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Substance Use in Vulnerable Patients with Orofacial Injury: Prevalence, Correlates, and Unmet Service Needs

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Abstract

Background—A large portion of the injuries treated at urban trauma centers are preventable with alcohol and substance use presenting as common antecedent risk factors.

Methods—Alcohol and drug use characteristics of vulnerable adults treated for intentional orofacial injury at a regional trauma center were investigated. Patients (N = 154) presenting with intentional facial injury were recruited. Patients were considered eligible for recruitment if they were adults, recently used alcohol or drugs, and had a fracture within the 30 days preceding recruitment that involved the jaw, orbit, nose, or cheekbone as determined by clinical history, examination and radiographic findings and that injury was due to interpersonal violence.

Results—This patient cohort evidenced significant levels of alcohol use, with 58% of our patient cohort meeting the criteria for problem drinking. Although lower than alcohol use rates, the reported use of illicit drugs was substantial. Almost half of the sample reported other substance use in the previous month, with 24% meeting the criteria for problem drug use.

Conclusions—Despite the very high percentage of individuals needing alcohol or drug treatment, only a small proportion of the patient sample reported having seen a professional for alcohol or drug treatment. Integrating substance use services into trauma care is discussed.

Keywords

Facial Injuries; Alcohol Use; Substance Use; Trauma Centers

Introduction

Injury is one of the leading causes of clinician contact and costly hospitalizations and presents a fiscal challenge to public health centers.¹ Estimates compiled by the Institute of Medicine's

Committee on Injury Prevention and Control indicate that the costs of injury are higher than those of any other health problem, and roughly equal to the costs associated with heart disease (second most costly) and cancer (third most costly) combined.² The increasingly unreimbursed costs of providing care to injury patients imposes a special burden on our regional trauma centers and compromises our public health centers in their ability to provide conventional medical services. As evident in the National Trauma Data Bank (NTDB) Annual Report of 2006,³ over half of the traumatic injuries occur in adults between the ages of 20 and 54 years with a significant segment of the care covered by self pay or Medicaid accounts. A large portion of the injuries treated at urban trauma centers are preventable with alcohol and substance use presenting as common antecedent risk factors. Pooled data on 4,063 patients treated at 6 regional trauma centers indicated that 40.2% of patients had a positive blood alcohol concentration (BAC) at admission⁴; when polydrug (alcohol, illicit drugs) use was included, over 60% of the patients tested positive for intoxicants among this set of patients.⁵ These findings are similar to those found at a Level I trauma center in which the prevalence of substance use among victims of major trauma was investigated.⁶ Of 516 patients who had urine toxicology and blood alcohol screens, 71% screened positive for alcohol or drugs or both: 52% had positive alcohol screens; and 42% had positive drug screens with cocaine and opiates representing 91% of positive drug screens. Utilizing a case-control analysis, Vinson et al.⁷ calculated the increased risk of intentional injury related to alcohol use and reported that drinking in the six hours prior to injury was positively associated with injury, with an odds ratio of 9.5 after 5 drinks.

Orofacial injury is a significant, yet mostly under-appreciated, aspect of the injury problem confronted by regional trauma centers. The face is a common target for assault and injury to the face, jaw, and mouth is regarded as a prominent marker of interpersonal violence.^{8,9} Reported variously as comprising 31%,¹⁰ 29.5%,¹¹ and 39%¹² of all trauma admissions, head/facial injuries are worthy of special emphasis because they occur in high frequency, disproportionately affects vulnerable populations,¹³⁻¹⁵ involve an anatomical region that largely defines perceptions of self-image and identity,¹⁶ and are often associated with persistent disabilities.¹⁷ Surgical management of these largely avertable injuries is expensive and constitutes the bulk of the dental/oral surgical services provided by public hospitals.¹⁸ In a cohort of 336 patients treated for orofacial injuries at an inner-city trauma center, Shetty et al.¹⁹ determined that 83% of the injuries resulted from interpersonal assault, and the direct costs of providing care (excluding the more severe gunshot wounds) were nearly \$3 million.

