

UCSF

UC San Francisco Previously Published Works

Title

Utilization of a Sobering Center for Acute Alcohol Intoxication

Permalink

<https://escholarship.org/uc/item/73k374rt>

Journal

Academic Emergency Medicine, 24(9)

ISSN

1069-6563

Authors

Smith-Bernardin, Shannon
Carrico, Adam
Max, Wendy
[et al.](#)

Publication Date

2017-09-01

DOI

10.1111/acem.13219

Peer reviewed



HHS Public Access

Author manuscript

Acad Emerg Med. Author manuscript; available in PMC 2018 September 01.

Published in final edited form as:

Acad Emerg Med. 2017 September ; 24(9): 1060–1071. doi:10.1111/acem.13219.

Utilization of a Sobering Center for Acute Alcohol Intoxication

Shannon Smith-Bernardin, PhD, RN,

University of California San Francisco, School of Nursing, Department of Social & Behavioral Sciences, San Francisco, CA, USA; Alcohol Research Group, Emeryville, CA, USA

Adam Carrico, PhD,

University of Miami Health System, Department of Public Health Sciences, Division of Prevention Science & Community Health, Miami, FL, USA

Wendy Max, PhD, and

University of California, San Francisco, Institute for Health & Aging, San Francisco, CA, USA

Susan Chapman, PhD, RN, FAAN

University of California, San Francisco, School of Nursing, Department of Social and Behavioral Sciences, San Francisco, CA, USA

Abstract

Objective—To describe the population utilizing a sobering center for public alcohol intoxication, and compare between single-visit users, repeat users, and high users.

Methods—We conducted a secondary analysis of 1,271 adults cared for in the Sobering Center from July 2014 to June 2015. We divided the population into three groups: single-use (1 visit), repeat users (2-5 visits) and high (6+) users, and evaluated demographics, lifetime health diagnoses utilizing the Elixhauser Comorbidity Index, rates of public service utilization including ambulance and emergency department, and related costs.

Results—The population was primarily male, middle-aged, and ethnically diverse. As compared to single-visit users (n=869), repeat (n=287) and high users (n=115) were older, were more likely to be currently homeless, and had spent more time homeless. Repeat and high users had significantly higher rates of hypertension, liver disease, diabetes, depression, psychoses, and drug abuse diagnoses as compared to single-visit users. In addition to sobering visits, utilization of ambulance and ED and related costs were significantly greater for the high users compared to repeat and single-visit users.

Conclusions—From an overall heterogeneous population, more frequent utilizers of the Sobering Center, both high and repeat users as compared to low users, had significantly greater prevalence of chronic disorders, service utilization, and homelessness. Findings indicate that a sobering center can have a prominent role in the care for those with acute alcohol intoxication, particularly those individuals with chronic public intoxication who are likewise homeless. Further

Corresponding Author: Shannon Smith-Bernardin, Shannon.smith-bernardin@alumni.ucsf.edu, 415-624-7341 mobile.

Prior Presentations: 10-minute oral presentation in regular session with five person panel. 20 attendees to session. Association of Medical Education and Research on Substance Abuse (AMERSA) annual conference, November 2016 (Washington DC).

longitudinal research could offer important insights as to the population served over time, investigating changes in utilization and efforts towards health and housing stabilization.

Keywords

Sobering center; public intoxication; alcohol use disorders

Introduction

Public alcohol intoxication has a substantial impact on public health and emergency services throughout the country. Nearly 30% of patients in medical emergency¹⁻³ or psychiatric emergency departments⁴ are intoxicated on alcohol, with up to 70% of patients intoxicated during peak hours⁵. An estimated 40% of those intoxicated present by ambulance⁶. Both acute and chronic alcohol consumption contribute to the level of alcohol intoxication in the emergency department^{7,8}. Current reports indicate that the prevalence of binge drinking in the United States (5 or more drinks for a man, and 4 or more drinks for a woman in one sitting) is 17.1%, with one in six adults consuming at these levels on average four times monthly⁹. Importantly, over half the alcohol consumed by adults is in the form of binge drinking¹⁰, and nearly 80% of those intoxicated in the ED were diagnosed with an alcohol use disorder based on DSM-IV criteria⁸.

Sobering centers have emerged as an alternative care site for those with alcohol intoxication, and there are approximately two dozen sobering programs in existence in the US¹¹ and more internationally¹²⁻¹⁶. As defined by a recent article:

“A facility where actively alcohol-intoxicated clients can safely recover from acute intoxication. This includes alternatives to jail and emergency departments, as well as drop-in centers. This excludes long-term (>2 nights) housing, medical detoxification and residential substance abuse treatment centers as well as private-pay centers unless affiliated with a sobering center.”¹¹

These current sobering centers are increasingly seen as an option to emergency department and criminal justice care^{11,17-21}, in providing for the short-term recovery from acute intoxication. Data on these services is limited though expanding, and current knowledge show that the specific care and staffing models provided in sobering facilities varies from facility to facility. With this, not all intoxicated individuals treated in an emergency department may be appropriate for a sobering center yet utilization data indicate thousands of individuals are cared for annually¹¹. Sobering centers are not intended to be treatment facilities or rehabilitation for alcohol use disorders, though they are considered one of the ways individuals can be referred to treatment (i.e. detoxification, residential rehabilitation) if desired.

The goal of this study is to describe the key features of the care environment for the San Francisco Sobering Center and the population of individuals served. The current study aims to investigate the population utilizing the San Francisco Sobering Center, and to provide an in-depth analysis of demographics, health status, and the rate of use and cost of public health services used by the population throughout San Francisco. To our knowledge, no other study

has detailed the characteristics of a population utilizing a sobering facility in the United States.

Methods

Design and Setting

This cross-sectional study examined the population utilizing the sobering center for care of acute alcohol intoxication in San Francisco, California. This study was certified as exempt from Institutional Review Board review as a secondary analysis of de-identified data.

The San Francisco Sobering Center has been in operation since July 2003 and provides short-term (4-12 hour) monitoring and nursing care for adults aged 18 and over with acute alcohol intoxication²². The Sobering Center, a collaborative program with the Department of Public Health and the Community Access & Treatment Services 501c3, is an unlicensed facility supported through the City and County of San Francisco General Fund. The mission of the Sobering Center is “to provide safe, short-term sobering and care coordination for acutely intoxicated adults in San Francisco”²³.

