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Getting a Fix: A Contemporary View of Substance Use & Addiction

I. The Relationship Between Substance Misuse and Acquired Brain Injury

Traumatic Brain Injury

Substance misuse, particularly alcohol, is a risk factor for sustaining a traumatic brain injury. According to studies using Traumatic Brain Injury Model Systems data, approximately two-thirds of persons who present at an emergency room with a traumatic brain injury are under the influence of alcohol or are intoxicated (i.e., blood alcohol content $\geq$ 0.08). In some study samples, the percentage of persons under the influence or intoxicated at the time of traumatic brain injury is 78%. For some, a traumatic brain injury can be a risk factor for developing a substance use disorder. Approximately 30-40% of persons with traumatic brain injury had a substance use disorder prior to sustaining a brain injury. However, approximately 20% of persons with a traumatic brain injury and who did not misuse alcohol or medication pre-injury, develop a substance use disorder post-injury. Several factors have been proposed to explain the development of substance use disorders post-injury, including disinhibition and impulse control difficulties following frontal lobe injury; self-medication for anxiety and/or depression that are common within the first year of sustaining a traumatic brain injury; and boredom/disruption of positive daily routines following a brain injury. The consequences of traumatic brain injury can be physical (weakness and decreased motor coordination, decreased balance, decreased endurance, etc.); emotional (anxiety, depression, mood swings); cognitive (impaired attention and memory, poor problem-solving and decision-making, language impairment, decreased self-awareness); and behavioral (disinhibition, anger and agitation, difficulty sleeping, etc.).

Stroke

Chronic alcohol misuse is also a risk factor for sustaining a stroke. Chronic alcohol misuse can cause blood clotting disorders, heart arrhythmias, and can lead to hypertension and development of diabetes. All these conditions are risk factors for stroke. Additionally, stimulant medications and street drugs (such as amphetamines, cocaine, etc.) can raise heart rate and blood pressure to dangerous levels and may result in a hemorrhagic stroke. Like a traumatic brain injury, the consequences of a stroke can include physical, emotional, cognitive, and/or behavioral deficits. Deficits associated with stroke tend to be more focal whereas deficits associated with traumatic brain injury tend to be more diffuse (i.e., involving multiple areas and systems in the brain)

Anoxic/Hypoxic Encephalopathy

Finally, non-lethal drug overdose, particularly involving use/abuse of opioids and benzodiazepines, can cause cardiac and/or respiratory failure and result in anoxic or hypoxic brain injury. When the brain is deprived of oxygen and nutrients, cellular death can occur within a few minutes. Some areas of the brain, such as the hippocampus, are particularly vulnerable to oxygen deprivation. The hippocampus is involved in memory consolidation, so anoxic/hypoxic injuries can cause severe cognitive impairment vs. physical impairment.

II. Challenges in Treating Substance Misuse in Persons with Acquired Brain Injury

Deficits in cognition, particularly executive functioning

Cognitive deficits, particularly those caused by frontal lobe injury can result in certain treatment challenges when attempting to address substance misuse in persons with traumatic brain injury. Attentional and memory deficits can negatively impact carry over between sessions. Therefore, patients may require additional structure and repetition, as well as external compensatory strategies (such as a memory aid notebook) to ensure the information is available for review and to ensure carry over between sessions. Deficits in executive functioning, such as information processing speed and accuracy, and decreased self-awareness can also present treatment challenges. Information must be presented in small "bites" and treating therapists must probe for understanding, asking patients to reflect the information just presented. Embedding information in stories, anecdotes, can also be helpful. Finally, patients may lack accurate self-awareness.

Additionally, patients may not fully understand the need for substance misuse treatment as part of a comprehensive post-acute brain injury rehabilitation program. They may not appreciate the relationship between certain health, relational, financial, and vocational consequences, and substance misuse. Patients may resist substance misuse treatment, citing the fact that they have been "dry" (i.e., not using the substance of choice) for several weeks or even months prior to admission. It is true that while a patient was in coma or on a locked acute, hospital-based brain injury unit, he/she did not consume alcohol and/or drugs. However, patients have not developed mechanisms to cope with the physical, cognitive, emotional, and behavioral changes that frequently accompany brain injury, and these changes may trigger a return to substance misuse.

Difficulties with traditional or 12-step approaches to treatment

While traditional approaches have helped millions of people obtain and maintain sobriety, individuals with brain injury may have difficulty with some aspects of this type of treatment. First, many traditional approaches require patients to take on another diagnostic label (i.e., addict, alcoholic). Traditional approaches also involve a great deal of group work, requiring attention, remembering the topic at hand, and turn taking in group discussions. These tasks may be difficult following a brain injury.

Secondly, due to cognitive deficits, patients with brain injury may not understand concepts central to traditional or 12-step programs, such as: "Higher Power", "One Day at a Time", "Let Go and Let God", etc.

Finally, some individuals may have had a negative experience with traditional or 12-step treatment approaches prior to brain injury and therefore may be resistant to this type of treatment after brain injury.

For these reasons, alternate treatment approaches may be more appropriate for some individuals with brain injury. For many persons with brain injury and co-occurring substance misuse, the Transtheoretical Model, or Stage Change Model, along with Motivational Interviewing techniques has proven to be effective.

