Residual Behaviors Influencing TBI Treatment and Recovery

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Objectives

Participants will be able to understand traumatic brain injury incidents and demographics and their influence on recovery.

Participants will be able to identify challenges and risk factors with behavior and neurobehavioral conditions.

Participants will understand the interaction of substance abuse and brain injury.

Participants will have a basic understanding of outcomes research results regarding behaviors and its influence on brain injury recovery, and substance use/abuse.
“Silent Epidemic”

An insult to the brain, not of a degenerative or congenital nature but caused by an external physical force, that may produce a diminished or altered state of consciousness, which results in impairment of cognitive abilities or physical functioning. It can also result in the disturbance of behavioral or emotional functioning. (Reeves & Panquluri, 2011; Journal of Psychosocial Nursing Mental Health Services).

Approximately 2.5 million TBIs will occur this year
80% will fall in the mild category
20% will fall in the moderate to severe category
10% of the moderate to severe will have neurobehavioral impairments
requiring facility based treatments
Substance Use Epidemic

Substance Use/Abuse

120,000 users of “hard” drugs in the US:
51,000 Opioids
4,300 Cocaine
3,800 Amphetamine

Statistics:
* Deaths from drug use 43,982 (CDC 2013)
* 16.6 million adults abuse alcohol
* Alcohol related deaths 88,000 (NIH 2013)
* Cannabis...
  
  No reported deaths (CDC 2013)
Some think....

Behavior is like tug of war... it’s not when you understand the root cause of the behavior.
Behavior is an opportunity in Neurology

Behavioral Neurology uses behaviors to determine possible neuropathological diagnoses.

Behavior can be an indication of an acute medical crisis!
The Science of Behavior
Challenge is Etiology

For neurological injuries, the challenges that are faced by patients, support systems and professionals are varied. However, the challenges can be categorized for ease of understanding.

Categories:

- Biological/Biochemistry – cellular level; repair and plasticity
- Neuropathology – tissue, physiology level
- Neurobehavioral – individual level
- Neurocognitive – individual level
- Psychosocial variables – individual and environmental levels
Behavior is Multifaceted

• Behavior, whether from a neurological injury or from another event or medical condition, is highly complex.

• Most behaviors involve cognitive processing, conditions of the behaviors, other persons including family, social aspects, financial aspects, and legal considerations.

• Example: Why do people stop at stop signs? Is it to prevent getting a ticket, to prevent injury, or to prevent feeling guilty for running the sign?
Synergy

Fig. 1: Relationships among values, attitudes, behavior and culture
Behavior is defined as...

Range of actions made by an organism in conjunction with their environment (psychosocial variables).

Response of the system or organism to various stimuli or inputs

Neurological Behaviors are those that occur in response to neurological injury severity, injury location, and psychosocial variables of the individual.
The Science of Substance Use
**Figure 1:** The anatomy of the human reward system (From National Institutes of Drug Abuse (NIDA))

**PFC** – prefrontal cortex; **ACG** – anterior cingulate gyrus; **OFC** – orbitofrontal cortex; **SCC** – subcallosal cortex; **NAc** – nucleus accumbens; **VP** – ventral pallidum; **Hipp** – hippocampus; **Amyg** – amygdala
Frontal Lobe Pathology


Summary of findings:
• Behavioral Manifestations of Impaired Response Inhibition and Salience Attribution (I-RISA) Syndrome of Drug Addiction. See components of the model
  • Drug Reinforcement through intoxication
  • Craving
  • Bingeing
  • Withdrawal

• The imaging studies reviewed provided evidence for the involvement of the frontal cortex in the various aspects of drug addiction, including reinforcing responses to drugs during intoxication, activation during craving, and deactivation during withdrawal.
• The involvement of the frontal cortex throughout these cyclical stages of addiction is likely to play an important role in the cognitive behavioral and emotional changes that perpetuate drug self administration and that are highlighted in the I-RISA syndrome of drug addiction.
SUBSTANCE USE
during adolescence can harm development of abilities like:

- Extended reasoning
- Impulse control
- Delaying gratification

Prefrontal cortex is one of the last regions of the brain to reach maturity. All addictive drugs, including alcohol and marijuana, have especially harmful effects on the adolescent brain.

#FacingAddiction
Neurobehavioral Syndromes
**Neuropathology**

**Frontal:** results in cognitive, emotional, and behavior dysregulation. (Dimasio and Dimasio, 1990-2000; University of Iowa).

