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Correlates of Hospital Use in Homeless and Unstably Housed Women: The Role of Physical Health and Pain

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Abstract

Purpose—To examine correlates of emergency department (ED) use and hospitalizations in a community-based cohort of homeless and unstably housed women, with a focus on the role of physical health and pain.

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Methods—We conducted a cross-sectional analysis of baseline survey results from a study of homeless and unstably housed women in San Francisco. Primary outcomes were any self-reported ED visit and inpatient hospitalization over the prior 6 months. Primary independent variables of interest were self-reported physical health status, as measured by the Short Form-12 (SF-12), and bodily pain. Other potential covariates were organized using the Gelberg-Andersen Behavioral Model for Vulnerable Populations. Standard bivariate and multivariable logistic regression techniques were used.

Results—Three hundred homeless and unstably housed women were included in the study, of whom 37.7% reported having an ED visit and 23.0% reported being hospitalized in the prior 6 months. Mean SF-12 physical health scores indicated poorer than average health compared to the U.S. norm. Most women (79.3%) reported at least some limitation in their daily activities due to pain. In adjusted analyses, moderate and high levels of bodily pain were significantly correlated with ED visits (OR=2.92 and OR=2.57) and hospitalizations (OR=6.13 and OR=2.49). As SF-12 physical health scores decreased, indicating worse health, the odds of ED use increased. Predisposing, enabling and additional need factors did not mediate these associations.

Conclusions—Physical health and bodily pain are important correlates of ED visits and hospitalizations in homeless and unstably housed women. Interventions to reduce ED use among women who are homeless should address the high levels of pain in this population.

Keywords

homeless persons; emergency service; hospital; hospitalization; pain

INTRODUCTION

More than 1.5 million people in the United States experience homelessness at least once in any given year (U.S. Department of Housing and Urban Development, 2011). Homelessness is associated with higher than average levels of chronic illness, worse access to primary care, unmet health needs, and multiple other risks to health (Baggett, O'Connell, Singer, & Rigotti, 2010; Duchon, Weitzman, & Shinn, 1999; Hwang, 2001; Hwang et al., 2011 & 2013; Hwang & Dunn, 2005; Shortt et al., 2008; Zlotnick & Zerger, 2009; Chambers et al., 2013). People who experience homelessness are frequent users of hospital-based acute care, with higher rates of emergency department (ED) visits and inpatient hospitalizations than stably housed patients (D'Amore, Hung, Chiang, & Goldfrank, 2001; Hwang et al., 2013; Kushel, Perry, Bangsberg, Clark, & Moss, 2002; Kushel, Vittinghoff, & Haas, 2001; Mandelberg, Kuhn, & Kohn, 2000; Niska, Bhuiya, & Xu, 2010; Weinreb, Goldberg, & Perloff, 1998). This acute care use is of concern to health care providers and policy-makers because it is costly to the health system and may indicate unmet health needs or inadequate access to other health care.

Researchers have attempted to answer the question of why people who are homeless use hospital-based acute care. Multiple prior studies have examined correlates of health services use among people who are homeless and unstably housed, identifying a wide array of factors associated with ED visits and/or hospitalizations including: basic sociodemographic characteristics such as age, race, and insurance coverage; mental illness and substance

abuse; chronic medical conditions, worse physical health, and disability; crime and victimization; and subsistence needs such as homelessness and food insecurity (Baggett et al., 2011; Chartier, Carrico, Weiser, Kushel, & Riley, 2012; Kushel et al., 2001 & 2002; Lim, Andersen, Leake, Cunningham, & Gelberg, 2002; Padgett, Struening, Andrews, & Pittman, 1995; Small, 2011; Stein, Andersen, Koegel, & Gelberg, 2000; Weinreb, Perloff, Goldberg, Lessard, & Hosmer, 2006; Weiser et al., 2013). The Behavioral Model for Vulnerable Populations divides these factors into predisposing, enabling and need categories as a conceptual framework for understanding the use of health services (Gelberg, Andersen, & Leake, 2000).

