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# Emergency Department Visits in a Cohort of Persons with Substance Use: Incorporating the Role of Social Networks

**Paul Sacamano**[a], **Noa Krawczyk**[b], and **Carl Latkin**[iD,c]

[a]Department of Epidemiology, Johns Hopkins University Bloomberg School of Public Health, Baltimore, Maryland, USA

[b]Department of Mental Health, Johns Hopkins University Bloomberg School of Public Health, Baltimore, Maryland, USA

[c]Department of Health, Behavior & Society, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, USA

## Abstract

**Background—**Frequent emergency department (ED) visits often suggest inappropriate use for low acuity needs and multiple comorbidities, including substance use disorders.

**Objective—**This study examines associations of individuals and their social networks with high frequency ED use among persons reporting substance use.

**Methods—**Information was obtained from interview responses from the first 6-month follow-up visit of a longitudinal. Prevalence ratios for the outcome of high frequency ED visits (≥2 in 6 months) were determined with a generalized linear model, log link, Poisson distribution and robust standard errors.

**Results—**Of 653 participants, 131 (20%) had ≥2 ED visits. In multivariable analysis, greater likelihood of high frequency ED visits over 6 months was associated with being homeless (PR: 1.58; 95% CI: 1.19, 2.10), taking ≥3 medications (PR: 1.58; 95% CI: 1.19, 2.10) and having had a hospitalization over the same period (PR: 4.33; 95% CI: 3.26, 7.56). Among social network factors, lower likelihood of high frequency visits was associated with each increasing year of mean alter age (PR: 0.98; 95% CI: 0.6, 0.99) and greater likelihood with having received health-related informational support from ≥2 alters (PR: 1.62; 95% CI: 1.04, 2.53).

**Conclusions/Importance—**Social network factors may play an important role in ED use. Interventions to promote health behaviors through social influence may be helpful in reducing high frequency ED visits.

**CONTACT** Paul Sacamano, psacama1@jhu.edu, Department of Epidemiology, Johns Hopkins University Bloomberg School of Public Health, 615 North Wolfe Street, W6508, Baltimore, MD 21205, USA.

**ORCID**

Carl Latkin http://orcid.org/0000-0002-0643-8586

**Declaration of interest**

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

### Keywords

Emergency department use; ego networks; social support; substance use

## Background

There are an estimated 41.9 emergency department (ED) visits per 100 persons annually in the United States, with approximately 32% of ED patients are triaged with less than urgent needs (Rui, Kang, & Albert, 2017). Aside from medical need, social support may effect decision-making about health care utilization (Deri, 2005) as psychosocial determinants often underlie frequent use of emergency services. Nonetheless, little is known regarding the contribution of social network factors to ED use.

Persons with high frequency ED use tend to have a greater number of comorbidities (Hastings et al., 2011) and polypharmacy (Agarwal et al., 2016; Behr & Diaz, 2016) as well as behavioral health needs (LaCalle, Rabin, & Genes, 2013). Substance use disorders have been implicated in ED use (Skinner, Blanchard, & Elixhauser, 2014) and the co-occurrence of substance use with mental illness increases visit frequency (Curran et al., 2008). Across the United States, homeless persons have been estimated to have almost twice the overall rate of ED use (National Center for Health Statistics), and patients experiencing concurrent substance use, mental illness and homelessness were found to be 2.53 times more likely to experience frequent ED visits (Thakarar, Morgan, Gaeta, Hohl, & Drainoni, 2015).

Social support is known to affect decision-making about healthcare utilization in general (Deri, 2005), but less is known regarding its influence on ED use. Social networks are defined as social ties and types of resources available from an individual's social network members (Gottlieb & Bergen, 2010). Frequent visitors to the ED report lower levels of social support (Sandoval et al., 2010; Weinreb, Perloff, Goldberg, Lessard, &Hosmer, 2006) and consulting a family member or friend before visiting the ED has been related to inappropriate use of the ED for nonurgent health needs (Behr&Diaz, 2016).

## Objectives

This study aims to identify factors associated with high frequency ED use among a group of persons with a high degree of psychosocial disparities, including substance use, mental illness, and homelessness, with a focus on the role of social networks.

## Methods

### Study population

This is a secondary analysis of a cross-sectional sample of participants from a longitudinal study evaluating an intervention to reduce high-risk drug use and sex behaviors. Eligible participants were 18 to 55 years of age and reported to have (1) injected drugs or (2) snorted/sniffed heroin or cocaine or smoked crack along with a sex behavior risk in the prior six months. Participants were paid $35 for completing the baseline visit. The Institutional

Review Board approved the study and consent procedure and all participants provided written informed consent.

### Independent variables

Data were collected through an interviewer-led survey instrument and Audio Computer-Assisted Self-Interview. Egocentric social networks were characterized from the respondent's perspective alone and included the participant themselves and their social contacts, referred to as the ego and alters, respectively. Categorical variables for social support indicated having received support from none, one and two or more alters over the prior 6 months. Emotional support was measured as having someone who is always in your corner, instrumental support as having someone who would offer a place to stay if needed and informational support as having asked for advice about a health problem. As a proxy for level of comorbidities, a dichotomous variable was generated for the use of medications for ≥3 health conditions.

