setting. Homeless ED patients have distinct care needs and patterns of ED utilization that are unmet by the current disease-oriented and episodic models of emergency medicine. More research is needed to determine the prevalence and characteristics of homelessness in the ED and to develop evidence-based treatment strategies in caring for this vulnerable population.


## Background

Homelessness is a substantial problem in the United States. The U.S. Department of Housing and Urban Development (HUD) estimates that over 560,000 people experience homelessness on any given night,[1] and up to 1.5 million individuals experience homelessness over the course of a year.[2] In 2010, nearly 552,000 ED visits were made by individuals known to be homeless.[3] ED visits by homeless persons increased by nearly 44% between 2005 and 2010, compared with a 7.4% increase for domiciled persons.[4]

There is no universally accepted definition of homelessness. Regulatory definitions, which define policy interventions and eligibility for public assistance, vary between agencies. For example, the U.S. Department of Health and Human Services (HHS) has a broad definition of homelessness:

> An individual who lacks housing (without regard to whether the individual is a member of a family), including an individual whose primary residence during the night is a supervised public or private facility (e.g., a shelter) that provides temporary living accommodations, and an individual who is a resident in transitional housing . . . An individual may [also] be considered to be

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> homeless if that person is "doubled up," . . . [or] unable to maintain their housing situation and forced to stay with a series of friends and/or extended family members. In addition, previously homeless individuals who are released from prison or a hospital may be considered homeless if they do not have a stable housing situation to which they can return.[5]

In contrast, the HUD employs a more limited definition:

> An individual who lacks a fixed, regular, and adequate nighttime residence; or an individual who has a primary nighttime residence that is a public or private place not designated for or ordinarily used as a regular sleeping accommodation for human beings, including a car, park, abandoned building, bus or train station, airport, or camping ground.

The variation in definitions may contribute to underrecognition and misconceptions of homelessness in the emergency department (ED).[6]

## Importance

Emergency departments are the de facto health care providers for many of the US homeless. Yet homeless persons pose special challenges for the emergency provider (EP) and defy conventional assumptions about patient responsibility in health care delivery. They suffer a higher burden of chronic illness (e.g., cardiovascular disease, mental illness, hypertension) and infectious disease (e.g., tuberculosis [TB]), are disproportionately vulnerable to violence and injury, and are at increased risk of premature death and disability.[7–14] Although they may need and benefit from primary care or specialized health services, the homeless face significant barriers in accessing care.[15–17] Moreover, they frequently have competing needs for food and shelter that may eclipse their clinical needs, prevent them from adhering to outpatient treatment regimens, and lead to repeated ED visits and hospitalizations.[15,18–23] This problem is likely to worsen over the next decade, as the homeless population continues to age and their reliance on ED services increases.[24–26]

Contrary to popular stereotypes,[27,28] the homeless population is composed of a wide range of people, including single women (40%), families (36%), and unaccompanied adolescents (6.5%).[1] Moreover, the conditions of homelessness vary widely, depending on whether the individual or family is in an emergency shelter or a transitional housing program or is on the streets. Homeless individuals may also be "doubled up" or "couch surfing," conditions that refer to residing with a series of friends and/or family members.[5] Individuals often rely on one or more of these strategies during their period of homelessness.

Pathways to homelessness are equally complex and are often triggered by job loss, domestic violence, release from incarceration, unexpected medical illness, drug use, or psychiatric illness, among others.[8,24,29–31] These categories are neither static nor mutually exclusive. They may change over time according to economic conditions, government policies, or even severe weather conditions or natural disasters.[32–36] They may interact synergistically, or there may be reverse causality, thus creating difficulties with causal modeling and even fully describing homelessness in the United States. Because of these complexities and their potential impact on patient care, ED utilization, and expenditures,[37,38] relatively little is known about homelessness in the ED setting.

## Goals of This Investigation

We conducted a systematic review of the literature on homelessness in the ED setting. Our data collection and processing were guided by the following questions: 1) What is the prevalence of homelessness among US ED patients? 2) What are the epidemiologic characteristics (age, sex, ED utilization patterns, etc.) of homeless ED patients? 3) How can we characterize the health needs of homeless ED patients? 4) What are the evidence-based guidelines for managing these patients in the ED? We further seek to highlight knowledge gaps in the current literature and suggest directions for future research.

# MATERIALS AND METHODS

## Study Design

To manage the large number of studies on homelessness and health, we limited our investigation to studies examining homelessness in the context of emergency medicine (EM). There are many papers in EM that include "homelessness" as an exposure or covariate in models of specific health outcomes. However, even though these studies contribute to our understanding of these outcomes, they usually relied on homelessness as a binary variable and did not fully

explore the conditions of homelessness or issues specific to the homeless population in the ED. Conversely, there are many community-based studies of homeless persons' health outcomes and health care utilization patterns. Again, these studies provide valuable information in understanding the characteristics and needs of homeless persons. However, these studies are often conducted in community outreach settings (e.g., homeless shelters) and may not generalize to homeless ED patients. Where appropriate, we cite them to contextualize our interpretation of results and/or recommendations. Finally, we excluded studies outside the United States because they may not generalize to the U.S. population, as other nations may have differing features of their health care resources and/or social welfare systems. In sum, we limited our investigation to peer-reviewed studies that explicitly examined homeless populations in the ED setting in the United States.

## Inclusion Criteria

The following inclusion criteria were used to select articles in our review: 1) peer-reviewed publications; 2) published between January 1, 1990, and December 31, 2016; 3) English-language publication; 4) study was conducted in the United States; 5) subjects were homeless ED patients and/or study was conducted in an ED setting; and 6) study utilized quantitative, qualitative, or mixed methods.

## Literature Search and Article Selection

We searched the following databases: PubMed, Ovid, and Google Scholar for articles published between January 1, 1990, and December 31, 2016. The PubMed search used the following headings: ("Emergency Service, Hospital" *or* "emergency department" *or* "emergency room") *and* ("homeless" *or* "homelessness"). Searches were limited to English-language publications and human subjects research, but no further age or publication limits were applied. These headings were repeated in the remaining databases. Because Google Scholar is a broad, interdisciplinary database, we did not repeat our search in databases specific to other fields that may study homeless populations (e.g., nursing and social sciences).