The Emergency Medical Treatment and Active Labor Act (EMTALA) stipulates that EDs cannot turn patients away without performing at least a medical screening exam, regardless of whether they complain of chest pain or hunger (Rosenbaum, 2013). In an environment where services are legally mandated, unmet subsistence needs may play a role in motivating some ED visits among homeless patients (Rodriguez et al., 2009) and frequent emergency department users (Malone, 1998). At the same time, it is equally critical to acknowledge the importance of real medical needs in motivating health services use in homeless and low-income populations (Malone, 1998; Doran, Raven & Rosenheck, 2013). While predisposing and enabling factors are important drivers of health services use, and while medical need is often considered as a mediator of these effects, the reverse relationship (the extent to which enabling and predisposing factors mediate medical need) has received less attention. This is important because relationships between predisposing, enabling and need factors are not strictly linear; rather, the model assumes that health services influence health status and health status goes on to subsequently influence each domain.

Amidst the existing literature, one particular factor related to medical need – pain – has received very little attention as a potential correlate of hospital-based acute care in homeless populations. This gap in the literature is notable given new research showing very high levels of pain, including severe and chronic pain, among homeless and unstably housed populations (Hansen et al., 2011; Hwang et al., 2011). Prior studies in non-homeless populations have found pain to be a significant predictor of ED use (Barbera et al., 2013; Doran, Raven, & Rosenheck, 2013), and pain is the most common reason for ED use in the general U.S. population (Niska et al., 2010).

Research shows that women experience pain differently from men (Kimble et al., 2003; Paller, Campbell, Edwards, & Dobs, 2009). In addition, the social context of pain may differ for women (Paller, Campbell, Edwards, & Dobs, 2009). Despite gender differences in the experience and context of pain, very few studies have examined the role of pain in ED use and hospitalizations in homeless and marginalized women (Gelberg et al., 2009; Weinreb et al., 2006). In addition, studies have found that homeless women may have more negative patterns of health services use (e.g., increased ED visits) compared to homeless men, yet women are generally underrepresented in prior research (Hwang & Henderson, 2010; Kushel et al., 2002; Padgett et al., 1995). In this study we hypothesized that, in addition to a multidimensional measure of overall physical health status, a single dimension of pain alone would be significantly correlated with hospital-based acute care (ED visits and hospitalizations) among women who are homeless or unstably housed, and these

associations would not be diminished by adjusting for factors including age, race, substance use, and unmet subsistence needs.

METHODS

We conducted a cross-sectional analysis of baseline data from an ongoing cohort study (the “Shelter, Health, and Drug Outcomes among Women” study) of homeless and unstably housed women in San Francisco. Participants were recruited from San Francisco community-based venues including free food programs serving over 100 meals per day, homeless shelters, and a random sample of single room occupancy hotels selected with probability proportionate to the number of residents. At small venues all persons present were invited to participate in study screening procedures; at larger venues a subsample of individuals (e.g., every third person) was invited to participate. This recruitment strategy was based on that developed by Burnam and Koegel (1988) in an attempt to recruit a sample reflecting San Francisco’s larger population of homeless and unstably housed women, and is the same as that used by prior studies of homeless populations in San Francisco and Canada (Riley et al., 2012; Hwang, et al., 2013). Inclusion criteria were being biologically female, age ≥ 18 years, and having a history of housing instability (defined as having slept in a public place, shelter, or with other people because there was no other place to sleep [“couch-surfed”]). HIV testing occurred during study screening and HIV-infected individuals were over-sampled so that half of the enrolled cohort was HIV-positive to ensure statistical power for HIV-specific analyses. Enrolled women completed comprehensive interviews at baseline and every 6 months; the current study uses results from baseline interviews only. Audio computer assisted self-interviewing (ACASI) was used for questions regarding drug use and sexual behaviors. Baseline interviews were conducted from June 2008 – August 2010. The study was approved by the Institutional Review Board at the University of California, San Francisco.

