

Title: Traumatic Brain Injury and Alcohol Use Disorders

E. Lanier Summerall, MD, MPH

Department of Psychiatry

Dartmouth Medical School

Alcohol Medical Scholars Program **(Slide 1)**

I. Introduction **(Slide 2)**

A. Alcohol misuse common in the gen. pop.

1. 80% lifetime use ¹

2. 15% lifetime abuse

3. 10% lifetime dependence ²

4. Intoxication, abuse or dependence = alcohol use disorders
(AUD's)

B. Traumatic brain injury (TBI) each year in US common³ **(Slide 3)**

1. 1.4 million total

a. 50,000 die

b. 235,000 hospitalized

c. 1.1 million to emergency room

2. Mechanisms of TBI more common with alcohol³

a. Falls-28% (#1 cause death in old)

b. Motor vehicle accidents (MVA's)-20% (#1 cause hospitalization)

c. Struck by/against object-19%

d. Assaults/violence-11% (#1 cause death in young)

3. Location/type of TBI ⁴ **(Slide 4)**

a. Anywhere in brain

b. Visible-brain bruise, tissue deformity

i. Invisible-axon damage

c. Frontal lobe damage = "fingerprint" of TBI due to:

- i. Acceleration/deceleration of brain
- ii. Bony structure of skull

(Slide 5)

4. TBI can cause : ⁵ **(Slide 6)**

a. Frontal syndrome (Mnemonic=VALIUM)

- i. ↓ Vision/hearing
- ii. ↓ Attention/concentration
- iii. ↓ Language skills
- iv. ↓ Insight
- v. Unacceptable behaviors
- vi. ↓ Memory
 - i. Impulsivity
 - ii. Sexual disinhibition
 - iii. Violence

b. Physical/neurologic problems

- i. Seizures
- ii. Headaches
- iii. Unsteady gait
- iv. Spasticity
- v. Tremor

c. 40% develop depression ^{6, 7}

C. Relationship complex **(Slide 7)**

1. Alcohol misuse ↑ risk of TBI
2. TBI ↑ risk of alcohol misuse for some (↓ judgment)
3. AUD + TBI can ↓ recovery from either

D. This lecture covers: **(Slide 8)**

1. Definitions
2. Epidemiology/outcomes for AUDs before TBI
3. Epidemiology/outcomes for AUDs post-TBI
4. Prevention AUD + TBI
5. Treatment

II. Definitions

A. TBI

1. Defined by level of consciousness at time of TBI, using

Glasgow Coma Scale (GCS)⁸ **(Slide 9)**

- a. Standard neurologic assessment
- b. Best response in eye movement + verbal response + motor = total GCS
- c. Lowest score 3 = deep coma or death
- d. Highest score 15 = fully awake, responsive

2. Mild TBI (concussion) **(Slide 10)**

- a. If available, GCS: 13-15, or
- b. Loss of consciousness (LOC): ≤ 30 minutes, or
- c. Post-traumatic amnesia (PTA): ≤ 24 hours, or
- d. Dazed, confused, “seeing stars”
- e. Commonly called concussion
- f. 85-90% symptom free w/in days-weeks

3. Moderate TBI

- a. GCS: 9-12, or
- b. LOC: 30 minutes-24 hours, or
- c. PTA: > 24 hours < 7 days
- d. Recovery variable; not linearly related to severity

4. Severe TBI

- a. GCS: 3-8 or
- b. LOC: >24 hours or
- c. PTA: > 7 days
- d. Recovery variable; not linearly related to severity

B. DSM IV definitions of AUD's ⁹, etc. **(Slide 11)**

1. Legal intoxication usually ~0.8% blood alcohol level (BAL)

2. Std drink = 10-12 gm alcohol = ~ 0.2 gm/dl ¹⁰

- a. 12 oz. beer
- b. 5 oz. wine

- c. 1 oz spirits (gin, vodka, whiskey, et al.)

