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Emergency Department Use in a Cohort of Older Homeless Adults: Results from the HOPE HOME Study

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Abstract

Objective—The median age of single homeless adults is over 50, yet little is known about their emergency department (ED) use. We describe use of and factors associated with ED use in a sample of homeless adults 50 and older.

Methods—We recruited 350 participants who were homeless and 50 or older in Oakland, CA. We interviewed participants about residential history in the prior six months, health status, health-related behaviors, and health services use, and assessed cognition and mobility. Our primary outcome was the number of ED visits in the prior six months based on medical record review. We used negative binomial regression to examine factors associated with ED use.

Results—In the six months prior to enrollment, 46.3% of participants spent the majority of their time unsheltered, 25.1% cycled through multiple institutions including shelters, hospitals and jails, 16.3% primarily stayed with family or friends, and 12.3% had become homeless recently after spending much of the prior six months housed. Half (49.7%) of participants made at least one ED visit in the past six months; 6.6% of participants accounted for 49.9% of all visits. Most (71.8%)

identified a regular non-ED source of healthcare; 7.3% of visits resulted in hospitalization. In multivariate models, study participants who used multiple institutions (incidence rate ratio [IRR] = 2.27; 95% confidence interval [CI] = 1.08–4.77) and who were unsheltered (IRR = 2.29; 95% CI = 1.17–4.48) had higher ED use rates than participants who had been housed for most of the prior six months. In addition, having health insurance/coverage (IRR= 2.6; CI = 1.5–4.4), a history of psychiatric hospitalization (IRR = 1.80; 95% CI = 1.09–2.99), and severe pain (IRR = 1.72; 95% CI = 1.07–2.76) were associated with higher ED visit rates.

Conclusions—A sample of adults aged 50 and older who were homeless at study entry had higher rates of ED use in the prior six months than the general US age-matched population. Within the sample, ED use rates varied based on individuals' residential histories, suggesting that individuals' ED use is related to exposure to homelessness.

Keywords

Hospital emergency service; Homeless persons; Aging

Introduction

Background

Individuals who are homeless visit emergency departments (EDs) at higher rates than the general population[1,2] and are more likely to be frequent ED users.[3–6] Reasons for high rates of ED use among people experiencing homelessness include a high prevalence of unintentional injuries and exposure to violence while homeless, as well as shared risk factors, including a high prevalence of drug, alcohol, tobacco use and mental health disorders.[7–16] Finally, homeless individuals have a higher prevalence of being uninsured and of lacking reliable telephones or transportation; these factors may lead to ED use for complaints that may not necessitate ED care under different life circumstances.[17,18]

The median age of single homeless individuals has been increasing and is now over 50.[19] Older, compared to younger, homeless people have lower rates of illicit substance use and higher rates of chronic diseases.[20,21] Homeless individuals aged 50 and older have a prevalence and severity of geriatric conditions (i.e. cognitive impairment, functional impairments) higher than that of the general population in their 70s and 80s.[9,20] For this reason, homeless individuals are considered to be "older" at the age of 50.[22]

The federal definition of homelessness as delineated in the Homeless Emergency Assistance and Rapid Transition to Housing (HEARTH) Act, includes as homeless those who lack any shelter, those who stay in emergency shelters, and those who are at imminent risk of losing housing.[23] There are a variety of living conditions that meet the definition of homeless. Approximately one third of homeless adults in the United States are unsheltered, whereas others stay in emergency shelters or double-up temporarily with family or friends.[24] While some individuals remain homeless for long periods of time, others experience homelessness for short periods only. These varied conditions of homelessness may be associated with differing patterns of healthcare utilization.

Importance

As most prior research was conducted before the aging of the homeless population, there is little known about how homeless adults 50 and older use the ED. In addition, most prior studies of homelessness recruited individuals from shelters, or included only those who sought healthcare at homeless-specific clinics, which limits their generalizability. Finally, most prior studies classified individuals as homeless at one point in time and did not examine how health services utilization differed if individuals regained or lost housing. Understanding the patterns of and factors associated with ED use in adults 50 and over with a broader range of experiences of homelessness may help formulate appropriate interventions that can better serve homeless individuals who use the ED and respond best to the needs of this high risk population.

Goals of this investigation

To describe the patterns of ED use and to identify factors associated with ED use, we recruited a sample of 350 adults aged 50 and older in Oakland, CA who met criteria for homelessness, and examined data on their ED use in the prior six months. We hypothesized that the varied experience of homelessness (e.g. setting, duration) would differentially impact ED use. We also examined the contribution of chronic pain, chronic medical conditions, use of primary care, insurance status, mental health, and substance use problems in our cohort, based on our review of the literature demonstrating that these factors contribute to ED use.[4,25]

Methods

Subjects & Setting

Between July 2013 and June 2014, we recruited 350 individuals using purposive sampling from a random sample of homeless encampments, one recycling center, all overnight homeless shelters, and all free and low-cost meal programs serving at least 3 prepared meals a week in Oakland, CA.[26] We designed our sampling frame in concert with our community advisory board, based on the best available evidence regarding the population experiencing homelessness in Oakland. We had predetermined recruitment targets from each venue, based on the numbers of unique individuals who met our study criteria who were served there over the course of the year. We continued to recruit from each venue until we met our venue-specific targeted enrollment.