Data collection and processing was initially conducted by the first author, who was trained in a series of research work group meetings focused on refining the purpose of the study, as well as the inclusion and exclusion criteria. For all the databases searched, titles and abstracts of articles were manually reviewed by the first author to confirm that they met the specified inclusion criteria and explicitly examined homeless populations within the ED setting. Articles that met inclusion criteria from any database underwent a full-text evaluation. Bibliographies of these articles, as well as the articles citing them, were screened for additional articles that met criteria for inclusion in the full-text review. Any questions or concerns regarding the inclusion of articles in this review were resolved by discussion with the coauthors.

The literature search identified 1,053 publications. Two articles were identified by cross-referencing bibliographies and citing articles within these records. After removal of duplicates, 619 publications remained and were screened by title and abstract. Of these articles, 517 did not meet the inclusion criteria. The most common reasons for exclusion at this stage were the publication type (e.g., letter to the editor, policy paper, dissertation thesis) and studies conducted outside the United States. After initial screening, 104 articles remained and underwent full-text screening for eligibility. A total of 28 articles that examined homelessness in a U.S. ED context were identified and included in our analysis (Table 1). Our process was based on guidelines detailed in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement and is illustrated in Figure 1.[39]

The studies included varied considerably in their methods for collecting and documenting homeless status, including self-report, medical records, health information exchange data, registered address (e.g., a patient was recognized as homeless if he or she listed their address as that of a known shelter or church), or a combination of these methods.[40,41] Because of wide variation in study questions and methodology, we could not develop a practical quality assessment score.[42] Three[43–45] of the 28 studies used qualitative interview techniques to generate rather than confirm hypotheses. Sixteen studies were cross-sectional in design and thus eligible for the usual risks of bias in causal interpretation, including selection bias, information bias, residual confounding, and unmeasured heterogeneity. In addition, five[38,46–49] of the cross-sectional studies obtained data from chart review, with its own inherent methodologic problems, especially missing data.[50] Six[3,4,25,51–53] of the chart review studies analyzed a publicly available probability sample of U.S. ED visits, the National Hospital Ambulatory Medical Care Survey (NHAMCS), which is a federally administered multilevel, stratified, annual sample of

Table 1
Reviewed Literature on Homelessness in the ED

| Authors | Definition of Homelessness | Methods | Results |
|---|---|---|---|
| Niska et al. (2010)[3] | Identified as "homeless" in the NHAMCS patient residence variable. | Cross-sectional analysis of the 2007 NHAMCS. | In 2007, there were about 117 million ED visits in the United States. About 25% of visits were covered by Medicaid or the State Children's Health Insurance Program (SCHIP). About one-fifth of ED visits by children younger than 15 years of age were to pediatric EDs. There were 121 ED visits for asthma per 10,000 children under 5 years of age. The leading injury-related cause of ED visits was unintentional falls. Two percent of visits resulted in admission to an observation unit. Electronic medical records were used in 62 percent of EDs. |
| Tadros et al. (2016)[4] | Identified as "homeless" in the NHAMCS patient residence variable. | Cross-sectional analysis of the 2010 NHAMCS. | Approximately 679,854 visits were made by homeless patients, the majority of which were made by men (72.3%) and patients between the ages of 45 and 64 years (50.5%). Homeless patients were twice as likely to be uninsured. ED visits by homeless patients had increased by 44% during the 5-year period. Arrival to the ED by ambulance increased by 14% between the study years, and homeless patients were less likely to be admitted. |
| Mackelprang et al. (2014)[10] | Individuals identified as homeless in the NEISS | Cross-sectional analysis of injury characteristics among individuals identified as homeless in NEISS. | A random sample of 2,680 age- and sex-matched controls was identified for the same time period. Incident location differed between groups, and mention of substance use was significantly more common among homeless cases than controls. Body part injured differed significantly between cases and controls for all age groups, with the exception of older adults. Among homeless cases, injuries occurred most frequently to the lower extremities, and sprains/strains, contusions/abrasions, and burns were most common. |
| Pearson et al. (2007)[17] | Individuals who did not have an address of residency or who could not provide an address of temporary residency at triage were categorized as homeless by ED registration personnel. | Retrospective cohort study at an urban safety-net hospital in Denver, CO. All patients who presented to the ED during 2003 were identified. Simple random samples of 300 homeless adult patients and 300 nonhomeless adult patients were identified and included as the study sample. | Homeless patients were slightly older (41 years [IQR = 34–48 years] vs. 36 years [IQR = 25–46 years]) and had substantially higher substance abuse histories but had similar medical and psychiatric comorbidities compared with nonhomeless patients. Homeless patients also spent more time in the ED per visit (4.4 hours [IQR = 2.6–7.5 hours] vs. 3.8 hours [IQR = 2.1–5.7 hours]), were less likely to be admitted to the hospital (8% vs. 19%), and were more likely to use ambulance services (51% vs. 29%). Finally, homeless patients received a similar level of estimated benefit of emergency treatment compared with nonhomeless patients, and a substantial proportion of their visits was directly related to excessive alcohol use. |
| Rodriguez et al. (2009)[21] | Lack of stable housing for the preceding 2 months. | Prospective case–control study in the ED of an urban county hospital from July–August 2006 and February–March 2007. | A total of 191 homeless and 63 control subjects were enrolled. Homeless persons spent a mean (±SD) of 3.5 (±3.0) nights/week sleeping without shelter and ate a mean (±SD) of 2.1 (±1.1) meals per day; 51% stated they had been assaulted on the street. On an analog scale, in which 0 = no problem and 10 = worst possible problem in their daily lives, the mean (±SD) homeless subject responses for hunger, lack of shelter, and safety were 4.8 (±3.7), 6.1 (±4.2), and 5.1 (±4.0), respectively. More homeless (29% [55/189]) than not homeless (10% [6/63]) persons replied that hunger, safety concerns, and lack of shelter were reasons they came to the ED (Delta = 20%; 95% CI = 10%–29%). If offered a place that would provide food, shelter, and safety at all times, 24% of homeless subjects stated they would not have come to the ED. |