- Think of this massive region (30% of the brain mass) as the regulator and manager of the entire system
- Differences of left vs. right injury; differences with orbitofrontal vs. lateral vs. ventral.
- Social dysregulation; social awareness impairment; overestimation of skills and underestimation of deficit

**Temporal:**

- Memory impairment due to unilateral or bilateral involvement.
- Kluver Bucy Syndrome: rare behavior impairment due to bilateral damage of the anterior temporal lobes; hyper orality, inappropriate sexual behavior, agnosia, loss of normal fear and anger responses, memory loss, dementia
• The study focused on differences in those with neurobehavioral impairments vs. those with neurorehabilitation impairments.

• **Both groups improved clinically and statistically** with structured interventions and multidisciplinary approach.

• The **neurobehavioral group averaged 2-3xs longer** length of stay for improved functional outcomes than the neurorehabilitation group due to the behavioral impact on recovery of functions generally.
Identify the psychosocial and behavior variables..

- Medical/Psychiatric: none prior to injury
- Severe TBI from a fall of 30 feet into pipes with coma
- Age of onset: 20 years old
- Graduated High School
- Family of alcoholics; he started heavy use at age 14
- Legal: significant for multiple misdemeanors
- Outcome: severely disabled, family discord due to injury and severity; excessive alcohol use throughout recovery
Psychiatric

- Depression and Anxiety are the primary psychiatric concerns related to outcomes.
- Depression and Anxiety occur in about 10% of the population without injury.
- With injury, depression may be as high as 26% and anxiety as high as 24% (Fann et al., 1995). Chaudhry et al (2013) and Lewis & Horn (2013) found depression rates as high as 34% and anxiety may be from 20-70%.
- Rate of suicide may be higher following injury.
- Psychosocial interventions post trauma was initially helpful, but further research is needed for long-term outcome.
- Long-term resources are typically needed.
1) If a couple is newly married or newly together either just prior to the injury or within approximately 1 year of injury, then divorce is likely following the injury.

2) Extended family involvement is great for support early in recovery. However, if the family of origin becomes overbearing with the injured and significant other, then stress increases likely causing more conflict.

3) Dysfunctional patterns of coping prior to injury accentuate following injury.

4) Family dynamics can best be described by systems theory and cultural theory on how family training and management is completed at home (e.g., who is designated caregiver).
Marital and Family Research

1) Kreutzer, Marwitz & Kepler, 1992: “the disruptive effects of brain injury on family functioning has been widely documented.

2) The crisis of brain injury begins almost immediately following the trauma or onset of illness (Lezak, 1978, 1988).

3) Lezak, 1988; Livingston, 1990, Romano, 1974 provided the basis for family involvement with traumatic brain injury. The emphasis of this research revealed that “a family that refused to acknowledge the presence of any real or permanent change in one of its members, through denial, only exacerbates the stresses created by the realities of living with a brain-damaged family member.”

4) DENIAL: most prominent defense mechanism used by families in crisis.

5) Additional research has shown that there are beneficial effects of family involvement with medical and psychiatric conditions.
Educational Effects

• There may be a relationship with level of education and resources post injury (e.g., savings, insurance, ability for multiple incomes in the home).

• Lower education often leads to less resources and community reliance for assistance (BSCIP, Vocational Rehabilitation, etc.). Treatment may only be provided for brief periods rather than until stability is managed.

• Education has a greater impact on recovery of functions once medically stable, and when considering returning to work or some form of gainful employment option.

• Education can also play a role in behavior control both pre-injury and post-injury.

• Education is not correlated with substance use – it may be correlated with types of substances due to cost.
Occupational Effects

- Occupational history prior will have a definite impact on the ability to return to work post-injury.
- The complexity of one’s job or position in a company may adversely impact the ability to resume productive employment.
- Realities: often a person returning has slower processing, fatigue effects, and complex problem solving impairments.
- If one returns too early, then there may be stigma that one is not “good enough” to return to work.

- If active substance use and brain injury are combined, then it is unlikely that an individual will return to work productively.
Substance Abuse and Brain Injury
Treatment of Substance Abuse

- Treatment for substance abuse and addiction is delivered in many different settings using a variety of behavioral and pharmacological approaches.

- In the United States, more than 14,500 specialized drug treatment facilities provide counseling, behavioral therapy, medication, case management, and other types of services to persons with substance use disorders (Center for Disease Control, 2016).

- In brain injury recovery, the same specialized services are provided.

