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## Homeless in America: injuries treated in US emergency departments, 2007–2011

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Despite being a high-risk population, epidemiological research about injuries among homeless individuals is limited. We sought to describe injury characteristics among individuals identified as homeless in the National Electronic Injury Surveillance System (NEISS), and to compare them to age- and sex-matched controls. We searched text narratives for all patients with product-related injuries who presented to NEISS emergency departments from 2007 to 2011 to identify homeless cases ( $N = 268$ ). A random sample of 2680 age- and sex-matched controls was identified for the same time period. The incident location differed between groups, and the mention of substance use was significantly more common among homeless cases than controls. The 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. Additional research on injury among homeless individuals is warranted in order to identify meaningful preventive strategies for this at-risk population.

**Keywords:** homelessness; injury; emergency department

### 1. Introduction

Homelessness is a serious public health problem in the United States. A 2012 estimate reported that 633,782 homeless persons were identified in communities across the United States (Cortes et al., 2012), and as many as 3.5 million Americans are believed to experience homelessness in any given year (National Alliance to End Homelessness, 2009).

Health disparities between homeless and housed individuals are well documented, with individuals who are homeless demonstrating elevated rates of chronic medical conditions, mental illness and substance-use disorders (Trevena, Nutbeam, & Simpson, 2007). Precarious or non-existent housing renders homeless individuals vulnerable to multiple forms of victimisation, and their risk of unintentional injury is elevated, given their living conditions and environmental exposure (e.g. frostbite). Moreover, immediate survival demands (e.g. obtaining food and shelter) compete with seeking health care (Gelberg, Gallagher, Andersen, & Koegel, 1997), and individuals who are homeless often delay seeking care until acute needs necessitate intervention (Martins, 2008). Excess morbidity among the homeless results in rates of mortality that are four times the general population; the average age of death is between 42 and 52 years (O'Connell, 2005).

Homeless adults are among the most common repeat visitors to emergency departments (EDs; Kushel, Perry,

Bangsberg, Clark, & Moss, 2002; Mandelberg, Kuhn, & Kohn, 2000). In 2010, an estimated 552,000 ED visits (71.8 visits per 100 persons) were made by individuals who reported being homeless, a rate nearly double that of individuals with private residences (Niska, Bhuiya, & Xu, 2010). Homeless individuals have higher rates of hospitalisation than low-income, housed persons (Weinreb, Goldberg, & Perloff, 2001) or the general population (Martell et al., 1992). They also experience longer lengths of stay, resulting in greater overall costs (Hwang, Weaver, Aubry, & Hoch, 2011; Salit, Kuhn, Hartz, Vu, & Mosso, 1998). Substance abuse or psychiatric illness commonly precipitates hospital care (Adams, Rosenheck, Gee, Seibyl, & Kushel, 2007).

Although traumatic injury has been cited as a common reason why homeless persons seek ED care (Padgett & Struening, 1991; Padgett, Struening, Andrews, & Pittman, 1995), the literature describing the nature of the injuries for which they seek treatment is scarce (Padgett & Struening, 1992). Only one study to date has described the nature of injuries among a sample of homeless patients (Frencher et al., 2010). Using data about patients who were admitted to hospitals in the New York state, Frencher et al. (2010) highlighted differences across the lifespan in injury mechanisms among homeless compared to low-income, housed patients. They cited the need for unique injury prevention initiatives in the areas of burn, fall, poisoning and violence.

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The purpose of this study was to describe injury characteristics (e.g. body part injured) and circumstances (i.e. time of year, location where injury occurred) among individuals identified as homeless in EDs in the United States, specifically. Homeless cases were derived from the National Electronic Injury Surveillance System (NEISS) and were compared to a random sample of controls (i.e. patients not identified as homeless). NEISS data include narrative text describing each incident, which provides an opportunity to identify cases of individuals who were homeless at the time of their injury and to ascertain additional descriptive information concerning the circumstances in which injuries tend to occur in this population.