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Table 1 (continued)

| Authors | Definition of Homelessness | Methods | Results |
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| Brown and Steinman (2013)[25] | Identified as "homeless" in the NHAMCS patient residence variable. | A multiyear (2005–2009) cross-sectional analysis of NHAMCS. | The ED visits of homeless adults aged 50 years and older accounted for 36% of annual visits by homeless patients. Although demographic characteristics of ED visits were similar in older and younger homeless adults, clinical and health services characteristics differed. Older homeless adults had fewer discharge diagnoses related to psychiatric conditions (10% vs. 20%; p = 0.002) and drug abuse (7% vs. 15%; p = 0.003) but more diagnoses related to alcohol abuse (31% vs. 23%; p = 0.03) and were more likely to arrive by ambulance (48% vs. 36%; p = 0.02) and to be admitted to the hospital (20% vs. 11%; p = 0.003). |
| Doran et al. (2016)[32] | Patients with a primary or secondary ICD-9 diagnosis of homelessness or inadequate housing. | Before-and-after study using an all-payer claims database of ED visits in NYC to compare the demographic characteristics, insurance status, geographic distribution, and health conditions of ED patients with a primary or secondary ICD-9 diagnosis of homelessness or inadequate housing in the first week after Hurricane Sandy's landfall versus the baseline weekly average in 2012 prior to Hurricane Sandy. | Found statistically significant increases in ED visits for diagnosis codes of homelessness or inadequate housing in the week after Hurricane Sandy's landfall. Those accessing the ED for homelessness or inadequate housing were more often elderly and insured by Medicare after vs. before the hurricane. Secondary diagnoses among those with a primary ED diagnosis of homelessness or inadequate housing also differed after vs. before Hurricane Sandy. These observed differences in the demographic, insurance, and coexisting diagnosis profiles of those with an ED diagnosis of homelessness or inadequate housing before and after Hurricane Sandy suggest that a new population cohort—potentially including those who had lost their homes as a result of storm damage was accessing the ED for homelessness or other housing issues after the hurricane. |
| Ku et al. (2014)[38] | Homeless status was determined by self-report and review by an interdisciplinary team. | Cross-sectional analysis of hospital records for ED visits in 2006 at an urban academic medical center. | A total of 5,440 (8.9%) ED visits were made by 542 frequent users, 74 (13.7%) of whom were homeless and made 845 ED visits. Homeless frequent users had a median age of 47 years (IQR = 39–56 years), were predominantly male (85.1%), and were insured by Medicaid (59.5%). Most (44.2%) visits by homeless frequent users occurred between 1500 and 2259 hours and had an Emergency Severity Index of Level 3 (55.5%). Sixty-four percent of visits resulted in homeless patients being discharged back to the street; only 4.0% had a specific discharge plan addressing homelessness. Total charges and payments for all homeless frequent users were $4,812,615 and $802,600, respectively. The single top frequent user accrued charges of $482,928. |
| Doran et al. (2014)[43] | NA | In-depth, one-on-one interviews with EM residents. Interviews were analyzed thematically. | Three recurring themes emerged from 23 resident interviews. First, residents learn unique aspects of EM by caring for patients who are homeless. Second, residents learn how to care for patients who are homeless through experience and informal teaching rather than through a formal curriculum. Third, caring for patients who are homeless affects residents emotionally in complex, multifaceted ways. Emotions were dominated by feelings of frustration. |
| McCormack et al. (2015)[44] | Individuals met the federal definition of chronic homelessness. | Semistructured, qualitative interviews with 20 chronically homeless, alcohol-dependent participants with > 4 annual ED visits for 2 consecutive years at Bellevue Hospital. Interviews were triangulated with field notes and medical records. Data were analyzed thematically. | Fifty codes emerged, which were clustered into four broad themes: alcoholism, homelessness, health care, and the future. The participants' perspectives support a multifactorial process for the evolution of their alcoholism and its bidirectional reinforcing relationship with homelessness. Their self-efficacy and motivation for treatment is eroded by their progressive sense of hopelessness, which provides context for behaviors that reinforce stigma. |

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Table 1 (continued)

| Authors | Definition of Homelessness | Methods | Results |
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| Doran et al. (2013)[45] | NA | Qualitative, semistructured interviews with EM residents from two residency programs. Interviews analyzed thematically. | From 23 interviews, three key themes emerged: 1) use of pattern recognition in identifying and treating patients who are homeless, 2) variations from standard ED care for patients who are homeless, and 3) tensions in navigating the boundaries of ED social care. |
| Doran et al. (2013)[46] | Patients were considered homeless if it was documented that they were living in a shelter, on the streets or other place not meant for human habitation, or in another temporary and unstable situation such as "couch surfing" with friends or family because lack of another place to live. | Cross-sectional analysis of ED charts from a large urban teaching hospital. | There were 113 unique patients who were homeless and admitted to the hospital a total of 266 times during the study period. The mean age was 49 years, 27.4% of patients were women, and 75.2% had Medicaid. Half (50.8%) of all hospitalizations resulted in a 30-day hospital inpatient readmission and 70.3% resulted in either an inpatient readmission, observation status stay, or ED visit within 30 days of hospital discharge. Most readmissions occurred early after hospital discharge (53.9% within 1 week, 74.8% within 2 weeks). Discharge to the streets or shelter vs. other living situations was associated with increased risk for readmission in multivariable analyses. |
| Jones et al. (2013)[47] | Homeless individuals were identified by a computer search on the term "homeless" in all hospital admission and ED reports and by electronic screening for home addresses matching all shelters in the community and LDS hospital. Homelessness was confirmed on chart review. | Cross-sectional study of ED charts, comparing homeless ($n$ = 172) and nonhomeless ($n$ = 1,897) patients presenting to a Salt Lake City, UT, ED with community-acquired pneumonia from 1996 to 2006. In the homeless cohort, measured referral from and follow-up with the local homeless health care clinic and arrangement of medical housing. | Homeless patients were younger (44 years vs. 59 years; $p < 0.001$) and had lower CURB-65 scores and higher hospitalization risk (severity-adjusted OR = 1.89; 95% CI = 1.33–2.69) than did nonhomeless patients, with a similar length of stay, median inpatient cost, and median outpatient cost, even after severity adjustment. Of homeless patients, 22% were referred from the homeless health care clinic to the ED; 54% of outpatients and 51% of hospital patients were referred back to the clinic, and medical housing was arranged for 23%. |
| Orenstein et al. (1992)[48] | Resided in a homeless shelter. | Cross-sectional analysis of sheltered children and domiciled ED patients over a 9-month period. | Mean patient age was 3.4 years, mean maternal age was 27 years in both groups, and mean time spent in shelters was 7.8 months. Shelter families had more children, more single mothers, and higher rates of unemployment and uninsurance than did control families. Shelter children showed greater frequencies of immunization delay, lack of TB testing, and lack of a regular health care site and higher rates of medical admissions from the ED. |
| Wang et al. (2015)[49] | Homeless patients identified in electronic health records. Positive queries were paired with the Tarrant County Homeless Management Information System (HMIS) database archived in Fort Worth, TX, which contains personal information of individuals meeting the HUD definition of homelessness. | Cross-sectional analysis of homeless visits presenting to the ED and receiving treatment between July 2013 and June 2014. Appropriate vs. inappropriate use of the ED was determined using the New York University ED Algorithm. | Following New York University ED Algorithm standards, 76% of all ED visits were deemed inappropriate with approximately 77% of homeless patients receiving charity care and 74% of patients with no insurance seeking noncrisis health care in the ED ($p = 0.112$). About 50% of inappropriate ED visits and 43.84% of appropriate ED visits occurred in patients with a PCP assignment ($p = 0.019$). |
| Coe et al. (2015)[51] | Identified as "homeless" in the NHAMCS patient residence variable. | Cross-sectional analysis of the 2009–2010 NHAMCS. | Homeless patients were significantly more likely to be older or male, have self-pay, have no charge/charity or other as payment type, arrive via ambulance, have a longer ED visit, and have a past visit to the same ED in the preceding year. |