- The goal in brain injury with substance abuse is integrated recovery.
Treatment of Substance Abuse

• Programs typically start with detoxification and medically managed withdrawal, often considered the first stage of treatment. Detoxification, the process by which the body clears itself of drugs, is designed to manage the acute and potentially dangerous physiological effects of stopping drug use.
  
  – Detoxification alone does not address the psychological, social, and behavioral problems associated with addiction and therefore does not typically produce lasting behavioral changes necessary for recovery.

• Detoxification is often managed with medications administered by a physician in an inpatient or outpatient setting; therefore, it is referred to as "medically managed withdrawal." (Center for Disease Control, 2016)

- For lasting impact, the focus is on long-term residential treatment providing care 24 hours a day, generally in a non-hospital settings.

- In many cases, the model incorporates the community with:
  - Planned lengths of stay of between 6 and 12 months.
  - The focus is on the "resocialization" of the individual and use the program’s entire community as active components of treatment.

- Addiction is viewed in the context of an individual’s social and psychological deficits, and treatment focuses on developing personal accountability and responsibility as well as socially productive lives.

- Treatment is highly structured and can be confrontational examining damaging beliefs, self-concepts, and destructive patterns of behavior and adopt new, more harmonious and constructive ways to interact with others.
Brain Injury and Substance Abuse

• The focus is on longer-term residential treatment providing care 24-hours a day, in a non-hospital settings incorporating both substance abuse programming and neurological rehabilitation strategies.
  – managing perseverative behaviors and thoughts, and learning of prosocial behaviors

• The integrated model incorporates the rehabilitation and social community with planned lengths of stay of between 6 and 12 months; earlier discharge does not result in maintaining new or modified behaviors.

• The treatment is focused on repeated learning to correct prior patterns and establish newer patterns of managing stress and reactions to uncontrolled events rather than using substances as a primary coping mechanism.

• Brain injury education with the effects of substances on brain recovery is provided for improved insight and awareness.

• Treatment is structured within the context of neurocognitive and neurobehavioral impairments.
Treatment of Substance Abuse

Individualized Counseling (Center for Disease Control, 2016)

Individualized substance use/counseling not only focuses on reducing or stopping illicit drug or alcohol use; it also addresses related areas of impaired functioning—such as employment status, illegal activity, and family/social relations—as well as the content and structure of the patient’s recovery program.

Through its emphasis on short-term behavioral goals, individualized counseling helps the patient develop coping strategies and tools to abstain from drug use and maintain abstinence. The substance use counselor encourages 12-step participation if possible. The same is provided for substance abuse and brain injury.

Group Counseling (Center for Disease Control, 2016)

Many therapeutic settings use group therapy to capitalize on the social reinforcement offered by peer discussion and to help promote drug-free lifestyles. Research has shown that when group therapy either is offered in conjunction with individualized drug counseling or is formatted to reflect the principles of cognitive-behavioral therapy or contingency management, positive outcomes are achieved.
The curse of mad scientist’s block
Cognitive-Behavioral Therapy (CBT) was developed as a method to prevent relapse when treating problem drinking, and later it was adapted for cocaine-addicted individuals.

Cognitive-behavioral strategies are based on the theory that in the development of maladaptive behavioral patterns like substance abuse, learning processes play a critical role. Individuals in CBT learn to identify and correct problematic behaviors by applying a range of different skills that can be used to stop drug abuse and to address a range of other problems that often co-occur with it.

A central element of CBT is anticipating likely problems and enhancing patients’ self-control by helping them develop effective coping strategies. Specific techniques include exploring the positive and negative consequences of continued drug use, self-monitoring to recognize cravings early and identify situations that might put one at risk for use, and developing strategies for coping with cravings and avoiding those high-risk situations.

Research indicates that the skills individuals learn through cognitive-behavioral approaches remain after the completion of treatment. Current research focuses on how to produce even more powerful effects by combining CBT with medications for drug abuse and with other types of behavioral therapies. A computer-based CBT system has also been developed and has been shown to be effective in helping reduce drug use following standard drug abuse treatment.


Contingency management (CM) principles involve giving patients tangible rewards to reinforce positive behaviors such as abstinence. Studies conducted in both methadone programs and psychosocial counseling treatment programs demonstrate that incentive-based interventions are highly effective in increasing treatment retention and promoting abstinence from drugs.