We conducted an initial screen for study eligibility at the recruitment venue and invited individuals who met basic eligibility criteria (English speaking, aged 50 and older, homeless) to undergo an eligibility interview at our study site within one week. Most study interviews took place at St Mary's Center, which is a non-profit community-based organization serving indigent older adults. It is located near a large proportion of the homeless population in West Oakland and is easily accessible by public transportation. After a detailed eligibility interview, we offered enrollment to participants who met the eligibility criteria: English-speaking, aged 50 and over, defined as homeless by the Homeless Emergency Assistance and Rapid Transition to Housing Act,[23] and able to give informed

consent, as determined by a teach-back method.[27] We obtained written informed consent from all study participants.

Participants received gift cards to a major retailer worth $5 for the eligibility interview and $20 for the baseline interview. The University of California, San Francisco Institutional Review Board approved all study procedures.

Baseline Interview

Trained study staff administered a structured interview, which included housing history, demographic information, health history, heath care utilization, drug and alcohol use, mental health, social relationships, and healthcare utilization. Study staff completed assessments of cognitive impairment and physical functioning. We provided all participants with lists of community resources. If participants had acute medical or psychiatric needs, study staff called the study PI (MK) or covering physician to help assess the severity and to determine the appropriate intervention.

Dependent Variable

We defined the dependent variable as the number of emergency department (ED) visits in the 6 months prior to study enrollment, determined via administrative data from the public hospital serving the study area and medical record requests from other hospitals. For the public hospital, we obtained complete records of all ED visits for all study participants. We used participant self-report of ED visits to determine from which other hospitals to request records. At the baseline visit, participants reported how many times they had an ED visit that did not result in a hospitalization in the prior 6 months. For up to 4 visits, we collected the hospital name.

Reasons for ED use (descriptive variable)—Participants self-reported reasons for ED use. For up to four ED visits that did not result in hospitalization and, separately, up to four hospitalizations, we asked participants to report their reason for presenting (new injury, new illness, worsening chronic illness, pain, mental health problem, substance use, pain medication refill, other medication refill, other). We included reasons for all ED visits.

Hospitalizations (Descriptive variable)—We asked participants to report the total number of times they had been hospitalized in the prior 6 months. For up to 4 visits, participants reported the hospital name and whether or not the admission had occurred via the ED. For each hospital reported, we queried the hospital to obtain the dates of all ED and hospital visits by the participant who named it during his or her interview. For a group of three hospitals operated by a single provider, if a participant reported a visit to any of the three, we queried about visits to all. For our dependent variable, we included ED visits for which there was verification, whether or not the visit resulted in admission and whether or not the participant had reported it. We assessed number of hospitalizations in the same manner, and included hospitalizations that were and were not preceded by an ED visit.

Independent Variables

Sociodemographic Characteristics—We asked participants to self-report their age, sex, race/ethnicity, and highest level of education (0–11 years versus high school degree, GED, or more education), and monthly income (sources and amount). We categorized combined monthly income from all sources as $0–150, $151–700, $701–1150, and over $1150. We asked participants to report whether they had current health insurance and if so, which one. We classified participants as insured (Medicaid, Medicare, VA coverage, private insurance) or covered by county non-insurance health coverage plan for indigent adults versus uninsured/no health coverage. Adapting language from a question from the National Health Interview Survey,[28] we asked participants if they had a regular, non-emergency department place that they received health care, and a regular health care provider (physician, nurse practitioner or physician assistant).

Residential Categories and History—Participants reported the age at which they first became homeless as an adult (aged 18 or older). To construct a six-month residential history, study staff asked participants where they had stayed the prior night, and then worked backward to construct a 6-month residential history, noting length of stay at each location (outdoors/location not meant for human habitation; emergency shelter; transitional housing; permanent housing for formerly homeless people; hotel or motel room; participant's own housing; staying with friends or family; and hospital; jail or prison; treatment program or other institution).[29] We used these residential histories to perform cluster analysis that allowed us to develop a classification of participants' residential categories during the six months preceding study enrollment (See Analysis). Participants reported the duration of their current episode of homelessness.

Health status

We asked participants to self-report their health status (fair or poor versus good, very good, or excellent).[30] Participants reported whether a health care provider had ever told them they had the following conditions: congestive heart failure, coronary artery disease or myocardial infarction, stroke, high blood pressure, diabetes, asthma or chronic obstructive pulmonary disease, and cancer) or whether they had tested positive for the human immunodeficiency virus.[31]

Mental Health and Substance Use—We screened participants for post-traumatic stress disorder (PTSD) using the Primary Care PTSD Screen.[32] We considered those with a response of 3 or more as screening positive for PTSD. To assess the prevalence of depressive symptoms, we used the Center for Epidemiologic Studies Depression (CES-D) Scale.[33] We categorized scores of 22 as indicative of moderate to severe depressive symptomatology. [34,35] We used questions from the National Survey of Homeless Assistance Providers and Clients to determine if participants had lifetime experiences of : (1) hallucinations, (2) trouble controlling violent behavior, or (3) attempted suicide, categorizing responses as any versus none.[36] We asked participants if they had ever been hospitalized for a psychiatric problem.