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Table 1 (continued)

| Authors | Definition of Homelessness | Methods | Results |
|---|---|---|---|
| Ku et al. (2010)[52] | Identified as "homeless" in the NHAMCS patient residence variable. | Cross-sectional analysis of the 2005 and 2006 NHAMCS. | Homeless individuals from all age groups made 550,000 ED visits annually (95% CI = 419,000–682,000) or 72 visits per 100 homeless people in the United States per year. Homeless people were older than others who used EDs (mean age of homeless people = 44 years compared with 36 years for others). ED visits by homeless people were independently associated with male sex, Medicaid coverage and lack of insurance, and Western geographic region. Additionally, homeless ED visitors were more likely to have arrived by ambulance, to be seen by a resident or intern, and to be diagnosed with either a psychiatric or substance abuse problem. Compared with others, ED visits by homeless people were four times more likely to occur within 3 days of a prior ED evaluation and more than twice as likely to occur within 1 week of hospitalization. |
| Oates et al. (2009)[53] | Identified as "homeless" in the NHAMCS patient residence variable. | Cross-sectional analysis of the 2005 NHAMCS. | Of the 115 million visits to national EDs in 2005, 472,922 were made by homeless patients. In comparison with the nonhomeless, these patients were more likely to arrive by ambulance and to be uninsured. Both groups had similar admission rates and triage urgency, with a trend toward increased diagnostic testing for homeless patients. |
| Lam et al. (2016)[54] | Defined homelessness as having the keyword "homeless" in the address line or if the homeless item was checked in the patient registration form | Retrospective cohort study in single ED of impact of homelessness on revisits, with unit of analysis the patient rather than the visit. Setting was an urban safety-net hospital in 2012. Patient demographics, mental health status, homelessness, insurance coverage, level of acuity, and ED disposition per ED visit were analyzed using multilevel modeling to control for multiple visits nested within patients. | Study included 139,414 adult ED visits from 92,307 unique patients (43.5 ± 15.1 years, 51.3% male, 68.2% Hispanic/Latino). Nearly 8% of patients presented with mental health conditions, while 4.6% were homeless at any time during the study period. Among patients with mental health conditions, being homeless contributed to an additional 28.0% increase in likelihood (4.28 to 5.48 odds) of 30-day ED revisits and 38.2% increase in likelihood (2.04 to 2.82 odds) of hospital readmission, compared to NHNM patients as the base category. Adjusted predicted probabilities showed that homeless patients presenting with mental health conditions have a 31.1% chance of returning to the ED within 30 days postdischarge and a 3.7% chance of hospital readmission, compared to nonhomeless patients presenting with mental health conditions (25.2%, 2.6%) and NHNM (7.7%, 1.5%). |
| McCormack et al. (2013)[55] | Undomiciled without shelter use for 9 of 24 months | A small prospective, difference-in-differences study evaluating the impact of a multifactorial ED intervention program focused on providing some form of housing from January 2011 to March 2012 at Bellevue Hospital. | Collectively, the sample had a mean age of 50.0 ± 10.0 years, was predominantly male (56 of 60), and had a mean age-adjusted Charlson score of 5.1 ± 2.2. The differences in differences between intervention and prospective patients and retrospective controls, respectively, were –12.1 and –12.8 for ED visits and –8.5 and –19.0 for inpatient days. |
| Tsai et al. (2013)[56] | Veterans who were identified as homeless in VA administrative data. | Cross-sectional analysis of national VA administrative data from fiscal year 2010 for a cross-sectional study comparing homeless ($n$ = 64,091) and nonhomeless ($n$ = 866,621) ED users on sociodemographics, medical and psychiatric diagnoses, and other clinical characteristics. | Homeless veterans had four times the odds of using EDs than nonhomeless veterans. Multivariate analyses found few differences between homeless and nonhomeless ED users on the medical conditions examined, but homeless ED users were more likely to have been diagnosed with a drug use disorder (OR = 4.12, 95% CI = 3.97–4.27), alcohol use disorder (OR = 3.67, 95% CI = 3.55–3.79), or schizophrenia (OR = 3.44, 95% CI = 3.25–3.64) in the past year. |

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Table 1 (continued)