As with general trauma, there are substantive linkages between substance use and facial injury. Mathog et al.²⁰ found that over 82% of the 1,432 mandible fractures in 906 patients were the result of aggravated assault and related largely to substance use and risky behaviors. Their findings are echoed by Ogundare et al.²¹ who reported interpersonal violence as the proximate cause of injury in 79% of all patients with mandible fractures; 55% of the patients reported the use of an illicit substance within two hours of the injury. The behavioral precursors of alcohol and drug use that lead to violence and intentional injury also predispose vulnerable patients to recurrent injury. Of those trauma victims who survive their injuries, significant subsets (23% - 52% of urban trauma patients) resume risk-taking behaviors leading to recurrent injury or recidivism.^{22,23} In a five-year follow-up of 501 survivors of violent trauma seen at one hospital, Sims et al.²⁴ found that 62% abused alcohol or drugs. Given the substantive linkages between substance use and injury and reinjury, numerous investigators and national agencies have argued for treating trauma center admissions as a secondary symptom of an underlying substance use problem and for developing secondary prevention strategies that focus on the causal substance use behaviors.^{25,26} Correspondingly, we investigated the alcohol and drug use characteristics of vulnerable adults treated for intentional orofacial injury at a regional trauma center. Beyond the prevalence and correlates of substance use behaviors, we were

interested in clarifying the unmet service needs of trauma patients and exploring the link between substance use and injury severity.

Materials and Methods

Participants

Consenting patients (n = 154) presenting with intentional facial injury to the Los Angeles County/University of Southern California Medical Center (LAC/USC) between January, 2005 and January, 2007 were recruited into a randomized controlled trial of a culturally competent motivational intervention focusing on antecedent substance use behaviors. Inclusion criteria were: age 18 or older; self-reported use of alcohol or drugs within the past 30 days; at least one fracture involving the jaw, orbit, nose or cheekbone as determined by clinical history, examination and radiographic findings; the fracture occurred within the past 30 days; the fracture was due to interpersonal violence. Exclusion criteria were: severe gunshot injuries, or altered mental status attributable to head injuries; incarceration or current treatment for mental illness; inability or unwillingness to participate in motivational interviewing designed to increase responsibility for drinking/drug use and to reduce the risk of future violence. Of the 171 patients eligible for the study, 9.94 percent (n = 17) declined to participate. Primary reasons for refusals included: facial pain; too busy due to dealing with the combination of work and injury treatment; not wanting to travel to the clinic again; and not wanting to deal with anything more than the injury itself. In addition to the subset of 154 enrolled patients, medical chart abstraction on all patients treated for orofacial injuries (n = 503) during the time period of the study was conducted to obtain clinician ratings of injury severity and allow case-control analysis.

Procedures

Patients who were receiving treatment for orofacial fractures were approached in the dental clinic, Ear, Nose and Throat (ENT) clinic or inpatient emergency care and were informed that the purpose of the study is to find out more about how injuries like theirs occur, what increases the risk of such injuries, and what might be done to reduce this risk. They were informed that participation would involve a 45-minute baseline interview, and random assignment into a motivational interviewing intervention or control condition and two follow-up interviews. Only data from the baseline interview is used in this analysis. Informed consent from eligible patients was obtained by research staff utilizing study procedures approved by the Institutional Review Boards at the University of Southern California and University of California, Los Angeles. Consenting patients were interviewed by trained bilingual interviewers who used structured questionnaires and face-to-face interviews to collect extensive baseline information on sociodemographic characteristics and various psychosocial measures. Interviews were conducted using English or Spanish versions of standard data collection forms used by UCLA's Integrated Substance Abuse Program (ISAP). Data from completed interviews as well as data abstracted from medical charts was entered into computers and compiled in two databases. The larger database is comprised of information abstracted from the trauma encounter forms of all 503 patients treated at LAC/USC for orofacial injury during the time period of the study. The smaller database consisted of a subset of 154 patients who qualified for the study because their injuries resulted from interpersonal violence and involved alcohol or drug use.