## 2. Methods

The US Consumer Product Safety Commission (CPSC, 2013) operates NEISS, a database of consumer-product-related injuries from a stratified national probability sample of 100 US EDs. The CPSC defines a consumer product as “any article produced or distributed for use by a consumer in or around a home, school or recreational area” (p. 2). All injuries in which a consumer product is associated with the presenting injury are reported. Illnesses are included only when a consumer product is directly related to the onset of a specific illness (CPSC, 2013). Injury data collected include age, sex, body part injured, diagnosis, disposition, location of incident, consumer product(s) associated with injury, and a brief narrative that provides additional details on the patient, injury and circumstances relevant to the occurrence of the injury. Onsite NEISS coders review emergency records on a daily basis to extract details regarding each incident. Previous studies have illustrated the utility of utilising NEISS and other narrative data to ascertain detailed information about injuries beyond routinely coded data (Bohl, Sharma, & Jones, 2011; Collins, Smith, & Comstock, 2007; Howell, Nelson, & McKenzie, 2010; McKenzie, Scott, Campbell, & McClure, 2009; Mitchell, Finch, Boufous, & Browne, 2009).

We evaluated all product-related injury narratives presented to NEISS EDs between 1 January 2007 and 31 December 2011. To identify cases associated with homelessness, we searched narratives for the following words or truncations: ‘homeless’, ‘homeles’, ‘homless’, ‘homelss’, ‘hoemless’, ‘home less’, ‘vagrant’, or ‘indigent.’ The word ‘transient’ and its iterations were not searched because it is often used in association with injury symptoms (e.g. transient pain) and would have resulted in overidentification of narratives not related to homelessness. Narratives were reviewed by one author (JLM) to exclude cases incorrectly classified (e.g. injured person was not homeless). A random control sample was derived from the full 2007–2011 NEISS database using Stata/SE 11.2 (StataCorp, 2011) and matched with the homeless

group by age and sex at a ratio of 10:1. A ratio of 10:1 was chosen to provide an adequately large yet manageable sample of controls from the 1.9 million injuries reported to NEISS from 2007 to 2011. The narratives for all cases and controls were reviewed and categorised according to whether substance use was associated with the injury. Given that substance use is a common precipitant of injury (Kowalenko, Burgess, Szpunar, & Irvin-Babcock, 2013; Rivara et al., 1993), we reviewed narratives for the presence of words associated with alcohol (i.e. *alcohol*, *ETOH*, *drunk*, *beer*, *liquor*, *drink*, *intoxicated*, *intoxication*), drugs (i.e., *drug*, *marijuana*, *cocaine*, *crack*, *meth*, *heroin*, *inhaling*, *huffing*, *snort*) or polysubstance abuse (i.e., *polysubstance*, *polypharmacy*, *subs abuse*; multiple substances listed) and categorised them accordingly.

### 2.1. Data analysis

Injury cases were divided into categories based on age group (i.e. children [0–15 years], adolescents and young adults [16–25 years], adults [26–59 years] and older adults [60 years and older]). Age categories were selected *a priori*, given that types of injuries tend to vary over the lifespan (e.g. older adults are more likely to sustain injuries as a result of falls than younger groups; Rockett et al., 2012). We described the number and percentage of injuries by age group for the following characteristics: sex, season of injury, location of incident, ED disposition and substance involvement. Location of incident included the following NEISS-defined variables: home, street or highway, other public property, school, place of recreation or sports or missing/not recorded. ED disposition was categorised as: treated and released; transferred, admitted or held for observation; left without being seen; or fatality.

