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Substance Use, Depression and Mental Health Functioning in Patients Seeking Acute Medical Care in an Inner-City ED

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Abstract

The study investigated the behavioral health of a consecutive sample of 5,641 adult emergency department (ED) patients aged 19 through 60 presenting for medical care in a large, inner-city hospital emergency department. Twenty-three percent met criteria for major depression; average

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mental health functioning, as measured by the mental health component of the SF-12, was half of a standard deviation lower than in the general population; 15% met criteria for alcohol or drug abuse/dependence in the past year. Comorbidity was high. These behavioral health disorders may complicate treatment and diagnosis of the chief presenting complaint. These findings, coupled with the high rates of these disorders, suggest the importance of screening and either beginning appropriate treatment or offering appropriate referral for such disorders in ED settings.

Introduction

Co-occurring medical and psychiatric disorders are relatively common in the general population and clinical samples, resulting in poor outcomes and high healthcare costs.¹⁻⁸ Patients with poor mental health, including substance abuse, are relatively frequent users of the general medical Emergency Department (ED)⁹⁻¹⁷ and the specialized psychiatric ED.^{18, 19} Nationally, it has been estimated that 5.4% of ED visits in 2000 received a psychiatric discharge diagnosis.²⁰ In smaller samples, Richmond et al.²¹ found 44.7% of ER patients (N=275) met DSM-IV criteria for a past or present psychiatric disorder with the greatest proportion (7% of the sample) meeting criteria for a lifetime depression. Claassen found that 13% of ED patients not presenting with a psychiatric complaint or suicide attempt nevertheless had suicidal ideation.²² Among those reporting a past-year emergency department visit, the 2005 National Alcohol Survey found 24% positive for past-year risky drinking, 8% for problem drinking, 3% for alcohol dependence, and 7% for illicit drug use.²³ A review of 11 ED studies shows overall prevalence rates of illicit drug use of 35–40% in studies using blood and urine toxicology and 1–5% in self-report studies.²⁴ Hoyer and co-workers found 21.6% of ED patients in a prospective observational study screened positive for symptoms of depression.²⁵ Another study found that approximately 30% of older patients who present to the ED may be depressed.²⁶

These rates suggest EDs are likely to encounter a high prevalence of substance abuse and mental illness, even when patients may present with non-psychiatric medical complaints.^{17, 27, 28} Furthermore, substance abuse and mental illness often go unrecognized, untreated, and consequently not referred by ED health care providers.^{17, 27, 29, 30} Untreated psychiatric or substance abuse disorders may complicate diagnosis and treatment of the chief medical complaint, inhibit recovery, and impair quality of life.^{31,32}

While mental health problems are commonly comorbid with substance abuse in the general population,³³⁻³⁵ little is currently known about the epidemiology of mental health/substance abuse comorbidity in ED patients presenting with non-psychiatric complaints. In particular, it would be useful to know more about the prevalence of comorbid mental illness in ED patients seeking ED care for medical (i.e., non-mental health) complaints, and the demographic and substance use correlates of those disorders. A more detailed knowledge of these issues would be helpful in guiding administrators and clinicians on decisions regarding what disorders to screen for in ED patients, and if screened, how to best manage these disorders. For example, while it is common-place, at least in terms of official policy if not actual practice, to screen for alcohol disorders in ED's, screening for depression is less common.³⁶ However, if depression is common in those ED patients with alcohol disorders, EDs might need to adopt treatment practices, or utilize referral sources, that are designed for patients diagnosed with comorbid depression and alcohol use disorders.

Previous research has focused on specific mental illnesses, such as anxiety and depression,^{21,31} or those areas with an overt link between mental illness or substance abuse and ED presenting medical complaints such as injuries or chest pain.^{13,31,21} Whereas there has been substantial research on the prevalence of mental health problems, particularly depression, in primary care¹⁻⁴ and general medical inpatient care,^{37, 38} there have been

fewer comprehensive screening studies examining the spectrum of substance abuse and mental health problems in ED patients presenting with non-psychiatric complaints. Hustey and Smith²⁹ found that 16.5% of elderly ED patients (N=267) screened positive on the Short-Form Geriatric Depression Scale, and that ED physicians failed to recognize depression in two-thirds of those screening positive for depression in the study. Two larger European studies and one UCLA study of patients presenting to emergency departments found prevalence rates of mental illness ranging from 13.6% for mood disorders in an Italian ED to 46% for at least one psychiatric diagnosis in the UCLA ED.^{15, 39, 40}

When considering measurement of mental health problems, two approaches could be taken, a disorder-specific approach using a common mental health disorder/cluster of symptoms such as depression, or a generic measure of mental health such as mental health functioning. Depression has the advantage of being widely studied, at least in primary care, has clearly defined treatment guidelines, and is relatively prevalent in individuals using health services, but will not necessarily identify many individuals with other mental health problems such as anxiety and psychosis. On the other hand, a more generic measure of mental health has the advantage of potentially covering the wide range of psychiatric problems that can impair functioning, but has the disadvantage of lacking specific treatment protocols.