| Authors | Definition of Homelessness | Methods | Results |
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| Stovall et al. (1997)[57] | Living in overnight shelters or on the street. | Retrospective cohort study of VA ED was evaluated to delineate the differences in use of services between homeless and domiciled veterans who have mental disorders. Data were obtained and compared on DSM-III-R diagnoses, number of hospitalizations, lengths of stay, and outpatient visits in the preceding year. | Homeless veterans with mental disorders were significantly more likely to have emergency visits and psychiatric admissions in the preceding 12 months than were the domiciled veterans. However, the mean length of stay was shorter for the homeless group. |
| Tsai and Rosenheck (2013)[58] | Veterans who were identified as homeless in VA administrative data. | Case–control study of veterans, comparing ED use by homeless vs. domiciled patients. National VA administrative data from fiscal year 2010 were used. Covariates included sociodemographic and clinical variables, as well as use of ambulatory care and psychotropic medications. | Sixteen percent of domiciled VA patients used EDs at least once during the year and 1% were frequent ED users (>4 ED visits) compared to 45% of homeless VA patients, 10% who were frequent ED users. Among homeless VA patients, those who used EDs were more likely to have a range of psychiatric and medical conditions, and had more service visits and psychotropic medication prescriptions than non-ED users. Multivariate analyses suggest their risk for psychiatric and medical conditions increase their likelihood of using ED services. The high rate of ED use among homeless veterans is associated with significant morbidity, but also greater use of ambulatory care and psychotropics suggesting that their ED use may reflect unmet psychosocial needs. |
| Mackelprang et al. (2015)[59] | Individuals whose address was "homeless" or "none" or a homeless shelter or service agency (i.e., homeless or unstably housed) in King County, WA, during any recorded encounter between July 1, 2009, and June 30, 2012. | Retrospective cohort study of 15- to 25-year-olds admitted to the ED or inpatient floors of two urban teaching hospitals in King County, WA, between July 1, 2009, and June 30, 2012. | A total of 1,151 ED visits and 227 inpatient admissions were documented. Fifty percent of patients had an ED visit or hospital readmission within 1 year, with 43.1% receiving care within 30 days of discharge. Cox regression showed that female individuals with an injury diagnosis (hazard ratio = 1.74, 95% CI = 1.06–2.85) and male individuals with an acute medical condition (hazard ratio = 1.59, 95% CI = 1.09–2.32) at index visit were more likely to have an ED visit or hospital readmission during the following year, as were patients who provided a private address at their index visit. |
| Doran et al. (2016)[60] | Current homelessness and housing stability was assessed with two questions that have been well studied and are now routinely administered at VA hospitals nationwide. | Cross-sectional survey of a random sample of patients in a single urban ED. | 13.8% of patients were currently living in a homeless shelter or on the streets. Further, 25.4% of patients reported concern about becoming homeless in the next 2 months and 9.1% had been evicted in the past year. 42.0% of patients reported difficulty meeting essential expenses and 35.9% were worried about running out of food. |
| Fryling et al. (2015)[61] | Defined "homelessness" as lack of stable housing for the previous 2 months, including couch surfing, sleeping at a shelter, sleeping outside, and sleeping in their car, as well as any other form of unstable housing. | Cross-sectional survey of non–critically ill adults of an urban county Level I trauma center ED. Assessed access to communication, awareness of the ACA, insurance status, and barriers preventing subjects from enrolling in health insurance and compared homeless persons' responses with concomitantly enrolled housed individuals. | Of the 650 enrolled subjects, 134 (20.2%) were homeless. Homeless subjects were more likely to have never heard of the ACA (26% vs. 10%). "Not being aware if they qualify for Medicaid" was the most common (70%) and most significant (30%) barrier to enrollment reported by uninsured homeless persons. Of homeless subjects who were unsure if they qualified for Medicaid, 91% reported an income < 138% of the federal poverty level, likely qualifying them for enrollment. Although 99% of housed subjects reported access to either phone or Internet, only 74% of homeless subjects reported access. |

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Table 1 (continued)

| Authors | Definition of Homelessness | Methods | Results |
|---|---|---|---|
| Post, et al. (2013).[62] | Patients living "doubled up" with family or friends, or in some other transitional living arrangement such as staying in a motel, at their place of work, in a church, or a car in addition to including patients who were living in shelters or on the streets or other public places not meant for nighttime residence. | Cross-sectional survey that continuously enrolled sequential patients in three EDs 24 hours per day, 7 days per week for 6 weeks (July–August 2012). 5,788 ED patients were enrolled, of whom 249 were identified as homeless. | 70.7% (176/249) of patients experiencing homelessness own cell phones compared to 85.90% (4,758/5,539) of patients in stable housing (p = 0.001) with the former more likely to own Androids, 70% (53/76) vs. 43.89% (1,064/2,424), and the latter more likely to have iPhones, 44.55% (1,080/2,424) vs. 17% (13/76; p = 0.001). There is no significant difference in new media use, modality, or frequency for both groups; however, there is a difference in contract plan with 50.02% (2,380/4,758) of stably housed patients having unlimited minutes vs. 37.5% (66/176) of homeless patients. 19.78% (941/4,758) of patients in stable housing have pay-as-you-go plans vs. 33.0% (58/176) of homeless patients (p = 0.001). Patients experiencing homelessness are more likely to want health information on alcohol/substance abuse, mental health, domestic violence, pregnancy, and smoking cessation. |
| D'Amore et al. (2001)[63] | Homelessness was defined as being present for any person not residing at a private address, group home, or drug treatment program. | Survey of all homeless adult patients presenting to an urban, tertiary care ED and a random set of nonhomeless controls over an 8-week period during summer 1999. | Homelessness was associated with a history of significantly higher rates of infectious disease, ethanol and substance use, psychiatric illness, social isolation, and rates of ED utilization. |

ACA = Affordable Care Act; HUD = U.S. Department of Housing and Urban Development; IQR = interquartile range; NEISS = National Electronic Injury Surveillance System; NHAMCS = National Hospital Ambulatory Medical Care Survey; NHNM = nonhomeless, non–mental health; TB = tuberculosis; VA = Veterans Affairs.

ED records. This survey can provide estimates of national prevalence and cross-sectional associations, but contains only information abstracted after the visit, from completed ED records. Further, the unit of analysis in these studies is the ED visits. Unlike many clinical subjects, homelessness in the ED may be particularly sensitive to the unit of analysis. Since homeless persons tend to utilize ED services at higher rates than nonhomeless persons, visit-based inferences may be biased estimates of person-based association. Seven studies[17,38,46–49,54] were single-institution ED chart reviews, likewise limited to cross-sectional inference.[50] Finally, one study[55] evaluated an intervention using the method of difference in differences.

## RESULTS

### Overview of the Articles

Ten studies employed secondary analysis of data from existing national sources, such as NHAMCS,[3,4,25,51–53] the National Injury Surveillance System (NEISS),[10] and the national Veterans Affairs (VA) administrative data.[56–58] Six studies retrospectively examined charts or administrative data of a single hospital.[17,38,47,49,54,59] Seven studies prospectively enrolled patients at a single ED.[21,48,55,60–63] One study examined a retrospective cohort at two hospitals.[59] One study used observational before-and-after data of New York City EDs after Hurricane Sandy.[32] Two studies employed qualitative semistructured interviews with EM residents to assess their opinions of the homeless ED population.[43,45] One study employed qualitative semistructured interviews with chronically homeless alcoholics in a single ED.[44]

Despite the variation in methods, the studies broadly examined four aspects of homelessness in the ED: 1) prevalence and sociodemographic characteristics of homeless ED visits (7/28);[4,25,32,51–53,60] 2) ED utilization by homeless adults (19/28);[4,17,21,25,38,44,46,49,51–59,61,62] 3) clinical characteristics of homeless populations (12/28);[10,17,25,38,47,48,52,56–59,63] and 4) medical education and evidence-based management of homeless ED patients (2/28).[43,45] Some of the studies overlapped in their methods and research questions. We describe findings within these categories in the following sections.