Measures

Primary outcomes—The two primary outcomes were any self-reported ED visit in the past 6 months and any self-reported inpatient hospitalization in the past 6 months. ED visits included visits for any reason, including substance use or psychiatric related reasons. Both visits resulting and not resulting in a hospitalization were included. Inpatient hospitalizations were defined as staying overnight in a hospital bed. Nights spent in the waiting room or the ED but without admission to the hospital were not included as inpatient hospitalizations, nor were overnight detoxification stays for substance problems because such stays are categorized separately from inpatient hospitalizations by insurers and hospitals, and likely have different associated predictive factors compared to other inpatient hospitalizations.

Independent variables—All variables were based on participant self-report during baseline interviews. We used the Gelberg-Andersen Behavioral Model for Vulnerable Populations as a conceptual framework to identify and organize variables potentially associated with ED use and hospitalizations (Andersen & Aday, 1978; Gelberg, Andersen, & Leake, 2000). We controlled for multiple need, predisposing, and enabling variables established as important in prior studies to elucidate the independent associations between

the primary exposures of interest (self-reported physical health and bodily pain) and study outcomes.

Need factors included measures of physical health. The primary independent variables were the Physical Component Summary score of the SF-12 (PCS-12) and the presence of bodily pain. The SF-12 is a 12-item health survey that includes dimensions of general health perceptions, physical functioning, bodily pain, vitality, role-physical, role-emotional, social functioning, and mental health. It produces both physical and mental health summary measures, which have been previously validated in homeless populations (Larson, 2002; Ware, Kosinski, & Keller, 1996). Scores range from 0–100, with higher scores indicating better health. General U.S. population norms are a mean of 50 and standard deviation of 10 for both the Mental and Physical Component Summary scales, with norms for women approximately one point lower than for men (Ware et al., 2007).

The presence of bodily pain was based on the SF-12 pain dimension question, which asks how much pain interferes with normal work or activities. Responses were given on a five-level scale and were collapsed into three levels for analysis – none/low (responses of “not at all” or “slightly”), moderate (responses of “moderately”), and high (responses of “quite a bit” or “extremely”) – as consistent with methods used in prior research (Barry, Pilver, Potenza, & Desai, 2012; Novak, Herman-Stahl, Flannery, & Zimmerman, 2009). Other need variables included HIV status and the presence of other chronic medical conditions including heart disease, high blood pressure, diabetes, emphysema or asthma, and hepatitis.

Predisposing factors included age, race, homelessness status, substance abuse, mental health, and victimization. We categorized homelessness status as spending 1–25% of nights living in a shelter, streets, or other public place in the past six months (“short-term homelessness”) and spending 26–100% of nights in these places (“long-term homelessness”) (Weiser et al., 2009). We defined at-risk drinking as having more than 7 standard drinks per week based on the National Institute on Alcohol Abuse and Alcoholism (2005) definition of at-risk drinking for women. Illicit drug use was defined as any use of cocaine, crack, heroin, or methamphetamines in the past six months. Mental health was measured using the Mental Component Summary scale from the SF-12 (MCS-12). Violence measures were based on the Severity of Violence against Women Scales (Marshall, 1992).

Enabling factors included health insurance and presence of competing subsistence needs. Health insurance categories were based on previous research and included no insurance, occasional coverage, and continuous coverage over the prior six months (Riley et al., 2011). Unmet subsistence needs were consistent with those used in prior studies and included having difficulty finding enough to eat, clothing, a place to wash, a place to use the bathroom, and transportation (Gelberg, Gallagher, Andersen, & Koegel, 1997). Participants were asked if they had difficulty filling each of these five needs in the past six months (yes or no), and were classified as having a subsistence need if answering affirmatively to any question.