This paper reports on a one-year systematic evaluation of a consecutive sample of 5,641 adult ED patients aged 19 through 60 presenting for medical complaints in a large, inner-city hospital emergency department (ED) in Flint, Michigan. Screenings were conducted as part of two larger randomized controlled trials of linkage interventions for alcohol and other drug dependent individuals. A brief health survey examined (1) rates of poor mental health functioning and major depression in this population; (2) demographic correlates of these outcomes; and (3) associations of these outcomes with measures of substance use and DSM-IV diagnoses of abuse and dependence to test the hypothesis that ED patients with poor mental health are at risk for greater rates of substance use and substance use disorders, an association that has not been investigated previously in the ED. The purpose of these analyses was to understand the extent of mental health impairment using two different measures, one disorder-specific and one “generic,” in this large (n=5,641) sample from an inner-city ED serving primarily socio-economically disadvantaged patients (almost half reported incomes less than \$10,000 and two-thirds reported no education beyond high school); whether correlates of these two measures differed, and the extent of the associations between mental health problems and substance use and abuse/dependence.

METHODS

Study Design

This study was conducted at the Hurley Medical Center ED in Flint, Michigan, an urban, Level-1 trauma center with an annual ED census of approximately 75,000 patients serving predominantly inner-city, economically-disadvantaged patients. Once a thriving industrial city, home to General Motors and the United Auto Workers, plant closings in Flint have resulted in widespread unemployment. In 2006, the median family income in Flint was \$31,493, just 54% of the national median family income of \$58,526; 31.1% of families lived below the poverty level (3.2 times the national rate of 9.8%); and the housing vacancy rate (19.2%) was 1.7 times the national rate (11.6%). The population of Flint is 50% African-American, but its public schools are 80% African-American. In the 2001-02 school year, 66% of students in the Flint City School District qualified for free or reduced price lunch.⁴¹ Flint's poverty level is similar to that of many other mid-sized U.S. cities. For example, in 2006 Hartford, CT, had a median family income of \$31,287, with 25.1% of families living in poverty, and a housing vacancy rate of 15.6%. Similarly, Camden, NJ, had a median family income of \$29,125, with 32.3% of families living in poverty, and a housing vacancy

rate of 21.1%.⁴² The rate of past-month illicit substance use in Genesee County (where Flint is located) was 10.8% (4.8% excluding marijuana); which was similar to other inner-city communities (11.2% (4.1%): Philadelphia; 12.1% (5.4%): Boston).⁴³ Although Flint is extreme in its poverty and related problems, it is also typical of other inner-city areas in the country; thus, the findings from the proposed study should be generalizable to other large inner-city Emergency Departments.

All adult patients (18-60 years of age) who presented to the ED from 9am – 11pm, seven days a week and did not meet study ineligibility criteria (see below) were approached to complete a web-tablet-based health screen. These times were chosen because a previous study found a low recruitment rate in the midnight shift.⁴⁴ Written consent was obtained from eligible patients and the health screen took approximately 10 minutes to complete. The study was approved by the University of Michigan and the Hurley Medical Center Institutional Review Boards and Certificates of Confidentiality were obtained from the NIAAA and NIDA.

Participants

Patients were excluded from the study if they were pregnant, triaged to the trauma bay (indicating life-threatening trauma), unable to provide informed consent (e.g. unconscious, in police custody, non-English speaking), were acutely suicidal, or presented for psychiatric evaluations. Patients who refused to participate in the study were asked their gender, race, and reasons for refusing to participate. Data for this report were obtained for a full year of recruitment, from April, 2006 through March, 2007, and include only the first ED visit for each unique patient, with no duplicate visits included.

Measures

Health-Related Quality of Life (SF-12)—The SF-12 assessed physical functioning; social functioning; physical and emotional role functioning; mental health; general health perceptions; vitality; and pain.^{45, 46} These indicators of health status have been widely studied and are generally accepted outcomes for screening and intervention studies.^{47, 48} For the purpose of this analysis, the SF-12 was scored into the mental health component (MHC), and those participants in the lowest quartile of the study participants were coded as “one” (the “low mental health functioning” group) and those in the higher quartiles coded as “zero”. Internal consistency (Chronbach’s alpha) for the mental health component in these data was 0.76.