To assess alcohol use, we administered the Alcohol Use Disorders Identification Test (AUDIT),[37] modifying the time frame to six months. We considered scores of 8 or more as indicative of at-risk alcohol use. Using the World Health Organization's Alcohol, Smoking and Substance Involvement Screening Test (WHO-ASSIST) with an expanded timeframe of six months,[38] we assessed participants' risk of experiencing problems due to their use of cocaine, amphetamines, and non-prescribed opioids. We considered a score of 4 or more for any of the three substances to indicate at-risk substance use.

Functional Status and Cognition—We used the 5-item Katz Activities of Daily Living (ADL) scale to assess functional status.[39] We categorized participants as having a difficulty with ADLs if they reported difficulty performing one or more ADL due to a physical, mental, emotional, or memory problem.[40] We administered the Modified Mini-Mental State Examination (3MS)[41] to screen for cognitive impairment. We adjusted 3MS scores for age and education using a standard reference population.[41,42] We categorized participants scoring below the 7th percentile (>1.5 standard deviation below the mean) as cognitively-impaired.[43] To assess the lower extremity functioning of participants, we administered the Short Physical Performance Battery (SPPB).[31] We categorized participants as having impairment in lower extremity functioning if they scored 10 or less.[44]

Social Support—Participants indicated instrumental support by reporting if they had someone who would lend money or offer a place to stay if needed.[45,46] Participants were dichotomized as having no versus any social network based on whether they reported having at least one friend or relative.

Pain—Using the Brief Pain Inventory,[47] we asked participants to rate their average pain in the past week from 0 (no pain) to 10 (worst pain imaginable). We categorized pain ratings as none (0), mild to moderate (1–7), and severe (8–10).[48] We asked participants with severe pain in the past week how long they had experienced this pain, and categorized responses as 6 months or less versus more than 6 months. We asked whether participants experienced oral pain and if so, how often (never or hardly ever versus occasionally, fairly often, or very often).

Other experiences—Participants were asked to report whether they had experienced physical or sexual abuse in the previous six months. Participants reported whether they had been incarcerated in jail or prison in the prior six months.

Analysis—To define our independent variable of residential categories, we classified participants into clusters that represented the predominant place that they stayed in the prior six months based on the residential follow-back survey using k-medians cluster methodology.[49] Cluster analysis finds existing patterns within data to generate groups by minimizing within-group and maximizing between-group variability. It has been used in other studies of homeless individuals to classify subpopulations.[50–52] We performed cluster analysis using Stata version 11.0. For further details of our cluster analysis, see a prior manuscript from our group.[49]

For statistical modeling of our primary outcome, the number of participant ED visits, we used negative binomial regression to examine factors associated with the number of ED visits in the prior 6 months. We chose to use negative binomial over Poisson modeling because there was substantial overdispersion of the data (mean = 1.8, variance = 14.6). We started with bivariate models based on pre-existing hypotheses, using variables listed above. [53,54] For our multivariate model we used backward stepwise elimination, starting with a model containing all independent variables with a bivariate p-value of 0.2 or less and retained independent variables with p-values of less than or equal to 0.05. We conducted all analyses using SAS version 9.4. [55]

Results

We approached 1412 individuals, of whom we determined that 505 did not meet basic eligibility requirements; an additional 371 declined prior to examining eligibility. We scheduled 536 for further screening, of whom 361 attended their appointment and 350 were eligible and agreed to enrollment (Figure 1). The majority of the 350 participants in the sample were male, African-American, and under 60. The majority of participants (74.3%) had completed high school, GED degree or higher. Over 90% of participants reported less than $1150 per month income from all sources. Most (79.6%) of individuals had insurance or health care coverage provided by the county. More than two-thirds of participants (72.0%) reported having a non-ED regular health care location and 52.9% reported having a regular health care provider. (Table 1)

ED use

Half of participants (49.7%) had at least one ED visit within the past 6 months. One-fifth (19.1%) had one ED visit, while 27.7% had two or more (range 2–32). The 23 participants (6.6%) who made 7 or more ED visits in the prior six months accounted for 49.9% of all ED visits. (Figure 2) The most common reasons for visiting the ED were worsening of a chronic illness (23.9% of visits), a new illness (21.6%), and pain (19.2%). (Table 2)

Hospitalizations—Ten percent of participants had one or more hospital admissions in the prior six months. Most admissions (85.7%) occurred via the ED. Of all ED visits, 7.3% resulted in a hospital admission.

Residential status

While all participants were homeless at the time of enrollment, our cluster analysis divided participants into four groups based on where they had spent the most nights in the prior six months: we classified 46.3% as "unsheltered," 25.1% as "users of multiple institutions" (shelters, jails, hospitals), 16.3% as "cohabiters" staying with family or friends, and 12.3% as "renters," having spent the majority of their nights in the prior six months housed before becoming homeless. [49] Unsheltered participants and users of multiple institutions were more likely to have experienced longer episodes of homelessness. The majority of renters (90.7%) and cohabiters (57.9%) had been homeless for less than 6 months as compared to only a minority of unsheltered individuals (9.9%) and multiple institution users (28.7%); 69.7% of unsheltered individuals had been homeless for over 1 year.