This program run by registered nurses and medical assistants provides supportive care using protocols and practice care guidelines. Clients receive vital sign monitoring every two hours, oral rehydration, nutrition, vitamins (multivitamin, folic acid, and thiamine), and basic wound care as needed. Additionally, staff provide for basic hygiene needs including shower access, laundry, delousing, clean clothing and shoes. The Sobering Center accepts clients around the clock from ambulances, police, homeless van service, emergency departments, and other community programs. Due to the limited number of beds, walk-ins are accepted on a limited basis. The San Francisco Sobering Center differs from others nationally in that it is the only known sobering program currently accepting clients from the 911-ambulance system^{11,23}.

Measures

Demographics and healthcare service utilization data for users of the Sobering Center were obtained from the Coordinated Case Management System (CCMS), a custom Oracle database created by San Francisco in 2003. All client encounters at the Sobering Center are entered into the CCMS in real-time during a visit, and each entry includes demographics, admission and discharge details, and staff notes relevant to the encounter. In addition to Sobering Center visit information, the database includes subject-level information for all users of city-funded health and social services throughout San Francisco²⁴. The data utilized for this study involved the entire population of the Sobering Center from July 2014 to June 2015 (n=1,271).

Demographics included age, ethnicity (White, Black, Latino/a, Native American, Other), housing status (homeless, permanently housed), language (English, Spanish, Other), and gender (Male, Female). Due to privacy considerations, gender was categorized as male or female; transgender subjects were placed into the gender with which they identified. If a history of homelessness was noted, related variables included years of homelessness, current homelessness in last year, and homeless status (Outdoors, Other, Transitional).

Connection to services was dichotomized as Yes/No, including whether the subject had a primary care provider, a primary care clinic, or case management. Age, healthcare service utilization, and utilization-related costs were analyzed as continuous variables. Visits to the emergency department and Sobering Center were counted as one per visit. Ambulance transport was one for each transport; of note, data for ambulance transports was only available for users transported four or more times in one month. Users with less than four ambulance transports within at least one month were not included in ambulance data. Medical detoxification was a continuous variable with number of total days spent in detoxification; for example, a client may have 5 visits for a total of 30 days in detoxification. The total days of 30 would be used in measuring this variable. For utilization-related costs, Department of Public Health analysts calculate per-utilization associated costs on a per fiscal year basis. These are average total costs for a client to be served at the respective facilities, calculating total number of client encounters served by total operational and facility expenses. The costs are not used for billing purposes. The per-incident costs for the services included in this study are for fiscal year July 2014 to June 2015: emergency department visit (\$648.72 per visit); sobering center (\$264.18 per visit); ambulance (\$1,675 per transport); medical detoxification (\$406.98 per day); inpatient days at the county hospital (\$1443.30 per day); and urgent care (\$193.80 per visit).

For health status indicators, the San Francisco Department of Public Health utilizes the Elixhauser Comorbidity Index. The Elixhauser index utilizes ICD-9 diagnostic codes and categorizes health status indicators into three system-related groups: medical (27 diagnoses), mental health (two), and substance abuse (two)^{25,26}. Each indicator was measured as a continuous variable, indicating the number of times a subject had been treated for the respective diagnosis in their lifetime. For this study, the health status indicator for each system-related group was dichotomized to Yes/No. The maximum Elixhauser score is 31, indicating 31 Yes/No health status indicators. For example, a subject with diabetes mellitus, chronic obstructive pulmonary disease, previous treatment for crack-cocaine use, and an active alcohol use disorder would have an Elixhauser score of four (4). The score does not reflect the number of times seen for each diagnosis.

Data Analysis

Clients utilizing the Sobering Center at least one time during the most recent fiscal year July 2014 to June 2015 (n=1,271) were included in a comprehensive analysis of demographic characteristics, health status, utilization patterns, and costs. Data analysis was performed using STATA/IC 14.1 for Mac (STATA Corporation, College Station, Texas). We analyzed the data via statistical tests including analysis of variance (Elixhauser index score; time span homeless; age; utilization visits and costs) and chi-square (gender, Elixhauser diagnoses, living situation, homeless in last year, history homelessness, assignment of primary care clinic and provider, case management) using 95% level of significance, followed by Bonferroni post-hoc procedure. We initially analyzed four groups of unduplicated clients based on annual utilization: one-time users (1 visit), repeat (2-5), chronic (6-15), and super users (16+). Through statistical analyses including chi-square and analysis of variance, we found there were no significant differences in demographics, housing status, or medical diagnoses between the chronic (6-15 visit) users and the super (16+) users of sobering

services. For continued analysis, these two groups were combined as “high users”, with 6+ visits to the Sobering Center. For final analysis, unduplicated clients were distributed into three distinct groups: single-visit users (n=869; 1 visit), repeat users (n= 287; 2-5 visits), and high users (n=115; 6+ visits). After considering the results of the above analyses, we performed a multiple logistic regression to predict users of 2 or more visits for sobering services as compared to single-visit users. With a binary dependent variable (single-visit vs. user with 2+ visits), we performed a direct model building with categorical and binary independent variables. These variables for regression were selected based on both clinical knowledge of the population and whether these variables were significantly different between groups in post-hoc analysis. Missing data was minimal, and no values were imputed.

Results

Utilization

In the year of analysis from July 2014 to June 2015, there were 1,271 unduplicated clients for a total of 3,452 encounters at the Sobering Center. Clients were referred into the Sobering Center by the 911/ambulance system (n=1,505; 44%), street outreach services (n=945; 27%), police (n=354; 10%), emergency departments (n=350, 10%), and other parties (n=301; 9%). A vast majority of encounters were discharged after successfully sobering, although others were discharged prematurely due to behavioral difficulties (n=113; 3%), departure against staff advice (n=334; 10%), or required ambulance transfer to an emergency department (n=152; 4%).

Single-Year Population Analysis

The population was primarily male (82%) and ethnically diverse (43.6% White, 22.9% Latino/a, 19.2% Black), with a mean age of 44.4 years (Table 1). Although a majority of subjects were without housing, over 30% of clients lived in permanent housing. In addition to alcohol use, over 38% of clients had a diagnosis of drug abuse at some time during or previous to the study time.