Major Depression—The PHQ-9, a nine-item depression module from the Patient Health Questionnaire (PHQ) was used to assess DSM-IV criteria for major depression.⁴⁹ Considered a reliable and valid measure of depressive symptomatology,^{50, 51} the PHQ-9 yields a depression severity score ranging from 0 to 27. Responses are elicited for the past two weeks. Five levels of depression severity can be identified: 0-4 (“none”), 5-9 (“mild”), 10-14 (“moderate”), 15-19 (“moderately severe”), and 20-27 (“severe”). A score of less than 10 is rarely exhibited by an individual with major depression, whereas a score of 15 or higher typically indicates major depression.²⁵ For the purposes of this report, individuals were classified as having evidence of depression if their total score on the PHQ-9 was at least 10 (i.e., “moderate” depression) or if five or more PHQ items were scored as occurring in “more than half the days” during the past two weeks, recognizing that this is not a clinical diagnosis of major depressive disorder. The latter scoring is often used,⁵⁰ but the former has also been endorsed as a straightforward and acceptable system.⁵² (Chronbach’s alpha for this measure for these data was 0.86.)

Alcohol and Drug Use—Measures of substance use and DSM-IV substance use disorders were taken from the Substance Abuse Outcomes Module (SAOM).⁵³ The SAOM has been carefully designed over the past decade based on advice of an expert panel and extensive validation, and measures DSM-IV⁴⁹ substance use disorders, key prognostic factors, and outcome domains for evaluation of substance abuse treatment. The SAOM has undergone extensive reliability and validity examinations in substance abuse treatment samples.⁵³ In the most recent evaluation, the SAOM for the measures included in this report had test-retest reliabilities (intraclass correlation coefficient for continuous variables, kappas for dichotomous variables) of 0.85-0.91, and had concurrent validity measures of 0.6-0.8. Internal consistency in the SAOM diagnostic interview was 0.93 (Chronbach's alpha) and agreement between the SAOM diagnosis of substance use disorder and the CIDI-SAM was 93%.^{53, 54} The SAOM measures past number of drinking days, average alcohol consumption and frequency of binge drinking in the past 30 days, and drug use frequency, along with questions to ascertain DSM-IV diagnoses for alcohol and drug abuse/dependence. For this study, the SAOM was modified to obtain the DSM-IV abuse and dependence criteria separately for alcohol, cocaine, marijuana, methamphetamine, and opiates. Chronbach's alpha for the DSM-IV diagnostic data collected in this study were 0.89, 0.86, and 0.90 for alcohol, marijuana, and cocaine abuse/dependence respectively.

Injury—Whether or not presenting complaint was injury as recorded by the research assistant at the time of consent. Alcohol has been widely identified as a correlate of injury presentations in the ED.⁵⁵⁻⁵⁷

Data Analyses

Descriptive statistics were computed for basic socio-demographic variables, alcohol and illegal drug use, and physical and mental health functioning. Data were scored to assess DSM-IV diagnoses of substance abuse or dependence and (separately) alcohol, cocaine, and marijuana abuse or dependence (DSM diagnoses of stimulant and opiate abuse and dependence were not scored due to low self-reports of any use). The mental health component (MHC) of the SF-12 was scored and individuals in the lowest quartile of the sample (the low mental health functioning group) were identified. Bivariate analyses were computed to contrast the low mental health functioning group and those with depression on the PHQ-9 to those not in these groups on demographics and substance use variables. Specifically, contingency tables with Chi-square tests of independence were used for categorical variables and two-sample t-tests or a general linear models F-test for three groups were used for continuous variables. Because of the large sample size (N=5,641) and multiple testing, the level of significance was reduced to $p < 0.01$ to minimize the chance of a Type I Error. Separate logistic regression models were fit for low mental health functioning and depression using simultaneous forced entry, entering demographic variables (gender, age, race, marital status, education, employment, insurance), and substance use variables (alcohol use or binge drinking, cocaine use, and marijuana use) or, alternatively, DSM-IV diagnoses of alcohol and drug abuse and dependence (three categories each). Binge drinking was defined as 4+ drinks for women and men 65+, and 5+ drinks for men under the age of 65. Due to the right skewed distributions of the past 30 days' use of drugs, with large frequencies at zero, cocaine and marijuana use was coded by a dichotomous measure of any use in the past 30 days. Interactions between gender and, separately, race and the substance use and substance diagnosis variables were also evaluated.

RESULTS

During this twelve-month period of recruitment there were 8,782 potentially eligible patients, but 1,481 (16.9%) were missed and were not screened. Of the missed patients, 90%

were missed because either the recruiter was busy with another patient or the physician was working with the patient. The other 10% were missed because the recruiter couldn't locate the patient, the patient was given pain medications and had difficulty concentrating, or the patient was discharged prior to being approached. Of the 7,301 patients approached; 1,660 (22.7%) refused and 5,641 (77.3%) consented to participate in screening. Of the refusals; about 10% were concerned about confidentiality, 46% were too ill, tired or weak, or in too much pain to participate, and 17% did not want to be involved in a research study. The other 27% refused to participate due to various reasons, including the screening survey was too long (6%); family refused access to patient (6%); too stressed to participate (5%); hostile toward the medical center (4%); and felt offended by the alcohol/drug questions (2%). Males were slightly more likely to refuse than females (22.9% vs 20.6%, $p < 0.05$), but no differences in refusal rates were found between African-Americans and non African-Americans (21.9% vs 21.2%). Further information on refusals was not collected due to IRB concerns with the privacy of refusals.