Health status and conditions—Over half of the participants (55.7%) rated their health as fair or poor. A third (33.4%) had one chronic condition and 41.2% had two or more. The most common conditions were hypertension, asthma or chronic obstructive pulmonary disease, and diabetes. (Table 1)

Pain

Over one-third of participants (39.4%) reported experiencing severe pain in the prior week and 18.0% reported oral pain. Of those who met criteria for severe pain in the past week, 78.8% reported that their pain had lasted longer than 6 months (median = 8 years, IQR = 3.5–15 years).

Mental health and substance use

A third (32.6%) of participants screened positive for PTSD, 53.3% reported moderate to severe symptoms of clinical depression, and 65.0% reported ever having hallucinations, violent impulses, or a suicide attempt. One-fifth of participants (18.9%) reported ever having had a psychiatric hospitalization. Over a quarter (25.8%) of the participants met AUDIT criteria for at-risk alcohol use. Half (50.6%) met criteria for at-risk use of cocaine, opioids, or amphetamines.

Functional Status and Cognition

Over half (58.4%) of participants had limitations in lower extremity function as measured by SPPB; 38.9% reported difficulty with one or more ADLs and a quarter (25.8%) had cognitive impairment. (Table 1)

Other experiences

Thirty-five participants (10.1%) reported physical abuse in the past six months, and 10.6% reported being incarcerated in jail or prison in the prior six months.

Multiple variable models

Our full model included gender, residential status, health coverage, depressive symptoms, history of hallucinations, violent impulses, or suicide attempt, prior psychiatric hospitalization, cognitive impairment, self-reported coronary artery disease or myocardial infarction, hypertension, asthma/COPD, cancer, and stroke, pain in the past week, health insurance coverage, and physical abuse in the past six months (Table 3). Neither having a regular health care provider, a usual source of care, nor having an alcohol substance use problem was significant at the p<0.2 level.

In our reduced model, we found that, compared to the newly homeless, being a multiple institution user (IRR = 2.1; 95% CI = 1.0–4.5), and being unsheltered (IRR = 2.5; 95% CI = 1.3–4.9) was associated with a higher rate of ED visits in the prior six months, as was having health insurance/coverage (IRR= 2.6, 95% CI = 1.5–4.4). Having a lifetime history of psychiatric hospitalization (IRR = 1.7; 95% CI 1.0–2.8) and reporting severe pain in the prior week (pain score 8) (IRR = 1.6; 95% CI 1.0–2.6) were also associated with ED visits.

Neither functional nor cognitive impairments, any of the chronic diseases, nor a history of physical abuse was associated.

Discussion

We found, in a sample of adults 50 and older experiencing homelessness, half had visited an ED in the prior six months. This rate is higher than rates of ED use in the general population: in 2014, 18% of the adult general population aged 18–64 visited the ED one or more times over the course of a year.[56] In our study, a small proportion of individuals accounted for half of all visits. As in other studies looking at homeless individuals, despite the social deprivation and poor functional status of participants, the proportion of visits leading to hospitalization was lower than the national average.[15,57,58]

While all participants were homeless at study entry, a small group had spent the majority of the prior six months housed, corresponding with the period of interest. We found that those who had spent the majority of the past six months homeless, either unsheltered or staying in homeless shelters, had significantly higher rates of use than those who had spent most of their time housed. This finding is consistent with research that shows that homeless individuals who regain housing have lower rates of ED use than those who remain homeless. [59] Although homelessness is a dynamic process,[24] prior studies of the healthcare utilization of people experiencing homelessness have not measured exposure to homelessness during the period of interest, nor did they account for the different ways that individuals could experience homelessness.[4,60,61] Our findings suggest that classifying individuals as homeless based on a single point in time may oversimplify the contribution of homelessness to individuals' use of acute health care services.

We found that severe pain was associated with an increased rate of ED use. Over three-quarters of participants who reported severe pain reported that this pain had lasted at least six months, throughout the duration of the study period. In addition, a quarter of participants with one or more ED visits reported using the ED for complaints related to a chronic illness. These findings suggest that the ED remains a low-barrier access point to seek pain and medical treatment for homeless individuals. Although over two-thirds of the participants reporting having a regular non-ED place for care, neither this nor having a regular provider was associated with use of the ED. Prior literature has found that homeless individuals that have a regular place for healthcare still visit the ED.[62] Homeless individuals can face barriers to accessing non-ED ambulatory care, even with an identified primary care provider, [17,63,64] and this may contribute to their use of the ED for chronic medical conditions and pain that might otherwise be managed in outpatient settings.

We found an association with a lifetime history of psychiatric hospitalization, but not psychiatric symptoms or substance use problems. Prior literature on homeless adults has found associations with prior psychiatric hospitalizations and ED visits for physical health. [25,65,66] In keeping with prior literature, we did not find a high rate of ED visits for mental health problems. The literature on substance use problems as a risk factor for ED visits in homeless adults is mixed.[4,65,66] It is possible that in a sample with high prevalence of

substance use problems, we were unable to detect an association, or that substance use problems are not associated with ED use among homeless adults over the age of 50.

We found that having health care coverage (both insurance and pre-ACA coverage via the county) was associated with higher rates of ED use. It may be that having coverage indicates a higher degree of engagement with health care, resulting in an effect-cause relationship between ED use and insurance: in Alameda County, eligibility workers in clinics and EDs will link uninsured individuals with insurance at the time of a visit. It may also be that insured individuals in the cohort understood their insurer would cover the cost of their ED visit, whereas uninsured individuals can be subject to large bills.