During the 12 months of analysis, there were a total of 3,452 encounters. Single-visit users accounted for 869 visits, or 25.2% of total encounters, repeat users (n=287) accounted for 814 (23.6%) encounters, while high users (n=115) accounted for 1,769 (51.2%) encounters. Number of visits per client ranged from one to 83 distinct visits during the one-year study period. Subjects with repeat or high use were significantly older (49.5 and 50.6 years of age respectively, $p<0.001$) than single-visit users, and both women and men were equally likely to be single-use, repeat, or high utilizers. Unlike the single-visit category, the repeat and high user was more likely to have a history of homelessness (100 & 98 vs. 69%, $p<0.001$). Additionally, we found a significant difference between all three groups with high users more likely than repeat and single-visits users to be homeless during the last year (100% vs. 94 and 61%, $p<0.001$), and with more time spent homeless (9.9 vs. 8.0 and 5.3 years; $p<0.001$). As compared to single-users, repeat and high users had significantly higher rates of medical diagnoses and total score as measured by the Elixhauser index. Rates of liver disease (29 & 38 vs. 15%), hypertension (38 & 41 vs. 19%), depression (58 & 66 vs. 30%),

psychoses (40 & 44 vs. 19%) and drug abuse (52 & 70 vs. 30%) were significantly higher for repeat and high users than single-users ($p<0.001$), as shown in Table 2.

Our findings indicate that the persons utilizing the sobering center more frequently may also have a higher utilization of healthcare services and higher resultant costs within the larger system of care than single-users (Table 3a, Table 3b). High users as compared to repeat and single-users had significantly more interactions with the emergency medical system, including higher rates of use and costs for ambulance transports ($p=0.005$), and emergency department visits at the public hospital ($p<0.001$). There was no significant difference between high, repeat, and single-users in utilization or costs of inpatient hospital days or urgent care visits. Looking at transition to treatment, 25% of repeat users and 37% of high users attended medical detoxification during the study period, at a higher rate than single-time users (5%). However, there was no difference between the groups in the number of days spent in detoxification.

As identified in multiple logistic regression, there were a number of significant factors putting a client at greater odds of returning to the Sobering Center (2+ visits), as shown in Table 4. Controlling for age and ethnicity, the odds of a user with a history of depression being a returning user was 1.66 times greater than for those without depression, and 1.65 times greater for those with hypertension as compared to those without. Older age increased the odds of being a returning user, with those aged 45-54, 55-64, or 65-88 years at 4.8, 5.1, and 9.0 times greater odds, respectively, of being a returning user as compared to those under 25 years of age. A critical factor was housing status, with those homeless within the last 12 months having an 8.5 times greater odds of being a high user than those who were not homeless.

Discussion

This study examined the population utilizing an urban sobering center that provides care for adults aged 18 and older found intoxicated on alcohol in public. Our findings indicate that the population using our sobering center is middle-aged and ethnically diverse with substantial levels of chronic medical, psychiatric, and substance abuse disorders. The results of our study indicate that the population using the sobering center consists of many individuals with recidivism beyond one visit. Though a majority of clients had only one visit to the Sobering Center, a smaller number of individuals account for a majority of the total encounters. A significant number of clients with recurrent use were suffering from medical comorbidities, high rates of co-occurring drug abuse and mental illness, and significant histories of homelessness. Many of the individuals are likewise engaging with other urgent and emergent healthcare systems, particularly the emergency department and ambulance services. Despite this, a vast majority of the population is not connected to primary care clinics or providers and few have active case management.

This article contributes to the literature in three important ways. First, our study begins to characterize the population with public intoxication, specifically those served within our sobering center. As this work details, the population is a heterogeneous yet aging population with impressive rates of homelessness, chronic comorbidities, and use of the public health

system. A major finding of our study is the significant rates of previous and current homelessness in the Sobering Center-using population. The health status of homeless, chronic alcohol users is typically very poor. Excessive alcohol consumption has been implicated in numerous health conditions²⁷⁻²⁹, and chronic homelessness has been well documented as a significant risk factor for poor health³⁰⁻³². There is also seen an increased prevalence of psychiatric conditions³³⁻³⁶, and higher mortality rates for individuals with chronic alcohol use disorders and homelessness³⁷. In one report from San Francisco, over one-third of all decedents were legally intoxicated at the time of death³⁸. Our study affirms the high prevalence of numerous chronic conditions in the homeless segment of the sobering center users, including hypertension, diabetes, liver disease, depression, and psychoses. An implication of this finding is the opportunity to augment health services within a sobering center to provide care for chronic conditions, particularly in repeat and high use clients. More work is required to fully investigate the overall population and the likely subgroups, separate than those created based on utilization rates, which may emerge upon further study.

A second contribution is our examination of the rates of co-occurring drug abuse and the mental health diagnoses in the study population. The population utilizing sobering services has a substantial lifetime diagnosis rate for mental illness, with those in the repeat and high use groups with nearly twice the prevalence of depression and significantly higher rates of psychoses than single-visit users. These findings support previous research indicating higher prevalence of co-occurring disorders for those with alcohol use disorders^{17,36,39}. Considering the relatively low rate of medical detoxification utilization for both repeat and high use clients, there is a substantial opportunity to engage with individuals appropriate for treatment by providing specific interventions including motivational interviewing, referrals to treatment, and medication assistant therapies.

Lastly, a primary motivation for opening the San Francisco Sobering Center was to prevent the unnecessary transfer to the emergency department of acutely intoxicated individuals with no other urgent need^{22,40}. During the study period, over 43% of all encounters originated from ambulances and a small percentage of all encounters required transfer to the ED later in the encounter. If not for the Sobering Center, all these individuals would have been brought to the emergency department for acute alcohol intoxication. Additionally, a vast majority of repeat and high users of the Sobering Center were likewise utilizing the public emergency department at average rates considered to be high use in much of the related ED literature⁴¹⁻⁴⁶. Current literature indicates that homeless individuals with substance abuse diagnoses have disproportionately high rates of emergency services utilization^{17,37,47-49}, frequent interactions with the criminal justice system^{17,18,50}, and high overall rates of healthcare utilization^{37,51-54}. This study reinforces these previous findings when considering the healthcare utilization rates of the repeat (2-5) and high (6+ visit) users. This data indicate a Sobering Center may both prevent emergency department use, directly reducing the burden of ED overcrowding, and may offer a community-based facility from which to engage with ED high users. Considering the health status and utilization rates of many of these clients, this study suggests that a sobering center may function as a hub in which to target individuals whom are higher users of these services to offer interventions aimed at increasing health and decreasing service use.