Measures

Alcohol Use—The Alcohol Use Disorders Identification Test (AUDIT)²⁷ is a 10-item instrument developed by the World Health Organization to identify persons whose alcohol use has become hazardous or harmful to their health. International validation studies found alphas ranging from .80 to .98.²⁸ The AUDIT was administered to the patients as part of the face-to-face interview and the alpha for the current study is .85. Consistent with the information

provided on use of illegal drugs, patients reported on how many days during the thirty days preceding the interview they used any alcohol at all, or used alcohol to intoxication and also on the age at which they began regular alcohol use.

Drug Use—Drug use was elicited utilizing the Texas Christian University Drug Screen (TCUDS),²⁹ a 12- item index of severity of drug abuse. Developed as a short instrument for use with low-income, ethnic minority men who have contact with the criminal justice system, the TCUDS was evaluated on 18,364 Texas Department of Criminal Justice inmates.³⁰ TCUDS has a test-retest reliability of .95³¹ and an internal reliability of .89.³⁰ For our cohort of 154 patients with orofacial injury, the internal consistency had an alpha = .85. In addition to the TCUDS, those patients reporting use of illicit drugs also provided a complete history of each drug used, age when regular use began, most recent use, and use of the drug in past 30 days.

Medical Service Utilization—Medical service utilization was measured by an 18-item inventory of service utilization³² developed for the HIV/AIDS Treatment Adherence, Health Outcomes and Cost Study Group. Services included in the utilization series are: hospitalizations, emergency room visits, outpatient medical care, medical care from a private physician, care for a psychological or emotional issue, alcohol or drug treatment (residential, detox, outpatient, methadone maintenance), any self-help or support group for mental health or substance use, dental care, case management or other social work, help from family or friends related to a health problem, health services received while incarcerated or while residing in a homeless shelter, and health insurance. Data on medical service utilization was self-reported by the patients in the face-to-face interviews.

Facial Injury Severity—A variant of the facial injury scoring system developed by Shetty et al.³³ was used to provide a summary measure of the orofacial injury severity. Briefly, for each mandible fracture, six injury attributes considered significant in directing care and influencing outcomes were culled utilizing the acronym FLOTID. The individual components included 1) fracture Type (F), 2) location of fracture (L), 3) nature of occlusion (O), 4) teeth in fracture line (T), 5) presence of infection (I), 6) extent of interfragmentary displacement as determined from radiographs (D). The individual mandible fractures were assigned corresponding weights and summed up along with the weights assigned to coexisting midfacial fractures. The composite score reflects the relative severity of the facial injury and allows comparisons across different groups.³⁴ The injury severity scores for the cohort of 154 patients were abstracted from the surgical encounter forms collected by the surgeons.

Demographic or Background Variables—A questionnaire developed by the Integrated Substance Abuse Programs at UCLA was used to collect sociodemographic information including gender, country and date of birth, ethnic background, first language, marital status, children raised by patient, children currently living with patient, family history of substance use problems, time in jail/prison, time in homeless or emergency shelter, occupation, employment status, hours of work, education and religion or legal problems. The sociodemographic data was collected in by the interviewers in face-to-face interviews.

Results

The background and sociodemographic characteristics of the patient population are summarized in Table 1. The patients were predominately male (88%), with an average age of 32 years (range 18 - 62 years), and most had never been married (61%). The ethnic makeup of the participants was primarily Latino and African-American (47% and 28%, respectively), and over one fourth were born outside the United States (27%). More than half the patients reported educational attainment of High School or less (62%). The majority was unemployed (66%), working, on average, 6 days in the month preceding the interview (range 0 - 30 days).

