Prevalence of Substance use in Screened older trauma patients

By

Anthony Charles MD

A Master's Paper submitted to the faculty of
the University of North Carolina at Chapel Hill
In partial fulfillment of the requirements for
the degree of Master of Public Health in
the Public Health Leadership Program.

Chapel Hill

2008

Margaret Goulay MD MPH (Advisor)
Carol Runyan PhD MPH (Second Reader)
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Margaret Gourlay MD MPH (Advisor)
Date

Carol Runyan PhD MPH (Second Reader)
8/1/08 Date
Abstract

Introduction: Substance use disorders may be an under-appreciated cause of trauma-related morbidity and mortality in the older adult. Drug screening is underutilized in this population and as such, the prevalence of substance use in the older trauma patient is not clearly defined.

Methods: A cross-sectional analysis of older trauma patients was performed to determine the prevalence of substance use and elicit factors associated with alcohol and drug screening. All trauma patients ≥ 50 years of age admitted for ≥ 24 hours, to any of the 15 participating hospitals that report to the North Carolina Trauma Registry from January 1, 2000 to December 31, 2006 were eligible for inclusion in this study. The outcomes of interest were the prevalence of drug and alcohol use in the screened group. Multivariate logistic regression was performed to identify factors associated with screening for substance use.

Results: The number of patients meeting inclusion criteria for this study was 54,164. Mean age of this study sample was 71.6 years (range 50-107yrs); 84 % (n= 45,510) of the study group were white and 56.6 % (n=30,643) were female. The screening rate for alcohol and drugs is 15.22 % (8242/54,164) and 9.82 % (5318/54164), respectively. The overall screening prevalence for substance use (alcohol, drugs or both) is 17.62 % (9543/ 54,164). Prevalence of substance use in the screened cohort is 40.9 % (3903/9543). Factors significantly associated with screening include the male gender, (OR 1.52), racial minority (OR 1.8), and injury severity score >15 (OR 2.5).

Conclusion: The screening rate for substance use among older adults in this study population is low, despite a prevalence of substance use comparable to younger trauma population samples. This pattern is inconsistent with recommendations from the American College of Surgeons and the American College of Emergency Physicians for uniform screening for all trauma patients.
Research Question: What is the prevalence of current substance use in trauma patients aged 50 years and older who are screened in emergency rooms in North Carolina?

Introduction: Substance use may be an underappreciated cause of trauma-related morbidity and mortality in the older adult population. Because currently available diagnostic criteria were developed and validated in younger samples, they might significantly underestimate the prevalence of substance abuse in the older adult. The number of older adults who misuse or abuse illicit or prescription drugs and alcohol may increase because the “Baby Boomer” generation, (those Americans born between 1946 and the early 1960’s), have higher rates of substance use than earlier generation of age matched population groups. Few studies have addressed issues that may be unique to older substance abuse patients, especially how substance-related trauma may be different in this age group.

Prevalence of alcohol and illicit drug use by all trauma victims is high. A substantial portion of the estimated 110 million emergency department visits in the United States each year is related to unhealthy patterns of substance use. Studies of the prevalence of substance use-associated trauma range from 7% to 55%; Alcohol and illicit drug screening are associated with mechanism of injury, age, gender, ethnicity and the geographic location of the trauma center hence prevalence rates are variable. Prevention is a crucial component of the comprehensive treatment of trauma patients; thus, determination of the presence or absence of substance use by screening and the subsequent characterization and documentation of the nature of these substances is essential. For this study, the goal is to describe the prevalence of alcohol and drug screening among older trauma patients (≥50 years) presenting at various emergency rooms that participate in the North Carolina Trauma
Anthony Charles MD  
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Registry (NCTR). Current literature has little data regarding substance screening in the older trauma population. We performed a cross-sectional analysis of this group in order to illuminate factors associated with substance screening. Awareness of such factors will help hospitals to better evaluate current procedures and develop evidence-based practices regarding patient drug and alcohol screening.

Addendum to the Introduction

Behaviors and Characteristics of substance use among older adults

To better characterize the use of alcohol in the United States, the National Survey on Drug Use and Health (NSDUH) identified the severity of alcohol use based on timing and frequency of the consumption of alcoholic beverages, such as beer, wine, whiskey, brandy, and mixed drinks. Estimates for the prevalence of alcohol use are reported primarily at three levels, defined for both males and females and for all ages as follows:

**Current use** - At least one drink in the past 30 days (includes binge and heavy use).

**Binge use** - Five or more drinks on the same occasion at least once in the past 30 days (includes heavy use).

**Heavy use** - Five or more drinks on the same occasion on at least 5 different days in the past 30 days.

Binge and heavy alcohol use rates decreased with increasing age. While 58.8% of the population aged 45 to 49 in 2002 were current drinkers, 22.5% of persons within this age range were binge
drinkers and 7.7% drank heavily. It is important to note that the data reported by the NSDUH was based on a self-reported survey. Additionally, the incidence of heavy drinking has been estimated to be between 3% and 9% among those aged ≥ 65 years. Rates appear to be lower in older individuals compared to younger individuals (e.g., one-month prevalence of abuse and dependence was 6% in males ages 18 to 24 years versus 1.8% in older males). Some longitudinal studies suggest that alcohol consumption decreases with age, while others have reported stable or increased consumption. Alcohol abuse and dependence in older adults are likely to increase as baby boomers reach older age with heavier drinking habits than current population of the older adults. Despite a wealth of information on the epidemiology and treatment of alcohol abuse in older adults, few comparable data are available on drug abuse in this population.

The NSDUH obtains information on nine different categories of illicit drug use: marijuana, cocaine, heroin, hallucinogens, inhalants, and nonmedical use of prescription-type pain relievers, tranquilizers, stimulants, and sedatives. In these categories, hashish is included with marijuana, and crack is considered a form of cocaine. Several drugs are grouped under the hallucinogens category, including LSD, PCP, peyote, mescaline, mushrooms, and "Ecstasy" (MDMA).

It is estimated that the number of drug users aged 50 years and older will increase significantly from 2000 to 2020 because of an anticipated 52% increase in population in this age group and a projected increase in the rate of past-year use as more persons from younger higher-drug-using cohorts reach the age of 50 years. The number of marijuana users in this age group is forecasted to increase from 719,000 (1.0% of the population in that age group) to almost 3.3 million (2.9%). Use of any illicit drug is projected to increase from 1.6 million (2.2%) to 3.5
million (3.1%), and nonmedical use of psychotherapeutic drugs will increase from 911,000
(1.2%) to 2.4 million (2.7%). These estimates are based on data from the 1999, 2000, and 2001
National Household Surveys on Drug Abuse (NHSDA).

Cross-cultural perspectives on substance abuse

Recent epidemiological surveys found that 5.3% of Canadians aged 65 years and older
who drank were heavy alcohol drinkers compared with 37.5% of those aged 18–24 years, 22.8%
of those aged 25–44 years and 15.7% of those aged 45–64 years; a similar Finnish study
revealed that 2.1% of Finnish adults aged 65 years and older had active alcohol dependence,
and less than 1% had pure alcohol use disorders meeting Diagnostic and Statistical Manual of
Mental Disorders, Fourth Edition (DSM-IV) criteria compared with 5% of those aged 30–44
years, 3.5% of those aged 45–54 years and 4.0% of those aged 55–64 years; the prevalence of
DSM-IV alcohol dependence in American adults aged 50 years and older was 0.8% in men and
0.5% in women compared with 6.7 and 3.8% in those aged 18–23 years, 3.8 and 1.2% in those
aged 24–29 years and 2.7 and 1.6% of those aged 30–49 years, respectively; and 5.3% of
French emergency department patients aged 60 years and older had a DSM-IV diagnosis of
alcohol use disorder. Gender differences persist in older adults with men reporting higher
rates and levels of alcohol use. National prevalence rates may reflect differences in cultural
and social attitudes towards alcohol use.
Prescription drug use in older adults

Older adults use prescription medications approximately three times as frequently as the general population, and use of over-the-counter medications by this group is even more extensive. In the United States, the estimated annual expenditure on prescription drugs by elderly persons is $15 billion—a four-fold greater expenditure per capita on medications than younger individuals. 