Limitations

Our study had several limitations. We chose to use a conservative measure of ED visits and include only visits for which we had a hospital record, which may have led to underreporting. However, we took measures to limit missing data. For the most commonly used ED, which accounted for 48.9% of self-reported visits, we accessed complete administrative data. For all other EDs, we requested records only if a participant reported that he or she had been there (or, in the case of three partner hospitals, at any of the three hospitals) in the prior six months. Many of our measurements spanned the same 6-month look-back period as our primary outcomes of interest (ED use). However, in a few cases (PTSD, depressive symptoms, pain), we evaluated measurements on the day of the interview or for a shorter period to correspond with validated measures. We conducted this study in a single city, Oakland. In Alameda County, the county that includes Oakland, approximately 4,000 individuals experience homelessness on a given night, half of whom live in Oakland. Oakland is a mid-sized city (population 400,000) with a diverse population. Oakland has homeless services health clinics, free and low-cost meal programs, and mobile outreach services for homeless individuals, and these characteristics may prevent our findings from being generalized to other jurisdictions. Like many cities across the United States, in the years prior to the study initiation, Oakland's housing prices increased, placing more individuals at risk of homelessness. While less expensive than other cities in the SF Bay area, Oakland was beginning to experience a period of dramatic rental cost increases during the period of the study recruitment. Our study population was predominantly African American, and this may have limited our ability to detect racial or ethnic differences among study participants. We relied on participants to self-report chronic disease and did not verify these diagnoses with medical records. While all participants were homeless at the time of study entry, we measured ED use in the prior six months, when some participants were not homeless. However, this has allowed us to compare those who spent most of their nights homeless to those who did not.

Conclusions

In this study of adults aged 50 and older who were homeless at study entry, we found that those who were homeless throughout the prior six months had significantly higher rates of ED use than those who had spent much of the prior six months housed. We found elevations in risk of ED use both for those who were unsheltered and those who spent their time in

shelters and other institutional settings. Homeless adults who are over age 50 have high rates of ED use when compared to the general population.[56,60] The high proportion of visits for chronic disease and pain-related complaints and low likelihood of admission could suggest that outpatient non-ED health care resources for homeless individuals are not easily accessible for people experiencing homelessness, leading individuals to seek out care in the ED for complaints that may be manageable in non-ED settings. This could be due to hours of operation, the need for appointments, the lack of transportation options, or other reasons. Future research should evaluate the impact of accessible and culturally acceptable non–ED alternative sites of care for older homeless individuals. Decreasing homelessness would likely decrease ED use in at-risk populations.

Acknowledgments

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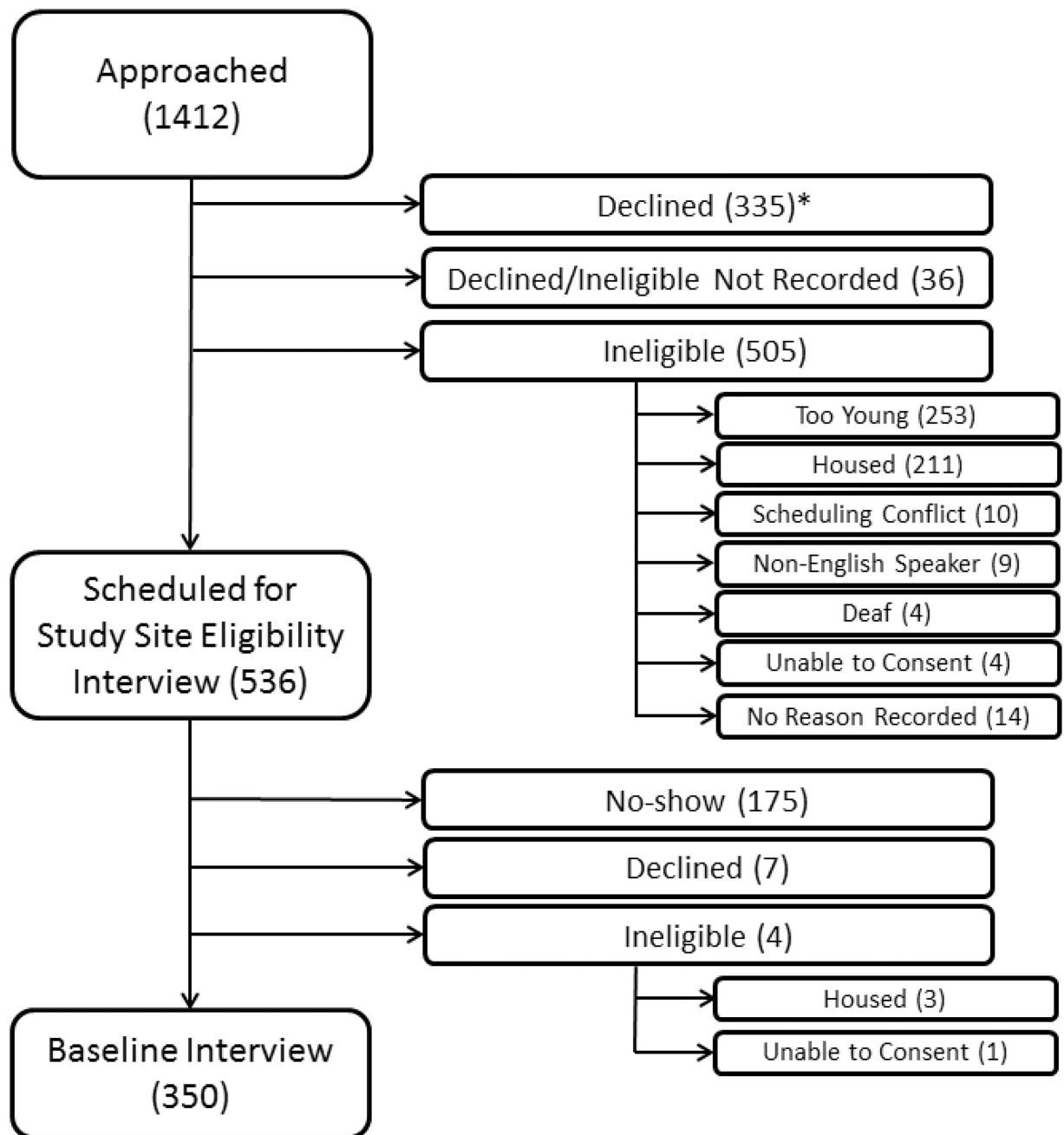
Figure 1.