Additionally, almost 6% reported membership in a gang, and 28% reported legal problems such as probation, parole, an outstanding warrant, or a pending legal case. Drug and alcohol problems were common among the patients' families, with 40% reporting at least one family member with an alcohol problem, and 27% reporting at least one family member with a drug problem.

Drug and alcohol use in the patient population is summarized in Table 2. Extensive information was obtained regarding alcohol and drug use in the 30 days preceding the interview. Alcohol use was common, with patients drinking alcohol on 11 out of the 30 days preceding the interview, on average. Some patients (1.9%) reported daily alcohol use. Furthermore, 49 patients reported drinking alcohol to intoxication, doing so on an average of 9 days in the month preceding the interview. Patients reported regular alcohol use as early as age 7. The median score on the AUDIT was 10.0 which is well above the standard cut-off point of 8³⁵ for identification of an alcohol use problem. The percentage of patients scoring above the standard AUDIT cut-off of 8 was 58%; 14.9% had never used alcohol.

Almost half of the patients (45%) reported illegal drug use during the previous 30 days. Marijuana/hashish was most commonly reported as the primary drug (30%), but patients also reported amphetamines, opiates, and crack cocaine, as the drug used most frequently. Frequency of use of primary drug ranged from 1 to 30 days in the month preceding interview. As with alcohol, many patients reported starting regular use of drugs at a young age. Additionally, almost one quarter (24.0%) of study participants had TCUDS scores at or above the standard, cut-off of 4 for referral for assessment for drug use disorder.³¹

Table 3 summarizes the utilization of services by the patient population in the 6 months preceding the intake interview. A significant segment of the patients reported obtaining their medical care through a hospital emergency room or hospital clinic/outpatient department (22% and 16%, respectively), and infrequently in a private doctor's office (8%). A small percentage of patients reported seeking help with psychological or emotional issues from professionals, group meetings, or social workers (10%, 11%, and 9%, respectively). Patients reported seeking professional help for alcohol or drug treatment (10%), sometimes attending a residential treatment facility or an outpatient facility for drug or alcohol problems (4.5% and 3.9%, respectively).

The severity of the facial injuries is summarized in Figure 1 (histogram of injury severity) and Table 4. The calculated injury severity summary score ranged from 2 to 25, following a roughly normal distribution with a mean of 13 and a standard deviation of 5. Half of the patients presented with more than one mandible fracture (50%), and a few (8%) had associated midfacial injuries.

Conclusions

Our findings corroborate other studies^{20,36,37} reporting that patients with injuries resulting from assaults are predominantly single, minority, adult males. Beyond the manifest socioeconomic marginalization (ethnic minorities, largely unemployed), our sample appeared to be a high-risk population (e.g., significant numbers having spent time in jail or in homeless/emergency shelters). Despite the high need for medical services, there was low medical service utilization overall, with most of the medical services obtained in the form of emergency care.

Our patient cohort evidenced significant levels of alcohol use. The majority reported alcohol use in the previous month with a high frequency of use and about one-third of the sample reported alcohol use to intoxication. A significant segment of the cohort reported a history of family alcohol problems, a finding that has implications for the initiation as well as the continued use of alcohol by the patients. What is most striking, however, is that 58% of our

patient cohort met the criteria for problem drinking according to the alcohol-screening instrument administered (AUDIT). The median AUDIT score of 10.0 in our patients was significantly higher than the standard cutoff score of 8. Connigrave et al.³⁸ have shown that AUDIT cut-off scores of 12 are specific predictors for alcohol-related social problems.