The body part injured was categorised as head, neck, upper extremity, lower extremity, trunk or other (e.g. pubic region, 25%–50% of body, >50% of body). Based on NEISS diagnosis codes, we categorised injuries as intracranial injury, burn, laceration, contusion/abrasion, fracture, sprain/strain, poisoning, internal organ injury, dermatitis/conjunctivitis or other (e.g. amputation, crushing, internal injury, nerve damage, puncture, haemorrhage). Intracranial injury was defined as a concussion or a fracture or internal organ injury to the head (Xiang, Sinclair, Yu, Smith, & Kelleher, 2007). Injury diagnoses categorised as ‘Missing’ by NEISS were recoded based on narrative text descriptions. We created a ‘non-injury’ category to describe instances with no apparent injury as per the NEISS diagnoses or narrative (e.g. ‘*Homeless man found outside unresponsive in his wheelchair in respiratory arrest, intubated and brought around*’). Patients with diagnoses described as ‘trench foot’, ‘maceration’ or cellulitis were categorised as infections and included with dermatitis/conjunctivitis in the non-injury category. These non-injury cases are included in the NEISS system

because the onset of the disorder was associated with a consumer product (e.g. trench foot associated with wearing wet socks for a prolonged period).

Patient and injury characteristics were compared across cases and controls using chi-squared tests or Fisher's exact tests where any cell count was less than 5. Data were analysed by using Stata/SE 11.2 (StataCorp, 2011). The actual sample size of this study is the unweighted number of patients presenting to NEISS EDs. National estimates, while possible with NEISS data, were not appropriate, given that homelessness is not systematically reported in narratives, and the number of cases would result in unstable estimates. As per the University of Washington Human Subjects Division, this study did not require institutional review board approval because it was performed on publicly available, de-identified data.

### 3. Results

Between 1 January 2007 and 31 December 2011, 1,885,274 individuals presented to NEISS EDs with product-related injuries. Among these, 275 cases contained NEISS narrative text with the term 'homeless' or an aforementioned truncation. For seven cases, narrative text mentioned homeless in a context other than describing the injured individual (e.g. '*Pt was struck in ankle w/cart yesterday while helping homeless man down hill*') and were excluded, leaving a final sample of 268 cases. A randomly sampled comparison group of 2680 sex- and age-matched patients was derived from the 2007–2011 NEISS dataset. The final sample of 2948 cases and controls was predominantly male (80.2%). On average, males were significantly older (43.3 years, SD = 13.9) than females (38.3 years, SD = 2.2; t-test,  $p = .02$ ). Exact age was missing for one homeless case; thus, that person's data were not included in Table 1 and Table 2.

Incident location differed significantly between cases and controls across all age groups ( $p < .01$ ; Table 1). Among cases identified as homeless, the majority of injuries occurred on public property or street/highway, while controls tended to be injured at home. Injuries were distributed evenly across the seasons. Eighty per cent of homeless patients were treated in the ED and released, with 18.7% transferred to another hospital, admitted or held for observation. Disposition did not vary by age group among cases. However, adult patients who were homeless were more likely to be admitted ( $p < .01$ ) than adult controls. Leaving without being seen or departing against medical advice did not differ between groups.

Substance use was mentioned in 52 (19.4%) of the homeless patients' narratives and was significantly more common among cases than controls ( $p < .01$ ), except among children where no differences were noted (see Table 1). In contrast to the adults and older adults where alcohol was noted more frequently, mention of drug

involvement was just as common as alcohol use among homeless adolescents and young adults.

Body parts injured and injury diagnoses are described in Table 2. Upper extremity injuries were more common among controls, while lower extremity and 'Other' body part injuries were most common among homeless cases. The body part injured differed significantly between cases and controls for all age groups, with the exception of older adults.

For all groups except older adults, homeless cases were significantly more likely to be diagnosed with a non-injury condition than an injury ( $p < .01$ ). Overall, the most common injury diagnosis among cases and controls was sprain/strain ( $N = 55$  [20.5%] and  $N = 647$  [24.1%], respectively). Among cases, most sprains/strains (50.9%) were associated with the trunk, usually the back (Figure 1(a)). Narratives suggest that back strains/sprains often resulted from carrying heavy bags or other objects, falling or sleeping on hard surfaces. Burn injuries were significantly more common among cases than controls (10.1% and 2.0%, respectively), with adults (11.3%) and older adults (8.0%) presenting with burn injuries more than the younger groups. Narratives for burn injuries described homeless individuals as suffering from frost-bite, sustaining burns while cooking and being burned by campfires. For additional details about injury diagnoses, see Figure 1(a) and 1(b).