On average, the study participants were relatively young (mean age=36.5 years, $SD=11.5$, range=19-60), female (57.7%), African-American (55.8%), had a high school degree or less (65.4%), were unemployed (53.2%), were unmarried or not living with someone (71.9%), and had some health insurance including Medicaid and Medicare (78.1%) (see Table 1). Thirty-four percent of the sample reported Medicaid coverage, 25.7% reported having private insurance, 14.6% reported receiving public assistance health care, and 3.9% reported receiving Medicare (data not reported in the table). Almost half (47.3%) reported incomes below \$10,000, although 27% of the sample did not respond to this item. Furthermore, the African-Americans in the sample were significantly more likely to be of low income (under \$20,000), compared to non-African-Americans (72.2% vs 60.2%, $p < 0.0001$), and significantly more likely to be unemployed (57.5% vs. 47.8%, $p < 0.0001$). Because of the high level of missing data on income, this variable was not included in multivariate analysis but employment status, education, and report of health insurance coverage were included as measures of socioeconomic status.

On average, study participants' self-rated mental health functioning score on the mental health component of the SF-12 was 46.2 ($SD=12.9$), considerably lower (indicating worse functioning) compared to mean scores of 50.0 for a community sample.⁴⁶ The mental health component of the SF-12 is designed to have a standard deviation of 10 in the general population, therefore the sample average was a half standard deviation below the population at large.⁵⁸ Moreover, the cutoff for the 25th percentile on the SF-12 MHC component in the sample was 36.6, which is substantially lower than the 25th percentile in the community norm of 45.1 on this scale.⁴⁶

Almost a quarter (23.4%) were classified by the PHQ-9 as moderately to severely depressed. Fifteen percent of the sample met DSM-IV criteria for either abuse of (6.7%) or dependence on (8.3%) alcohol or illicit drugs, including 5.9% alcohol abuse, 5.9% alcohol dependence, 3.8% drug abuse, and 5.1% drug dependence, almost entirely cocaine and/or marijuana abuse or dependence (note that individuals could meet DSM-IV criteria for more than one substance use disorder). Other stimulant or opiate use disorders were rare ($n=42$ for both disorders combined, data not reported in the table).

In bivariate analyses, women and those with few financial resources (being unemployed and reporting lower incomes) were more likely to have depression or low mental health functioning (generally, $p < 0.0001$, see Table 1). Interestingly, not having health insurance was associated with *better* mental health. Depression and low mental health functioning were also associated with past month use of cocaine and marijuana, as was meeting criteria for DSM-IV alcohol, cocaine, and marijuana use disorders. Alcohol use was associated with

depression but not low mental health functioning; being unmarried and not living with a partner was associated with low mental health functioning but not depression. Injured patients were significantly less likely to have mental health problems compared to non-injured patients.

Two separate multiple logistic regression models were run for each outcome, each including demographic data of age, gender, race (African-American vs. other), not married or living with a partner, high school graduate or less education, being unemployed, and not having health insurance (all yes/no variables). One model included information on substance use in the past month, coded in three levels for recent alcohol use (no use, use but no binge drinking, any binge drinking), and coded as yes/no for cocaine and marijuana due to their relative infrequency. The second set of models included three-level variables measuring DSM-IV diagnoses of alcohol, cocaine, and marijuana abuse and dependence (no diagnosis, abuse, dependence). All four models are presented even though there is substantial overlap (see Tables 2-4).

Among the substance use predictors, use of cocaine and marijuana was independently associated with both outcomes ($p < 0.001$), with OR's higher for cocaine (2.48 and 2.93, Tables 2 and 3) than for marijuana (1.66 and 1.57, Tables 2 and 3). On the other hand, alcohol use was not associated with low mental health functioning (Table 2). Table 3 shows an interaction between alcohol use and gender for depression, in that the association between alcohol use and depression depended on the participant's gender and the association of gender with alcohol use depended on the level of alcohol use. Therefore the OR's for alcohol use are presented separately by gender and (similarly) separate OR's are presented for females for each alcohol category (males are scored 0 for and therefore are the reference group). *Compared to men* (Table 3), women who were binge drinkers had the highest OR for depression (OR=2.35, $p < 0.001$), followed by women with alcohol use and no binge drinking in (OR=2.12, $p < 0.001$), and women with no alcohol use (OR=1.50, $p < 0.001$). On the other hand, alcohol use but no binge drinking and binge drinking *in men* was associated with significantly *lower* odds of depression compared to non-drinkers, (OR=0.67, $p < 0.01$, OR=0.74, $p < 0.05$, respectively) (Table 3). Level of alcohol use was not significantly associated at any level with depression in women.