Although lower than alcohol use rates, the reported use of illicit drugs was still substantial. Almost half of the sample reported other substance use in the previous month, with 24.0% meeting the criteria for problem drug use according to the drug assessment screen (TCUDS). As with alcohol use, a significant subset of the patients reported a family member with a drug problem. Similar to alcohol use patterns, familial influences may play an important moderating effect on substance use patterns and need to be addressed by any interventions directed towards drug using behaviors.^{39,40}

Despite the very high percentage of individuals rated as having an alcohol problem on the alcohol-screening instrument, and the relatively high percentage of people meeting criteria for a drug use problem, it should be noted that only a small proportion of the patient sample reported having seen a professional for alcohol or drug treatment. Beyond access to care barriers, there appear to be cultural and social influences, which prevent these high-risk individuals from seeking appropriate professional assistance. For risk-taking males, alcohol and substance use may be a way of gaining peer acceptance⁴¹; seeking assistance for substance use issues may be perceived as a sign of weakness. Many of the patients reported a family member with an alcohol or drug problem, and it is likely that many of these family members also did not obtain professional assistance. Because in the samples of the studies reviewed here, patients are receiving their healthcare in emergency care settings, it is to be expected that the underlying substance use problem is rarely addressed or that the patients are likely to continue their treatment once the emergent health issue is resolved. However, it is critical that we find ways to integrate trauma patients using high levels of alcohol or drugs into treatment services for alcohol and substance use. And previous studies have found that patients may be willing to address their substance use issues. For example, in a sample of primarily African-American males with major trauma, 87% of those using alcohol and 85% of those using drugs were contemplating or action oriented toward addressing their substance use behavior.⁴²

Although multiple studies now show that injury is strongly related to substance use, few clinics that deal with trauma screen patients for alcohol and substance use or provide preventive programs or referrals for alcohol and substance use. Most often, the focus is only on physical healing, and patients then return to their high-risk lifestyles, even though evidence supports the need for all trauma patients to be screened for substance use and for those who have positive screens to receive early intervention.⁴³⁻⁴⁵ In a study of referral patterns to needed psychosocial services Calle et al.⁴⁶ found that 53% of trauma patients with chronic substance abuse were not offered that type of assistance. A focus on screening and assessment efforts in the emergency room needs to be implemented to identify antecedent behaviors, and to assist in planning coordinated services. Previous research indicates that such problem-specific approaches can be valuable in assisting patients to reduce specific risk behaviors, such as alcohol use.⁴⁷⁻⁵⁰ Patients who received a brief intervention during a trauma center admission related to driving under the influence were less likely to be arrested for DUI within 3 years of discharge.⁵¹ Similarly, trauma patients defined as at-risk alcohol users who received either a brief personalized motivational intervention or a brief information and advice session were all found to have statistically significant reductions in drinking that persisted from 6 to 12-month follow-up.⁵² However, the evidence to support the effectiveness of brief interventions is stronger for individuals with at-risk drinking patterns than for those with severe alcohol dependence ("alcoholism"),⁵⁰ and for individuals with other substance use problems.⁵³ For example, in a meta-analytic review of brief interventions for alcohol use disorders, the effect

for brief interventions compared to control conditions was significantly larger when individuals with more severe alcohol problems were excluded.⁵⁴

Other trauma researchers have advocated for the integration of intervention into trauma care to address underlying problems, arguing that this would enhance patient participation in post-surgical care.^{48,55,56} Substance use not only increases vulnerability to injury, but also complicates trauma care and rehabilitation. For example, substance use impairment produces poor judgment, may lead an individual to neglect responsibilities, disinhibition may lead to a willingness to take unnecessary risks and act impulsively or aggressively—all of which can influence post-op care but also lead to repeat injury. If substance use services could be integrated into trauma care, then care would be: (1) more comprehensive relative to the injury, as services would target the underlying problem; an (2) may have a cyclical effect, in that if the underlying problem is addressed—at least to some extent—the patient may follow post-trauma care instructions more fully and be more less likely to have repeat injuries.