3.Acute intoxication: 1 +; **(Slide 12)**

- a. Slurred speech
- b. Incoordination
- c. Unsteady gait
- d. Nystagmus (rapid involuntary movement of eyes)
- e. ↓ Attention or memory
- f. Stupor or coma

4.Abuse: 1 + recurrent in same 12 mos.;

- a. ↓ Ability to fulfill role obligations
- b. Use in physically hazardous situations
- c. Legal problems
- d. Social or interpersonal probs.
- e. Never dependent

5.Alcohol dependence: 3 + recurrent in same 12 mos.;

- a. Tolerance (need more for effect)
- b. Withdrawal (rebound signs of intoxication)
- c. Use heavier or longer than intended
- d. Desire and inability to cut down
- e. Activities aborted
- f. Long time spent in alcohol-related activities
- g. Ongoing use despite consequences

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III. Epidemiology/outcomes AUD before TBI **(Slide 14)**

A. Epidemiology of intoxication + TBI ^{11,12}

1.45% of TBI hospitalized legally intoxicated

2.Intoxication < 19yo ↑ risky TBI-related behaviors; ^{13,14,15}

- a. 1.6 X ↑ Drinking + driving
- b. 2 X ↑ Driving after 5 or more drinks
- c. 1.8 X Riding w/ drunk driver
- d. 2.6 X ↑ injuries requiring medical attention

- e. 2.5 X ↑ violent behavior
- f. ↑ TBI 2° violence

B. Intoxication affects TBI outcome (Slide 15)

1. Can mask TBI (e.g. intracranial bleed) 2° sim. signs¹⁶
 - a. Unsteady gait, confusion, belligerence, unresponsiveness etc.
 - b. Missed diagnosis of TBI → inappropriate discharge, worse outcome, poss. death
2. ↑ Severity of TBI¹⁷
 - a. ↓ GCS
 - b. ↑ Damage on CT scan
3. ↑ Intensity of tx.¹⁸
 - a. 3X ↑ ICU days
 - b. 3X ↑ ventilator days
 - c. 2.5 X ↑ benzodiazepines
 - d. 2 X ↑ opioids
4. ↓ Scores on cognitive tests 1mo. + after injury^{19,20}
 - a. Verbal IQ ↓ 10%
 - b. Processing speed ↓ 10%
5. 2.5 X risk of repeat trauma next 2 years²¹

C. Epidemiology abuse/dependence before TBI (Slide 16)

1. Prior abuse/dependence: 37% TBI (w/o intoxication at TBI)²²
2. Abuse/dependence → risk of TBI in any 12 mos. ↑ 60%²³

D. Abuse/dependence before TBI affects TBI outcome

1. Post-injury unemployment 3X > TBI alone²⁴
2. Life satisfaction < TBI alone²⁵
3. ↑ Risk multiple TBI's²⁶

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IV. Epidemiology/outcomes of AUD's post-TBI (Slide 18)

A. Epidemiology

1. 50% w/ AUD before TBI ↓ alcohol use after TBI²⁷

2. Abstinence rates after TBI ↑ 2X (15% to 30%)
3. ~ 30% of all in AUD tx. have unreported hx. of TBI²⁸
4. Sub-group develop/maintain AUD post-TBI (**Slide 19**)
 - a. ~ 25% (10% gen. pop.)
 - b. Risk factors: ²⁹
 - i. Pre-TBI AUD
 - ii. Major depressive disorder post-TBI
 - iii. Less physical disability-independent, can obtain/use alcohol
 - iv. Male
 - v. Younger age
 - vi. Uninsured or on Medicaid
 - vii. Unmarried

B. AUD post-TBI affects TBI outcome (Slide 20)

1. ↓ Neuron reorganization from alcohol ↓ natural healing process ³⁰
2. TBI + AUD may ↑ brain atrophy ³¹
3. TBI + AUD death by suicide 4X > TBI alone³²
4. TBI + AUD death by suicide 7X > gen. pub.
5. ↑ Involvement in criminal justice system³³
6. Alcohol use ↑ impact of TBI symptoms
 - a. Gait/balance problems
 - b. Poor judgment
 - c. Poor insight
 - d. Inappropriateness
 - e. Depression

(Slide 21) (Slide 22)

V. Prevention TBI/AUD combo

- A. ID/tx. of AUD ↓ risky behaviors → TBI's
- B. Successful US public health interventions re MVA (**Slide 23**)
 1. MVA's previously #1 cause of TBI, now #2 (falls #1)³⁴