Limitations

This study is a retrospective cross-sectional study evaluating data collected during the standard operation of services, both in sobering and other citywide programs. We did not include a control group, nor did we evaluate individuals based on their outcomes at the Sobering Center. Additionally, this evaluation details the population using an urban sobering center and generalization to other settings should be made cautiously. In utilizing Elixhauser health status measures, we determined medical conditions based on a lifetime diagnostic rate. This measure does not indicate current health and disease status, nor active disability. Additionally, these diagnoses were obtained through Department of Public Health programs; any diagnosis received during care through a non-City program may not be recorded in this dataset and thus estimates may be limited.

Regarding utilization measures, both hospital visits and ambulance data is limited and likely underestimates the actual number of visits and ambulance transports. First, only the public hospital was included in emergency department and inpatient visit data. Considering the dense urban environment in San Francisco with 10 area hospitals, study subjects may be utilizing alternative EDs and inpatient services. For ambulance data, the San Francisco Fire Department reports transport data only for individuals classified as a SFFD ‘frequent user’, defined as four or more transports in one month. The data set for the current study thus received data for individuals with four or more transports in one month. Any months with three or less were not available for the utilization count. This may introduce a selection bias with particularly the health service utilization and cost analyses. By including data only for individuals previously determined to be ‘frequent users’ of the ambulance system, it may result in higher users of the sobering center biased towards having more ambulance use. Not all repeat or high users of Sobering services are high users of ambulances and vice versa, yet the likelihood that similar individuals may be higher users of both services must be considered. Despite these limitations, ambulance data were kept within the study, recognizing EMS utilization and costs are likely underestimated. Lastly, this study did not examine the effects of a sobering center on alcohol consumption or recidivism either as a stand-alone or in comparison to the emergency department or criminal justice interventions.

Public Health Implications

Based on utilization and recidivism rates, the sobering center largely cares for individuals with both chronic homelessness and alcohol use disorders. Systematically, the prevalence in this population of homelessness and disconnection from services indicate a greater need for rehousing and stabilization efforts. These findings suggest that a sobering program can be developed as a hub for services, engaging with individuals who are likewise utilizing other services throughout an urban environment. Efforts should prioritize developing wrap-around services within sobering facilities, including physical health care, social work, case management, and peer counseling, to address the impacts of homelessness and focus on connecting individuals to appropriate services. Low levels of primary care connection indicate that the sobering center is a possible location in which to engage with individuals for preventative and primary care. Further research examining past and current health insurance and social welfare connections may provide insight into what efforts are already ongoing with the population.

Related research into managed alcohol programs and wet housing^{17,48,55,56}, a specific type of project-based Housing First effort aimed exclusively at individuals with chronic public intoxication, suggest that a collaboration between a sobering facility and housing efforts may prove effective in stabilizing homeless individuals with chronic alcohol use disorders. Managed alcohol and wet housing programs provide a low-barrier housing solution without the goal of abstinence from alcohol, either allowing the consumption of personal alcohol or providing regularly dosed alcoholic beverages to individuals with alcohol use disorders. Further investigation into the potential role of sobering centers in the preparation for and provision of housing may offer additional direction towards onsite services that may be most effective.

Conclusion

In summary, our analysis provides the first comprehensive look at the characteristics of the population using an urban sobering center for acute alcohol intoxication. Findings indicate that a sobering center can have a prominent role in the care for those with acute alcohol intoxication, particularly those individuals with chronic public intoxication who are likewise homeless. Further longitudinal research could offer important insights as to the population served over time, investigating changes in utilization and efforts towards health and housing stabilization.

Acknowledgments

The authors would like to thank Drs. Isabel Elaine Allen, Carol Dawson-Rose, and Steven Paul for their support throughout the study.

Funding Sources/Disclosures: U.S. Department of Health and Human Services >

Substance Abuse and Mental Health Services Administration >

Center for Substance Abuse Treatment

Interdisciplinary Training Program 1U79TI025386-01

U.S. Department of Health and Human Services >

National Institutes of Health >

National Institute on Alcohol Abuse and Alcoholism

Alcohol Research Group Training Grant T32 AA007240

Bibliography

1. Charalambous MP. Alcohol and the Accident and Emergency Department: A Current Review. *Alcohol Alcohol*. 2002; 37(4):307–12. [PubMed: 12107029]
2. Pirmohamed M, Brown C, Owens L, et al. The burden of alcohol misuse on an inner-city general hospital. *QJM*. 2000; 93(5):291–5. [PubMed: 10825405]
3. Cherpitel CJ, Ye Y. Trends in alcohol- and drug-related emergency department and primary care visits: data from four U.S. national surveys (1995-2010). *Journal of studies on alcohol and drugs*. 2012; 73(3):454–8. [PubMed: 22456250]