### Prevalence and Sociodemographic Characteristics of Homeless ED Visits

Prevalence of homelessness in the ED is primarily estimated from the ED component of the NHAMCS

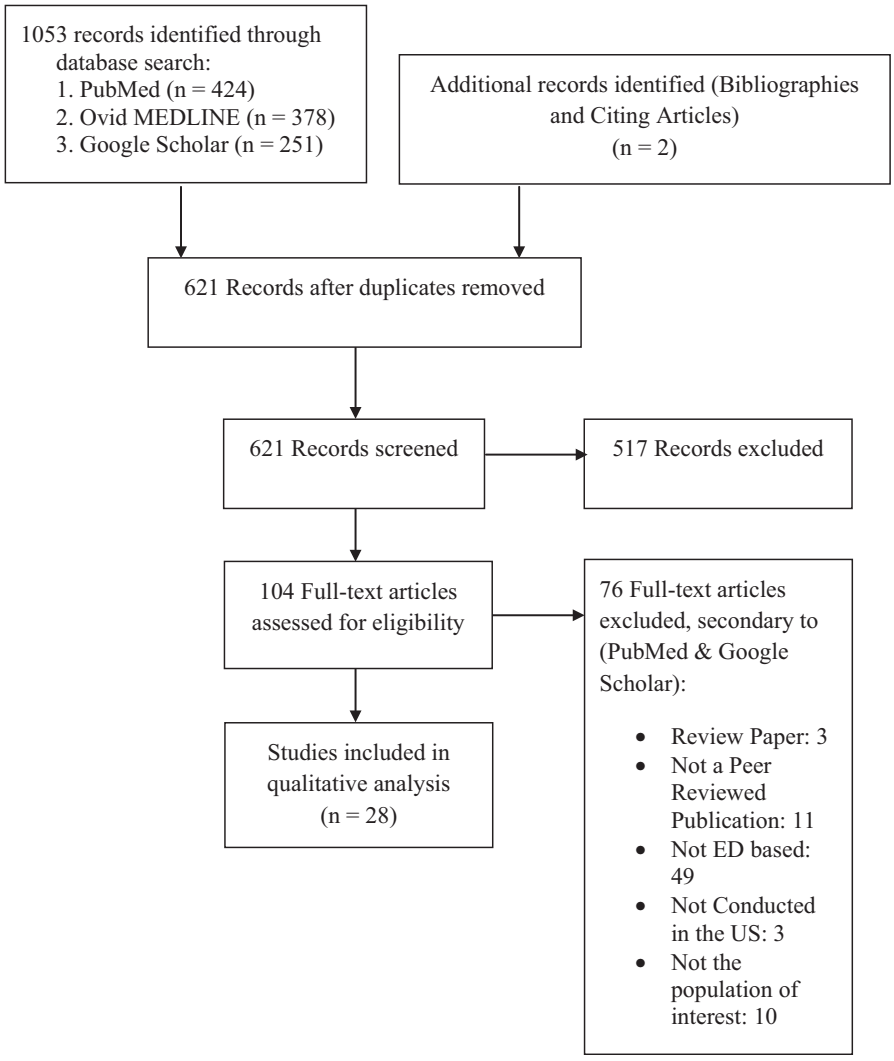


**Figure 1.** Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) flow diagram.

database, which provides a nationally representative survey of U.S. ED visits. NHAMCS added a residence category in 2005, which classified patients as "homeless" if they "had no home (e.g., lives on the street) or [the] patient's current place of residence is a homeless shelter."[64] The first study to examine this data found that homeless persons accounted for 0.4% of all ED visits in 2005.[53] Since then, studies utilizing the NHAMCS-ED database have consistently found that homeless persons accounted for less than 1% of ED visits (0.5%–0.65%).[4,25,51,52] One study found that ED visits by homeless persons increased by nearly 44% between 2005 and 2010, compared with a 7.4% increase for domiciled persons.[4] These studies have consistently found that homeless persons who visit the ED are mostly male (72%–77%) and more likely to be uninsured than their nonhomeless counterparts.[4,25,51–53] Additionally, homeless persons are significantly more likely to be older than their domiciled counterparts. Persons less than 18 years old accounted for only 4% of homeless ED visits,[52] while adults 25–44 years old accounted for nearly half,[53] and those 50 and older accounted for nearly a third of these visits.[25] In contrast to studies utilizing NHAMCS data, a cross-sectional survey of patients presenting to an urban ED found much higher rates of homelessness: 13.8% of patients reported living in a homeless shelter or on the streets, 9.1% reported an eviction in the preceding year, and 25.4% of patients were concerned about becoming homeless in the next 2 months.[60]

Importantly, the prevalence of homelessness in the ED is contingent upon factors external to the ED. For example, Doran et al.[32] observed increases in ED visits related to homelessness in the week after Hurricane Sandy in 2012. This was more prevalent in the elderly and in those insured by Medicaid, suggesting vulnerability within these subgroups.

## ED Utilization by Homeless Adults

Nineteen studies focused on the homeless' patterns of utilization of health services. Seven of these studies found that the homeless used the ED at higher rates, and were more likely to have repeat ED visits, than nonhomeless persons.[4,38,51,52,56–58] The high rates of uninsured homeless persons was used to explained this discrepancy in some studies. For example, in a cross-sectional survey conducted in an urban ED, Fryling et al.[61] found that homeless individuals had less knowledge of the Affordable Care Act (ACA) than their housed counterparts and were found to have a poor understanding of the ACA or Medicaid enrollment criteria. Despite these barriers, it is notable that three of the studies that reported higher rates of ED utilization were conducted in VA EDs, where insurance coverage is not a factor in seeking care.[56–58] One study found that homeless persons received similar benefits from ED treatment as nonhomeless persons,[17] while another classified nearly three-quarters of ED visits by the homeless as "inappropriate" based on the New York University ED algorithm.[49] Homeless persons also present to the ED with concurrent needs unmet by social welfare institutions. For example, in one survey conducted in an urban county ED, nearly one-third of homeless persons reported that hunger, concerns for their safety, and lack of shelter motivated their ED visits,[21] while another study of homeless frequent ED users found that only 4% were discharged with a plan that specifically addressed their homeless status.[38] In a survey of homeless patients' access to Internet, Post et al.[62] found no difference in homeless persons' access to Internet, social networking websites, and other forms of "new media." This may represent an underexplored opportunity to connect with homeless patients and improve health outcomes.

