



**AMERICAN COLLEGE OF SURGEONS**  
**Committee on Trauma**

## **Alcohol and Injury**

**Presented by the Subcommittee on Injury Prevention and Control**

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**Slide 1:** Alcohol and Injury  
**Title Slide**

**Slide 2:** Trauma is the most important, most expensive, and most tragic health problem in the United States. Trauma strikes suddenly, without warning—and no one is immune. Trauma is the leading cause of death between the ages of 1 and 40 years. Eighty percent of teenage deaths and more than 60 percent of childhood deaths are caused by trauma. The elderly are even at increased risk, because less severe injuries may end in death in older people.  
**Overview**

**Slide 3:** Each year, 150,000 persons are killed, 70 million are injured, and 11 million are disabled, 450,000 permanently. Because trauma often involves the young and often leads to long-term impairment, it is both tragic and expensive.  
**Statistics**

**Slide 4:** Death from injury is just the tip of the iceberg. Consider that every year, for every 2.6 million hospital discharges, there are 37 million emergency department visits from trauma.  
**Tip of the Iceberg**

**Slide 5:** Two-thirds of trauma are from unintentional causes. In other words, injuries are from motor vehicle crashes, falls, work-related accidents, and so on. Violence accounts for one-third of traumatic injuries.  
**Causes**

**Slide 6:**  
**TRAUMA IS NO  
ACCIDENT**

The term “accident” implies a random event leading to injury. It is now recognized that many so-called “accidents” are, in fact, predictable and, therefore, preventable. The most common contributory factor to injury occurrence is alcohol abuse.

**Slide 7:**  
**Alcohol Consumption**

More than 60 percent of people aged 21 to 49 years reported drinking alcohol in the past month. This total includes 70 percent of men and 54 percent of women between the ages of 26 and 34.

*[Add optional local story to bring the message home.]*

**Slide 8:**  
**Risk**

It is now well established that those who drink have a greater chance of dying from injury and sustaining nonfatal injuries. Even those who drink “relatively low levels,” in other words, less than one drink per day, are at a greater risk of getting injured.

**Slide 9:**  
**Contributory Role  
of Alcohol**

Forty percent of motor vehicle crash deaths involve alcohol drinking, and 40 percent of pedestrians killed had been drinking. The contributory role of alcohol in intentional trauma deaths is just as bad. The presence of alcohol in combination with easy access to a deadly weapon (most commonly a handgun) and often only a minor grievance is known as the deadly triad. These three factors together all too often result in tragedy for the victim as well as the assailant.

**Slide 10:**  
**Magnitude of Alcohol  
Problem**

Alcohol is responsible for approximately half of all trauma deaths and nonfatal injuries in the United States—a very tragic and very expensive public health problem that continues every day and every night on our nation’s highways, in our cities, and on our farms. Why has this problem been so difficult to address?

**Slide 11:**  
**Alcohol Is a Drug**

Let's look first at alcohol the **drug**. Yes—alcohol is a drug. Alcohol exerts effects on the body just like pills or injections, and these effects are dose related.

**Slide 12:**  
**Common Misconception**

One common misconception is that beer or wine, or even wine coolers, are not as dangerous as hard liquor. Because of this mistaken assumption, these forms of alcohol may, in fact, be more dangerous. Drinks shown here all contain identical amounts of alcohol.

**Slide 13:**  
**An Unusual Drug**

Alcohol is unusual among drugs in that it requires no digestion—it is absorbed unchanged into the bloodstream from the stomach and upper small intestine. Because alcohol is a liquid and does not need to travel far, alcohol is absorbed rapidly, and its effects are felt quickly. Food in the stomach slows the absorption of alcohol and, therefore, may delay some of its effects.

**Slide 14:**  
**Concentrates in the Brain**

Alcohol is soluble in both water and oil mediums. Because alcohol has a greater affinity for oil (or lipid) and since the brain is largely lipid in composition, alcohol is concentrated quickly in the brain.