Flow-chart of recruitment of 350 homeless adults over the age of 50.

*This figure shows the number of individuals approached, assessed for eligibility, and enrolled in the study, noting specific reasons for inability to enroll. Values represent the number of individuals in each group. Participants who declined after being approached (335) declined before being assessed for eligibility. Therefore, the number of participants who were ineligible for the study may have been higher than the numbers presented in this table.

Figure 2.
Distribution of emergency department (ED) visits by study population

Table 1

Participant Characteristics

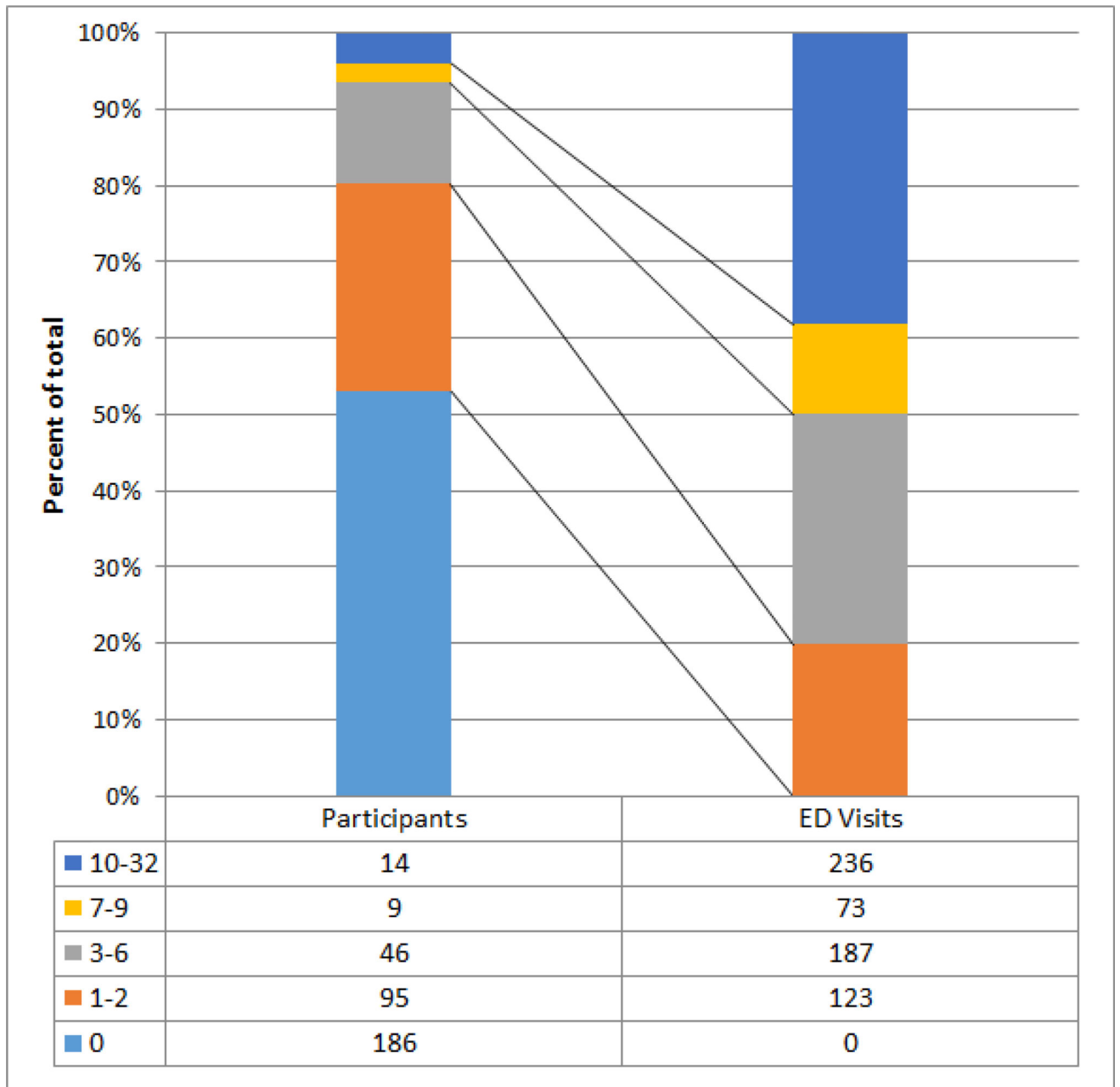| Variable[*]	No ED Visits N=186	Any ED Visits N=164	Total N=350
Age, Median (IQR)	58 (54–62)	58 (54–61)	58 (54–61)
Sex			
Male	143 (76.9)	127 (77.4)	270 (77.1)
Race			
Black	148 (79.6)	131 (79.9)	279 (79.7)
Non-Black	38 (20.4)	33 (20.1)	71 (20.3)
Education			
Completed High School or GED Degree	138 (74.2)	122 (74.4)	260 (74.3)
Monthly Income (All Sources)			
$0 to $150	49 (26.9)	39 (24.0)	88 (25.6)
$151 to $700	52 (28.6)	32 (19.8)	84 (24.4)
$701 to $1150	67 (36.8)	71 (43.8)	138 (40.1)
Over $1150	14 (7.7)	20 (12.4)	34 (9.9)
At-risk Substance Use, Past 6 Months			
Alcohol[a]	50 (26.9)	40 (24.5)	90 (25.8)
Cocaine, Opioids, or Amphetamines[b]	81 (43.5)	96 (58.5)	177 (50.6)
Residential Status[c]			
Cohabiter	31 (16.7)	26 (15.9)	57 (16.3)
Multiple Institution User	49 (26.3)	39 (23.8)	88 (25.1)
Newly Homeless/Renters	26 (14.0)	17 (10.4)	43 (12.3)
Unsheltered	80 (43.0)	82 (50.0)	162 (46.3)
Mental Health Status			
PTSD[d]	58 (31.2)	56 (34.1)	114 (32.6)
Moderate to Severe Depressive Symptomatology[e]	89 (48.4)	96 (58.9)	185 (53.3)
History of Hallucinations, Violent Impulses, Suicide Attempt	115 (62.2)	112 (68.3)	227 (65.0)
Past Mental Health Hospitalization	24 (12.9)	42 (25.6)	66 (18.9)
Functional Status and Cognition			
Any ADL Impairment[f]	64 (34.4)	72 (43.9)	136 (38.9)
Lower Extremity Functioning Impairment[g]	102 (55.4)	99 (61.9)	201 (58.4)
Cognitive Impairment[h]	44 (23.7)	46 (28.2)	90 (25.8)
Instrumental Social Support[i]			
None	62 (33.7)	54 (33.3)	116 (33.5)
Self-Rated Health Status[j]			
Poor or Fair Health	99 (53.2)	96 (58.5)	195 (55.7)
Medical Condition[k]			
Hypertension	100 (54.1)	95 (58.3)	195 (56.0)