Homeless persons are more likely to arrive to the ED by ambulance, presumably due to higher rates of injury, limitations in available transportation, and high rates of bystander use of ambulance services to attend to homeless persons' needs.[17,25,51–53] Two studies noted that the homeless were less likely to be admitted to the hospital than their nonhomeless counterparts,[4,17] whereas one study found similar rates of admission rates between the two groups.[53] However, this may be variable within subgroups of the homeless population, as one study also found that older homeless persons were significantly more likely to be admitted to the hospital than younger homeless adults (20% vs. 11%, respectively).[25] Once hospitalized, homeless persons also suffer a higher risk of inpatient readmission and repeat ED visits within 30 days.[46,59] Doran et al.[46] also found that discharge to the streets or shelter (as opposed to other living situations) was significantly associated with readmission within 30 days. Similarly, Lam et al.[54] examined a subset of the homeless population with mental health conditions and found that being homeless contributed to a 28.0% increased likelihood of 30-day ED revisits and a 38.2% increase in likelihood of hospital readmission, compared to being domiciled. McCormack and colleagues[55] enrolled chronically homeless, alcohol-dependent frequent ED users in a case management program that included access to supportive housing found that this helped decrease ED utilization in this population.

One study described the experiences, perceptions, or expectations of homeless persons within the ED.[44] This study, which focused on chronically homeless alcoholics in a single ED setting, found that they isolated themselves from their families due to the stigma of their alcohol addiction. Over time, these patients came to rely on the ED as a source for their subsistence needs (e.g., food, shelter, clothing).

## Clinical Characteristics of Homeless Populations

Twelve studies reported evidence on the health and diagnoses of homeless individuals in the ED. D'Amore et al.[63] found that homeless patients suffered from very high rates of medical illness such as HIV (35%) and TB (49%), and psychiatric illness such as schizophrenia (27%) and depression (70%). The rate of substance use was also extremely high in this cohort (36% of participants used heroin, 35% used cocaine, and 81% were alcoholics). The higher prevalence of psychiatric and substance abuse–related visits was reproduced in studies utilizing NHAMCS and VA data.[17,38,52,56,58] In contrast, one study of veterans with psychiatric diagnoses found that homeless and domiciled patients had similar diagnostic patterns, but homeless veterans were more likely to seek care in the ED and on a walk-in basis than their domiciled counterparts.[57] The risk of psychiatric and substance abuse–related visits may vary among subsets of the homeless population. For example, Brown and Steinman[25] found that homeless adults aged 50 and older were less likely to present with psychiatric or substance abuse complaints and more likely to present with injury-related and cardiovascular complaints than those aged 18–49.

Despite age-related differences, medical diagnoses are common among younger homeless adults. A recent study of homeless 15- to 25-year-old ED patients found that acute and chronic medical conditions were the most common diagnostic classifications (47 and 57%, respectively), followed by injuries (30%) and psychiatric diagnoses (23%).[59] Patients in this study were commonly diagnosed with multiple medical conditions, especially among those who were admitted for inpatient care. For example, 20% of females in this study had a pregnancy-related diagnosis, 38% of whom were also treated for assault-related injuries and 63% of whom had a psychiatric diagnosis. In contrast to these findings, a retrospective chart review of homeless patients with pneumonia found that homeless patients were younger and had lower CURB-65 scores, but were hospitalized at higher rates than non-homeless patients.[47] Mackelprang et al.[10] found significant differences in the injury rates and patterns of homeless and domiciled persons. In this study, the majority of injuries that occurred in homeless persons occurred on public property or street, while domiciled persons tended to be injured at home. Narrative data examined in this study suggested that injuries were often related to material conditions of homelessness (e.g., carrying heavy bags or other objects, sleeping on hard surfaces). Burn injuries were significantly more common among homeless persons (10.1%) than domiciled persons (2.0%), with narratives for burn injuries describing homeless persons as suffering frostbite, sustaining burns while cooking, and being burned by campfires. Homeless persons in this study were also more likely than their housed counterparts to have a history of substance abuse and mental illness and were more likely to have sustained their burn injury secondary to assault.

Only one study examined the consequences of homelessness in pediatric populations, finding higher frequencies of immunization delay and hospital admission.[48] Children in this study were also tested for TB at lower rates than their housed counterparts.

### Medical Education and Evidence-based Management

To our knowledge, no formal, evidence-based curricula exist by which residents and EPs learn to care for homeless ED patients. Moreover, we are unaware of any formal evidence-based guidelines regarding the care of homeless ED patients. One study based on interviews with EM residents reported that they learned how to care for homeless patients based on personal experiences, informal interactions, and narratives of "near misses."[43] Another study found that residents used stereotypes of poverty and homelessness (e.g., unkempt appearance) to identify homeless patients.[45] Residents in this study reported that it was common to deviate from standard of care when treating homeless patients and that caring for this population was fraught with tensions as to the boundaries of EM and the many social needs of these patients. Thus, EM residents and practitioners may lack adequate training in the evidence-based management of homeless patients.

## DISCUSSION

In this systematic review, we identified four broad categories within which homelessness in EM has been examined. Each of these categories provides valuable information on homeless patients in the ED, but important gaps in knowledge remain.

The majority of data on the prevalence of homelessness in the ED relies on NHAMCS data, which relies on self-reported patient residence. Some patients may underreport homelessness due to social desirability bias. Furthermore, because of the narrow definition of homelessness employed in NHAMCS, patients who may be "doubled up" or otherwise housing insecure may not be recorded as "homeless." This database therefore likely underestimates the prevalence of homelessness and housing insecurity among ED patients. Thus, researchers should address gaps in knowledge by systematically measuring the prevalence of homelessness in using definitions consistent with that employed by HHS. This definition can better measure the heterogeneous populations vulnerable to the adverse health effects of homelessness.

Additionally, the subsets of homeless individuals, and their respective need and characteristics, should be studied. For example, although the majority of homeless ED patients are men, over one-third are women, many of whom are concurrently caring for children. This population likely experiences a unique set of needs and vulnerabilities to assault and violent victimization.[8] Few studies have examined the medical problems of homeless women in the ED, and we found no studies that specifically examined homeless families. Studies examining differences in illness and injury patterns between men and women are necessary, as are studies characterizing their specific needs.