**Slide 15:**  
**Effects on Reactions**

The early effects of alcohol, therefore, are on the brain or central nervous system and are felt first on the higher intellectual functions like thinking, judgment, reasoning, reflex activity, and an activity called response modulation—or more simply, our ability to control our reactions.

**Slide 16:**  
**Effects on Operation of Motor Vehicle**

In terms of operating a motor vehicle, alcohol shortens attention span, slows reaction time, interferes with performance of complex motor tasks, and causes serious misconceptions. These effects of alcohol are dose related, but can be observed at a blood alcohol concentration (BAC) of 0.05 volume percent in most people and at 0.08 volume percent in virtually all people.

**Slide 17:**  
**Effects on Behavior**

The effects of alcohol vary from individual to individual and from time to time within individuals. But alcohol-related changes in behavior are usually observable, often predictable, and occasionally dangerous or violent. In lower doses, alcohol reduces inhibitions and impairs the ability to operate a motor vehicle. In higher doses, alcohol acts as a depressant, leading to impaired mental function and inability to operate a motor vehicle. Stupor and death follow, and these effects are dose related.

**Slide 18:**  
**Fate of Ingested Alcohol**

Once alcohol is absorbed into the bloodstream, 80 percent is metabolized by the liver, 10 percent is metabolized by the kidneys, and 10 percent is lost through the lungs and skin. The liver is the major route of getting rid of alcohol.

**Slide 19:**  
**How the Liver Metabolizes Alcohol**

A brief explanation of how the liver handles alcohol may help clarify the relationship between the amount of alcohol taken in and the blood alcohol concentration. Alcohol is changed in a two-step process from alcohol to an intermediary called acetaldehyde, which, in turn, is changed to a harmless substance called acetate. Acetate is a rich source of calories and is used by the body as an energy source. Each step depends on an enzyme, the most critical of which is called alcohol dehydrogenase, which changes alcohol to acetaldehyde. This conversion occurs at a constant rate and does not depend on the concentration of alcohol in the blood.

**Slide 20:**  
**Alcohol Metabolism**

In other words, alcohol metabolism is limited and is roughly equal to one drink per hour. Therefore, if you ingest at a rate exceeding one drink per hour, alcohol will begin to accumulate in your bloodstream.

<p><b>Slide 21:</b>  <b>Relationship of  Number of Drinks/  Blood Alcohol  Concentration</b></p>	<p>Through research and experience, the relationship between amount of alcohol ingested and BAC has been well worked out. Remember, this relationship varies from individual to individual and from time to time in the same individual, but on the average, the following relationship holds. If you drink between two and three drinks (12 oz of beer, 5 oz of wine, 1½ oz of 80-proof whiskey, or 12 oz of wine cooler) in an hour, on an empty stomach you will be impaired to operate a motor vehicle. Five drinks will render you legally intoxicated and subject to DUI statutes in most states (0.10 volume percent).</p>
<p><b>Slide 22:</b>  <b>Relationship of Blood  Alcohol Concentration  and Crash  Responsibility</b></p>	<p>It has also been observed that the concentration of alcohol in the blood is closely correlated with crash responsibility in those crashes that result in a fatality. As shown by this slide, as the BAC reaches 0.20 volume percent, the likelihood approaches almost 100 percent that the alcohol-impaired driver caused the crash.</p>
<p><b>Slide 23:</b>  <b>Carnage on the  Highway</b></p>	<p>A large number of the tragedies which occur everyday—the pain and suffering, the saddened families and friends—could be avoided.</p>
<p><b>Slide 24:</b>  <b>Alcohol and Trauma</b></p>	<p>Of the injured patients treated in the emergency department, 15 to 25 percent are BAC positive (defined as an alcohol level of 100 mg/dL or lower). If you look at all the trauma center patients, positive blood alcohol levels to this extent are found in about 50 percent of men and 40 percent of women.</p>
<p><b>Slide 25:</b>  <b>Alcohol, Other Drugs,  and Trauma</b></p>	<p>Half of the time, illicit drugs are used with alcohol: marijuana, 3 to 27 percent; cocaine, up to 34 percent; other opiates, about 15 percent.</p>

**Slide 26:**  
**Prevention Strategies**

A large body of epidemiologic data has shown that the certainty of detection is far more effective as a deterrent than the severity of punishment, *provided* that punishment is appropriate to the offense.