Analysis

We examined relationships of patient characteristics with having any ED visit and any hospitalization using bivariate logistic regression. We then performed multivariable logistic regression to identify independent relationships with the primary outcomes of interest, building separate models for ED use and hospitalizations. Inclusion of variables in the multivariable models was based on theory and findings from the prior literature, with all variables examined in the bivariate analyses included in the initial multivariable models. Because the SF-12 Physical Health Summary score was highly correlated with the measure of bodily pain (which was itself a question from the SF-12), with a Spearman correlation coefficient of -0.78 , these two variables were not included in the same multivariable model. Instead, parallel models were built using each of these two variables in turn. No other variables had Spearman correlation coefficients of greater than 0.4. Additionally, tolerance and variance inflation factors among the variables were tested and revealed no other problems of multicollinearity (Allison, 2012). Model concordance statistics ranged from 0.72–0.75, indicating acceptable model fit. Manual backwards selection was used to build parsimonious multivariable models, but results for these models were similar to those for the full models and model fit was not significantly improved, so they are not shown here. We explored for evidence of mediation by estimating the associations between the study outcomes and the primary independent variables of interest (physical health and pain) with and without including other covariates. All analyses were conducted using SAS 9.2, Cary, NC.

RESULTS

Participant Characteristics

Over 90% of eligible women agreed to participate in the study, resulting in a sample of 300 women. Participant characteristics are presented in Table 1. The mean age was 47 years, and the majority of participants were black (43.3%) or white (30.0%). Approximately half (49.0%) spent at least some time over the past six months literally homeless and about the same number (49.3%) reported having subsistence needs. Participants had high levels of illicit drug use (54.7%). Most were continuously insured (75.3%).

By design, half (50.7%) of study participants were living with HIV/AIDS. Participants also experienced other chronic medical conditions, with high blood pressure, asthma, and hepatitis among the most common. Most participants reported that overall they were in good (33.3%) or fair (32.7%) health. Mean SF-12 Physical Component Summary scores were 39.9 (SD 11.3). The prevalence of pain was very high, with only 20.7% of participants reporting that pain did not limit their normal activities. Victimization was common, with 27.3% of women experiencing physical violence and 9.0% experiencing sexual violence in the past six months. More than one-third of participants (37.7%) reported having an ED visit over the prior six months and 23.0% were hospitalized over the prior six months.

Correlates of ED Use and Hospitalizations

In bivariate analyses (Table 2), both physical health and pain were significantly correlated with ED use and hospitalizations. Having experienced sexual violence in the past 6 months

was also significantly correlated with both hospitalizations and ED visits in bivariate analyses. Other factors that emerged as significant correlates of ED use but not of hospitalizations included long-term homelessness and having unmet subsistence needs.

In adjusted analyses, physical health and bodily pain maintained their associations with ED use and hospitalizations (Table 2). For each ten point decrease in the SF-12 PCS score (approximately one standard deviation decrease in score, representing poorer health) odds of having an ED visit were 1.59 (95% CI 1.21–2.08) and odds of having a hospitalization were 1.36 (marginally significant, with 95% CI 0.99–1.86). The individual bodily pain measure was highly correlated with both ED use and hospitalizations. Participants who reported moderate or high levels of bodily pain had significantly higher odds of both ED visits (OR 2.92 for moderate pain, OR 2.57 for high pain) and hospitalizations (OR 6.13 for moderate pain, OR 2.49 for high pain) compared to patients who reported no or low levels of bodily pain. The presence of chronic medical illnesses was also associated with both ED visits and hospitalizations. One exception was HIV, with HIV-positive women – who have access to special health and social services specifically for people living with HIV/AIDS in San Francisco – having lower odds of an ED visit compared to HIV-negative women.