The homeless population has also aged considerably since the 1980s. The median age of single homeless adults is 50 years today, compared with 37 years in 1990, and is predicted to continue to rise.[26] Homeless adults are considered "elderly" at age 50, as they have health conditions similar to or higher than housed adults 15 to 20 years older (e.g., frequent falls or memory loss).[12] This has important implications for ED care delivery; however, relatively little research is dedicated to older homeless individuals in the ED.

Although the homeless are older on average, younger homeless patients also have high rates of comorbidities.[65,66] Depending on available resources, adolescents may be forced into streets or adult shelters, placing them at increased risk of victimization, substance use, sexually transmitted infection and HIV infection, and mental health problems.[67–69] Lesbian, gay, bisexual, and transgender youth comprise a particularly vulnerable subsection of this population, as they suffer worse outcomes than their heterosexual counterparts.[70–72] Children, adolescents, and young adults represent a small portion of the overall homeless population, but they have unique needs and vulnerabilities that should also be addressed in future research.

All of the studies we examined focused either on national surveys of homeless populations or on urban ED populations. Rural homelessness is a problem that is understudied and poorly understood.[73] Further studies are necessary to measure the prevalence of homelessness in rural EDs and characterize how rural homeless individuals differ from their urban counterparts.

The studies included in this review focused disproportionately on homeless persons' high rates of ED utilization and repeat visits, with some characterizing homeless persons' visits as "inappropriate." While the idea of "inappropriate" ED use has been critiqued elsewhere,[74,75] these findings strongly suggest that the homeless have needs that are unmet by social welfare institutions and remain either underexamined and underaddressed in the ED. Homeless persons often cycle between ED visits and hospital admissions. In the process, their health deteriorates and they become embroiled in costly, suboptimal cycles of care. This is especially pronounced among those discharged to shelters or streets versus other living situations (e.g., respite care, stable housing) and has been noted across age groups.[51–53,76] Further research is necessary to characterize the complex and unmet needs of this population and to guide improved care for them within the ED setting.

Few studies in this review focused specifically on the health of homeless ED patients. The adverse health effects of homelessness are well documented and have important implications for EPs. Homeless persons have mortality rates three to six times those of the general population, with homelessness found to be an independent risk factor for mortality.[7,77–79] They also experience higher rates of chronic illness, chronic injury, infectious disease (e.g., TB, HIV, and hepatitis C), substance use, and mental illness than their low-income, housed counterparts.[80–82] Moreover, homeless patients have difficulty obtaining, storing, and taking medications as prescribed due to their housing circumstances, which further contributes to their poor health outcomes.[83,84] Substance use is common among homeless patients who present for trauma care, especially among adolescents and young adults.[9,85] Importantly, we found no studies examining the effects of the current opioid epidemic on homeless populations. Further research is warranted to study the effects of this public health crisis on homeless persons. However, this should not obscure the medical comorbidities that accompany homelessness. Given that the ED is an important site for health care delivery for the homeless, it is important to their health needs and outcomes are better characterized to guide ED treatment decisions in the future.

One of the main difficulties in caring for the homeless in the ED is that their needs are manifold and interdependent, exceed many available resources, and defy traditional conceptions of health and health care delivery in EM. Homeless patients push the boundaries of disease-oriented models of medicine, and episodic models of EM care delivery, thereby challenging EPs to engage with the social determinants of health.[86] For example, housing is rarely considered a mode of health care delivery despite studies that consistently show that secure housing improves health and decreases ED utilization.[87–89] Additionally, Internet-based studies and service delivery may represent an underexplored medium to connect with and deliver care to these patients.[62] Furthermore, the design of studies and interpretation of findings often relies on researchers' assumptions, experiences, and priorities, which may not coincide with those of homeless patients. Interrogation of these assumptions, via qualitative studies of homeless ED patients, would therefore strongly enrich our understanding of their needs, challenges, and priorities.

Finally, we found no evidence-based guidelines or medical education curriculum to aid in the health care

providers' recognition or management of homeless patients in the ED. In two of the studies we examined, residents reported relying on stereotypes and deviating from the standard of care in caring for homeless patients.[43,45] This is particularly concerning given the high rates of comorbidities in homeless populations. Further, this practice raises ethical concerns and potential clinical pitfalls and may further render these patients vulnerable to stigma and discrimination by EPs, thereby exacerbating existing health inequalities. It is therefore important to characterize current EP practice patterns and attitudes toward these patients, especially when it comes to potential stigma and discrimination against these patients. Additionally, guidelines and educational training (in residency and beyond) are necessary to assist in the management of these patients and the avoidance of common pitfalls.

## LIMITATIONS

This review has several limitations. First, the variability of definitions of homelessness is an important limitation in the systematic measurement and analysis of homelessness in the ED. Second, our review included only studies conducted with the explicit intent of studying homeless populations within the ED. This may have excluded studies that do contribute to our understanding of homeless persons. However, the database search results underwent multiple reviews, and we are confident that the data presented are accurate and representative of our current knowledge of homelessness within US EDs. Third, we excluded studies that surveyed homeless populations about their ED use and health status. While these studies may offer important insights on the health and utilization patterns of various subsets of homeless people, the ED is a unique site of care deliver for this vulnerable population. We therefore sought to highlight what is known specifically within the ED setting and believe that our selection criteria have accomplished this. Finally, the generalizability of findings is limited by the heterogeneity of articles included. Most of the studies were performed at a single center and few used the same research methods, thereby limiting the comparability of findings.

## CONCLUSION

This review has outlined the available evidence on the prevalence, demographics, clinical characteristics, and evidence-based management of homeless persons in the ED. Homelessness is a substantial problem in the US and may be underrecognized and undermeasured among ED patients. Homelessness has significant effects on ED utilization. Homeless persons have high numbers of repeat ED visits and hospital admissions, especially when discharged to the streets or shelters. Despite the well-documented health problems associated with homelessness, few studies in our review examined the health needs and outcomes of homeless patients. This gap is particularly pronounced among pediatric and adolescent populations. Finally, we found no educational curricula or clinical guidelines to assist EPs in caring for homeless patients. Further research is needed to understand the health needs of homeless patients and to guide their care in the acute care setting.

Caring for homeless persons in the ED is challenging and requires that EDs be conversant in the in the social determinants of health and the unique aspects of homelessness in their community. This requires expanding the traditional boundaries of emergency care delivery and recognizing the ED's role in population health.[90,91] As the homeless population undergoes demographic shifts, EDs will continue to be the primary purveyor of health care for the homeless. By better understanding the characteristics and needs of this vulnerable population, we are better able to provide patients with appropriate and timely care.

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