Overall, older adults interface with more medications (both prescription and non-prescription drugs) than other age adjusted population groups. Incorrectly adhering to medication instructions or reluctance to ask for assistance regarding medication use is common among older adults and may contribute to the misuse of prescription medications and ultimately trauma. Although this pattern of drug use is common, it is frequently misdiagnosed by physicians and goes unnoticed by family members. Prescription drug abuse is present in 12% to 15% of older adults who seek medical attention. This data is based on the Medicare Current Beneficiary Survey, a nationally-representative database of Medicare eligible persons. Benzodiazepines (Valium) and narcotics (opiates) are two of the most commonly prescribed drugs that are abused by the older adult. Over the counter sleeping medications are the most common non-prescription drugs abused by the elderly. Like younger patients who abuse prescription drugs, the older abusers have a high rate of psychiatric problems due to the addiction. Screening for drug abuse in older adults can be difficult because of symptom and usage denial. Surveys of older individuals indicate from 17% to 20% are receiving psychotropic medications that are highly addictive. Almost half indicate use beyond the prescribed levels of these medications. The older patient is more likely to have traumatic complications due to prescription drug use.
Relationship between substance use and trauma

Substance use plays a major role in trauma-associated morbidity and mortality, and alcohol and other drugs are major factors in traumatic death rates, including motor vehicle crashes (MVC), homicides, burns, drowning, and suicides. The relationship between substance use and the increased propensity to all types of trauma has been established. Falls are the most common cause of trauma in the elderly (40%), followed by motor vehicle collisions (28-30%) and automobile vs. pedestrian (9-25%), all of which have been shown to increase with substance and psychoactive drug use. Although the prevalence of substance use in the elderly is less than in the younger trauma population, alcohol and prescription drug use and abuse is common. Older individuals consume 25-30% of all prescription drugs and are more likely than other age cohort to use psychoactive drugs with a potential for misuse, abuse and addiction.

By far, the largest empiric data exists for alcohol and its association with trauma, and most often examined is the association of alcohol and motor vehicle-related traumatic injury. This association has been most studied because it is often the most costly of substance-associated trauma. More than 70% of the annual estimates for the economic impact of alcohol use in the United States are attributed to lost productivity from injuries associated with trauma. Nearly two thirds of trauma center admissions in the United States are MVC victims, and typically more than half of these patients test positive for alcohol or other drugs. Madan and colleagues studied 557 victims of all ages with life-threatening injuries and found a prevalence of 70% of alcohol or illicit drug use, or both. Sloan and colleagues reported an 86% prevalence rate of substance use in trauma patients. Both these studies are cross sectional designs and direct
causality cannot be determined, but there exists an association. Similarly, in a previous study of 516 trauma patients in an academic medical center by Cornwell and coworkers, 48 71% of the victims screened positive for alcohol or drugs, or both. Fifty-two percent had positive alcohol screens and 42% had positive drug screens. Cocaine and opiates accounted for 91% of positive drug screens. Individuals with substance use are at high risk of traumatic injuries because of altered senses and judgment. In the United States almost half of the occupied trauma beds are occupied by patients injured in alcohol related traffic crashes. 49,50 It is estimated that more than 40% of fatal accidents in America are alcohol related. 51,52

The most commonly abused prescription drugs are benzodiazepines and opioid analgesics. Benzodiazepines, opioids and cyclic antidepressants substantially increase the risk for motor vehicle collisions and falls in the elderly. 53,54,55 Furthermore the pharmacological interactions between alcohol and many of the prescription drugs used and abused concurrently, such as benzodiazepines and barbiturates may be synergistic to potentiate the effect of either drug, resulting in central nervous system depression and the cognitive sequelae. 34 Although the association of alcohol use and MVC trauma is clear, the role of other drugs of abuse in MVCs has been studied less systematically; the lack of data may reflect a lack of substance screening rather than a lack of association.

**Sedative-hypnotic and opiate abuse in older adults**

There is a high prevalence of long-term benzodiazepine use among older adults, who account for 12.5% of the general population. 56 Thirty percent of all prescription drugs are prescribed for elderly persons, and many of these medications are psychotropics. 57 Of the
available sedative-hypnotic drugs, benzodiazepines are by far the most frequently prescribed. In a study by Morgan and colleagues, the prevalence of hypnotic drug use (92% of these being benzodiazepines) among persons aged 65 years or older in a nationally representative British sample was 16%. Two other cross-sectional studies—one from Europe and one from Quebec—showed prevalence rates of 19.8% and 23% for continuous use of benzodiazepines among older adults.

In a recent prospective study of 161 fall-from-height victims who underwent autopsy, the primary cause of death was suicide (84.5%), followed by accidents (7%) and homicide (1%). The cause of death was determined by forensics, and systematic qualitative and quantitative toxicological analysis. In the suicides, there was evidence of psychotropic medicines in 57% of the observations, with a much higher proportion of benzodiazepines and antidepressants in women than in men. Quantitative toxicologic analyses showed overdosing on medication in 16 suicide victims, with toxic levels in 11 of the victims. Toxicologic analysis made a significant contribution to the diagnosis of suicide by revealing drug use prior to the fatal event.

Psychoactive drug use is particularly problematic. Data obtained from elderly persons living in the community who were receiving services at a mental health clinic revealed that prescription drug abuse, most often of sedative-hypnotic, antianxiety, and analgesic drugs, accounted for about 5% of the average caseload. Screening of 1502 patients from hospital emergency departments revealed that 23.7% of persons older than 65 years used benzodiazepines, 19.8% used stimulants, 14.4% used opioids, 9.6% used barbiturates, 7.0% used alcohol, 2.2% used phencyclidine and 0.1% used marijuana. An Italian study of 1317 general practice patients aged 65–84 years reported that 87.8% used drugs for ‘insomnia, nervousness,
depression or anxiety. Of the 1317 patients, 95.6% were using benzodiazepines, most for more than a year. This study concurs with earlier American data from the Veterans Affairs hospital system suggesting that inappropriately high doses of benzodiazepines were commonly prescribed for older patients.

Comorbid disorders and gender appear to be important predictors of prescription drug use. Finlayson and Davis examined prescription drug use among 100 elderly patients admitted to an inpatient addiction program during a 20-year period (1974-1993) and found that 72% had an alcohol use disorder only, 16% had prescription drug dependence, and 12% had both alcohol and drug dependence. In this sample 35% developed drug dependence after age 60 years. According to the authors, the greatest risk factor for abuse of prescription drugs was being a woman. Swartz and colleagues examined data from the Piedmont Health Survey and reported that benzodiazepine use was predicted by being older, white, female, less educated, and separated or divorced, by having experienced a greater number of negative life events, and by having a psychiatric diagnosis. The potential negative side effect profile and toxicity of benzodiazepines on older adults has been well established. Problems associated with benzodiazepine use include sleep disturbance, cognitive difficulty, and impairment in activities of daily living, motor vehicle crashes, and gait concerns (e.g., accidental falls and fall-related fractures).

In contrast, Robins and Clayton analyzed data from the NHSDA and concluded that older men were more likely than women to report use of sedatives, tranquilizers, and stimulants. The strengths of these conclusions are based on the large sample size inherent in the National Household Survey and the standardized methodology. Moos and associates examined inpatient
treatment records for 1987 from Veterans Affairs medical centers. A total of 98,000 patients had a diagnosis of substance abuse, and approximately 22% (21,139 persons) were age 55 or older.