**Slide 27:**  
**Alcohol Addiction**

Alcohol prevention is important in the trauma population, because injury episode may be the first symptom of a treatable alcohol addiction. For instance, statistics prove that up to 50 percent of reviewed patients in emergency departments have alcohol dependence, as compared with 7 to 8 percent of the general population.

**Slide 28:**  
**What Is Social Drinking**

How is alcohol dependence different from the social drinking that is so prevalent in this country? Moderate social drinking, as defined by the National Institute of Alcohol Abuse and Alcoholism, accounts for no more than two drinks per day for men and no more than one drink per day for women.

**Slide 29:**  
**Alcohol and Trauma  
Recidivism**

The continuing dependence on alcohol or use of alcohol and injury sustained under the influence as reasons for readmission are quite prevalent and common. In a five-year follow-up of 246 patients, 44 percent were readmitted for injuries, and 20 percent died from injuries. Interestingly, 77 percent of the deaths were due to injury while in a state of continuing substance abuse.

**Slide 30:**  
**Identification of  
Substance Abuse**

The episode of injury under admission to the trauma center or the emergency department is a great opportunity for identification of substance abuse. Specifically, to obtain history of previous injury when under the influence of an intoxicating substance or a drunk/impaired driving conviction enables us to identify the patient who may be dependent.

**Slide 31:**  
**Laboratory Tests**

Lab tests may also help us identify patients with substance abuse. A positive blood alcohol concentration, a positive tox screen, or an abnormal liver function test, may suggest long-term alcoholism.

**Slide 32:**  
**Questionnaires**

Several questionnaires are available to identify the patient with substance abuse. One of them is the CAGE, which has four questions on efforts regarding cutting down drinking, annoyance over criticism, guilt feelings, and eye opening. Two other questionnaires, AUDIT and BMAST (Brief Michigan Alcoholism Screening Test), each have 10 questions. These questionnaires are widely available and can be used to identify those patients who have a long-term dependence.

Slides 33 and 34:  
**Does Intervention Work?**

A very important consideration is: Do all of these interventions in the trauma center actually work in terms of preventing or reducing further dependence on alcohol? Until recently, the data have been scant, but in 1999, Dr. Larry Gentilello and his group from Harborview Medical Center screened 2,524 patients from a population of 3,358 trauma patients in the trauma center. A total of 762 of these patients were randomized: approximately half to intervention and half to the control group. Among the 366 patients in the intervention group, 300 actually completed the interventions. Subsequent follow-up showed that in the group with intervention, 47 percent had a reduction in return to the emergency department within the first year, and 48 percent had a reduction in inpatient readmission for the following three years. All other outcomes, such as traffic violations, DUI, arrests, and so on, occurred statistically much less in the intervention group.

**Slide 35:  
Summary**

These data suggest that there is a significant potential for alcohol intervention, as well as injury prevention, in patients with long-term alcohol dependence, as long as there is a program of identification, surveillance, and intervention. The potential impact on reduction of future injury risks in young adults is quite a phenomenal consideration in active promotion of these intervention programs.

**Slide 36:  
Drinking and Driving  
Don't Mix**

*[Concluding remarks, individualized to your audience and locality.]*

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This slide presentation was prepared for the Committee on Trauma Subcommittee on Injury Prevention and Control by Carl A. Soderstrom, MD, FACS; Lawrence M. Gentilello, MD, FACS; and Rao R. Ivatury, MD, FACS. Please provide your comments to Rao R. Ivatury, MD, FACS, at Medical College of Virginia Hospitals, PO Box 980454, Richmond, VA 23298-0454.

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