4. Breslow RE, Klinger BI, Erickson BJ. Acute intoxication and substance abuse among patients presenting to a psychiatric emergency service. *Gen Hosp Psychiatry*. 1996; 18(3):183–91. [PubMed: 8739011]
5. Parkinson K, Newbury-Birch D, Phillipson A, et al. Prevalence of alcohol related attendance at an inner city emergency department and its impact: a dual prospective and retrospective cohort study. *Emergency Medicine Journal*. 2016; 33(3):187–93. [PubMed: 26698364]
6. Verelst S, Moonen PJ, Desruelles D, Gillet JB. Emergency department visits due to alcohol intoxication: characteristics of patients and impact on the emergency room. *Alcohol and Alcoholism*. 2012; 47(4):433–8. [PubMed: 22493048]
7. Verelst S, Moonen PJ, Desruelles D, Gillet JB. Emergency Department Visits Due to Alcohol Intoxication: Characteristics of Patients and Impact on the Emergency Room. *Alcohol Alcohol*. 2012; 47(4):433–8. [PubMed: 22493048]
8. Reynaud M, Schwan R, Loiseaux-Meunier MN, Albuissou E, Deteix P. Patients admitted to emergency services for drunkenness: moderate alcohol users or harmful drinkers? *Am J Psychiatry*. 2001; 158(1):96–9. [PubMed: 11136639]
9. Centers for Disease Control and Prevention (CDC). Vital signs: binge drinking prevalence, frequency, and intensity among adults - United States, 2010. *MMWR Morb Mortal Wkly Rep*. 2012; 61(1):14–9. [PubMed: 22237031]
10. Naimi TS, Brewer RD, Mokdad A, Denny C. Binge drinking among US adults. *JAMA : the journal of the American Medical Association*. 2003
11. Warren O, Smith-Bernardin S, Jamieson K, Zaller N, Liferidge A. Identification and Practice Patterns of Sobering Centers in the United States. *J Health Care Poor Underserved*. 2016; 27(4): 1843–57. [PubMed: 27818442]
12. Brewster-Liddle J, Parsons W, Moore S. Setting up an alcohol treatment centre. *Emerg Nurse*. 2013; 21(6):14–8.
13. Swain AH, Weaver A, Gray AJ, Bailey M, Palmer SG. Ambulance triage and treatment zones at major rugby events in Wellington, New Zealand: a sobering experience. *The New Zealand Medical Journal*. 2013; 126(1372):12–24.
14. Peckler B, Nguyen M. Drinking Up Rugby. *The New Zealand Medical Journal*. 2013; 126(1372): 6–8.
15. Turner A. Alternatives to Criminalizing Public Intoxication: Case Study of a Sobering Centre in Calgary, AB. *SSRN Journal*. 2015
16. Ogborne AC, Smart RG. Reactions to research: the case of the evaluation of Ontario's detoxification centres. *Br J Addict*. 1982; 77(3):275–82. [PubMed: 6958304]
17. Larimer ME, Malone DK, Garner MD, et al. Health care and public service use and costs before and after provision of housing for chronically homeless persons with severe alcohol problems. *JAMA : the journal of the American Medical Association*. 2009; 301(13):1349–57. [PubMed: 19336710]
18. Dunford JV, Castillo EM, Chan TC, Vilke GM, Jenson P, Lindsay SP. Impact of the San Diego Serial Inebriate Program on use of emergency medical resources. *Annals of emergency medicine*. 2006; 47(4):328–36. Internet. Available from: http://ac.els-cdn.com/S0196064405019578/1-s2.0-S0196064405019578-main.pdf?_tid=f2d943ae-f732-11e3-bc57-00000aacb35f&acdnat=1403128574_06ec9d97ebc3f5d6d1d4ad823f84537e. [PubMed: 16546617]
19. Ross DW, Schullek JR, Homan MB. EMS Triage and Transport of Intoxicated Individuals to a Detoxification Facility Instead of an Emergency Department. *Annals of emergency medicine*. 2013; 61(2):175–84. [PubMed: 23141299]
20. Flower K, Post A, Sussman J, Tangherlini N, Mendelson J, Pletcher MJ. Validation of triage criteria for deciding which apparently inebriated persons require emergency department care. *Emerg Med J*. 2011; 28(7):579–84. [PubMed: 20616108]
21. Cornwall AH, Zaller N, Warren O, Williams K, Karlsen-Ayala N, Zink B. A pilot study of emergency medical technicians' field assessment of intoxicated patients' need for ED care. *Am J Emerg Med*. 2012; 30(7):1224–8. [PubMed: 22056060]
22. Liu W. McMillan Stabilization Pilot Project. 2004:1–53. Unpublished Report.

23. Smith-Bernardin S, Schneidermann M. Safe sobering: San Francisco's approach to chronic public inebriation. *J Health Care Poor Underserved*. 2012; 23(3 Suppl):265–70. [PubMed: 22864503]
24. Martinez, MX., Parekh, R. SF Department of Public Health Coordinated Case Management System: High Users of Multiple Systems. San Francisco: 2011.
25. Quan H, Sundararajan V, Halfon P, et al. Coding algorithms for defining comorbidities in ICD-9-CM and ICD-10 administrative data. *Med Care*. 2005; 43(11):1130–9. [PubMed: 16224307]
26. Elixhauser A, Steiner C, Harris DR, Coffey RM. Comorbidity measures for use with administrative data. *Med Care*. 1998; 36(1):8–27. [PubMed: 9431328]
27. Polednak AP. Surveillance of US Death Rates from Chronic Diseases Related to Excessive Alcohol Use. *Alcohol and Alcoholism*. 2016; 51(1):54–62. [PubMed: 26041609]
28. World Health Organization. WHO Expert Committee on Problems Related to Alcohol Consumption. 2007:1–65.
29. Rehm J, Mathers C, Popova S, Thavorncharoensap M, Teerawattananon Y, Patra J. Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. *Lancet*. 2009; 373(9682):2223–33. [PubMed: 19560604]
30. Aday LA. Health status of vulnerable populations. *Annu Rev Public Health*. 1994; 15(1):487–509. [PubMed: 8054096]
31. Lebrun-Harris LA, Baggett TP, Jenkins DM, et al. Health Status and Health Care Experiences among Homeless Patients in Federally Supported Health Centers: Findings from the 2009 Patient Survey. *Health Serv Res*. 2012; 48(3):992–1017. [PubMed: 23134588]
32. Turnbull J, Muckle W, Masters C. Homelessness and health. *CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne*. 2007; 177(9):1065–6.
33. Eyrich-Garg KM, Cacciola JS, Carise D, Lynch KG, McLellan AT. Individual characteristics of the literally homeless, marginally housed, and impoverished in a US substance abuse treatment-seeking sample. *Soc Psychiat Epidemiol*. 2008; 43(10):831–42.
34. Collins SE, Malone DK, Clifasefi SL. Housing retention in single-site housing first for chronically homeless individuals with severe alcohol problems. *American journal of public health*. 2013; 103(Suppl 2):S269–74. [PubMed: 24148063]
35. Kessler RC, Crum RM, Warner LA, Nelson CB, Schulenberg J, Anthony JC. Lifetime co-occurrence of DSM-III-R alcohol abuse and dependence with other psychiatric disorders in the National Comorbidity Survey. *Arch Gen Psychiatry*. 1997; 54(4):313–21. [PubMed: 9107147]
36. Regier DA, Farmer ME, Rae DS, et al. Comorbidity of mental disorders with alcohol and other drug abuse. Results from the Epidemiologic Catchment Area (ECA) Study. *JAMA : the journal of the American Medical Association*. 1990; 264(19):2511–8. [PubMed: 2232018]
37. Hwang SW, Henderson MJ. Health Care Utilization in Homeless People: Translating Research into Policy and Practice. 2010:1–73.
38. OConnell J. Premature Mortality in Homeless Populations: A Review of the Literature. 2005:1–19.
39. Polcin DL. Co-occurring substance abuse and mental health problems among homeless persons: Suggestions for research and practice. *Journal of Social Distress and the Homeless*. 2015; 25(1):1–11. [PubMed: 27092027]
40. Pletcher MJ, Tangherlini N. McMillan Stabilization Pilot Project: Report from the SFFD Inebriate Survey. 2003:1–10.
41. Doupe MB, Palatnick W, Day S, et al. Frequent Users of Emergency Departments: Developing Standard Definitions and Defining Prominent Risk Factors. *YMEM*. 2012; 60(1):24–32.
42. O'Toole TP, Pollini R, Gray P, Jones T, Bigelow G, Ford DE. Factors identifying high-frequency and low-frequency health service utilization among substance-using adults. *Journal of substance abuse treatment*. 2007; 33(1):51–9. [PubMed: 17588489]
43. LaCalle E, Rabin E. Frequent Users of Emergency Departments: The Myths, the Data, and the Policy Implications. *YMEM*. 2010; 56(1):42–8.
44. LaCalle EJ, Rabin EJ, Genes NG. High-frequency users of emergency department care. *JEM*. 2013; 44(6):1167–73.