In models including substance use diagnoses (Table 4), alcohol abuse and dependence (OR=1.77, 2.35) and cocaine abuse and dependence (OR=1.81, 1.78) were significantly associated with the odds of low mental health functioning. Similar results were found in the multivariate analysis of depression for alcohol abuse (OR=1.69) and alcohol dependence (OR=2.78) and marijuana dependence (OR=1.75) but not for cocaine abuse or dependence.

Injured patients had lower odds of both measures of poor mental health, with OR's around 0.8 in all models. Certain demographic variables were strongly and independently associated with both depression and the broader measure of mental health functioning in all four models. Specifically, being unemployed was consistently associated with poorer mental health, with OR's all > 2.0 . Women were more likely to report evidence of depression and low mental health functioning (OR's from 1.7 to 1.9), whereas being African-American was associated with lower odds of both outcomes (OR's from 0.72-0.83). Lacking health insurance was also significant in the models for depression, with OR's approximately 0.75 indicating *lower* odds of depression. In other words, insured patients had higher odds of reporting poor mental health.

Terms representing polydrug use (e.g., alcohol and cocaine, alcohol and marijuana) were also explored with no substantially different results. Polydrug use did not add significantly to the models described above.

DISCUSSION

This data confirms earlier findings that Emergency Department patients, at least those in this inner-city sample, suffer higher rates of depression²⁶ and substance abuse^{23, 27, 59} than the general population or the population of primary care patients. Twenty-four percent of study participants met criteria for major depression, compared with rates ranging from 3-16% of the general adult population⁶⁰ and 5-13% of adult primary care patients.⁶¹ Average mental health functioning, as measured by the mental health component of the SF-12, was a half standard deviation lower than in the general population; 15% met criteria for alcohol or drug abuse/dependence, compared with 3.5% of the general population.³³ There were high rates of comorbidity among these disorders.

The findings for Emergency Department patients with either low mental health functioning or depression point to the importance of conducting screening and interventions for *both* mental health problems and substance use in urban Emergency Department settings. This study reports on one year of comprehensive screening for alcohol and drug use and abuse in a large inner-city Emergency Department serving a relatively poor and disadvantaged population. Strong associations between both depression and low mental health functioning and socioeconomic indicators, including employment status and low education, were found. The connection between poor mental health and poverty has been demonstrated multiple times. In a review of the literature, Fryers and colleagues found that common mental disorders were significantly more frequent in socially disadvantaged populations.⁶² A prospective study in Belgium found that a lowering in material standard of living between waves was associated with depressive symptoms and cases of major depression.⁶³ It is likely that the nature of the relationship is complex; poor mental health is often an impediment to full economic participation in society, poverty may exacerbate mild psychological distress to a serious condition, individuals who have better mental health are more able to hold down jobs, and individuals with poor mental health may gradually drift into poverty (“downward drift”) if they cannot work or become unable to work. Thus, while it is not surprising that being employed is associated with better mental health in this sample, it is interesting that the effects of social indicators are so strong in a study population that is mostly socially disadvantaged overall.

On the other hand, in the logistic regression analysis African-Americans had lower odds of poor mental health compared to Caucasians in this sample, although there were no differences on a bivariate basis. This analysis indicates that *all other variables being equal*, including socioeconomic indicators and substance use/abuse, African-Americans report better mental health compared to their Caucasian counterparts. This finding is not because Caucasians were more likely to be of low income or unemployed, because rates of these indicators were significantly higher in the African-Americans in this sample as shown in the Results. The “protective” effect of being African-American may be a function of better social support networks, stronger community ties, etc., but such data were not included in this assessment.

The rate of depression (24%) in this sample was high compared to studies of depression in primary care. Major depressive disorder is, in fact, one of the more common psychiatric disorders in primary care settings, with prevalence estimates ranging between 9.2% and 13.5% using the same or similar instruments.⁴⁰⁻⁴³ The low mental health functioning variable represented 25% of the sample by design; however, the lower-than-average score on the mental health component compared to community norms demonstrates that this study population has substantial impairment in mental health quality of life and functioning. The high rates of depression and poor mental health functioning may be a function of the study

Emergency Department serving a socioeconomically disadvantaged population, although there are no local community prevalence data available.

It is not surprising that there was a strong association between substance use, measured both as use and as DSM-IV diagnoses, and poor mental health. Multiple epidemiologic studies^{64, 65} and treatment studies⁶⁶ have documented the fact that substance use increases the odds of psychiatric comorbidity and vice versa.³⁵ On a bivariate basis, the associations seemed strongest for cocaine and marijuana use, with over twice as many individuals with depression and low mental health functioning having used cocaine compared to those with better mental health. Results were similar for DSM-IV diagnoses of cocaine and marijuana use disorders, as well as those with alcohol use disorders. In multivariate regression, cocaine and marijuana use as well as the DSM diagnoses of alcohol and cocaine disorders remained strong independent risk factors even when controlling for very strong demographic factors.