Few other factors emerged as significant correlates of ED use or hospitalizations in multivariable models. Having spent time literally homeless was associated with a trend toward increased odds of ED visits and hospitalizations, and this relationship reached statistical significance in two of the models. Trends toward higher levels of ED use and hospitalizations were also observed for participants experiencing sexual violence, but this finding did not reach statistical significance. The c-statistic, a measure of overall model fit, was similar for multivariable logistic regression models predicting ED use and hospitalizations using either the SF-12 PCS or the single bodily pain question as independent variables.

DISCUSSION

In this study of homeless and unstably housed women, physical health and pain were strongly correlated with hospital-based health services use, and these associations were not diminished by the inclusion of predisposing or enabling factors. Notably, the majority of women in the current study (79.3%) reported having at least some degree of activity limitation due to bodily pain. In unadjusted analyses, time homeless and unmet subsistence needs were significantly associated with ED use, and sexual violence was significantly associated with both ED use and hospitalization. The magnitude of effect on ED use for all three of these predisposing and enabling factors decreased slightly in the saturated (fully adjusted) models, whereas the magnitude of the effects of pain and physical health on ED use increased slightly in the saturated models. While analyses presented here are cross-sectional and must be interpreted with caution, these results may suggest that pain and physical health mediate associations between ED use and sexual violence, time homeless, and unmet subsistence needs, but these predisposing and enabling factors do not mediate associations between need factors and acute health services use.

Few prior studies have focused on the independent effect of pain on ED use and hospitalizations in homeless women. One study of both homeless and low-income housed female heads of households in Massachusetts found that bodily pain, as measured by the SF-36 bodily pain subscale, was significantly associated with frequent ED use (Weinreb et al., 2006). This study examined only ED use and not hospitalizations, and included only mothers living with their children, whereas most of the women included in the current study were not living with children. A second study focused on ethnic disparities in hospitalizations among homeless women in Los Angeles found that the presence of any bodily pain was associated with hospitalizations for black and Latina women but not for white women (Gelberg et al., 2009). This study examined hospitalizations but not ED use, and included only women aged 15–44, whereas women in the current study were older (mean age 47 years) and thus likely to have even higher levels of medical need. In both of these studies, as in the current study, homeless women had experienced high levels of physical and sexual violence, which may be one underlying cause of pain that is disproportionately common in the female homeless population compared to other populations (Weinreb et al., 2006; Gelberg et al., 2009). Taken together, these two prior studies (Weinreb et al., 2006; Gelberg et al., 2009) and the current study suggest that bodily pain may be associated with both ED visits and hospitalizations in homeless and low-income women. Other studies of people experiencing homelessness have included pain as a co-variable, but have only analyzed it as part of larger summary measures of health or did not comment on its impact on health services use (Gelberg et al., 1997; Stein et al., 2000).

Study Limitations

Several study limitations should be noted. First, ED use and hospitalizations were self-reported and not confirmed using hospital administrative or medical record data. Prior studies, however, have shown that people who are homeless adequately self-report health services use, and authors have suggested that asking simple questions like those used in the current study (i.e., asking participants if they had any ED visit or any hospitalization in the past 6 months rather than asking for a specific number of visits) can increase the accuracy of self-reports (Bonin, Fournier, Blais, Perreault, & White, 2007; Gelberg & Siecke, 1997). Second, the study sample may not be generalizable to all unstably housed women because participants were limited to women living in San Francisco and HIV-positive women were overrepresented by design. As far as our primary outcomes regarding the importance of physical health and bodily pain in predicting hospital-based acute care, however, results were similar in subgroup analyses we conducted with the HIV-positive versus HIV-negative subsamples (not presented). Third, we used only one broad measure of bodily pain. Given the strong relationships observed between pain and health care use in this study, future studies of health services use in homeless populations could use more comprehensive measures of pain, including differentiation of various types of pain.