Poisonings were categorised as 'Other' body part. Ninety-six per cent of poisoning injuries among homeless cases were associated with substance use. However, poisonings only accounted for 48.1% of the 52 cases for which the substance involvement was indicated, revealing that substance use was related to other injuries as well. Other injuries that involved substance use among cases included laceration ( $N = 6$ ), contusion/abrasion ( $N = 7$ ), fracture ( $N = 4$ ), internal organ injury ( $N = 4$ ) and burns ( $N = 4$ ). Contusions/abrasions among patients who were homeless occurred most commonly to the lower extremities (47.5%) and trunk (30.0%), and nearly half (48.2%) of burns were to the lower extremities. Lacerations were the only injury diagnosis that was more common among controls in all age groups.

Non-injury diagnoses were most common among children who were identified as homeless, specifically the NEISS category dermatitis/conjunctivitis (50%). These were frequently described as rashes or contact dermatitis associated with bedding. Infections comprised 11.3% and 10.0% of diagnoses among homeless children and adults, respectively, but were not mentioned in any of the controls' narratives in those age ranges. Most infections among the cases were associated with the lower extremities (92.0%). Narratives suggested that many resulted from prolonged exposure to wet socks or shoes, for example, '*Homeless pt has been wearing wet shoes and socks for a week. dx: foot maceration.*'

Table 1. Characteristics of homeless cases ( $N = 268$ ) identified in NEISS narratives and random population controls ( $N = 2680$ ), 2007–2011.

	Children 0–15 years			Adolescents/young adults 16–25 years			Adults 26–59 years			Older adults $\geq 60$ years		
	Homeless ( $N = 10$ )	Controls ( $N = 100$ )	Significance	Homeless ( $N = 29$ )	Controls ( $N = 290$ )	Significance	Homeless ( $N = 203$ )	Controls ( $N = 2030$ )	Significance	Homeless ( $N = 25$ )	Controls ( $N = 250$ )	Significance
	N (%)	N (%)		N (%)	N (%)		N (%)	N (%)		N (%)	N (%)	
<b>Sex</b>												
Male	6 (60.0)	60 (60.0)	–	21 (72.4)	210 (72.4)	–	165 (81.3)	1650 (81.3)	–	22 (88.0)	220 (88.0)	–
Female	4 (40.0)	40 (40.0)	–	8 (27.6)	80 (27.6)	–	38 (18.7)	380 (18.7)	–	3 (12.0)	30 (12.0)	–
<b>Season of injury*</b>												
Spring	4 (40.0)	21 (21.0)	0.43	8 (27.6)	60 (20.7)	0.35	47 (23.2)	504 (24.8)	0.61	6 (24.0)	53 (21.2)	0.44
Summer	2 (20.0)	25 (25.0)		5 (17.2)	82 (28.3)		54 (26.6)	583 (28.7)		4 (16.0)	76 (30.4)	
Autumn	3 (30.0)	26 (26.0)		6 (20.7)	78 (26.9)		50 (24.6)	503 (24.8)		9 (36.0)	66 (26.4)	
Winter	1 (10.0)	28 (28.0)		10 (34.5)	70 (24.1)		52 (25.6)	440 (21.7)		6 (24.0)	55 (22.0)	
<b>Location of incident</b>												
Home or mobile home	1 (10.0)	47 (47.0)	<0.01	1 (3.4)	110 (37.9)	<0.01	12 (5.9)	1038 (51.1)	<0.01	2 (8.0)	134 (53.6)	<0.01
Street or highway	–	–		5 (17.2)	13 (4.5)		29 (14.3)	85 (4.2)		1 (4.0)	4 (1.6)	
Other public property	9 (90.0)	4 (4.0)		14 (48.3)	15 (5.2)		95 (46.8)	123 (6.1)		16 (64.0)	29 (11.6)	
School	–	8 (8.0)		–	13 (4.5)		1 (0.5)	4 (0.2)		–	–	
Place of recreation or sports	–	12 (12.0)		–	56 (19.3)		6 (3.0)	225 (11.1)		1 (4.0)	20 (8.0)	
Missing/not recorded	–	29 (29.0)		9 (31.0)	83 (28.6)		60 (29.6)	555 (27.3)		5 (20.0)	63 (25.2)	
<b>Disposition</b>												
Treated and released	8 (80.0)	96 (96.0)	0.09	25 (86.2)	275 (94.8)	0.11	162 (79.8)	1900 (93.6)	<0.01	19 (76.0)	212 (84.8)	0.26
Transferred, admitted or held	2 (20.0)	3 (3.0)		3 (10.3)	12 (4.1)		38 (18.7)	106 (5.2)		6 (24.0)	38 (15.2)	
Left without being seen	–	1 (1.0)		1 (3.4)	3 (1.0)		2 (1.0)	22 (1.1)		–	–	
Fatality	–	–		–	–		1 (0.5)	2 (0.1)		–	–	
<b>Substance involvement**</b>												
Alcohol	–	–	0.09	3 (10.3)	6 (2.1)	<0.01	29 (14.3)	66 (3.3)	<0.01	5 (20.0)	8 (3.2)	<0.01
Drug	1 (10.0)	–		3 (10.3)	1 (0.3)		5 (2.5)	2 (0.1)		–	–	
Polysubstance use	–	–		–	–		5 (2.5)	2 (0.1)		1 (4.0)	–	
None	9 (90.0)	100 (100.0)		23 (79.3)	290 (97.6)		164 (80.8)	1960 (96.6)		19 (76.0)	242 (96.8)	