45. Hungerford DW, Pollock DA. Emergency department services for patients with alcohol problems: research directions. *Academic emergency medicine : official journal of the Society for Academic Emergency Medicine*. 2003; 10(1):79–84. [PubMed: 12511321]
46. Hunt KA, Weber EJ, Showstack JA, Colby DC, Callahan ML. Characteristics of Frequent Users of Emergency Departments. *Annals of emergency medicine*. 2006; 48(1):1–8. [PubMed: 16781914]
47. Chambers C, Chiu S, Katic M, et al. High utilizers of emergency health services in a population-based cohort of homeless adults. *American journal of public health*. 2013; 103(2):S302–10. [PubMed: 24148033]
48. Srebnik D, Connor T, Sylla L. A Pilot Study of the Impact of Housing First–Supported Housing for Intensive Users of Medical Hospitalization and Sobering Services. *American journal of public health*. 2013; 103(2):316–21. [PubMed: 23237150]
49. McCormack RP MD, Williams AR MD, Goldfrank LR MD, Caplan AL PhD, Ross S MD, Rotrosen J MD. Viewpoint Commitment to assessment and treatment: comprehensive care for patients gravely disabled by alcohol use disorders. *The Lancet*. 2013; 382(9896):995–7.
50. Zaller N. Drug court as an alternative to incarceration. *Med Health R I*. 2007; 90(5):154–6. [PubMed: 17557659]
51. Lewin Group. Summary Report of Evaluation Findings: A Dollars and Sense Strategy to Reducing Frequent Use of Hospital Services; 2008. p. 1-16. Available from: www.frequenthealthusers.org
52. Clifasefi SL, Collins SE, Tanzer K, Burlingham B, Hoang SE, Larimer ME. Agreement between self-report and archival public service utilization data among chronically homeless individuals with severe alcohol problems. *Journal of Community Psychology*. 2011; 39(6):631–44.
53. Stein JA, Andersen R, Gelberg L. Applying the Gelberg-Andersen Behavioral Model for Vulnerable Populations to Health Services Utilization in Homeless Women. *Journal of Health Psychology*. 2007; 12(5):791–804. [PubMed: 17855463]
54. Gelberg L, Andersen RM, Leake BD. The Behavioral Model for Vulnerable Populations: application to medical care use and outcomes for homeless people. *Health Serv Res*. 2000; 34(6):1273–302. [PubMed: 10654830]
55. Hallelman D. Super-Utilizer Summit. 2013:1–32.
56. Collins SE, Clifasefi SL, Dana EA, et al. Where harm reduction meets housing first: exploring alcohol's role in a project-based housing first setting. *The International journal on drug policy*. 2012; 23(2):111–119. Internet. Available from: <http://eutils.ncbi.nlm.nih.gov/entrez/eutils/elink.fcgi?dbfrom=pubmed&id=21852096&retmode=ref&cmd=prlinks>. [PubMed: 21852096]

Table 1
Descriptive Statistics for the Study Population (n=1,271): San Francisco Sobering Center,
July 2014 to June 2015

Variable	Full Population n=1,271	Single User (1 visit) n=869	Repeat Users (2-5 visits) n=287	High Users (6+ visits) n=115
	Mean ± SE, or n (%)	Mean ± SE, or n (%)	Mean ± SE, or n (%)	Mean ± SE, or n (%)
Age	44.4 ± 0.38	41.9 ± 0.47	49.5 ± 0.68	50.6 ± 0.93
Age range				
18-24	93 (7.4%)	90 (10.4%)	2 (0.7%)	1 (0.8%)
25-34	242 (19.2)	202 (23.4)	35 (12.2)	5 (4.4)
35-44	257 (20.3)	177 (20.5)	53 (18.5)	27 (23.5)
45-54	353 (27.9)	212 (24.6)	100 (34.8)	41 (35.7)
55-64	245 (19.4)	141 (16.3)	72 (25.1)	32 (27.8)
65-88	74 (5.9)	40 (4.6)	25 (8.7)	9 (7.8)
Ethnicity				
White	554 (43.6)	352 (40.5)	140 (48.8)	62 (53.9)
Latino/a	291 (22.9)	221 (25.4)	51 (17.8)	19 (16.5)
Black	244 (19.2)	162 (18.6)	57 (19.9)	25 (21.7)
Native American	34 (2.7)	12 (1.4)	20 (7.0)	2 (1.7)
Other	148 (11.6)	122 (14.0)	19 (6.6)	7 (6.1)
Gender				
Male	1,018 (82.2)	683 (81.4)	243 (85.3)	92 (80)
Female	221 (17.8)	156 (18.59)	42 (14.7)	23 (20)
Language				
English	938 (73.8)	615 (70.8)	228 (79.4)	95 (82.6)
Spanish	128 (10.1)	98 (11.3)	25 (8.7)	5 (4.4)
Unknown	174 (13.7)	129 (14.8)	31 (10.8)	14 (12.2)
Other	31 (2.4)	27 (3.1)	3 (1.1)	1 (0.9)
Patient Encounters				
Total visits, <i>per group</i>	3,452	869	814	1769
Average number of visits, <i>per client</i>	2.7 ± 5.8	1 ± 0	2.8 ± 1.0	15.4 ± 13.6
Current housing/homeless status				
Homeless (Outdoors)	509 (39.9)	312 (35.9)	138 (48.1)	57 (49.6)
Homeless (Other)	192 (15.2)	102 (11.7)	56 (19.5)	35 (30.4)
Homeless (Transitional)	116 (9.1)	69 (7.9)	39 (13.6)	8 (7.0)
Permanently Housed	392 (30.8)	343 (39.5)	37 (12.9)	12 (10.4)
Other	41 (3.2)	29 (3.3)	10 (3.48)	2 (1.7)
Unknown	22 (1.7)	14 (1.6)	7 (2.4)	1 (0.9)
Homeless at any time in last year				
Yes	913 (71.8)	529 (60.9)	280 (97.6)	115 (100)
Any history of homelessness				
Yes	990 (77.9)	595 (68.5)	269 (93.7)	115 (100)