Implications for Practice and Policy

The current study's findings are particularly important given recent research showing high levels of pain among homeless populations (Fisher et al., 2013; Gelberg et al., 2009; Hansen et al., 2011; Hwang et al., 2011). Homelessness puts people at risk for multiple types of violence and other injuries (Baggett, O'Connell, Singer, & Rigotti, 2010; Padgett &

Struening, 1992), which may contribute to the high levels of pain seen in this population. There has been a paucity of research on pain among women who are homeless. Three studies specifically examined pain in homeless populations (Fisher et al., 2013; Hansen et al., 2011; Hwang et al., 2011). These studies included only small numbers of women (n=7 [Fisher et al., 2013], n=27 [Hwang et al., 2011], and n=76 [Hansen et al., 2011]), and no studies have compared rates or types of pain in women versus men who are homeless. In the study with the largest number of women, 98.7% of women experienced moderate to severe pain versus 87.9% of men (calculated by study authors based on Hansen et al. 2011 Table 1), suggesting that homeless women may have even higher rates of pain than men. Women who are homeless have unique risk factors for pain including high levels of sexual violence. Further, women may experience pain differently from men. For example, prior studies have suggested that women may have heightened sensitivity to pain, suffer greater pain-related distress, and experience more physical limitation due to pain than men (Kimble et al., 2003; Paller, Campbell, Edwards, & Dobs, 2009). Therefore, future studies should examine pain among women who are homeless, and compare pain between homeless men and women.

The strong associations between bodily pain and ED visits and hospitalizations observed in the current study, even when accounting for predisposing or enabling factors, highlight pain management as a potentially important and unresolved issue in health care for homeless and unstably housed women. People who are homeless face multiple barriers to pain management and unmet pain treatment needs (Hwang et al., 2011). ED, hospital, and outpatient providers may need additional training to balance treating the significant pain experienced by patients who are homeless, while at the same time recognizing the potentially high levels of risky opioid-related behaviors in this population (Hansen et al., 2011). Medical outreach and enhanced outpatient treatment specifically geared toward addressing pain may be warranted for homeless populations. The high prevalence of physical and sexual violence experienced by women who are homeless should be addressed in interventions for pain in this group given that prior research has found a strong connection between multiple types of violence and pain (Bonomi et al., 2009; McCauley et al., 1995; Vives-Cases, Ruiz-Cantero, Escriba-Aguir, & Miralles, 2011). Non-pharmacologic alternatives for chronic pain treatment such as cognitive behavioral therapy, which can concomitantly address co-existing issues like PTSD or depression, may merit further exploration alongside more traditional pharmacologic therapy for a segment of women who are homeless (Morley, Williams, & Eccleston, 2013).

The high level of medical need observed in the study sample may be a downstream consequence of upstream social determinants of health such as poor housing, exposure to violence, food insecurity, and others. Multiple past studies have found that social factors such as homelessness and food insecurity are associated with health services use, and a large literature on the social determinants of health has shown clearly that social needs and physical health are intricately linked (Baggett et al., 2011; Bradley, Elkins, Herrin, & Elbel, 2011; Bradley, 2011; Braveman, Egerter, & Williams, 2011; Kushel et al., 2002; Weiser et al., 2013; Woolf & Braveman, 2011). The current study highlights the importance of considering medical needs along with social needs in homeless and unstably housed women.

Future studies of health services use among women and men experiencing homelessness should be careful to include adequate measures of medical need, including measures of pain. Studies utilizing in-depth interviews may be needed to better understand how individuals appraise pain and act on it. Multiple complex factors go into patients' decisions to seek care in the ED (Capp, Rooks, Wiler, Zane, & Ginde, 2013; Ragin et al., 2005). Future studies could more directly examine the role of pain at the time of an ED visit among patients who are homeless, including differentiation of various types of pain and chronicity of pain.

Our findings have implications for designing programs to address the high levels of ED use and hospitalizations among women who are homeless. We suggest that such efforts include interventions such as intensive chronic disease and pain management programs, in recognition of the high levels of medical need in this population. Interventions designed to reduce hospital use among women who are homeless are unlikely to be successful unless they adequately address the significant health needs, including high levels of bodily pain, alongside the significant social needs of this population.