Of these, 13.7% were diagnosed as having drug dependence or drug-induced psychosis, and an additional 58.2% had a diagnosis of alcohol abuse or dependence. Recommended guidelines defining the appropriate use of sedative-hypnotics in older adults states that prescriptions be intermittent, brief, and for purposes of acute symptom relief. Despite these guidelines, benzodiazepine use in older adults still ranks high. An association may exist between age-related physical morbidity and abuse of medications. Increasing age appears to be directly related to chronic pain and inversely related to acute pain. For example, individuals with arthritis may grow increasingly dependent on pain medications, particularly opiates, and those with sleep problems may be more likely to abuse benzodiazepines. This association may be partly due to difficulties that older individuals have in following and reading prescriptions.

**Screening for Alcohol and other Drugs in Trauma**

Screening is the application of a simple test to a group of persons for the purpose of identifying a subgroup with a certain condition. In many communities, various healthcare organizations sponsor programs to screen for particular illnesses, including breast and colorectal cancer and hypertension, among at-risk groups. Major medical centers in the United States have been urged for the previous two decades to provide toxicology testing of all patients who have significant trauma. In fact, the American College of Surgeons Committee on Trauma lists the ability to do drug screening as essential for certification of level I and level II trauma centers. Studies that have focused on the prevalence of drug testing have shown that 96.8% of level I and
level II trauma centers were capable of doing drug screens, but only 40% of these centers test routinely.\textsuperscript{75}

The purpose of screening hospitalized trauma patients for AOD use is not to place every patient in AOD treatment, but to provide information necessary for appropriate medical management of trauma patients, both in the acute phase of care and in rehabilitation. Another important purpose of screening in this patient group is to identify those whose use of alcohol and other drugs may have contributed to their injuries. Those with underlying substance abuse or dependence can then be referred to appropriate treatment. Different types of AOD screening tools are used; most frequently these are laboratory tests (usually of the blood or urine) or brief oral or written questionnaires. Alcohol and other drug screening in this study are limited to blood alcohol concentration and urine toxicology. There are several retrospective studies on screening prevalence for substance use in the trauma setting. Zautcke et al\textsuperscript{76} showed that the screening rate for adolescents (12-15 year age group) was 30\%. Porter et al\textsuperscript{77} utilized a statewide data base (Pennsylvania) and examined all injured adolescents admitted to a trauma center over a one-year period (1996). In that study of 4309 patients, 50\% of the 12-17 year old group was tested for alcohol compared to 70\% of the 18-20 year olds and 69\% of controls (21-25 years old). Only one study has documented the screening rates for older trauma patients (\geq 65 years) of only 5.2\% and 5.5\% were for the presence of alcohol and other drugs, respectively.\textsuperscript{78}

Summary of Evidence Quality

There is a paucity of studies that focus on the direct relationship between drug use and trauma in older patients. However, a majority of the studies reviewed concentrated on the substance use in the older population in general. They were all cross sectional studies and most had a sample size
of >500. Twenty-one of the studies reviewed were population-based and the 12 were hospital-based. There are no good data on cause-effect because no prospective studies have been performed in this patient population. Furthermore, most of the population based studies are derived from surveys, with its inherent limitations (selection bias and self-reporting) and the hospital-based studies have low generalizability. The overall quality of available evidence on this topic is fair.

METHODS

Methods for systematic review of the literature

We searched the MEDLINE/PubMed database (January 1985 to January 2008) using the following MeSH terms and keywords: “trauma” AND “older adults patients” AND “Substance use” OR “prescription drugs” AND “prevalence” for articles on substance use prevalence. The search was limited to studies of humans from 1990 till present, published in English with an age range of participants of 45 yrs.

We reviewed abstracts for all English language citations in peer-reviewed journals and excluded the following: studies that only included trauma in the elderly without associated substance or prescription drug use, or only blunt or penetrating mechanism of injury; studies without trauma-related health outcomes. Our initial search yielded 35 articles on the prevalence of substance use or prescription drugs on older trauma patients, 17 of which were excluded, 18 articles were reviewed for relevance and quality.
An additional 105 articles from supplementary searches and hand searches of reference lists were evaluated. Owing to the general paucity of studies from our searches, we considered all study designs except case reports, editorials, invited commentaries or letters.

Methods for original research study:

Participants: All trauma patients ≥ 50 years of age admitted via the emergency department and stay for ≥ 24 hours at any of the 15 participating hospitals that report to the North Carolina Trauma Registry and presenting, from January 1, 2000 to December 31, 2006 were eligible for this study. Data on all eligible patients were analyzed. From this database, patients with documented prescribed narcotics for chronic pain and those who may have had narcotics prescribed in the emergency room were included.

Definition of older Adults

Although there are commonly used definitions of old age, there is no general agreement on the age at which a person becomes “old.” The common use of a calendar age to mark the threshold of old age assumes equivalence with biological age. In Britain, the Friendly Societies Act, enacted the definition of old age as, "any age after 50", yet retirement policy schemes mostly used age 60 or 65 years for eligibility. 79 Age classification varies between countries and over time, reflecting in many instances the social class differences or functional ability related to the workforce, but more often than not is a reflection of the current political and economic situation. Many times the definition is linked to the retirement age, which in some instances, is lower for women than men. This transition in livelihood became the basis for the definition of old age which occurred between the ages of 45
and 55 years for women and between the ages of 55 and 75 years for men. The decision to use
50 years of age as the cut off for older adults was based on the above.

**Outcomes:** The outcomes of interest were the prevalence of drug and alcohol testing in the
screened cohort. All analysis was based on the data derived from the North Carolina Trauma
Registry (NCTR). Of the 125 hospitals in the state of North Carolina, twelve level I, II or III
trauma centers and three other non-trauma designated hospitals across the state of North
Carolina report clinical, demographic and outcome data to the NCTR. Information regarding the
prevalence of alcohol and drug use in trauma patients presenting to other hospitals which do not
report to data to NCTR is not available for analysis. The NCTR database does not include
prehospital deaths. The secondary objective is to determine the independent factors associated
with screening in this cohort of older trauma patients.

**Other variables:**

Basic demographic variables such as sex, age, race, Injury Severity Score (ISS),
mechanism of injury and years of screening were available in the database. The database also
included variables of interest regarding substance use screening. The NCTR has fields labeled
"alcohol present" and "drugs present." The potential entries were "yes," "no," or a blank field.
Alcohol and other drug testing were considered performed when the respective fields in the
database were coded as either positive or negative. We assumed that no test was performed if the
fields are blank.

In this study sample, blood alcohol levels were measured using the standard gas
chromatography method across all the hospitals and urine toxicology screens were performed.
The toxicology panel tested for benzodiazepines, opiates, cannabinoids, barbiturates, methamphetamines, cocaine, phencyclidine (PCP), and lysergic acid diethylamide (LSD). The term *substance use*, in this study, refers to alcohol and other drugs that we tested unless individually stated.

**Statistical analysis:** Data is reported only in the aggregate form, with descriptive statistics reported by groups including gender, age, ISS, mechanism of injury and the proportion of subjects who were screened and unscreened. A student’s T-test is used to compare the screened vs. unscreened groups by age, and Pearson Chi-squared tests is used to compare the screened and unscreened groups by gender, race, and ISS. Variables that surfaced as significant (p<0.05) in the bivariate analysis were then entered into a logistic regression model. This model examines the association of the binary outcome “screened/unscreened” (dependent Variable) with the following independent variables: Injury severity score (ISS), race, age and gender. The adjusted odds ratio of screening is reported for each independent variable.

**Results:**

Of the 152,292 patients seen between January 1, 2000 and December 31, 2006, 54,164 patients met the inclusion criteria for this study. Mean Age of this study sample was 71.6 years (range 50-107 yrs); 84.02 % (n= 45,510) of the study population were white and 56.56 % (n=30,643) were female. (Table 1)

A bivariate comparisons of patients screened and unscreened for any substance use revealed significantly different screening rates among racial groups, gender groups, and patients with injury severity scores above 15. When age was stratified in to 3 groups, higher prevalence
of substance screening was noted in the 50-59 year old cohort compared to the older age cohort. As patients got older they were significantly less likely to be screened. (Table 2)

The overall screening prevalence of substance use (either alcohol or drugs) was 17.62% (9543/54,164). Of the entire study group, the screening rate for alcohol was 15.22% (8,242/54,164) and the screening rate for drugs was 9.82% (5318/54,164). The screening rate for both alcohol and drugs together in the same study subject was 7.41% (4018 / 54164). [Figure 1]

The overall prevalence of substance use detected in this study population is 40.9% (3903/9543). [All those positive for alcohol (n=2880) in addition to all those positive for drugs (n=1569) and subtracting those positive for both (n=546) so as not to double count] [Table 3]

Stratified analysis of substance use to determine the independent prevalence of either alcohol use or drug use revealed a prevalence rate for alcohol and drug use of 34.9% (2880 of 8242) and 29.5% (1569 of 5318), respectively. [Table 4 & 5]

Multivariate logistic regression analysis to model screening as the dependent variable was performed. Factors that emerged as significant (p<0.05) in the bivariate analysis [Table 2] were entered into the regression model. Multivariate logistic regression analysis was used to determine factors associated with substance use screening. This analysis revealed that injury severity score, male gender, and minority race are associated with being screened for substance use. Patients with ISS greater than 15 have 2.5 times greater odds (95% CI 2.37-2.63) of getting screened as compare to those with lower ISS. Males have a 1.8 times greater odds of being screened compared to females (95% CI 1.72-1.90). Racial minorities have a 1.5 times greater odds of being screened than Whites (95% CI 1.44-1.61). (Table 6). Increasing age in years is associated with reduced odds of being screened for drugs or alcohol. For year every increase in
age over the mean age, the odds of getting screened is 55% lower (AOR 0.55, 95% CI 0.54-0.57).

| Table 1. Characteristics of adults ≥50 year presenting to hospitals participating in the North Carolina Trauma Registry, n = 54,164 |
| Variable | |
| Age (mean± SD) | 71.6±13 |
| Gender | |
| Male | 23,521 (43.4) |
| Female | 30,643 (56.6) |
| Race | |
| White | 45510 (84) |
| Minority | 8654 (16) |
| Injury Severity Score (mean± SD) | 9.8± 7.7 |
| Injury Severity Score | |
| ISS >15 | 9477 (17.6) |
| ISS≤15 | 44276 (82.4) |
| Screened - substance use | |
| Yes | 9543 (82.4) |
| No | 44621 (17.6) |
| Screened - Alcohol | |
| Yes | 8242 (15.3) |
| No | 45922 (84.7) |
| Screened - Drugs | |
| Yes | 5318 (9.8) |
| No | 48,846 (90.2) |
| Screened - both drugs & alcohol | |
| Yes | 4018 (7.4) |
| No | 50,147 (92.6) |
Figure 1. Flow Chart

North Carolina Trauma Registry
n=152,292

ψ Excluded
n=98,128

Adults ≥50
n=54,164

Screened for Substance Use
n=9,543

Screened
n=44,621

ψAlcohol
n=8,242

Positive
n=2,880

Negative
n=5,362

Drugs**
n=5,318

Positive
n=1,569

Negative
n=3,749

ψ Both
n=4018

ψ All those age <50 years were excluded

† Refer to those subjects tested specifically for Alcohol among those screened for substance use

** Refer to those subjects tested specifically for drugs among those screened for substance use

Drugs tested include: Opiates, Benzodiazepines, cannabinoids, methamphetamines, barbiturates, cocaine, phencyclidine (PCP), and lysergic acid diethylamide (LSD)

§ Refer to those subjects tested specifically for both drugs and alcohol among those screened for substance use. Of those tested, 546 subjects are positive for both alcohol and drugs.
<table>
<thead>
<tr>
<th>Variables</th>
<th>Screened n= 9543</th>
<th>Unscreened n= 44621</th>
<th>P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White (n= 45510)</td>
<td>(14)</td>
<td>(86)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Minority (n= 8654)</td>
<td>(25.1)</td>
<td>(74.9)</td>
<td></td>
</tr>
<tr>
<td><strong>Sex</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Female (n= 30.643)</td>
<td>(39.1)</td>
<td>(60.9)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Male (n= 23.521)</td>
<td>(63.3)</td>
<td>(36.7)</td>
<td></td>
</tr>
<tr>
<td><strong>Age (yrs)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-59 (14,096)</td>
<td>(46.5)</td>
<td>(53.5)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>60-69 (10,198)</td>
<td>(21.3)</td>
<td>(78.7)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>≥70 (29,870)</td>
<td>(9.4)</td>
<td>(90.6)</td>
<td></td>
</tr>
<tr>
<td><strong>Injury Severity Score</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Low ≤15 (44276)</td>
<td>(14.4)</td>
<td>(85.6)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>High &gt;15 (9477)</td>
<td>(37.6)</td>
<td>(62.4)</td>
<td></td>
</tr>
</tbody>
</table>

*p value for difference between screened and unscreened group using Student T-test.
### Table 3. Prevalence of any substance use in the screened older adult cohort, n=9543

<table>
<thead>
<tr>
<th>Variables</th>
<th>Any Substance Use?</th>
<th>p value*</th>
</tr>
</thead>
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<tr>
<td></td>
<td>n (%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3903 (40.9)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Race</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>White (n=7143)</td>
<td>2717 (28.5)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Minority (n=2400)</td>
<td>1186 (49.4)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Female (n=3493)</td>
<td>(28.7)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Male (n=6050)</td>
<td>2899 (47.9)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age (yrs)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>50-59 (n=4459)</td>
<td>2437 (54.6)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>60-69 (n=2174)</td>
<td>850 (39)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>≥70 (n=2910)</td>
<td>616 (21.1)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Injury Severity Score</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Low ≤15 (n=6372)</td>
<td>2576 (40.4)</td>
<td>0.2</td>
</tr>
<tr>
<td>High &gt;15 (n=3090)</td>
<td>1286 (41.6)</td>
<td></td>
</tr>
</tbody>
</table>

* p value for Student T-test comparison between subgroups with a positive screen.
Table 4. Prevalence of actual alcohol use in the older adult cohort, n=2880

<table>
<thead>
<tr>
<th>Variable</th>
<th>Positive Alcohol Screen</th>
<th>P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>n (%)</td>
<td>2880 (34.9)</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White (n=6144)</td>
<td>1986 (32.3)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Minority (n=2098)</td>
<td>894 (42.6)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female (n=2843)</td>
<td>635 (22.3)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Male (n=5399)</td>
<td>2245 (41.6)</td>
<td></td>
</tr>
<tr>
<td>Age (yrs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-59 (n=3964)</td>
<td>1776 (44.8)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>60-69 (n=1940)</td>
<td>652 (33.6)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>≥70 (n=338)</td>
<td>452 (19.3)</td>
<td></td>
</tr>
<tr>
<td>Injury Severity</td>
<td></td>
<td>0.3</td>
</tr>
<tr>
<td>Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low &lt;=15</td>
<td>1902 (35 )</td>
<td></td>
</tr>
<tr>
<td>High &gt;15</td>
<td>952 (34.2)</td>
<td></td>
</tr>
</tbody>
</table>

¥ The total number of patients screened for alcohol n=8,242
* p value for difference between comparison groups using Student T-Test.
### Table 5. Prevalence of drug use in the older adult cohort, n=1569

<table>
<thead>
<tr>
<th>Variables</th>
<th>Positive Drug Screen</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td></td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White (n=3815)</td>
<td>1090 (28.5)</td>
<td>0.0176</td>
</tr>
<tr>
<td>Minority (n=1503)</td>
<td>479 (31.8)</td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female (1892)</td>
<td>481 (25.4)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Male (3426)</td>
<td>1088 (31.7)</td>
<td></td>
</tr>
<tr>
<td><strong>Age(yrs)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-59 (2666)</td>
<td>1090 (40.8)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>60-69 (1203)</td>
<td>277 (23)</td>
<td></td>
</tr>
<tr>
<td>≥70 (1449)</td>
<td>202 (13.9)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td><strong>Injury Severity Score</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low &lt;=15 (3414)</td>
<td>1031 (30.1)</td>
<td>0.095</td>
</tr>
<tr>
<td>High &gt;15 (1853)</td>
<td>519 (28)</td>
<td></td>
</tr>
</tbody>
</table>

*Indicates a statistically significant value (p<0.005) between the subgroups

¥ The total number of older adults screened for drugs use n= 5318
Table 6. Multivariate Logistic regression model for predictors of screening status, n=53,753

<table>
<thead>
<tr>
<th>Variables</th>
<th>Adjusted Odds Ratio*</th>
<th>Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>Ref.</td>
<td></td>
</tr>
<tr>
<td>Minority</td>
<td>1.52</td>
<td>1.44-1.61</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>Ref.</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1.81</td>
<td>1.72-1.90</td>
</tr>
<tr>
<td><strong>ISS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Score (&lt;15)</td>
<td>Ref.</td>
<td></td>
</tr>
<tr>
<td>High Score (&gt;15)</td>
<td>2.50</td>
<td>2.37-2.63</td>
</tr>
<tr>
<td><strong>Age (71±13)</strong></td>
<td>0.55</td>
<td>0.54-0.57</td>
</tr>
<tr>
<td>(Mean±SD)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*each variable adjusted for all the other covariates listed
DISCUSSION

Despite recommendation from the American College of Surgeons and the American College of Emergency Physicians for uniform screening for all trauma patients, the screening rate for substance use among older adults in this study appear low. Although, there is a strong association between substance use and injuries demonstrated in the literature, drug and alcohol testing among patients admitted for traumatic injuries is not routine. In this study population, only 17.6% were screened for either drugs or alcohol showing that compliance with the uniform screening recommendations across age groups is low for the hospitals reporting data to the NCTR. Other research has shown that testing rates for all trauma patients range from 35% to 89% and from 35% to 62% for alcohol and other drugs, respectively.

Despite the low number of patients being screened, the positive prevalence for any substance (alcohol or any of the assayed drugs) was approximately 40% among those screened. Historically, rates of substance use in patients admitted for traumatic injuries exceed those of the general population, with positive drug and alcohol test results ranging from 30% to 40% and from 27% to 47%, respectively. However these rates reflect a preponderance of substance use in a younger cohort of trauma patients.

Among the hospitals participating in the NCTR there appears to be racial and gender bias in testing rates in this older trauma population. Trauma protocols, including the evaluation and management of acutely injured patients, are racially, ethnically, and age neutral and so differences in care between trauma patients of different racial and ethnic and age groups represent variations from expected care. Our analysis demonstrates higher rates of substance testing among racial minorities and men when compared to whites or women upon presentation to North Carolina trauma centers that report data to NCTR. According to the 2002 National
Survey on Drug Use & Health (NSDUH) Whites were more likely than any other racial/ethnic group to report current use of alcohol in 2002. An estimated 55.0% of whites reported past month use. The next highest rate was for persons reporting two or more races (49.9 percent). The lowest current drinking rate was observed for Asians (37.1 percent). The rates were 39.9 percent for blacks, 44.7 percent for American Indians/Alaska Natives, and 42.8 percent for Hispanics. While national data show that drinking prevalence is highest among whites, in our study whites were tested less for alcohol consumption when compared to their minority counterparts. A previous study from a single institution found that Black and Hispanic patients were tested for drugs more frequently than Caucasians, but this analysis did not adjust for demographic, physiologic, or diagnostic variables that may affect the rate of drug screening. Our findings are consistent with this study and demonstrate a non-universal screening process at the hospitals participating in NCTR. The practices of NCTR reporting hospitals seem inconsistent with known national prevalence rates. By these standards, Caucasians would be more likely to receive at least alcohol screening.

Despite the use of trauma treatment protocols, minority patients presenting with acute injuries may be at particular risk of receiving differential testing because of the ethnic, racial, and socioeconomic differences in trauma epidemiology. Racial and ethnic assumptions notwithstanding, of those screened in this study population, males are more likely to test positive for substances. In general, women are tested for alcohol and drugs less often than their male counterparts, and are less likely to have a positive test result for either. These gender-based assumptions lead to non-universal screening for substance use.
Assumptions that older individuals have lower likelihood of drug use and may explain not only the lower testing rates in our study sample, but also the reduction in testing rates in the older subgroups. Of note, patients in the high injury severity category demonstrate higher rates of testing. We speculate that physician perception of patients would likely have its greatest impact on patient testing in this group; as patients with minor injuries would have a low likelihood of requiring testing for treatment. Patients with extensive injuries would more likely receive alcohol and drug testing as routine to rule out interactions between possible substances and therapeutic methods. Paradoxically, in this study, the prevalence of substance use was higher in the low injury severity category, suggesting that, though the association of substance use with traumatic injury is strong, a positive screen does not wholly determine or independently predict injury severity. In addition, patients with less extensive injuries retain the ability to communicate and this may certainly influence clinical decision making and protocol adherence, thus leading to selective testing based on physical examination and clinical clues.

While several investigators have found less aggressive diagnostic workups for minority patients in a variety of clinical circumstances, these findings perhaps do not apply in alcohol and drug testing. There are possible punitive ramifications of positive alcohol and drug tests results. This same legalistic nature does not exist with other medical testing. It has been shown that patients labeled as alcohol or drug users often receive differential care from hospital staff. This increased rate of testing of minority patients would likely raise the number of positive test results in this population, thereby resulting in more minority patients labeled as “users” and subsequently placing them at risk of receiving prejudicial treatment. Alternatively, it has been demonstrated that testing for alcohol among injured patients may, in fact, be in the patient’s best interest. Several studies have demonstrated that the finding of a positive alcohol
test on admission may represent a “teachable moment” and may reduce future alcohol related injuries. As such, it may indeed be the white patients who are receiving suboptimal care in this regard. Regardless, the data suggest that universal and uniform screening is the best option for providing equal care. In addition, current screening practices are not operating according to evidence based practice as there are few studies have had the opportunity to evaluate a cohort that had universal substance screening.

This study confirms that the current level of commitment to universal substance screening in trauma patients does not give an accurate picture of substance use/abuse among older adults. The implementation of the policy of universal substance screening will allow for the study of the impact of substance use in this population group. Patients identified to be substance users in the trauma setting and recidivist can be offered counseling and rehabilitation. Universal substance screening in trauma will allow for prospective studies to identify high risk groups. We need further research to further elucidate the reasons for race, age and gender differential testing.

Study Strengths and Limitations

The major strength of this study is the size of the study population. Furthermore, our statistical analyses adjusted for many confounding variables (race, gender, injury severity and mechanism of injury) that affect rates of alcohol and drug testing. There are, however, several limitations to this study. Although the NCTR provides detailed instructions and guidelines for data collection, the validity and accuracy of the data are not established. Assumptions are made regarding missing screening data points, particularly where the field is blank, we assumed that no testing was done; the ability to determine the true status is limited in this data set.
It should be noted that the race recorded in the NCTR is not self-reported, but rather it is administratively assigned (coded by hospital staff). As such, these classifications may not correlate with patient self-categorization. Our data set, consequently, categorizes patients in the way that healthcare professionals may perceive these patients. The race data collected in the NCTR is more relevant for exploring race-based biases than would be patient self-reporting. In addition the racial category data were collected in limited groups (White vs. Minority). This consolidates the all minorities into one category when in fact there are larger differences between racial minorities and their respective access barriers. Collection of race and ethnicity data should be universal, standardized, and self volunteered. Findings, such as the increased alcohol testing rate in racial minorities which include Hispanics, may be influenced by such unmeasured variables as language barriers that could cause an increase in testing due to an inability of the physician to use language cues in their assessment of the patient.

Prescribed and over-the-counter medications can yield positive results that cannot be differentiated from illicit drugs in our dataset. For those that tested positive, a full drug history was not available to us to determine the potential for cross reactivity of the immunoassay for urine toxicology with other medications. Blood alcohol concentration (BAC) measurement is certainly more reliable with very rare false positives. Not all illicit drugs appear on toxicology panels. In addition, opiates and benzodiazepines are the two most common therapeutic medications administered in the trauma setting. It is possible that these drugs may contribute to the increase in substance use prevalence in this study population, as protocols in timing and collection of urine specimens in trauma settings may vary in hospitals reporting to the NCTR. In
this study, patients were screened for substance use with BAC measurement and urine toxicology assays; blood toxicology and urine alcohol levels were not performed to corroborate substance use status.

There is selection bias in this cohort as it consists of only those patients presenting to twelve Level I, II and III trauma centers and three other non-trauma designated hospitals that report data to the NCTR. Unfortunately, the NCTR is not truly representative of the entire older trauma population in the state of North Carolina, accounting for only 15 of the 125 hospitals in the state. In addition, in this retrospective study, the lack of data regarding the patient’s presenting status and clinical features (e.g., whether alcohol was smelled on the breath of the patient, or whether alcoholic beverages or illicit drugs were found at the scene of the trauma), which may play a role in determining which patients are tested, limits this analyses. We also could not differentiate between first testing for substance use as opposed to repeated testing that may have been initiated based on review of medical records showing past positive tests.

Finally, the screening rate in this study population is very low compared to other trauma population groups, with a dataset that is not representative of the state based on race and gender or hospital of presentation, hence these finding may not be generalizable to other states or indeed the country as a whole. A similar study using a more representative dataset e.g., National Trauma Data Bank may result in a generalizable conclusion.
Addendum to Discussion

Barriers to Alcohol and Drug Screening

Health care Providers

Health problems are highly prevalent among older substance-using adults; many of them have regular contact with medical services. Primary care and other healthcare services therefore provide a valuable opportunity to screen this group. However, despite their regular contact with healthcare professionals, substance use disorders among older persons are often missed or misdiagnosed. Physicians often fail to recognize elderly substance abuse for many different reasons namely, lack of awareness and failure to perceive the importance of substance abuse in the elderly, failure to obtain and/or record accurate drug histories, reluctance to ask potentially embarrassing questions and lack of initiation of any action regarding an older adult's substance use and embarrassment by the physician at the idea of suggesting that his/her elderly patient be screened for abuse. The physician who prescribes medication, the patient for whom the medication is prescribed, the patient’s pharmacist, and the caregiver of the patient, who may be dispensing or monitoring the medication, all play a part in potentiating drug misuse, with the potential for increasing prevalence and traumatic sequelae.

Health Insurance law and Reimbursement for medical care

Thirty two states and the District of Columbia have laws that explicitly allow insurers to use alcohol exclusions in reimbursement of rendered medical care (Alabama, Alaska, Arizona, Arkansas, California, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Kansas, Kentucky, Louisiana, Maine, Mississippi, Missouri, Montana, Nebraska, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, West...
Nine states prohibit insurers from using alcohol and other drug exclusions (Connecticut, Colorado, Iowa, Maryland, Nevada, North Carolina, Rhode Island, South Dakota and Washington).

Nine states implicitly allow insurers to use alcohol exclusions (Massachusetts, Michigan, Minnesota, New Hampshire, New Mexico, Oklahoma, Utah, Vermont and Wisconsin). Because these states do not have a specific law related to exclusions, courts have ruled that, in the absence of explicit laws, insurance companies can sell policies that use exclusions to limit liability. Court rulings vary by state, with some being more lenient (requiring proof only of alcohol use prior to injury) and others being more strict (requiring proof of a casual relationship between the use of alcohol and the injury).

The Uniform Accident and Sickness Policy Provision Law (UPLL), was promulgated by the National Association of Insurance Commissioners some five decades ago for the benefit of insurance companies.¹⁰³ UPLL is a legal statute that allows insurance carriers to exclude coverage for alcohol and other drug-related injuries. This means that insurers shall not be liable for any loss sustained or contracted in consequence of the insured’s being intoxicated or under the influence of any narcotic or intoxicant unless administered on the advice of a physician.¹⁰³

The UPLL decision to reimburse in alcohol-related injury is based on the presence or absence of a blood alcohol concentration. Any positive BAC is considered a positive screen. The legal limit of 0.08g/dl does not have to be reached to determine positivity. UPLL is only limited to commercial insurance companies.¹⁰³

Based on the above, knowledge of insurance laws within each state may influence provider or hospital decision to institute substance use screening for trauma patients regardless of guidelines as reimbursements may be compromised by screening. In states with exclusion laws,
this is one of the greater disincentives to alcohol and other drug screening in trauma patients may lead to less testing. Medicare and Medicare will reimburse cost of care, screening and brief intervention for alcohol and drug related injuries.

**Benefits and Costs of Screening**

The overall benefits of alcohol and other drug (AOD) screening in at-risk populations are well known. Identifying and treating substance use problems greatly benefit patients and their families. These benefits extend to all patients, both adolescents and elderly and include improvements in overall patient health status and in family emotional health. The screening process frequently identifies AOD problems early in their development. Early prevention and intervention efforts with at-risk populations have long-term benefits that are difficult to calculate. In weighing the costs and benefits of any AOD screening program, the availability of resources to address the problems identified through screening must be considered. Ideally, efforts should be made to match each patient to an appropriate mode of treatment. The efficacy and availability, as well as the costs, of various modes of treatment must therefore be taken into account when costs and benefits are analyzed.

About 1.48 million persons with traumatic injuries were admitted to trauma centers and hospitals in 2007. Many of these patients recover from their injuries but some are reinjured. In a retrospective population-based analysis by Worrell et al., re-injury rates were 0.09% over five years. One of the main objectives of substance screening among trauma patients is to reduce reinjury and its associated costs, both personal and economic. Other benefits of substance screening among injured patients with AOD problems include better medical management of hospitalized patients, safer and more effective pain management, and improvements in aftercare.
planning and treatment\textsuperscript{111} and increased probability of compliance with physical rehabilitation or other follow-up care and prevention of future AOD-related injuries.\textsuperscript{112}

It should also be noted that widespread implementation of AOD screening among injured patients will generate important data about the scope of the problem of AOD-related injury and its long-term costs to society. Such data can be used in public education efforts and to pursue increased funding for alcohol and other drug abuse treatment. The cost of the urine toxicology is $261 for the panel of drugs listed above\textsuperscript{113} (adjusted for inflationary trend at 3\%\per year since 2001). The direct cost of a BAC is valued at $15 based upon the current Medicare allowable fee schedule in 2000.\textsuperscript{114}

**Legal and Ethical Issues in Alcohol and Drug Screening**

By signing a general medical consent form in an emergency department, a patient gives consent to receive diagnostic and screening tests that are deemed necessary to the management of the presenting problem.\textsuperscript{115} In situations when a patient is incapacitated and cannot sign, it is permissible for treating personnel to proceed with any measures deemed necessary to provide medical treatment.\textsuperscript{116} Thus, in order to gain information that will affect the patient's medical management, a physician can order a blood alcohol concentration (BAC) and a urine drug screen for a patient who arrives at the emergency department with traumatic injuries. Additional specific consent does not have to be obtained from the patient for these tests.\textsuperscript{117}
Like many other medical interventions, screening for AOD abuse necessarily entails some degree of encroachment on an individual's privacy. Whether screening is done by laboratory testing or administration of a behavioral questionnaire, information about the individual is being gathered that pertains to his or her lifestyle and personal habits. When this information is shared with other caregivers, the individual's confidentiality is also affected. These are generally intended to be in the interests of the patient, whether for the medical management of the presenting condition or to encourage the acceptance of treatment for substance abuse and dependence. It is common for people with AOD problems, however, to face social stigmatization and discrimination when these problems become known to others.118

It was partly the unfortunate consequences of stigmatization that gave rise to Federal regulations and laws protecting information related to patients' AOD abuse.119 Although healthcare staff need to have all of the information relating to a patient's medical care, this need must be weighed against the potential consequences to the patient of having his or her privacy impinged upon by dissemination of that information to others. Caregivers are obligated to obtain, share, and safeguard AOD-related information appropriately. This obligation is both ethical and legal in nature.115 The importance of protecting a patient's privacy cannot be overemphasized.

Unfortunately, despite efforts to educate the public about the nature of substance use disorders, they remain socially stigmatizing conditions, and patients often face adverse consequences when information about substance use is disclosed. Such a patient, for example, may find it difficult or impossible to obtain insurance coverage for hospitalization costs if it is made known that his or her traumatic injuries were related to alcoholism. In turn, these adverse consequences may discourage patients with AOD problems from seeking treatment.
Recommendations

To identify the magnitude of the problem of substance use disorders in the elderly population, diagnostic criteria must be made more appropriate for with older persons. Current data collected annually by the National Survey on Drug Abuse should be analyzed to provide more accurate estimates of drug abuse trends among baby boomers. Elderly persons have high rates of poor compliance with recommended use of medications. Thus increased attention should be paid to standardized prescription labels printed in large type, and more research should focus on medication compliance in this group.

Change Perceptions

The perception that drug abuse is not a problem among older adults continues to exist. Most of the research emphasis is on younger populations, without appreciation of the unique problems presented by the elderly drug. The time to develop a treatment infrastructure that is sensitive to problems of older drug users is now. Awareness of the problem of drug abuse in the older adult population must be increased through education of both professionals and the public.

Change Insurance Statutes

At least 12 states, including North Carolina, have specifically chosen not to adopt the model law giving insurers statutory authority to write policies excluding coverage for injuries caused by alcohol and drug use. Coverage for care is ever changing and extremely confusing for patients and physicians alike. The existence of even one company that routinely excludes coverage affects how physicians treat all patients. A change in the regulatory statutes would be the clearest method to guarantee that coverage is not denied. Given accumulating evidence to
support substance screening in the trauma setting, a variety of expert and consensus group panels have concluded that the scientific basis for their routine screening hospitals and emergency departments has been established, and it is time to move towards national implementation and abandon the practice of excluding coverage for "preexisting" conditions.

**Segregate information about substance use in the Medical Record**

Information about substance use screening, intervention, and referral can be kept in a separate part of the medical record, access to which is restricted. A "gatekeeper" familiar with confidentiality and substance abuse issues could be assigned to make decisions over release of this information. This method would give greater control over access to this information but may make it so inconvenient that the providers caring for the patient never use it.

**Educate Physicians**

Sheridan ¹²¹ identified actions by health professionals that contribute to the problem of substance use and prescription drug abuse and misuse: (a) inaccurate diagnosis, (b) inaccuracies in drug treatment, (c) Polypharmacy, including failure to consider drug interactions, and (d) deliberate overmedication, particularly in elderly institutionalized, psychiatric patients. Simple improved screening procedures could be implemented through adequate monitoring of repeated prescriptions, and/or prescription of multiple medications. At least some of the problems with prescription medication in the older adult may be related to physician misinformation or lack of information. Education of health professionals about the problem of drug misuse and prevention of the causes noted above is one approach to prevention.
Opportunity for Intervention

Brief alcohol and other drug interventions in trauma patients have been shown to reduce subsequent alcohol intake and injury recidivism.122,123 Current recommendations to provide brief interventions to trauma patients are based on a number of factors. They capitalize on a “teachable moment,” wherein the health care worker can moderate the conceptual link between drinking and its consequences at a time when the consequences are obvious. Patients with alcohol problems may not seek alcohol treatment but often receive treatment of medical conditions related to their drinking. Injuries are the most common condition for which patients with alcohol problems seek medical attention.124 Alcohol interventions in trauma centers may also provide an opportunity to initiate care before problems progress to a more severe stage, requiring more costly and intensive treatment and medical services.42 Alcohol also plays such a major role in causing injuries that injury-prevention programs are unlikely to be successful if hazardous drinking is not addressed. Under this model universal screening and identifying individuals that test positive for substance is the first step in an interventional model and without such screening there are patients that are not accessing perhaps needed services. Further investigations are needed regarding cost implications and interventions to encourage rehabilitation in the outpatient setting rather than merely managing trauma acutely in substance users.

Conclusion

Substance abuse by older adults is a problem that is not well understood or described and requires further exploration and empirical research. Older adults who misuse drugs are in danger of serious physical consequences, namely, trauma. The stereotypes of the young adult drug abuser preclude attention to the older adults who misuse alcohol and other drugs including,
psychoactive drugs to alter reality. Drug misuse and abuse can be prevented to some extent by education of health professionals and elders as well as by clinical interventions to structure medication self-administration while at home. There is very little empirical information about the scope of the problem of drug misuse and substance abuse in the older adult and many unanswered questions remain.

Alcohol and drug use remains a major comorbid factor in trauma in the older adult, and that injury prevention efforts should include a strong focus on counseling regarding these lifestyle choices.

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Substance Use and Trauma: A Global Perspective

There is a considerable amount of data in the literature regarding the association between alcohol and traumatic injuries. Data on global substance use comes from a number of sources, including population surveys, health-service data, and policy documents and for illegal drugs, from data on drug seizures, drug related crime and deaths. The true extent of global substance use is unknown, as it is, by definition, hidden in the population.\(^1\) The combination of alcohol use and the use of other drugs can have a synergistic effect, increasing the likelihood of injury, whether intentional (e.g., self-inflicted or related to violence) or unintentional (e.g., motor vehicle accidents, poisonings, falls, fires and others), causing disability and increasing caseloads worldwide.\(^2\)

The 2008 World Drug Report (United Nations Office on Drugs and Crime, 2008) estimates that approximately 208 million people or 4.9% of the world’s population aged 15 to 64 have used drugs at least once in the last 12 months. This figure has remained relatively stable since 2004. The monthly prevalence of drug use is approximately 112 million (2.6%). Rates of problem drug use remains at about 0.6% (26 million people) of the global population aged 15 to 64. Cannabis, consumed by close to 166 million persons, continues to be the most prevalent of all illegal drugs used. Amphetamines are the second most widely used drugs and over the 2006/07 period 25 million people are estimated to have used amphetamines (including methamphetamine) at least once in the previous 12 months, about the same as a year earlier. An estimated 9 million people used ecstasy over the 2006/7 period, up from 8.6 million in 2005/06. Mortality statistics show that illicit drugs claim about 200,000 lives a year.\(^3\)
Toxicological studies have shown that drug use prevalence varies according to the population studied. In severe injury situations, cannabinoid levels range from 7 to 37%, cocaine levels from 8 to 12% and benzodiazepine (BZD) levels from 4 to 8% worldwide. In adolescent populations, however, these levels range from 6% to 7.5% for cannabinoids, 8% for cocaine, 6% for BZDs and 9% for alcohol. In psychiatric patients treated in the ER, the prevalence is even higher when compared with other populations studied, with levels of 12.8% for cannabinoids, 38% for cocaine and 7.6% for BZDs.

More than 1% of the global population aged 15-64 years abuse opiates (including heroin) and the same percentage again abuse cocaine. Use of ecstasy, cannabis and opiates is more prevalent in Asia compared to other continents and regions. Moreover, alcohol consumption rates are increasing, mainly in developing countries and binge drinking in young people is also of concern.

There is a dearth of studies looking specifically at the use of alcohol and other drugs in the older trauma population worldwide, particularly in the developing world. This may be, in part, due to the limited research capacity in most of the world In addition, the life expectancy in developing nations is uniformly less than 50 years of age. Furthermore, the burden of trauma not only varies depending on locations but the alcohol and other drug related traumatic events depend on the baseline drug use characteristics of the studied population.

Motor vehicle trauma has been reported to be associated with over 300,000 deaths annually on a global scale. Up to 25% of accidents involve drug affected drivers, and the commonest agent implicated is frequently cannabis which is said to be implicated in up to 32% - 46% of cases. The population frequency of drug driving has been found to be about 4% in both Australia and
the USA. Cannabis has been reported as featuring prominently in drug driving incidents in many nations including Sweden, Spain, Italy, Netherlands, France, USA, Australia, and from multinational collaborations.