Variable*	No ED Visits N=186	Any ED Visits N=164	Total N=350
Diabetes	23 (12.4)	26 (15.9)	49 (14.0)
Asthma/Chronic Obstructive Pulmonary Disease	39 (21.0)	53 (32.3)	92 (26.3)
Cancer	8 (4.3)	13 (7.9)	21 (6.0)
Human Immunodeficiency Virus	10 (5.5)	9 (5.6)	19 (5.5)
Coronary Artery Disease/Myocardial Infarction	12 (6.5)	20 (12.2)	32 (9.1)
Stroke	16 (8.6)	23 (14.1)	39 (11.2)
Congestive Heart Failure	12 (6.5)	13 (7.9)	25 (7.1)
Oral Pain[l]			
Occasionally/Fairly Often/Very Often	68 (36.6)	72 (43.9)	140 (40.0)
Pain, past week[m]			
Mild to Moderate	57 (30.6)	30 (18.5)	87 (25.0)
Severe	57 (30.6)	80 (49.4)	137 (39.4)
Health Care Utilization			
Regular Health Care Location	129 (69.4)	123 (75.0)	252 (72.0)
Regular Health Care Provider	95 (51.4)	89 (54.6)	184 (52.9)
Abuse, Past 6 Months			
Physical[n]	13 (7.1)	22(13.5)	35 (10.1)
Sexual[o]	5 (2.7)	1 (0.6)	6 (1.7)
Jail or Prison, Past 6 Months	21 (11.3)	16 (9.8)	37 (10.6)
Any Health Insurance Coverage[p]	139 (39.9)	138 (85.2)	277 (79.6)

*
Data presented as N (%) unless otherwise noted

[a]
At-risk alcohol use defined as Alcohol Use Disorders Identification Test (AUDIT) score ≥ 8

[b]
At-risk drug use defined as Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) score ≥ 4

[c]
Residential status defined as primary living environment in the past 6 months as determined using cluster analysis; Overall (Type 3) p-value = 0.021

[d]
Post-traumatic stress disorder defined as a PTSD Screen score of ≥ 3

[e]
Moderate to severe depressive symptomatology defined as a Center for Epidemiologic Studies Depression Scale score of ≥ 22

[f]
ADL, activities of daily living, impairment defined as self-reported difficulty performing 1 or more ADLs

[g]
Lower extremity functioning impairment defined as Short Performance Physical Battery score of ≤ 10