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Table 1**Study Participant Characteristics**

	Total (n=300) n (%) unless noted
<i>Predisposing Factors</i>	
Age, mean (SD)	47.0 (8.7)
Race	
White	90 (30.0)
Black	130 (43.3)
Latina	15 (5.0)
Asian/Pacific Islander	10 (3.3)
Other	55 (18.3)
Percent of time homeless (shelter, streets, or public place) ¹	
None	153 (51.0)
1–25%	52 (17.3)
> 25%	95 (31.7)
At-risk alcohol use (>7 drinks/week)	67 (22.3)
Illicit drug use (cocaine / crack, heroin, methamphetamine)	164 (54.7)
Physical violence ²	82 (27.3)
Sexual violence	27 (9.0)
SF-12 Mental Health Score, mean (SD)	40.5 (12.0)
<i>Enabling Factors</i>	
Insurance coverage	
None of the time	40 (13.3)
Part of the time	34 (11.3)
All of the time	226 (75.3)
Subsistence needs ³	148 (49.3)
<i>Need Factors</i>	
SF-12 Physical Health Score, mean (SD)	39.9 (11.3)
General health	
Excellent or very good	76 (25.3)
Good	100 (33.3)
Fair	98 (32.7)
Poor	26 (8.7)
HIV-positive	152 (50.7)
Other chronic medical conditions	
High blood pressure	106 (35.3)
Asthma	89 (29.7)
Hepatitis	67 (22.3)
Diabetes	40 (13.3)
Heart disease	37 (12.3)

	Total (n=300) n (%) unless noted
Emphysema	26 (8.7)
Amount that pain limits normal activities	
Not at all	62 (20.7)
Slightly	63 (21.0)
Moderately	51 (17.0)
Quite a bit	82 (27.3)
Extremely	42 (14.0)
<i>Health Services Use</i>	
ED visit in past 6 months	113 (37.7)
Hospitalization in past 6 months	69 (23.0)

¹ Unless otherwise noted, questions refer to time period of past six months.

² Due to non-response, for physical violence and sexual violence denominators are 297 and 295, respectively.

³ Includes having inadequate food, clothing, access to bathroom or a place to wash, or transportation

Table 2

Factors Correlated with ED Use and Hospitalizations, Bivariate and Multivariable Analyses