Significance indicated by the  $p$ -value from comparison between homeless cases and random population controls using chi-squared tests or Fisher's exact tests where any cell count was less than 5. No  $p$ -value is provided for sex because cases and controls were matched on sex and age.

\*Defined by month of injury: spring (March, April, May), summer (June, July, August), autumn (September, October, November), winter (December, January, February).

\*\*Includes mention of alcohol or drug use in narratives.

Note: Exact age was not included in NEISS for one homeless adult; that individual and 10 controls are not listed in the table above.

Table 2. Injury characteristics for homeless cases (N = 268) identified in NEISS narratives and random population controls (N = 2680), 2007–2011.

	Children 0–15 years			Adolescents/young adults 16–25 years			Adults 26–59 years			Older adults ≥ 60 years		
	Homeless (N = 10)	Controls (N = 100)	Significance	Homeless (N = 29)	Controls (N = 290)	Significance	Homeless (N = 203)	Controls (N = 2030)	Significance	Homeless (N = 25)	Controls (N = 250)	Significance
	N (%)	N (%)		N (%)	N (%)		N (%)	N (%)		N (%)	N (%)	
<b>Body part injured</b>												
Head/neck*	2 (20.0)	50 (50.0)	<0.01	3 (10.3)	57 (19.7)	<0.01	30 (14.8)	371 (18.3)	<0.01	7 (28.0)	51 (20.4)	0.32
Upper extremities	–	31 (31.0)		7 (24.1)	109 (37.6)		29 (14.3)	700 (34.5)		4 (16.0)	76 (30.4)	
Lower extremities	1 (10.0)	13 (13.0)		8 (27.6)	80 (27.6)		74 (36.5)	470 (23.2)		7 (28.0)	55 (22.0)	
Trunk	1 (10.0)	2 (2.0)		5 (17.2)	38 (13.1)		39 (18.7)	435 (21.4)		5 (20.0)	60 (24.0)	
Other**	6 (60.0)	4 (4.0)		6 (20.7)	6 (2.1)		32 (15.8)	54 (2.7)		2 (8.0)	8 (3.2)	
<b>Injury diagnosis</b>												
Intracranial injury	2 (50.0)	15 (15.5)	0.17	–	19 (6.7)	0.02	12 (7.4)	95 (4.9)	<0.01	2 (8.7)	18 (7.8)	0.11
Burn	–	2 (2.1)		1 (4.5)	6 (2.1)		23 (14.2)	44 (2.3)		2 (8.7)	2 (0.9)	
Laceration	–	27 (27.8)		3 (13.6)	62 (21.8)		11 (6.8)	429 (22.0)		2 (8.7)	55 (23.8)	
Contusion/abrasion	1 (25.0)	22 (22.7)		3 (13.6)	53 (18.6)		30 (18.5)	393 (20.2)		6 (26.1)	43 (18.6)	
Fracture/dislocation	–	13 (13.4)		4 (18.2)	49 (17.2)		7 (4.3)	317 (16.3)		4 (17.4)	45 (19.5)	
Sprain/strain	–	11 (11.3)		7 (31.8)	76 (26.7)		43 (26.5)	514 (26.4)		5 (21.7)	46 (19.9)	
Poisoning	1 (25.0)	3 (3.1)		4 (18.2)	4 (1.4)		20 (12.3)	20 (1.0)		1 (4.3)	3 (1.3)	
Other***	–	4 (4.1)		–	16 (5.6)		16 (9.9)	136 (7.0)		1 (4.3)	19 (8.2)	
<b>Non-injury diagnosis****</b>	6 (60.0)	3 (3.0)	<0.01	7 (24.1)	5 (1.7)	<0.01	41 (20.2)	82 (4.0)	<0.01	2 (8.0)	19 (7.6)	1.00