IMPLICATIONS FOR BEHAVIORAL HEALTH

These results suggest that (1) universal screening for cocaine and marijuana use in the Emergency Department could serve as an additional indicator of depression and/or poor mental health functioning beyond asking regarding specific mental health issues, and (2) those with depression and/or poor mental health functioning are at high risk for the physical and psychological consequences of substance use. Therefore, if mental health issues are clearly present, then information regarding substance use should be elicited. Furthermore, research has also shown that individuals with both psychiatric and substance use disorders are at high risk for multiple Emergency Department visits.¹¹

Thus, it would appear that brief inquiries by Emergency Department clinicians regarding both mental health symptomatology and recent drinking, cocaine and marijuana use could serve as a reasonable screen, to be followed up by more in-depth questioning if affirmative answers are received. (However, these findings regarding males' drinking being negatively associated with depression suggest that queries regarding alcohol use in men might not elicit indicators of depression). Findings from multivariate analysis found few substantial differences between models with "use" variables and models with diagnosis information. Collecting information on substance use may be more practical for the Emergency Department clinician who may not have the time to do a diagnostic assessment but does have the time to query briefly regarding alcohol and drug use/no use. In fact, findings suggest few substantive differences between lower and greater levels of alcohol use implying that a simple elicitation of use/no use may be sufficient.

Brief screens for depression are available that are even shorter than the PHQ-9⁶⁷ or clinical staff could administer the SF-12 or its shorter version, the SF-8. Both the SF-12 and SF-8 include items that query limitations in work or usual activities because of emotional problems; these items form the basis for the low mental health functioning score in this report, although the actual scoring is a weighted combination of all items in the SF-12. The study found that patients presenting for an injury to an inner-city Emergency Department have lower odds of mental health problems compared to those presenting for non-injury complaints; these findings suggest that such screening might focus or at least begin with patients who do not present with injuries.

Individuals with strong indicators of depression or poor mental health functioning require further assessment, either by referral to primary care or a mental health specialist, or in the Emergency Department itself. In particular, a substantial proportion of individuals with low mental health functioning in our sample did not report moderate depression (9% of the sample, n=528, data not reported) and would not be expected to benefit from

antidepressants, but could warrant regular monitoring. Such patients would need careful evaluation and potentially other forms of mental health treatment such as psychotherapy.

The direction of the relationship between mental health problems and substance use and abuse is complex. Individuals with mental health problems use alcohol and drugs in an effort to self-medicate psychiatric symptoms/psychological distress, and substance use itself may induce symptoms such as depression, psychosis, and anxiety. Disentangling these issues probably cannot take place in the Emergency Department but would be an important component of referral or follow-up care.

However, there are a number of barriers to implementing these recommendations. The study Emergency Department does not have social workers on site 24/7; currently, if there are concerns about mental health and/or substance use disorder, mobile crisis workers employed by Community Mental Health agencies are paged to the Emergency Department. Such workers conduct an assessment and provide referrals/linkages as deemed appropriate. The referrals include public, private and faith-based treatment programs in the local communities. Thus, the linkages do exist. However, the lack of space and/or waiting lists to enter publicly funded programs treating mental health and/or substance use limits treatment opportunities for those without clear risk of imminent harm to self or others. Thus, additional funding is needed for these programs.

Another strategy would be for inner city Emergency Departments to develop more linkages to self-help groups, churches, and support groups such as the National Alliance for the Mentally Ill, which could at least supplement formal resources and provide on-going support. But innovative strategies for substance abuse and mental health services do need to be developed in under-resourced communities.

On the other hand, it is important to note that the Centers for Medicare and Medicaid Services recently (2008) created new reimbursement codes for substance use screening and brief interventions for Medicaid and Medicare recipients, enhancing the potential for more widespread use of brief intervention techniques in the future, particularly in high volume Emergency Department settings. These billing codes should create an economic climate in which Emergency Departments have the financial capacity to provide interventions for substance use at least in patients covered by Medicaid and Medicare. In the future, research regarding the efficacy of brief intervention approaches for mental health issues such as depression could provide the basis for reimbursement by Medicare/Medicaid for screening and brief interventions for mental health among patients in the inner-city Emergency Department. These brief interventions also need to provide referral to informal community resources as well as formal resources, given the limits of available capacity in formal settings.