Variable	Full Population n=1,271	Single User (1 visit) n=869	Repeat Users (2-5 visits) n=287	High Users (6+ visits) n=115
	Mean ± SE, or n (%)	Mean ± SE, or n (%)	Mean ± SE, or n (%)	Mean ± SE, or n (%)
Homeless Timespan (in years, if any history of homelessness)	6.6 ± 0.20	5.3 ± 0.24	8.0 ± 0.36	9.9 ± 0.54
Case management, currently enrolled				
Yes	221 (16.6)	110 (12.7)	69 (24.0)	32 (27.8)
Primary care provider assigned				
Yes	389 (30.6)	204 (23.5)	123 (42.9)	62 (53.9)
Primary care clinic assigned				
Yes	462 (36.4)	248 (28.5)	142 (49.5)	72 (62.6)
Serious medical problem, diagnoses				
Liver Disease	255 (20.1)	127 (14.6)	84 (29.3)	44 (38.3)
Peptic Ulcer Disease/ Bleed	20 (1.6)	8 (0.9)	9 (3.1)	3 (2.6)
Diabetes	102 (8.0)	52 (6.0)	31 (10.8)	19 (16.5)
Hypertension	294 (23.1)	138 (15.9)	109 (38.0)	47 (40.8)
HIV/ AIDS	57 (4.5)	27 (3.1)	23 (8.0)	7 (6.1)
Cardiac Arrhythmias	204 (16.1)	113 (13.0)	52 (18.1)	39 (33.9)
Neurological Disorders	241 (19.0)	138 (15.9)	57 (19.9)	46 (40)
Chronic obstructive pulmonary disease	249 (19.6)	164 (18.9)	55 (19.2)	30 (26.1)
Psychoses	332 (26.1)	167 (19.2)	114 (39.7)	51 (44.4)
Depression	500 (39.3)	258 (29.7)	166 (57.8)	76 (66.1)
Diagnosis of alcohol abuse, lifetime	1,201 (94.5)	805 (92.6)	282 (98.3)	114 (99.1)
Diagnosis of drug abuse, lifetime	493 (38.8)	262 (30.2)	150 (52.3)	81 (70.4)

Table 2
Comparative Demographics, Housing Status, and Health Status and Service Connections between Single-Use, Repeat Users, and High Users of Sobering Center, July 2014 to June 2015

	Single Use (1 visit) (n=869)	Repeat Use (2-5 visits) (n=287)	High Use (6+ visits) (n=115)	
One-Way ANOVA with Bonferroni Procedure				
	Mean	SD	Mean	SD
Age in Years	41.9	13.9	49.5	11.5
Years homeless (mean, SD)	5.35	5.92	7.99	6.03
Total Elixhauser Score (<i>Total diagnoses, #/31</i>)	3.1	3.2	4.7	3.6
	F	P	F	P
	50.6	<0.001	38.7	<0.001
	37.2	<0.001	37.2	<0.001
	SD	Post-hoc	SD	Post-hoc
	10	1<2&3	5.8	1<2<3
	3.5	1<2&3	3.5	1<2&3
Chi-Square Analysis with Bonferroni Procedure				
	Freq	%	Freq	%
Male	683	81.4	243	85.3
Any history of homelessness	595	68.5	280	97.6
Homeless in last 12 months	529	60.9	269	93.7
	χ^2	P	χ^2	P
	2.56	0.278	141.9	<0.001
	164.7	<0.001	164.7	<0.001
	Freq	%	Freq	%
Medical Conditions (Elixhauser, lifetime dx)				
Liver disease	127	14.6	84	29.3
HIV/ AIDS	27	3.1	23	8.0
Diabetes	52	6.0	31	10.8
Hypertension	138	15.9	109	38.0
Neurological condition	138	15.9	57	19.9
Depression	258	29.7	166	57.8
Psychoses	167	19.2	114	39.7
Drug Abuse	262	30.2	150	52.3
	38.3	<0.001	6.1	0.002
	12.9	0.002	16.5	<0.001
	19.2	<0.001	40.9	<0.001
	81.6	<0.001	40	<0.001
	38.6	<0.001	66.1	<0.001
	101.6	<0.001	44.4	<0.001
	68.8	<0.001	70.4	<0.001
	97.8	<0.001	70.4	<0.001
	Freq	%	Freq	%
Health Services, assigned				
Primary Care Provider	204	23.5	123	42.9
Primary Care Clinic	248	28.5	142	49.5
	70.5	<0.001	78.6	<0.001
	78.6	<0.001	78.6	<0.001

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

	Single Use (1 visit) (n=869)	Repeat Use (2-5 visits) (n=287)	High Use (6+ visits) (n=115)						
One-Way ANOVA with Bonferroni Procedure									
Case Management	Mean 110	SD 12.7	Mean 69	SD 24.0	Mean 32	SD 27.8	F 31.7	P <0.001	Post-hoc 1<2&3

Table 3a
Comparative Average Utilization per Client for Public Health Services throughout San Francisco between Single-Visit User, Repeat Users and High Users of Sobering Center, July 2014 to June 2015