Significance indicated by the p-value from comparison between homeless cases and random population controls using chi-squared tests or Fisher's exact tests where any cell count was less than 5.

\*Head/neck category includes ear, eye, face, neck and mouth.

\*\*Includes internal injuries, injuries to 25%–50% of the body or all of the body.

\*\*\*Includes ingestion of a foreign object, crushing injury, foreign body, hematoma, puncture, anoxia, avulsion or non-head internal organ injury.

\*\*\*\*Includes infection, dermatitis/conjunctivitis, pain without specified injury, and no identifiable injury.

Note: Exact age was not included in NEISS for one homeless adult; that individual and 10 controls are not listed in the table above.

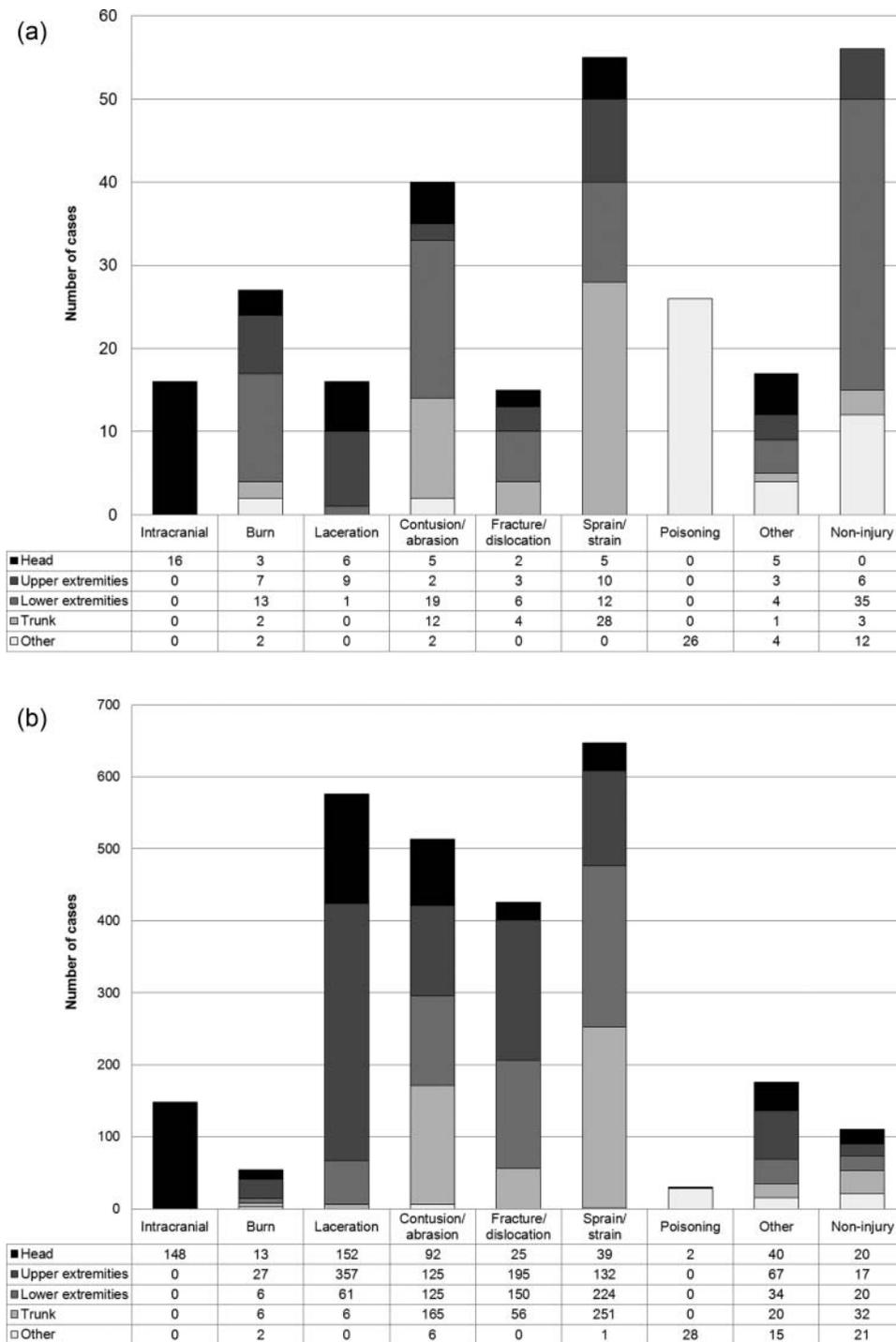


Figure 1. (a) Distribution of diagnoses by body region for homeless cases. (b) Distribution of diagnoses by body region for population controls.

#### 4. Discussion

Although health care utilisation among the homeless population has received considerable attention in the literature, there is a dearth of research on injury specifically. The purpose of this study was to describe injury characteristics among individuals, with ED-treated injuries, who

were identified as homeless in NEISS narrative text from 2007 to 2011, and to compare them to a random sample of NEISS patients not identified as homeless.

Consistent with prior studies on ED utilisation among homeless individuals, we found that most visits to EDs captured by NEISS were made by adult males (Ku, Scott,