	ANY EMERGENCY DEPARTMENT VISIT			ANY HOSPITALIZATION		
	Unadjusted OR (95% CI)	Adjusted ¹ OR (95% CI)	Pain Model	Unadjusted OR (95% CI)	SF-12 PCS Model	Adjusted OR (95% CI)
<i>Predisposing Factors</i>						
Age ²	1.00 (0.97–1.03)	0.98 (0.95–1.01)	0.98 (0.94–1.01)	1.00 (0.97–1.03)	0.98 (0.94–1.02)	0.97 (0.93–1.01)
Race (nonwhite vs. white)	1.06 (0.64–1.77)	0.91 (0.50–1.65)	0.96 (0.53–1.75)	1.07 (0.59–1.92)	0.80 (0.40–1.59)	0.85 (0.42–1.72)
Percent of nights spent in shelter, streets, or public place (ref=0%)						
1–25%	1.76 (0.92–3.37)	1.76 (0.81–3.82)	1.47 (0.68–3.20)	1.90 (0.93–3.88)	2.53 (1.05–6.11)	2.20 (0.89–5.45)
26–100%	2.25 (1.32–3.83)	2.04 (1.02–4.06)	1.85 (0.93–3.70)	1.45 (0.78–2.67)	1.78 (0.79–4.00)	1.71 (0.73–4.00)
At-risk alcohol use (>7 drinks/week)	1.06 (0.61–1.86)	1.00 (0.51–1.95)	0.95 (0.49–1.86)	0.86 (0.44–1.66)	0.68 (0.31–1.49)	0.62 (0.28–1.40)
Illicit drug use	1.28 (0.80–2.04)	1.13 (0.63–2.03)	1.11 (0.62–1.99)	1.29 (0.75–2.22)	1.18 (0.60–2.32)	1.13 (0.57–2.23)
Physical violence	1.61 (0.96–2.70)	1.30 (0.67–2.52)	1.28 (0.66–2.49)	1.56 (0.88–2.79)	1.13 (0.52–2.44)	1.19 (0.54–2.64)
Sexual violence	2.56 (1.14–5.75)	2.45 (0.94–6.36)	2.38 (0.92–6.14)	2.55 (1.12–5.79)	2.14 (0.81–5.70)	2.49 (0.92–6.76)
SF-12 Mental Health Score ³	1.10 (0.90–1.35)	0.90 (0.71–1.15)	0.81 (0.64–1.04)	1.23 (0.97–1.55)	1.19 (0.89–1.58)	1.06 (0.79–1.43)
<i>Enabling Factors</i>						
Insurance coverage (ref=none)						
Part of the time	0.91 (0.35–2.35)	1.04 (0.37–2.98)	0.95 (0.33–2.72)	0.69 (0.20–2.35)	0.70 (0.18–2.70)	0.64 (0.16–2.48)
All of the time	1.02 (0.51–2.05)	1.45 (0.63–3.32)	1.58 (0.69–3.61)	1.32 (0.57–3.03)	1.33 (0.49–3.60)	1.46 (0.53–4.01)
Subsistence needs (any vs. none)	1.91 (1.19–3.06)	1.35 (0.75–2.42)	1.43 (0.80–2.58)	1.25 (0.73–2.14)	0.79 (0.40–1.56)	0.73 (0.36–1.50)
<i>Need Factors</i>						
SF-12 Physical Health Score ³	1.41 (1.13–1.76)	1.59 (1.21–2.08)	-----	1.35 (1.05–1.74)	1.36 (0.99–1.86)	-----
HIV (positive vs. negative)	0.59 (0.37–0.94)	0.54 (0.30–0.97)	0.53 (0.30–0.96)	1.47 (0.85–2.52)	1.54 (0.78–3.01)	1.40 (0.70–2.81)
Chronic medical illness (ref=none)						
One	2.08 (1.12–3.87)	2.32 (1.17–4.57)	2.72 (1.36–5.42)	2.02 (0.93–4.40)	1.74 (0.75–4.03)	2.34 (0.97–5.65)

	ANY EMERGENCY DEPARTMENT VISIT			ANY HOSPITALIZATION		
	Unadjusted OR (95% CI)	SF-12 PCS Model	Adjusted ¹ OR (95% CI)	Pain Model	Unadjusted OR (95% CI)	SF-12 PCS Model
Two or more	2.67 (1.52–4.70)	2.33 (1.18–4.61)	2.86 (1.43–5.71)	3.82 (1.93–7.58)	3.05 (1.38–6.77)	4.19 (1.80–9.75)
Bodily pain (ref=none/low)						
Moderate	1.87 (0.95–3.71)	-----	2.92 (1.32–6.47)	3.72 (1.71–8.09)	-----	6.13 (2.42–15.53)
High	2.35 (1.39–3.99)	-----	2.57 (1.36–4.85)	2.68 (1.39–5.15)	-----	2.49 (1.12–5.52)
<i>c-statistic for model</i>	N/A	0.73	0.72	N/A	0.72	0.75

Items in bold print are statistically significant at the p<.05 level.

¹ Separate models presented using SF-12 Physical Health Score and bodily pain subcomponent given multi-collinearity between these variables.

² Per additional year of age

³ SF-12 Mental and Physical Health Scores are for each 10 points lower on the scale (approximately one standard deviation), representing poorer health.