It is important also to note that individuals who meet criteria for substance use disorders may be the least likely to seek care for their substance use in primary or specialty health settings, and that the Emergency Department may be one of the few opportunities to influence their longer-term health and safety outcomes. This study found that almost 20% of the sample admitted to marijuana use in the past 30 days. The importance of effective and efficient methods of screening and intervening with alcohol and illegal drug-related problems in emergency settings has already been emphasized.^{55, 59, 68, 69} Of particular concern are those individuals who meet criteria for alcohol or drug abuse or dependence, because they may be experiencing some of the more serious consequences of these disorders, leading to more frequent visits to the Emergency Department, higher costs, and poor health care outcomes. Furthermore, individuals with comorbid medical and psychiatric

conditions demonstrate persistent poor functioning over time, thus increasing the probability of greater medical care costs.^{32, 70}

In conclusion, an Emergency Department visit can provide an ideal opportunity to identify individuals with depression and poor mental health functioning, many of whom could benefit from either pharmacologic or behavioral mental health interventions. The strong association between substance use and poor mental health suggests the importance of referring individuals with substance use disorders to more specialized substance abuse treatment with dual diagnosis capacity or mental health programs that also address substance use directly. The sample in this screening study was drawn from a large, urban Emergency Department serving a diverse population, comparable socioeconomically to many inner cities, making the results found here particularly relevant in beginning to determine best practices in developing methods to help diverse populations with substance use disorders and mental health problems seek and receive appropriate care. Reliable and valid screening measures, currently or potentially reimbursable by Medicare and Medicaid, that can be introduced and completed in a fast and efficient manner are a key to providing linkages to treatment for a vulnerable population, many of whom seek care only in emergency settings.

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Table 1

Bivariate Correlates of Depression and Low Mental Health Functioning (N=5,641)*

	Depression		Low Mental Health Functioning		Total
	Yes N (%) ^a	No N (%) ^a	Yes N (%) ^a	No N (%) ^a	N (%) ^a
Demographics					
Age, years, mean (SD)	37.6 (11.2) /	36.2 (11.6)	37.1 (11.3)	36.3 (11.6)	36.5 (11.5)
Female	893 (67.6) /	2360 (54.6)	930 (65.9) /	2323 (54.9)	3253 (57.7)
African-American	704 (53.3)	2443 (56.6)	782 (55.4)	2365 (55.9)	3147 (55.8)
Not married/living together	986 (74.6)	3070 (71.1)	1067 (75.6) ²	2989 (70.1)	4056 (71.9)
High school education	900 (68.1)	2787 (64.5)	976 (69.2) ²	2711 (64.1)	3687 (65.4)
No health insurance	228 (17.3) /	1001 (23.2)	270 (19.2) ²	959 (22.7)	1229 (21.8)
Unemployed ^a	916 (69.3) /	2081 (48.3)	970 (68.8) /	2027 (48.0)	2997 (53.2)
Income \$10,000	575 (62.0) /	353 (43.0)	613 (62.2) /	372 (42.6)	1949 (47.3)
Clinical					
Injured	285 (21.6) /	1196 (27.7)	309 (21.9) /	1172 (27.7)	1481 (26.3)
Alcohol use (past month)					
None	757 (57.3) ²	2345 (54.3)	759 (53.8)	2343 (55.4)	3102 (55.0)
Use, No Binge	267 (20.2)	1073 (24.8)	317 (22.5)	1023 (24.2)	1340 (23.8)
Binge	297 (22.5)	902 (20.9)	335 (23.7)	864 (20.4)	1199 (21.3)
DSM alcohol disorder (past year)					
None	1073 (81.2) /	3898 (90.2)	1146 (81.2) /	3825 (90.4)	4971 (88.1)
Abuse	96 (7.3)	239 (5.5)	112 (7.9)	223 (5.3)	335 (5.9)
Dependence	152 (11.5)	183 (4.2)	153 (10.8)	182 (4.3)	335 (5.9)
Cocaine use (past month)	117 (8.9) /	132 (3.1)	122 (8.7) /	127 (3.0)	249 (4.4)%
DSM cocaine disorder (past year)					
None	1216 (92.1) /	4194 (97.1)	1296 (91.9) /	4114 (97.3)	5410 (95.9)
Abuse	26 (2.0)	39 (0.9)	28 (2.0)	37 (0.9)	65 (1.2)
Dependence	79 (6.0)	87 (2.0)	87 (6.2)	79 (1.9)	166 (2.9)

	Depression		Low Mental Health Functioning		Total
	Yes N (%) ^a	No N (%) ^a	Yes N (%) ^a	No N (%) ^a	
Marijuana use (past month)	318 (24.1) /	790 (18.3)	365 (25.9) /	743 (17.6)	1108 (19.6)
DSM marijuana disorder (past year)					
None	1227 (92.9) /	4143 (95.9)	1302 (92.3) /	4068 (96.2)	5370 (95.2)
Abuse	40 (3.0)	109 (2.5)	53 (3.8)	96 (2.3)	149 (2.6)
Dependence	54 (4.1)	68 (1.6)	56 (4.0)	66 (1.6)	122 (2.2)
TOTAL	1321 (23.42)	4320 (76.58)	1411 (25.00)	4230 (75.0)	5641