2.MADD (Mothers Against Drunk Driving)

- a. Started 1980
- b. Advocates tougher drunk driving laws

3.Mandatory seat belt laws in US late 1980's ³⁵

- a. ↓ All fatalities 45%
- b. ↓ All injuries 50%
- c. ↓ TBI's 38%

4.Laws ↓ BAC to 0.08% ↓ alcohol related fatalities and related TBI's 36% ³⁶

C. Public Health Challenges (**Slide 24**)

- 1.Mandatory helmet law ↓ TBI 67% for motorcycle riders ³⁷
- 2.Highest rate of drunk driving=motorcycle riders ³⁸
- 3.2X TBI deaths in states w/o helmet law ³⁹
- 4.<50% of states w/ mandatory helmet law

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VI. Treatment Approaches

A. As TBI have ↑ risk AUD, need search for acute withdrawal

- 1.Assessment of acute withdrawal (may be masked by TBI)

(Slide 26)

- a. Symptoms
 - i. Anxiety/Agitation
 - ii. Insomnia
 - iii. Irritability
- b. Signs
 - i. Tremor
 - ii. ↑ Reflexes
 - iii. Sweating
 - iv. Unstable blood pressure
 - v. ↑ Pulse
 - vi. Disorientation/confusion
- c. Interview for symptoms/amt. of use if possible

- i. Life problems re alcohol
 - ii. Usual and max. drinks past wk.
 - iii. Time since last drink
 - iv. Previous withdrawal episodes
 - d. Physical exam for signs of withdrawal/chronic use
 - i. Enlarged liver and spleen
 - ii. Cardiac arrhythmia (“holiday heart”)
 - e. Labs ⁴⁰
 - i. BAL
 - ii. Gamma glutamyl transpeptidase (GGT)
 - >35units
 - iii. Carbohydrate deficient transferrin (CDT) 20 u
 - or 2.6%
 - iv. LFT’s, CBC, Utox, etc.

2. Treatment of acute withdrawal (**Slide 27**)

- a. Benzodiazepines (benzos) = gold standard ⁴¹
 - i. “Start low, go slow” ⁴²
 - 1'. After TBI, ↑ sensitivity to med effects
 - a'. Sedation
 - b'. Respiratory depression
 - 2'. Low initial doses – ½ reg. dose
 - 3'. ↑ cautiously, based on symptoms + signs
 - ii. Longer-acting benzos preferred ⁴³
 - 1'. Chlordiazepoxide (Librium)
 - a'. Start 25 mg. PO QID
 - b'. ↑ or ↓ Based on clin. assess
 - 2'. Diazepam (Valium)
 - a'. 5 mg PO QID
 - b'. ↑ or ↓ Based on clin. assess.
- b. Overmedication → respiratory depression or coma

c. Undermedication → agitation, delirium, seizure

B. Early-phase treatment/ prevention of AUD's (Slide 28)

2. Motivation to change alcohol behaviors ↑ after TBI ⁴⁴

- a. If dependent pre-TBI, ↑ motivation ⁴⁵
- b. ↑ # of drinks/week pre-TBI, ↑ motivation
- c. ↑ BAL at injury ≠ ↑ motivation
- d. Motivation highest 1st yr. post-TBI

3. Motivational interviewing (MI) effective at this stage ⁴⁶

- a. Non-directive interview
- b. Patient-centered, empathetic
- c. Elicits behavior change
- d. Explores/resolves ambivalence

4. MI + coping skills training > MI alone ⁴⁷

- a. Avoid situations/people likely to ↑ drinking
- b. Relaxation-exercise, breathing exercises
- c. Distraction-hobbies, “keeping busy”
- d. Identification/participation in meaningful activity

C. Treatment of chronic AUD +TBI (Slide 29)

2. No evidence-based algorithm for treatment ⁴⁸

3. ↓ Effect of standard tx. ⁴⁹

- a. Cognitive barriers
 - i. ↓ Attention, judgment, insight, language skills
 - ii. ↓ Short-term memory, etc. ↓ behavior control
- b. Interpersonal barriers 2° ↓ cognition/↑ behavior problems
 - i. Frustrate caregivers
 - ii. Impair fxn. in self-help groups
- c. System barriers
 - i. High cost of AUD + TBI care
 - ii. Most inpt. AUD programs exclude TBI
 - iii. Outpatient tx. may not be enough