	Single Use (1 visit) (n=869)		Repeat Use (2-5 visits) (n=287)		High Use (6+ visits) (n=115)		Analysis					
	N, % of group ⁱ	Mean Visits/Days	SD	N, % of group	Mean Visits/Days	SD	N, % of group	Mean Visits/Days	SD	F	P	Post-hoc
Utilization per Client												
Sobering Center visits	869 (100%)	1	0	287 (100%)	2.8	1	115 (100%)	15.4	13.6	623.1	<0.001	1<2<3
ED visits (public hospital)	319 (36.7%)	4.3	5.9	216 (75.3%)	5.8	6.8	102 (88.7%)	10	8.8	27.4	<0.001	1=2<3
Medical Detoxification, days	44 (5.1%)	19.6	15.0	72 (25.1%)	20.8	18.2	42 (36.5%)	22.3	18.0	0.25	0.777	1=2=3
Inpatient, days	130 (15%)	10.7	14.7	93 (32.4%)	13.5	21.7	57 (49.6%)	12.6	10.7	0.83	0.439	1=2=3
Urgent Care visits	124 (14.3%)	2.5	2.2	99 (34.5%)	2.6	2.4	43 (37.3%)	2.3	2.1	0.28	0.758	1=2=3
Ambulance Transports ⁱⁱ	36 (4.1%)	6.9	8.2	50 (17.4%)	6.6	5.8	58 (50.4%)	13.1	15.9	5.43	0.005	1=2<3
Total Urgent/Emergent Utilization (Visits) ⁱⁱⁱ	869 (100%)	9.9	21.9	287 (100%)	28.4	32.0	115 (100%)	63.1	45.5	215.5	<0.001	1<2<3

ⁱNot all clients in each group utilized all services. This column indicates the number and percentage of clients in each group who utilized that service during the study period.

ⁱⁱUsers with 4 or more ambulance transports in any one calendar month period included.

ⁱⁱⁱTotal urgent/emergent utilization includes services above, plus jail health days, psychiatric emergency and crisis services, and social detoxification.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 3b
Comparative Average Costs of Utilization per Client for Public Health Services throughout San Francisco between Single-Visit User, Repeat Users and High Users of Sobering Center, July 2014 to June 2015

	Single Use (1 visit) (n=869)		Repeat Use (2-5 visits) (n=287)		High Use (6+ visits) (n=115)		Analysis					
	N, % of group ⁱ	Mean Cost (\$)	SD	N % of group	Mean Cost (\$)	SD	N % of group	Mean Cost (\$)	SD	F	P	Post-hoc
Costs per Client												
Sobering Center costs	869 (100%)	264.18	0	287 (100%)	749.28	263.86	115 (100%)	4063.78	3593.68	623.1	<0.001	1<2<3
ED costs (public hospital)	319 (36.7%)	2820.61	3841.74	216 (75.3%)	3742.15	4412.81	102 (88.7%)	6506.28	5700.51	27.4	<0.001	1=2<3
Medical Detoxification costs	44 (5.1%)	8000.86	6099.93	72 (25.1%)	8467.45	7424.85	42 (36.5%)	9079.53	7342.43	0.25	0.777	1=2=3
Inpatient costs	130 (15%)	15410.00	21148.98	93 (32.4%)	19492.31	31369.23	57 (49.6%)	18256.48	15428.30	0.83	0.439	1=2=3
Urgent Care costs	124 (14.3%)	475.12	423.27	99 (34.5%)	508.97	472.76	43 (37.3%)	455.20	405.38	0.28	0.758	1=2=3
Ambulance costs ⁱⁱ	36 (4.1%)	11537.75	13780.78	50 (17.4%)	10986.9	9631.05	58 (50.4%)	21917.36	26624.81	5.43	0.005	1&2<3
Total Urgent/ Emergent costs ⁱⁱⁱ	869 (100%)	7127.70	31516.57	287 (100%)	19078.96	28412.68	115 (100%)	43219.45	38553.89	73.1	<0.001	1<2<3

ⁱNot all clients in each group utilized all services. This column indicates the number and percentage of clients in each group who utilized that service during the study period.

ⁱⁱUsers with 4 or more ambulance transports in any one calendar month period included.

ⁱⁱⁱTotal urgent/emergent utilization includes services above, plus jail health days, psychiatric emergency and crisis services, and social detoxification.

Table 4

Factors associated with repeat utilization (2+ visits) of Sobering Center as compared to single-visit utilization (1 visit): San Francisco, July 2014 to June 2015

Variable	Odds Ratio	Std. Err.	z	P> z	95% Conf Interval
Log likelihood = -627.56					
Number of obs = 1,264					
LR chi2(17) = 325.84					
Prob >chi2 = 0.0000					
Pseudo R2 = 0.2061					
Age ⁱⁱ					
25-34	2.53	1.62	1.46	0.15	0.73 8.84
35-44	3.88	2.44	2.16	0.03	1.13 13.31
45-54	4.77	2.97	2.50	0.01	1.40 16.19
55-64	5.05	3.19	2.56	0.01	1.46 17.43
65-83	9.02	6.05	3.28	0.00	2.43 33.56
Ethnicity ⁱⁱⁱ					
Latino/a	0.65	0.12	-2.32	0.02	0.45 0.93
Black	0.55	0.10	-3.21	0.00	0.38 0.79
Native American	2.47	1.01	2.21	0.03	1.11 5.51
Other	0.49	0.13	-2.71	0.01	0.29 0.82
Homeless in last 12 months	8.53	2.27	8.06	0.00	5.06 14.37
Diabetes, <i>diagnosis</i>	1.06	0.26	0.22	0.83	0.65 1.72
Hypertension, <i>diagnosis</i>	1.65	0.30	2.77	0.01	1.16 2.34
AIDS/ HIV, <i>diagnosis</i>	1.16	0.36	0.48	0.63	0.63 2.15
Liver disease, <i>diagnosis</i>	0.95	0.17	-0.27	0.79	0.67 1.36
Drug abuse, <i>diagnosis</i>	1.22	0.22	1.14	0.26	0.86 1.73
Depression, <i>diagnosis</i>	1.66	0.28	3.00	0.00	1.19 2.30
Psychoses, <i>diagnosis</i>	1.27	0.21	1.44	0.15	0.92 1.77
_cons	0.01	0.01	-6.62	0.00	0.00 0.05

Reference groups:

i single visitors (1 visit),

ii 18-24 years old,
iii White.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript