

The Problem of Substance Use and TBI

Who is at risk for developing a substance abuse problem after TBI?

How many people who have traumatic brain injuries are intoxicated at the time of injury?

How common is a history of substance abuse before the injury?

How common is TBI among persons receiving substance abuse treatment?

1. Who is at risk for developing a substance abuse problem after TBI?

Many people who incur a traumatic brain injury have a substance abuse problem prior to their injury. As a result, it is not surprising that a number of people after they have had traumatic brain injury also have a substance abuse problem. Adolescents and adults who are hospitalized for traumatic brain injury are much heavier drinkers than their peers who have not incurred a TBI. However, for traumatic brain injury as well as for other injuries, there is often a "honeymoon" after the injury when the amount of drinking stops or reduces (Bombardier, Temkin, Machamer & Dikmen, 2003; Corrigan, Lamb-Hart & Rust, 1995; Kreuzer, Doherty, Harris & Zasler, 1990; Krueutzer, Witol, Sander, Cifu, Marwitz & Delmonico, 1996).

A few studies of persons with traumatic brain injury have found that alcohol use gets worse in the period 2 to 5 years after the injury and that unless something is preventing them, many resume their prior levels of alcohol and other drug use (Corrigan, Rust et al., 1995; Kreutzer, Witol et al., 1996; Kreutzer, Witol et al., 1996; Corrigan, Smith-Knapp et al., 1998). Situations that limit resuming use include having to live in an institutional setting where alcohol and other drugs may be less available, or living under closer supervision of family members who help the individual consume less. Of course, use may reduce or stop if the individual is provided information about the effects of alcohol and other drugs after traumatic brain injury or, for people with actual substance abuse problems, being provided treatment.

In addition to the large number of individuals who had a substance use disorder

before their injury and return to those levels after, some studies have indicated that between 10% and 20% of persons with traumatic brain injury develop a substance use problem for the first time after their injury (Corrigan et al., 1995; Kreutzer et al., 1996). Thus, taken together, it is a very high proportion of individuals who have been hospitalized for traumatic brain injury who will be at risk for developing a problem after their injury — either because they had one before or because of the vulnerabilities created by the injury itself. "Substance abuse is a risk factor for having a traumatic brain injury and traumatic brain injury is a risk factor for developing a substance abuse problem."—John Corrigan

2. How many people who have traumatic brain injuries are intoxicated at the time of injury?

At least 20% of adolescents and adults who are hospitalized and at least 30% of those requiring rehabilitation are intoxicated at the time of their injury. It is not surprising that there is a significant link between being intoxicated and incurring a serious injury. Whether because of diminished motor control, blurred vision, poor decision making or greater vulnerability to being victimized, a number of persons incur a traumatic brain injury while they are intoxicated. There is a lot of information available about how susceptible to injury people are when they have blood alcohol levels that exceed the legal limit. There is every indication that other drugs also put people at risk for injury. Three studies that have provided estimates of the number of people intoxicated at the time of their injury are shown below:

In persons hospitalized:

Colorado TBI Surveillance and Follow-up System: 21% BAC .08 (n=2,151 hospital admissions in Colorado 16 years old).

In persons treated in rehabilitation:

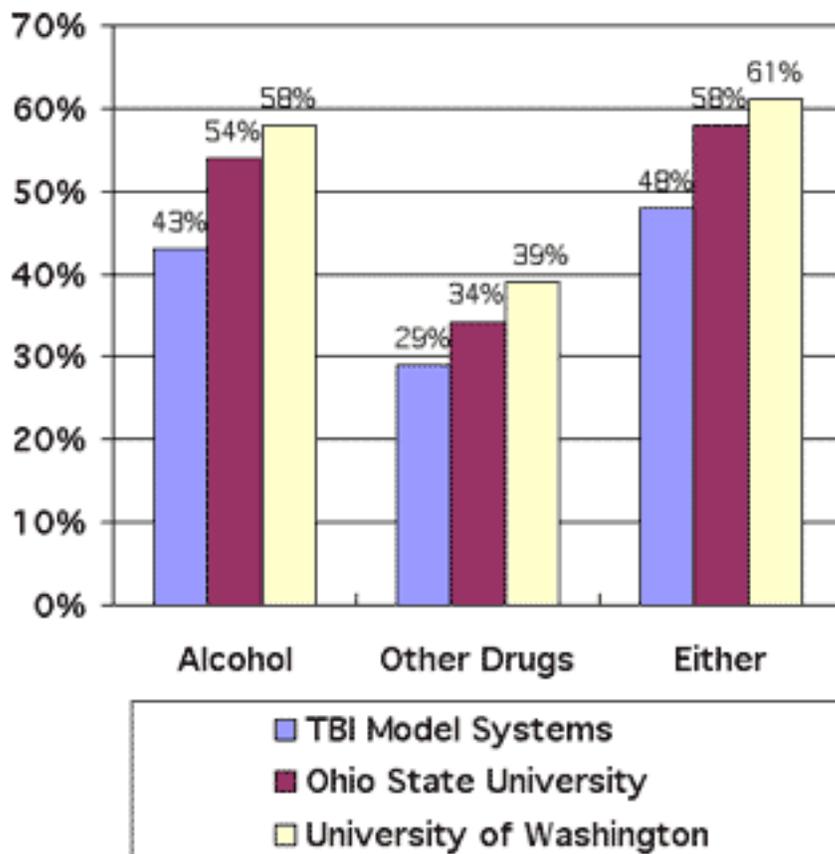
TBI Model Systems: 37% BAC .10 (n=3,893 admissions to Model Systems acute rehab centers).

OSU Suboptimal Outcomes Study: 25% BAC .10, 12% + drug screen, 32% either (n=356 consecutive admissions for acute rehab).

3. How common is a history of substance abuse before the injury?

Corrigan (1995) reviewed published literature on persons with TBI who were intoxicated at time of injury and those who had a prior history of substance use disorders, whether or not they were intoxicated. Based on articles reporting these variables, having a prior history of substance abuse was more common

than being intoxicated at the time of injury. Additionally, clinicians and researchers who used screening tools during the hospital stays found significantly higher rates than those who relied on later medical record review. This result suggests that more people will be identified if a systematic method of inquiring is used; rather than counting on patients to volunteer information or relying on reports of intoxication at injury. Since that review, there are several additional sources of data on the frequency of prior substance use disorders in adolescents and adults treated in acute rehabilitation. Results from the following articles are graphed below:



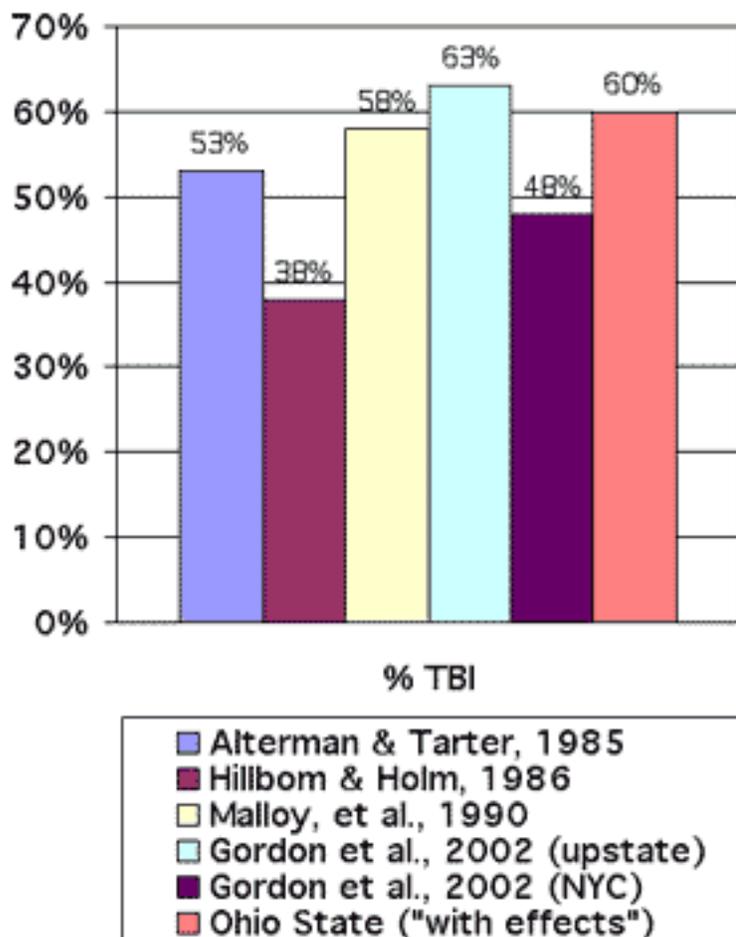
- TBI Model Systems National Database (n=1,262; Corrigan et al., 2003): 43% problem alcohol use or worse, 29% illicit drug use, 48% history of either;

- OSU Suboptimal Outcomes Study (n=356 consecutive admits to acute rehab): 54% alcohol abuse or worse, 34% other drug abuse or worse, 58% history of either;
- University of Washington (n=142 consecutive admits to acute rehab, Bombardier, Rimmele & Zintel, 2003): 58% at-risk alcohol use or worse, 39% recent illicit drug use, 61% history of either.

For adolescents and adults who require inpatient rehabilitation—as many as 60% may have a prior history of substance use disorder.

4. How common is TBI among persons receiving substance abuse treatment?

While there has not been a definitive, population-based study of how many individuals receiving treatment for substance abuse problems have incurred traumatic brain injuries, a collection of studies in the last 20 years suggests that it may be as high as 50%. The studies are summarized below and their results are graphed in the accompanying figure. The lowest rate observed was 38% of persons in treatment, the highest was 63%. Visual inspection of the graph supports an estimate of 50%, if not more.



Articles included in graph (below)

- Alterman & Tarter (1985) found 53% of a sample of 76 male alcoholics had histories of TBI.
- Hillbom & Holm (1986) found 38% of a sample of 157 alcoholics had a history of TBI with loss of consciousness or hospitalization.
- Malloy, et al. (1990) found 58% of a sample of 60 alcoholics had TBI marked by loss of consciousness, hospitalization, or major neurological change.
- Gordon et al. (2002) found 63% of 243 clients screened in 13 publicly funded programs in upstate NY had TBIs; 48% of 404 screened in 12 facilities in NYC.
- At OSU, 119 clients in residential treatment, intensive outpatient or ambulatory detoxification at a publicly funded substance abuse facility:
 - 68% 1 TBI with loc 5 minutes, or required ER visit or hospitalization;

- 35% 1 TBI with loc 1 hour or requiring hospitalization;
- 60% 1 TBI with early effects that did not persist at time of interview;
- 53% 1 TBI with early effects that persisted at time of interview.

The Effects of Substance Use and TBI

How does substance abuse affect a person who has had a traumatic brain injury?

How is the brain affected?

How much alcohol or other drugs is it safe to consume after brain injury?

1. How does substance abuse affect a person who has had a traumatic brain injury?

There are multiple reasons why alcohol and other drug use after traumatic brain injury is not recommended. The substance abuse education series "User's Manual for Faster, More Reliable Operation of a Brain after Injury" (Ohio Valley Center, 1994) enumerates eight reasons:

1. People who use alcohol or other drugs after they have a brain injury don't recover as much
2. Brain injuries cause problems in balance, walking or talking that get worse when a person uses alcohol or other drugs.
3. People who have had a brain injury often say or do things without thinking first, a problem that is made worse by using alcohol and other drugs.
4. Brain injuries cause problems with thinking, like concentration or memory, and using alcohol or other drugs makes these problems worse.
5. After brain injury, alcohol and other drugs have a more powerful effect.
6. People who have had a brain injury are more likely to have times that they feel low or depressed and drinking alcohol and getting high on other drugs makes this worse.

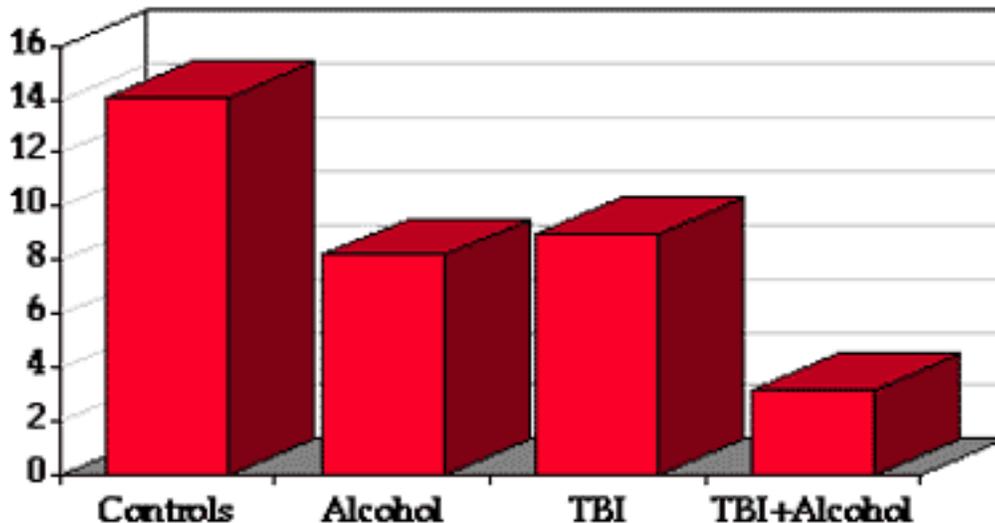
7. After a brain injury, drinking alcohol or using other drugs can cause a seizure.
8. People who drink alcohol or use other drugs after a brain injury are more likely to have another brain injury.

2. How is the brain affected?

There is mounting evidence about the adverse effects of alcohol and other drug use after traumatic brain injury. Several studies have observed an association between use and such unwanted outcomes as unemployment, living alone and feeling isolated, criminal activity and lower life satisfaction (Sherer et al., 1999; Corrigan et al., 1997; Kreutzer et al., 1996; Kreutzer et al., 1991; Corrigan et al., 2003). While these studies have observed associations, the causal links or processes have not been fully explained.

There are also studies suggesting an "additive effect" on brain structure and function for substance abuse and traumatic brain injury (Barker et al., 1999; Baguley et al., 1997; Bigler et al., 1996). One example is the study by Ian Baguley and colleagues from Australia (see graph below). Their 1997 study of event-related evoked potentials (an indication of how fast the brain detects new stimuli) showed a clear additive effect of heavy social drinking and traumatic brain injury requiring hospitalization. Those subjects who had either of these conditions were slower responding than people with neither; and those with both were slower still.

P300 Amplitude



3. How much alcohol or other drugs is it safe to consume after brain injury?

The answer to this question requires multiple considerations. First, there are many reasons why it is not safe to consume illegal drugs, including their interactions with prescribed drugs or other medical conditions, the potential for being arrested, the proven greater vulnerability to injury or being victimized, and last but not least the potential for additional brain damage from these uncontrolled substances.

Alcohol – because it is a legal substance for adults – presents a more complex question. Our starting point is that certainly no one should consume more alcohol after traumatic brain injury than would be considered safe for an adult who had not. Many people do not realize that for adult men under age 65 it is recommended that no more than two alcoholic drinks should be consumed each day. For men over age 65 and for women, the recommended maximum is one drink per day (reference NIAAA website).

So the question becomes after traumatic brain injury should an individual drink even these amounts? Based on information about how alcohol and traumatic brain injury add together to change brain structure and function, we believe that there is no safe amount. We suspect that especially during the early period of recovery – the first several years when the brain is attempting to spontaneously heal and otherwise accommodate the injury – alcohol can

inhibit these natural processes.

[Next: Treatment for Substance Use With TBI](#)