Voucher-Based Reinforcement (VBR) augments other community-based treatments for adults who primarily abuse opioids (especially heroin) or stimulants (especially cocaine) or both. In VBR, the patient receives a voucher for every drug-free urine sample provided. The voucher has monetary value that can be exchanged for food items, movie passes, or other goods or services that are consistent with a drug-free lifestyle. The voucher values are low at first, but increase as the number of consecutive drug-free urine samples increases. VBR has been shown to be effective in promoting abstinence from opioids and cocaine in patients undergoing methadone detoxification.

Prize Incentives applies similar principles as VBR but uses chances to win cash prizes instead of vouchers. Over the course of the program (at least 3 months, one or more times weekly), participants supplying drug-negative urine or breath tests draw for the chance to win a prize worth between $1 and $100. Studies examining this concern found that Prize Incentives CM did not promote gambling behavior.
Research: Contingency Management


Community Reinforcement Approach

Community Reinforcement Approach (CRA) Plus Vouchers is an intensive 24-week outpatient therapy for treating people addicted to cocaine and alcohol. It uses a range of recreational, familial, social, and vocational reinforcers, along with material incentives, to make a non-drug-using lifestyle more rewarding than substance use.

The treatment goals are twofold:
1. To maintain abstinence long enough for patients to learn new life skills to help sustain it; and
2. To reduce alcohol consumption for patients whose drinking is associated with cocaine use.

Patients attend one or two individual counseling sessions each week, where they focus on improving family relations, learn a variety of skills to minimize drug use, receive vocational counseling, and develop new recreational activities and social networks. Those who also abuse alcohol receive clinic-monitored medication therapy. Patients submit urine samples two or three times each week and receive vouchers for cocaine-negative samples. Studies in both urban and rural areas have found that this approach facilitates patients’ engagement in treatment and successfully aids them in gaining substantial periods of cocaine abstinence.
Research: Community Reinforcement


Family Behavior Therapy (FBT), which has demonstrated positive results in both adults and adolescents, is aimed at addressing not only substance use problems but other co-occurring problems as well, such as conduct disorders, child mistreatment, depression, family conflict, and unemployment. FBT combines behavioral contracting with contingency management.

FBT involves the patient along with at least one significant other such as a cohabiting partner or a parent (in the case of adolescents).

Therapists seek to engage families in applying the behavioral strategies taught in sessions and in acquiring new skills to improve the home environment.

Patients are encouraged to develop behavioral goals for preventing substance use and HIV infection, which are anchored to a contingency management system. Substance-abusing parents are prompted to set goals related to effective parenting behaviors.

In a series of comparisons involving adolescents with and without conduct disorder, FBT was found to be more effective than supportive counseling.


Summary of Behavioral Therapies

1. Addiction is a complex but treatable disease that affects brain function and behaviors.
2. No single treatment is appropriate for everyone.
3. Treatment needs to be readily available.
4. Effective treatment attends to multiple needs of the individual, not just his or her drug abuse.
5. Remaining in treatment for an adequate period of time is critical.
6. Behavioral therapies are the most commonly used forms of drug abuse treatment.
7. Medications are also important in the treatment of substance use/abuse, in combination of behavioral therapies.
1. Addiction is a complex but treatable disease that affects brain function and behaviors.
2. No single treatment is appropriate for everyone; this is especially true with the concomitant treatment of brain injury and substance use/abuse.
3. Treatment needs to be readily available, adaptable and flexible.
4. Effective treatment attends to multiple needs of the individual, not just his or her drug abuse or neurobehavioral complications.
5. Remaining in treatment for an adequate period of time is critical. In Brain injury, substance use is typically involved prior to injury and within 2 years of the injury onset, substance abuse will return to baseline without intervention.
6. Behavioral therapies are the most commonly used forms of drug abuse treatment, and within brain injury treatment.
7. Medications are also important in the treatment of substance use/abuse, with a combination of behavioral therapies. In brain injury, the same rules apply. However, the medications used may be tailored first for optimal brain function and risks, followed by substance abuse reduction strategies.
Guidelines to reduce behavior

**Person-centered:** individual should be included in identification and design of the treatment plan.

**Supportive:** plan’s design should make it very likely that the individual will succeed (especially in the early stages). Assess all of their needs as noted above.

**Simplicity:** plan should be easy for staff and individual to understand.

**Consistency:** plan must be implemented as consistently as possible. Education of staff, patient, and family about the goals and objectives. Make sure that resources are considered as part of the discharge process.

**Flexibility:** plan must be flexible enough to adapt to changes in the individual.

**Positive:** staff should discuss the person’s successes.
Questions

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