Kertesz, & Pitts, 2010; Oates, Tadros, & Davis, 2009), and a seasonal pattern of injury was not observed (Pearson, Bruggman, & Haukoos, 2007). Moreover, homeless adults were more likely to be hospitalised than population controls (Martell et al., 1992; Owens & Mutter, 2010). In contrast with prior studies, few patients who were homeless left without being treated or against medical advice (Kertesz et al., 2009), and no differences were observed relative to controls. It is possible that some homeless individuals left without being treated and that the homeless status was either unknown or not documented in the medical record. Further, sufficient information to classify the injury as product related may not have been obtained, in which case the incident would not be included in NEISS.

Across all ages, injuries among homeless patients occurred most commonly to the lower extremities, with sprains/strains, contusions/abrasions and burns being the most common. While sprains/strains were also the most common injury among controls, circumstances surrounding such injuries among cases appear to be related to circumstances of homelessness, such as carrying heavy bags. Injuries that interfere with ambulation or with an individual's ability to bear weight on their upper or lower extremities may have unique implications depending on the housing status. Homeless individuals are often required to depart from shelters early in the morning and frequently must take their belongings with them. Some shelters provide storage spaces where belongings may be stored; however, for numerous reasons (e.g. perceived security of items) many homeless individuals carry their belonging with them at all times, which, as the narratives revealed, is the aetiology of many of the strain/sprain injuries. Thus, it is possible that contextual factors associated with homelessness may prolong the healing process or place homeless individuals at greater risk subsequent to injury relative to domiciled individuals.