4. Modify std. assessment of AUD for TBI **(Slide 30)**

- a. Routine screen for all TBI patients ⁵⁰
 - i. AUDIT
 - 1'. Alcohol Use Disorders Identification Test
 - 2'. 10 questions, takes little time
 - ii. GGT; CDT
- b. Multiple assessments needed ⁵¹
 - i. Interview pt. alone re alcohol use
 - ii. Review records for evidence AUD, past TBI
 - iii. Interview pt.'s family ⁵²
- c. Accommodate deficits/behaviors in work up
 - i. ↑ Time
 - ii. Frequent breaks
 - iii. Maintain positive interaction

5. Modify std. tx. of AUD for TBI ⁵³ **(Slide 31)**

- a. External motivators ↑ effectiveness of tx.
 - i. Financial incentives, concrete tx. plans ⁵⁴
 - 1'. 50% ↑ in tx. retention
 - 2'. May ↑ perceived value of tx.
 - ii. Intensive case mgmt. ⁵⁵
 - 1'. ↑ access to tx. and rehab.
 - 2'. ↑ continuity of tx.
 - 3'. Ongoing support patient/family
 - iii. Peer support provides; ⁵⁶
 - 1'. Emotional support
 - 2'. Knowledge about TBI/resources
 - 3'. Advocacy skills
 - 4'. Shared experiences
- b. Modify treatment conditions
 - i. ↑ Time
 - ii. ↓ noise/visual distractions

- iii. Frequent breaks in individual +group settings
- c. ↑ Cognitive retention
 - i. Pt. takes notes
 - ii. Pt. tapes session and listens again later
 - iii. Patient/caregiver repeat main points
 - iv. Role-play (coping strategies, relapse triggers)
- d. Content simplification ⁵⁷ **(Slide 32)**
 - i. Concrete , not abstract, e.g
 - 1'. Pt. uses decision making form (pros v. cons, alternative choices)
 - 2'. Break complex tasks into steps
 - ii. Behavioral focus (not insight-oriented) e.g.
 - 1'. List specific activities to replace drinking
 - 2'. Pictorial daily schedule
 - 3'. Alarm/watch to initiate these activities

6.Pharmacology **(Slide 33)**

- a. Monitor for alcohol and TBI medication interactions ⁵⁸
 - i. If pt on benzos for spasticity/anxiety, alcohol →sedation, respiratory depression
 - ii. If pt on anti-seizure medications: alcohol→ ↓ cognitive processing speed , ↓effectiveness
 - 1'. Valproic acid (Depakote)
 - 2'. Gabapentin (Neurontin)
 - 3'. Carbamazepine (Tegretol)
 - iii. If pt on propranolol for tremor : alcohol → sedation, arrhythmia, heart failure
 - iv. If pt on Selective Serotonin Reuptake Inhibitors (SSRI's) for post-TBI depression (fluoxetine/ Prozac, sertraline/Zoloft, etc): alcohol → sedation, ↓ cog processing speed
 - v. Many other med/ alcohol interactions possible

- b. Medications to stop drinking⁵⁹ (**Slide 34**)
 - i. Disulfiram (Antabuse) contraindicated
 - ii. Naltrexone (Revia) 50-100 mg/d
 - 1'. Opioid receptor antagonist
 - 2'. Reduces cravings, ↑ abstinence once achieved
 - 3'. No studies for TBI
 - iii. Acamprosate (Campral) ~ 2g/d
 - 1'. ↑ GABA (inhibits), ↓ glutamate (excites)
 - 2'. Reduces cravings, ↑ abstinence once achieved
- c. “Start low, go slow” 2° ↑ medication sensitivity
- d. Monitor medication adherence closely

D. This talk has covered (**Slide 35**)

- 1. Definitions
- 2. Epidemiology/outcomes for AUDs before TBI
- 3. Epidemiology/outcomes for AUDs post-TBI
- 4. Prevention AUD+TBI
- 5. Treatment

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