* depression measured by the PHQ-9, low mental health functioning by the lowest quartile on the mental health component of the SF-12; percents in the table are column percents;

^a some subjects did not respond or skipped this question;

¹ P < 0.0001;

² P < 0.01

Table 2

Logistic Regression Results for Demographic and Substance Use Correlates of Low Mental Health Functioning (n=5,641)^{*}

Variable	Low Mental Health Functioning	
	OR	CI
Female	1.71 ¹	1.49, 1.96
Age	1.01 ³	1.002, 1.013
Not married/living together	1.12 ³	1.009, 1.35
African-American	0.82 ²	0.72, 0.94
High school graduate or less	1.10	0.95, 1.26
Unemployed	2.2 ¹	1.93, 2.53
No health insurance	0.85	0.72, 1.00
Injury presentation	0.80 ²	0.69, 0.93
Alcohol use: ^{**}		
Alcohol use, no binge	1.03	0.88, 1.21
Binge drinker	1.13	0.95, 1.34
Use cocaine	2.48 ¹	1.87, 3.28
Use marijuana	1.66 ¹	1.41, 1.96

^{*} low mental health functioning by the lowest quartile on the mental health component of the SF-12; OR=odds ratio, CI=confidence interval for OR

^{**} reference group=no alcohol;

¹ p < 0.001

² p < 0.01

³ p < 0.05

Table 3Logistic Regression Results for Demographic and Substance Use Correlates of Depression (n=5,641)^{*}

Variable	Depression	
	OR	CI
Female		
No alcohol use	1.50 ¹	1.24, 1.81
Alcohol use, no binge	2.12 ¹	1.57, 2.84
Binge drinker	2.35 ¹	1.77, 3.13
Age	1.01 ²	1.004, 1.016
Not married/living together	1.14	0.98, 1.32
African-American	0.72 ¹	0.63, 0.82
High school graduate or less	1.05	0.91, 1.21
Unemployed	2.21 ¹	1.93, 2.55
No health insurance	0.75 ²	0.63, 0.89
Injury presentation	0.81 ²	0.69, 0.94
Alcohol use: ^{**}		
Alcohol use, no binge		
Females	0.95	0.77, 1.16
Males	0.67 ²	0.51, 0.89
Binge drinker		
Females	1.17	0.93, 1.47
Males	0.74 ³	0.57, 0.97
Use cocaine	2.93 ¹	2.20, 3.90
Use marijuana	1.57 ¹	1.32, 1.87

^{*} depression measured by the PhQ-9; OR=odds ratio, CI=confidence interval for OR

^{**} reference group=no alcohol; please note that an interaction between gender and alcohol use was identified in that the association of alcohol use with depression depended on the participant's gender and the association of gender with depression depended on the level of alcohol use, therefore the OR's for alcohol use are presented separately by gender and (similarly) separate OR's are presented for gender (females, males are scored 0 and therefore are the reference group) for each alcohol category.

¹ p < 0.001

² p < 0.01

³ p < 0.05

Table 4

Logistic Regression Results for Demographic and Substance Use Disorder Correlates of Low Mental Health Functioning and Depression (n=5,641)^{*}

Variable	Low MH Functioning		Depression	
	OR	CI	OR	CI
Female	1.75 ¹	1.52, 2.00	1.89 ¹	1.64, 2.18
Age	1.007 ³	1.001, 1.012	1.01 ¹	1.004, 1.016
Not married/living together	1.17 ³	1.01, 1.35	0.89	0.76, 1.03
African-American	0.83 ²	0.73, 0.95	0.72 ¹	0.63, 0.82
High school graduate or less	1.11	0.96, 1.27	1.06	0.92, 1.23
Unemployed	2.15 ¹	1.88, 2.46	2.21 ¹	1.92, 2.53
No health insurance	0.89	0.76, 1.05	0.77 ²	0.65, 0.92
Injury presentation	0.80 ²	0.69, 0.93	0.79 ²	0.68, 0.93
Alcohol abuse ^{**}	1.77 ¹	1.35, 2.31	1.69 ²	1.28, 2.24
Alcohol dependence ^{**}	2.35 ¹	1.80, 3.08	2.78 ¹	2.11, 3.65
Cocaine abuse ^{**}	1.81 ²	1.07, 3.08	1.94 ³	1.13, 3.33
Cocaine dependence ^{**}	1.78 ²	1.24, 2.55	1.53 ³	1.06, 2.20
Marijuana abuse ^{**}	1.34	0.91, 1.96	1.00	0.66, 1.52
Marijuana dependence ^{**}	1.64 ³	1.08, 2.49	1.75 ²	1.15, 2.67

^{*} depression measured by the PhQ-9, low mental health functioning by the lowest quartile on the mental health component of the SF-12; OR = odds ratio, CI = confidence interval for OR

^{**} reference group=no diagnosis;

¹ p < 0.001

² p < 0.01

³ p < 0.05