[h]
Cognitive impairment defined as Modified Mini-Mental State Examination score below the 7th percentile (i.e., 1.5 standard deviations below the demographically-adjusted cohort mean)

[i]
Instrumental social support defined as having anyone who would lend money or offer a place to stay if needed

[j]
Self-rated health status assessed using Ware, et al. 1-item health screen

[k]
Medical conditions assessed by self-report of having received a diagnosis from a physician or positive test result for HIV

[l]
Oral pain defined as having pain anywhere in the mouth in the past 6 months

[m]
Pain assessed using the Brief Pain Inventory; none (0), mild to moderate (1–7), severe (8–10); Overall (Type 3) p-value = 0.021

[n]Physical abuse defined as experiencing physical violence perpetrated by another person using an object or being slapped, hit, punched, kicked, choked, or burned

[o]Sexual abuse defined as being pressured or forced to have sexual contact, to do something sexual, or to have sex

[p]Health insurance coverage includes Medicaid; Medicare; Alameda HealthPAC, a county-run health plan covering low-income residents not eligible for Medicaid; or any other kind of private or public health plan

Table 2

Reasons for emergency department visits

Reason for ED Visit	No.	Percentage
Chronic Illness	83	23.9
New Illness	75	21.6
Pain	67	19.2
Injury	57	16.4
Needed Pain Meds	29	8.3
Mental Health Problem	20	5.8
Other [*]	17	4.9

[*] Other reasons include: Substance Use/Overdose, Needed non-pain meds, Planned surgery, Other/not specified

Table 3

Negative binomial regression models of factors associated with ED use

Variable	IRR, bivariate (95% CI)[a]	P-value, bivariate	IRR, full model (95% CI)	P-value, full model	IRR, reduced model (95% CI)	P-value, reduced model
Sex						
Male	1.4 (0.8–2.2)	0.198	1.5 (0.9–2.4)	0.134		
Residential Status[b]						
Cohabiter	1.6 (0.7–3.5)	0.243	1.1 (0.5–2.5)	0.754	1.3 (0.6–2.9)	0.518
Multiple Institution User	**3.2 (1.5–6.5)**	**0.002**	1.7 (0.8–3.6)	0.136	**2.1 (1.0–4.5)**	**0.042**
Unsheltered	**2.6 (1.3–5.1)**	**0.006**	**2.0 (1.0–3.9)**	**0.050**	**2.5 (1.3–4.9)**	**0.008**
Mental Health Status						
Moderate to Severe Depressive Symptomatology[c]	1.4 (0.9–2.1)	0.089	0.9 (0.6–1.4)	0.624		
History of Hallucinations, Violent Impulses, Suicide Attempt	1.3 (0.9–2.0)	0.169	0.9 (0.6–1.5)	0.776		
Past Psychiatric Hospitalization	**1.7 (1.0–2.8)**	**0.039**	1.7 (1.0–3.0)	0.052	**1.7 (1.0–2.8)**	**0.038**
Cognitive Impairment[d]	1.5 (1.0–2.4)	0.075	1.5 (1.0–2.4)	0.062		
Medical Condition[e]						
Asthma/Chronic Obstructive Pulmonary Disease	1.4 (0.9–2.2)	0.149	1.1 (0.7–1.7)	0.809		
Cancer	0.5 (0.2–1.3)	0.147	0.6 (0.2–1.4)	0.206		
Coronary Artery Disease/Myocardial Infarction	**1.9 (1.0–3.8)**	**0.050**	**2.0 (1.0–4.0)**	**0.042**		
Stroke	1.8 (1.0–3.4)	0.051	1.0 (0.5–2.0)	0.917		
Pain, Past Week[f]						
Mild/Moderate	0.9 (0.5–1.5)	0.687	0.7 (0.4–1.2)	0.237	0.7 (0.4–1.3)	0.246
Severe	**1.8 (1.1–2.8)**	**0.012**	1.6 (1.0–2.6)	0.058	1.6 (1.0–2.6)	0.051
Physical Abuse, Past 6 Months[g]	**1.8 (1.0–3.4)**	0.071	1.6 (0.8–3.0)	0.159		
Any Health Insurance Coverage[h]	**2.7 (1.6–4.4)**	**<.001**	**2.3 (1.3–4.0)**	**0.004**	**2.6 (1.5–4.4)**	**<.001**

[a] incidence rate ratio (IRR); 95% confidence interval (95% CI)

[b] Residential status defined as primary living environment in the past 6 months as determined using cluster analysis; Newly Homeless used as reference residential status category

[c] Moderate to severe depressive symptomatology defined as a Center for Epidemiologic Studies Depression Scale score of ≥ 22

[d] Cognitive impairment defined as Modified Mini-Mental State Examination score below the 7th percentile (i.e., 1.5 standard deviations below the demographically-adjusted cohort mean)

[e] Medical conditions assessed by self-report of having received a diagnosis from a physician

[f] Pain assessed using the Brief Pain Inventory; mild to moderate (score of 1–7), severe (score of 8–10)

[g] Physical abuse defined as experiencing physical violence perpetrated by another person using an object or being slapped, hit, punched, kicked, choked, or burned

[h] Health insurance coverage includes Medicaid; Medicare; Alameda HealthPAC, county-run health plan covering low-income residents not eligible for Medicaid; or any other kind of private or public health plan