Burn injuries represent less than 1% of all ED visits nationally (Taira, Singer, Thode, & Lee, 2010). Burns represented a slightly higher proportion (2.0%) of the control sample in this study. Among homeless individuals, however, burns constituted 10.1% of all ED-reported NEISS injuries. Homeless individuals hospitalised as a result of burn injuries are more likely than housed patients to have a history of substance abuse and mental illness and are more likely to have sustained their injury by assault (Kramer, Gibran, Heimbach, Rivara, & Klein, 2008). Burn injury and burn prevention among the homeless have received minimal attention in the literature. Substance use is common among patients who present for trauma care (Zatzick et al., 2012). In the current sample, substance involvement was noted in significantly more homeless cases than controls, and a particularly concerning pattern of substance abuse was noted among adolescents and young adults. Relative to adults and older

adults, drug involvement was mentioned in just as many narratives as was alcohol use. Prior studies have found compelling evidence of the utility of implementing brief interventions in acute settings (Gentilello, Ebel, Wickizer, Salkever, & Rivara, 2005; Monti et al., 2007). Future research should investigate the efficacy of tailoring those interventions for individuals who are homeless.

Concerning non-injury diagnoses, the finding that dermatitis/conjunctivitis diagnoses tended to result from contact with unsanitary bedding or bedbugs has implications. Changes in home and body hygiene have nearly eradicated bedbugs in developed nations; however, 30% of homeless shelters report a problem with bedbug infestation (Hwang, Svoboda, De Jong, Kabasele, & Gogosis, 2005). Extermination of bedbugs is costly but may have a meaningful effect on modifying the risk of exposure. Many infections were associated with prolonged exposure to wet socks and shoes, which has been noted in previous research (Raoult, Foucault, & Brouqui, 2001; Wrenn, 1991). These findings underscore the importance of tending to lower extremity health and of delivering interventions (e.g. providing clean socks) in places where homeless individuals seek services. These findings also highlight that some conditions for which homeless individuals seek care are preventable and may be treatable in less acute milieus.

Our study has several important limitations. First, NEISS data are based on consumer product-related injuries and illnesses. As a result, although NEISS includes a nationally representative sample of hospitals, not all types of injuries are included and certain products are excluded (e.g. automobiles). Therefore, cases are not representative of all ED visits to NEISS hospitals. Intentional injuries (e.g. injuries associated with violence), which are common among the homeless, are excluded from the NEISS data available for this study, even if a product was involved. Second, the number of homeless injuries was likely underestimated. Embarrassment or shame may prompt patients not to disclose that they are homeless, thereby leading to an incomplete ascertainment of ED visits made by homeless patients. Moreover, many hospitals do not systematically collect data on homelessness (Tsai, Weintraub, Gee, & Kushel, 2005), and NEISS EDs are not required to report the homeless status to NEISS. In addition, providers may have been biased to query the housing status among patients who appeared unkempt or intoxicated, possibly chronically homeless, than among patients who appeared neat but may have been transiently homeless (e.g. couchsurfing). Consequently, there may have been heterogeneity in the criteria hospital staff utilised to determine whether a patient was homeless, and narratives may not have accurately identified all cases. While it is possible that some of the patients in our control sample may have been homeless, given that homeless patients comprise less than

1% of ED visits nationally (Niska, Bhuiya, & Xu, 2010), we do not believe that this misclassification had a substantial impact on our findings. Similarly, substance use, which is frequently associated with injury, is likely underestimated in NEISS incident narratives. Despite these limitations, NEISS narrative text offers a unique opportunity to investigate differences between product-related injuries among patients identified as homeless and the general population. These findings highlight some of the differences in ED diagnoses among homeless individuals relative to sex- and age-matched controls and contribute to the scant body of literature on injury among homeless individuals.

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