**South America**

Traditional alcoholic beverages have been used in Brazil for many years (e.g., the Brazilian Indians used cauim, an alcoholic beverage obtained by fermenting maize). Sugarcane was also readily available and was distilled to produce ‘cachaca or pinga’. Another drug used by Brazilians that is local to the region is coca paste, which researchers speculated is more serious problem than cocaine use. However, since then there has been an increase in the prevalence of cocaine use, from 0.4% of the population aged 12-65 in 2001 to 0.7% in 2005. Research on alcohol use and abuse in Brazil has tended to focus on select communities, such as students, or indeed is confined to certain regions of Brazil. In fact, research indicates that the type and extent of drug use and misuse varies by geographical region in Brazil.

In Brazil, data on associations between injuries and substance use in ER patients remains limited and specifically focused on alcohol consumption. In 1989, Chaves et al. made observations based on detectable blood alcohol levels in 593 patients, victims of traffic accidents treated in an ER and found that 24.5% presented blood alcohol concentrations (BACs) that reached the level of positivity. In another study, also involving victims of traffic accidents, performed in the city of Curitiba in 2000, 42.85% of those assessed presented such BACs. Kerr-Corrêa et al. examined the medical records of 519 patients hospitalized with injuries and found that alcohol abuse/dependence was a factor in 12% of the cases.
In the first national survey on the use of psychotropic drugs, carried out in 107 Brazilian cities throughout 2001 by the Brazilian Information Center on Psychotropic Drugs, the prevalence of everyday drug use was 19.4% (95% CI: 16.6-22.1), and cannabis was the drug most often cited (6.9%; 95% CI: 5.2-8.6). An additional 3.3% of the sample reported having fallen as a result of using psychotropic substances, and a nearly equal proportion (3%) reported having injured themselves under the same circumstances. Cannabis dependence was reported by 1% of those interviewed, translating to 451,000 individuals. Surprisingly, the southeastern region of Brazil, where the city of São Paulo is located, presented the lowest estimate of cannabis dependency (0.7%), whereas the highest percentage (1.6%) was seen in the southern region.

In the same survey, the lifetime use of alcohol in the southeast region of Brazil was found to be 71.5% and alcohol dependence was found to be 9.2%, whereas BZD dependence was found to be 0.8% and the lifetime use of cocaine was found to be 2.6%.

Africa

Traditional alcoholic beverages have been part of the social and religious life of Sub-Saharan Africa for many years. However it is thought that alcohol use became more problematic with the introduction of western beverages during the slave trade when rum was bartered for slaves. Unlike alcohol, which has been available for a long time, other substances are relatively new (e.g., cannabis). Africa, while relatively drug free until the 1980s, the globalization of capital has been linked with increased drug availability across sub-Saharan Africa, drug trafficking across the continent, and the emergence of criminal gangs to conduct such trade. Apart from cannabis abuse in northern and southern Africa and khat chewing in north-eastern Africa, the history of drug abuse in Africa is relatively short. The abuse of drugs in Africa is nevertheless
escalating rapidly from cannabis abuse to the more dangerous drugs and from limited groups of
drug users to a wider range of people abusing drugs.

Alcoholism and multiple drug abuse have been associated the alarming rate of crime and
violence in South Africa. There has been an increase in access to drugs among adolescents. The
widespread availability of drugs and drug use in most of South Africa has heightened young
individuals' participation and exposure to violence. It is estimated that up to 30% of general
hospital trauma admissions in South Africa are directly or indirectly related to alcohol use. A
clinical assessment of hospital admissions found alcohol to be a contributing factor in general
trauma cases: in 38% of the admissions in the Cape metropolitan area and 49% in rural
communities alcohol was found to be a contributing factor. 48% of trauma patients admitted to
the casualty department of the Chris Hani Baragwaneth Hospital in Soweto on a Saturday night
were found to be intoxicated. 20

Almost 80% of all assault patients - both male and female - presented at an urban hospital
Trauma Unit in Cape Town were either found to be under the influence of alcohol or injured
because of alcohol related violence. 58% of people fatally injured in train related trauma (who
either fell from or walked in front of trains) in Cape Town had high blood alcohol
concentrations. 60% of pedestrians involved in collision traumas on the road and then treated in
a hospital trauma unit were found to have high blood alcohol concentrations. Over 50% of those
who had died by drowning in greater Cape Town, over a ten year period, were found to have
high concentrations of alcohol in their blood stream. 20

Europe
In Spain, alcohol has been the most extensively studied psychoactive substance, and is the only one for which the prevalence of use among non-fatal traffic casualties is known. No information is available on the recent use of illicit drugs or factors associated with their use in non-fatal road traffic casualties. The increasing use of medicinal and illegal drugs, particularly cannabis, for recreational purposes has created a problem for road traffic safety because its use affects the central nervous system and has the potential to impair driving ability.

Cannabis was the most common illegal substance used by road crash casualties, as reported in the literature. In Europe it has been estimated that the prevalence of cannabis use by injured car drivers varies from 3.3% to 10%, and two reviews of studies from European and non-European countries reported prevalence of 5–16.9% among non-fatally injured drivers, and 4–14% among injured or fatally injured drivers.

The prevalence of cocaine use by drivers was 6.0%, which lies within the range reported in the literature, 0–9% among injured drivers. In a study conducted in France, Mura et al. reported an increase in 2003–2004 in the prevalence of illegal substance use, particularly cannabis (28.9%) and cocaine (3%), among fatally injured car drivers under 30 years of age, compared with 2000–2001. Among injured car drivers less than 30 years of age in Mura et al’s study, the prevalence of cannabis and cocaine use was 18.3% and 15.0%, respectively.

The high prevalence of psychoactive substance use among road traffic casualties seen in Emergency rooms, particularly drivers and pedestrians, confirms the need for strategic planning at various levels. At a political and legislative level, it would be fitting to strengthen law enforcement, as well as random roadside drug and alcohol testing. On-site roadside testing of oral fluid may be an efficient procedure for detecting drivers under the influence of drugs.
Moreover, roadside testing should not be restricted to stereotypes, such as young male drivers at night or the weekend, because the prevalence of substance use was found to be high in all types of user regardless of age, with patterns of use that vary depending on the substance.\textsuperscript{27}

**Global Injury Prevention efforts**

The lack of attention to injury is partly caused by the fact that populations and governments regard injury as fundamentally different from other diseases. It is believed that injuries are caused by carelessness or bad luck and that little can be done to prevent them. Much can be done, however, to lower rates of death and disability from injury by addressing the spectrum of injury control, including surveillance, prevention, and treatment.

All too often injury prevention is misconstrued as merely admonitions to be careful. It is a scientific field like that used to control any other health problem, however, a scientific field that (1) seeks to understand the extent and characteristics of injury through surveillance and research; (2) identifies risk factors; (3) targets these risk factors through well-developed and scientifically based prevention efforts; and (4) evaluates the results of such prevention efforts so as to know which efforts are successful and, hence, should be continued and scaled up, and which efforts are not succeeding so that they can be amended or discontinued.

At prevention level, it would also be useful to incorporate screening for use of psychoactive substances in routine medical practice, primary care, traumatology services, and, particularly, Emergency rooms. Identification of at-risk people in the emergency setting is important for their possible referral to specialized services and to provide them with brief counseling, particularly as people are especially receptive to such counseling after being injured in a motor vehicle crash. In the case of alcohol misuse, such intervention has shown positive results in some studies.\textsuperscript{28,29} This
type of intervention has already been applied to traffic casualties involving alcohol in many
developed countries around the world, but its implementation can be difficult in developing
countries, mainly for infrastructure-related reasons.

Injury is a major global health problem. Much can be done to lower the rates of injury-related
death and disability by addressing the spectrum of injury control, including surveillance,
prevention, and trauma care. There is room for improvement in the application of scientifically
based, proved interventions at all points in this spectrum in all countries in the world. Likewise,
improved organization and planning for trauma care services needs to be better applied in most
countries.

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