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Figure 1.
Histogram of injury severity

Table 1Patient Background/Demographics (N = 154)[†]

	% [‡]
Sex	
Male	87.7
Female	11.0
Ethnicity	
Black	27.9
Mexican	40.3
Other Latino	7.1
White Non-Latino	10.4
Native American/Alaskan	1.9
Asian/Pacific Islander	2.6
Multi-Ethnic	7.8
Other	1.9
Country of Birth	
USA	72.7
Other	27.3
Marital Status	
Married	7.8
Living With	11.7
Separated	8.4
Divorced	9.7
Never Married	61.0
Legal Problems (probation, parole, warrant, etc.)	
No	72.1
Yes	27.9
Employment Status	
Employed	33.1
Unemployed	66.2
Education	
Less than High School	39.0
High School Graduate/GED	23.4
Some College/Trade/Tech/AA	30.5
4 years College or more	3.2
Has/had family member with alcohol problem?	
Yes	39.6
No	59.1
Has/had family member with drug problem?	
Yes	27.3
No	72.1

[†] M age = 32.2 (range 18 – 62). Number of days worked in last 30 days = 6.2 (range 0 – 30).

[‡] Some percentage values within category do not add up to 100% due to missing response.

Table 2**Drug and Alcohol Abuse**

	%	Frequency of use Range (days)	Range or ages at which regular use began [†]
<i>Patients Primary Drug[‡]</i>			
Marijuana/Hashish	29.9	1-30	12-23
Amphetamines	1.9	4-30	18-19
Heroin	1.3	26-30	20-30
Other Opiates	1.3	14-30	35-35
Crack	3.9	2-30	20-46
Poly-drug users	6.5	1-30	13-37
No reported drug use in past 30 days	55.2		
	<i>M (days)</i>	Frequency of use Range (days)	Range or ages at which regular use began [†]
<i>Alcohol Use[§]</i>			
Any Alcohol Use at all (n = 109)	11.0	1-30	7-25
Alcohol use to intoxication (n = 49)	9.4	1-29	7-25

[†] Ranges exclude patients who have used within the past 30 days but do not report themselves as regular users and, therefore, did not give an age at which regular use began.

[‡] As determined by number of days used in 30 days preceding interview.

[§] Number of days in the 30 days preceding interview.

Table 3**Service Utilization[†]**

	Yes (%)	No (%)	Range of Frequency of use [‡]
Medical Services			
Did you go to a hospital emergency room for emergency care?	22.7	76.6	1-6
Were you a patient in any hospital overnight or longer?	7.1	92.2	1-14
Did you go to any hospital clinic or outpatient department for medical care?	15.6	82.5	1-10
Did you go to any other clinic for medical care (e.g., community/neighborhood clinic)?	10.4	88.3	1-10
Did you get medical care in any private doctor's office?	8.4	90.9	1-14
Did you get any dental care?	12.3	87.0	1-4
Psychological or Social Services			
Did you see any professional for the primary purpose of getting help with a psychological or emotional issue?	9.7	89.6	1-50 [§]
Did you participate in any other support group, group counseling, or self-help group for emotional, substance abuse, or health issues?	11.0	88.3	1-264
Did you receive help from a case manager or social worker?	9.1	89.6	1-16 [¶]
Alcohol and Drug Services			
Did you see any professional for primary purpose of getting alcohol or drug treatment?	10.4	89.0	
Were you in a residential drug or alcohol treatment facility or detox hospital overnight?	4.5	11.7	4-100
Did you get any outpatient alcohol or drug treatment?	3.9	14.3	2-264 [§]
Jail / Homeless / Emergency Shelters			
Did you spend one or more nights in jail or prison?	25.3	72.1	1-535
Did you spend one or more nights in a homeless or emergency shelter?	13.0	85.7	1-180

[†] Each question asks about the 6 months preceding interview.

[‡] Minimum and maximum reported number of times the service was used in the 6 months preceding interview.

[§] One-on-one and/or group meetings.

[¶] Face-to-face meetings only.

Table 4**Injury Severity**

	M	SD	Range
Injury Severity Score	13.1	4.6	2-25
% of Patients			
Number of Mandible Fractures [‡]			
0		3.9	
1		39.0	
2+		49.9	
Number of Midfacial Fractures			
0		91.6	
1+		8.4	

[‡]Percentage values do not add to 100% due to missing response.