### Statistical analysis

The outcome of interest was high frequency ED visits, defined dichotomously as high (≥2) versus low (<2) visits in 6 months. Given the high prevalence of ED visits in this sample, prevalence ratios were determined through a generalized linear model with a log link, Poisson distribution and robust standard errors. An independent dichotomous variable representing six or greater total network members was retained regardless of statistical significance to control for differential impact of social network factors based on network size. All tests were two-sided variables with a $p$ value of 0.05 or less were included in multivariable regression models. The analysis was conducted using STATA version 14 (Stata Corp., College Station, Texas).

## Results

Among the total 653 participants, 80% (522) had 0–1 ED visits and 20% (131) had ≥2 visits in the past six-months (Table 1). High frequency visitors were more likely to have experienced homelessness, report any mental illness, have had at least one hospitalization and have been taking ≥3 medications in the past 6 months. The most commonly reported conditions for prescription medication use were any mental disorder (58%), blood pressure (29%), HIV (14%), and substance use treatment (11%). A greater proportion of participants with frequent ED use reported having at least one network member from whom they had received health-related informational support.

Mental illness was found to be significantly related to both homelessness and higher comorbidity, indicated by use of ≥3 medications. Therefore, mental illness was not included in the model to avoid obscuring the overlapping roles of homelessness and comorbidity. Model sensitivity to inclusion of mental illness without homelessness, or homelessness and medication use without mental illness was evaluated. Regardless of which of the three variables were included, all were significant and other significant variables, their direction and magnitudes of association were consistent.

In the multivariable analysis (Table 2), positive associations with high frequency ED use were being homeless (PR: 1.58; 95% CI: 1.19, 2.10), taking ≥3 medications (PR: 1.58; 95% CI: 1.13, 2.22) and having been hospitalized (PR: 4.33; 95% CI: 3.26, 5.76). For social network factors, each increasing year of mean age for network members was negatively associated (PR: 0.98; 95% CI: 0.96, 0.99) and having received health-related informational support from ≥2 alters was positively associated (PR: 1.62; 95% CI: 1.04, 2.53) with high frequency use. Those having consulted ≥2 alters for health-related information were more likely to be female, have insurance, ever injected drugs, be taking ≥3 medications, have high primary care use, report a mental illness and had larger social network size than those who consulted 0–1 alters.

## Conclusions/Importance

We found frequent ED use to be associated with homelessness, having a recent hospitalization and greater level of comorbidity. Similarly, behavioral health, including mental illness and substance use, and chronic medical comorbidities, like HIV, have been related to frequent use of emergency medical transportation services (Knowlton et al., 2013), all of which can be managed through outpatient care. Only 32% of frequent ED visitors that were homeless had a primary care provider (Ku et al., 2014) compared to 67% of Medicaid enrollees overall (Capp et al., 2013), suggesting an important disparity in access to appropriate preventative primary care among this population.

Participants who had consulted a social network member for health-related informational support were more likely to have frequent ED use and also a higher level of comorbidity, particularly mental illness, and were more likely to have ever injected drugs compared to those consulting few to no sources of informational support. Persons who inject drugs and those with mental illness experience barriers to care related to stigma, difficulty communicating with medical providers and consequently may turn to their peers for information (Lang et al., 2013a, 2013b). Therefore, the positive association between health-related informational support and frequent ED use in our study may reflect a greater need for health services overall and the importance of social support in health care seeking among this stigmatized group. Increasing mean age of social network members was protective against frequent ED use, which might be a consequence of older social contacts providing a stable influence and guiding towards alternatives for nonemergency care.

These findings suggest interventions to reduce high frequency ED use may benefit from incorporating social network factors, particularly those that draw upon mechanisms to affect behavior change through social influence (Latkin & Knowlton, 2015). Identifying and coaching informal opinion leaders is one means to promote diffusion of appropriate health care use and health-promoting behaviors (Valente & Pumpuang, 2007). More formally trained community health workers have a particularly important role in reaching stigmatized groups, such as the homeless and persons with mental health and substance use disorders (National Academies of Sciences, 2016). Lastly, the prevalence of multi-comorbidity, mental illness, substance use and homelessness among this group confirms the need for multidisciplinary teams that integrate medical with psychosocial and case management services. Although inferences are limited by cross-sectional data that does not allow

examination of the lag that may exist between an individual and social network exposures, this study adds to the evidence indicating that social networks may be a valuable place to intervene by strengthening support systems that can prevent the vulnerabilities that lead to poor health and frequent use of emergency services.

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## Table 1

Characteristics of participants by frequency of ED use in the last 6 months.

| Attribute | Total (*n* = 653) *N* (%) | Frequency of ED use | | *p* value |
|---|---|---|---|---|
| | | Low[1] (*n* = 522) *N* (%) | High[1] (*n* = 131) *N* (%) | |
| Age in years, mean (SD) | 44 (7.3) | 44.62 (7.10) | 44.24 (8.17) | 0.59 |
| Female sex | 298 (46) | 234 (44.8) | 64 (48.9) | 0.41 |
| Black race | 558 (85) | 453 (86.8) | 105 (80.2) | 0.15 |
| Less than High School Education | 352 (54) | 278 (53.3) | 74 (56.5) | 0.13 |
| Unemployed | 332 (51) | 276 (52.9) | 56 (42.7) | **0.003** ** |
| Past month income ≤$499 | 314 (49) | 257 (49.7) | 57 (43.5) | 0.19 |
| Insured[2] | 529 (81) | 414 (79.3) | 115 (87.8) | **0.027** ** |
| Homeless[2] | 159 (24) | 106 (20.3) | 53 (40.5) | **<0.001** ** |
| Used heroin, cocaine or crack[2] | 442 (68) | 352 (67.4) | 90 (68.7) | 0.78 |
| Ever injection drug use[3] | 321 (49) | 250 (47.9) | 71 (54.2) | 0.20 |
| Taking ≥3 medications[2] | 79 (12) | 49 (9.4) | 30 (22.9) | **<0.001** ** |
| >2 Primary care visits[2] | 327 (50) | 236 (45.2) | 91 (69.5) | **<0.001** ** |
| Hospitalization[2,4] | 105 (16.1) | 41 (7.9) | 64 (48.9) | **<0.001** ** |
| Mental illness | 203 (31) | 144 (27.6) | 59 (45.0) | **<0.001** ** |
| Social Network | | | | |
| Network size (median, IQR) | 6 (4–8) | 6 (4–8) | 6 (4–9) | **0.078** * |
| Partner, mean (SD) | 0.8 (1.0) | 0.8 (0.8) | 1.0 (1.6) | 0.12 |
| Kin, mean (SD) | 2.7 (2.0) | 2.7 (1.9) | 2.9 (2.1) | 0.27 |
| Nonkin, mean (SD) | 2.4 (2.2) | 2.3 (2.1) | 2.6 (2.4) | 0.24 |
| Alter age, years (median, IQR) | 49 (41–58) | 49 (41–58) | 48 (40–58) | 0.33 |
| Female, mean(SD) | 3.4 (2.0) | 3.3 (2.0) | 3.5 (2.1) | 0.29 |
| Any instrumental support[5] | 567 (87) | 457 (87.5) | 110 (84.0) | 0.28 |
| Any informational support[5] | 483 (74) | 377 (72.2) | 106 (80.9) | **0.043** ** |
| Any emotional support[5] | 628 (96) | 501 (96.0) | 127 (96.9) | 0.61 |

* $p < 0.10$;

** $p < 0.05$.

[1] High ED is greater than ≥2 visit/6 months vs. 1 or 0 visits/6 months.

[2] Within the previous 6 months.

[3] Heroin or cocaine alone or together, amphetamines, opiates.

[4] The most frequent reasons for admission accounting for 70% were cardiovascular (29, 28%), respiratory (18, 17%), mental illness (16, 15%), and substance use (10, 10%).

[5] ≥ 1 alter within the previous 6 months.

## Table 2

Bivariate and multivariable associations with high frequency ED use in the last 6 months.

| | High ED Use[1] *n* = 653 | |
|---|---|---|
| **Variable** | **Bivariate PR (95% CI)** | **Multivariable PR (95% CI)** |
| Participant attribute | | |
| Age, years | 0.99 (0.97, 1.02) | |
| Female sex | 1.14 (0.84, 1.55) | |
| Insured | 1.68 (1.04, 2.74) ** | 1.49 (0.97, 2.30) |
| Homeless | 2.11 (1.56, 2.85) ** | 1.58 (1.19, 2.10) ** |
| Medications ≥3[2] | 2.15 (1.54, 3.01) ** | 1.58 (1.13, 2.22) ** |
| Hospitalization | 4.99 (3.80, 6.54) ** | 4.33 (3.26, 5.76) ** |
| Network attribute | | |
| Network size ≥6 | 1.26 (0.93, 1.72) | 1.02 (0.77, 1.35) |
| Age, mean years | 0.98 (0.96, 1.00) ** | 0.98 (0.96, 0.99) ** |
| Female, number | 1.04 (0.97, 1.12) | |
| Active substance use,[3] number | 1.05 (0.96, 1.14) | |
| Instrumental support[4] | | |
| 1 alter | 0.82 (0.53, 1.26) | |
| ≥2 alters | 0.76 (0.48, 1.20) | |
| Informational support[4] | | |
| 1 alter | 1.40 (0.92, 2.11) | 1.23 (0.85, 1.79) |
| ≥2 alters | 1.81 (1.12, 2.90) ** | 1.62 (1.04, 2.53) ** |
| Emotional support[4] | | |
| 1 alter | 1.37 (0.54, 3.45) | |
| ≥2 alters | 1.18 (0.47, 2.97) | |

PR = prevalence ratio; CI = confidence interval.

** $p < 0.05$.

[1] Hi gh ED is greater than ≥2 visit/6 months vs 1 or 0 visits/6 months

[2] Self-reported number of conditions prescribed medications.

[3] Heroin, crack or cocaine use by any route last 6 months.

[4] Compared to baseline of no alters within the previous 6 months.