III. The Transtheoretical Model of Intentional Behavior Change (aka, Stage Change Theory)

Stages of Change

Developed and further refined by DiClemente and Prochaska in the mid 1980's, the Transtheoretical Model allows treating professionals to assess an individual's readiness for change, define the specific stage in the change process for a particular point in time, then meet the patient where they are in the change process and provide specific strategies to guide the patient through the change process.

The Stages of Change include: Precontemplation (not ready) – patient is unaware that a problem exists and is therefore unaware that a change is necessary; Contemplation (getting ready) – an "activating event" increases awareness that a problem may exist, and patients realize a change may be needed. The patient begins to weight the pros and cons of changing and often experiences ambivalence at this stage; Preparation (ready to change) – patients intend to act in the immediate future toward a change in behavior. However, patients may not know what they need to do. Treating professionals assist the patient in taking small steps toward change; Action (practicing new behaviors in a variety of environments) – patients acquire new, healthy behaviors and practice them in a variety of environments to strengthen the behaviors and promote change; Maintenance (making change permanent) – patients have been able to maintain changes and remain sober for at least 6 months; Termination – patients do not experience temptation and are confident they will not return to the unhealthy behavior as a means of coping.

IV. Elements of Substance Misuse Treatment for Persons with Acquired Brain Injury

As mentioned above, substance misuse treatment for persons with acquired brain injury is best carried out as part of a comprehensive, integrated post-acute rehabilitation program.

Screening for Treatment Appropriateness

Not everyone who is under the influence of drugs and/or alcohol at the time of brain injury requires intensive substance misuse treatment. Therefore, prior to recommending or beginning treatment, a thorough screening should be conducted. Elements of the screening includes a history/record review, interview with patient and support system, and formal evaluation. A review of records and medical history can reveal whether the patient was under the influence at the time of injury, as well as inform treating professionals of prior substance misuse treatment, co-morbidities that should be considered during treatment, etc. An interview with the patient and family can provide information about previous substance use, substances of choice, patterns of use, consequences resulting from substance misuse (i.e., physical, relational, legal, financial, and vocational), as well as any prior attempts to stop harmful use, or any prior formal treatment. Finally, formal assessment can include any number of established measures, such as the CAGE, Alcohol Use Disorders Identification Test (AUDIT), or the Substance Abuse Subtle Screening Inventory (SASSI), that allow for normative comparisons. Patients are

provided treatment based on the assessment and can range from information/education to intensive interventions.

Evaluating Readiness for Change/Goals

Should patients require intensive treatment (i.e., beyond information, education, and monitoring), evaluating readiness for change is an essential early treatment activity. Through Motivational Interviewing techniques, treating professionals determine where patients are in the changes process. Specific goals are developed depending upon the identified stage of change, for example: Precontemplation – heighten awareness that a problem exists, and that change may be necessary; Contemplation – reduce ambivalence, evaluate pros/cons of change, and tip the decisional balance toward change; Preparation – explore changes that may need to be made to achieve sobriety; provide some small, manageable steps toward change; Action – identify skills or strategies necessary for successful change and begin practicing with treating professionals in clinic setting, eventually moving practice of strategies into community settings.

Other Skills Training

As part of a comprehensive, integrated post-acute rehabilitation program, all disciplines are actively involved in the treatment of substance misuse, not just psychology or counseling.

Many with pre-existing substance misuse did not have a structured or positive daily routine. Patients may have remained awake late into the night, slept during the day, consumed unhealth foods, may not have managed finances appropriately, etc. Occupational therapists and the structure of the overall treatment program assist in developing a consistent and positive daily routine. Patients learn to get up and go to bed at about the same time each day, shop for groceries and perform laundry and housekeeping tasks at set days/times throughout the week, shop for nutritional foods that will promote recovery, and develop a budget/reconcile a bank account. Occupational therapists and/or Leisure/Recreation therapists can assess a patient's pre-injury leisure lifestyle, identify risky leisure activities, and expose the patient to safer and healthier alternatives. Patients can practice alternative leisure activities, or previous activities they enjoyed, without the use of alcohol or other substances. That is, patients can learn to have fun without alcohol or drugs.

Physical therapists teach patients the benefits of exercise and the positive impact regular exercise can have on sleep, mood, and other health conditions such as blood pressure and blood glucose. With the assistance of the physical therapists, patients develop an individualized exercise program, not only to address deficits stemming from injury, but to promote overall health. Time for regular exercise is also incorporated into the positive daily routine.

Many patients with co-occurring substance misuse may have a difficult time identifying and expressing emotions, for communicating effectively, and asking for assistance. Speech/Language Pathologists assist with developing assertive communication skills, problem-solving skills, and social pragmatics (i.e., taking turns in conversation, paying attention to non-verbal cues, etc.)

As patients gain mastery of skills and strategies, practice of skills and strategies is moved into community or real-life settings. For example, using a problem-solving strategy to address a conflict with a roommate, using a relaxation strategy to de-stress at the end of the day and promote sleep; using a checklist in the grocery store to purchase healthy food items, and referring to the list to purchase only items that are on the list to resist impulse spending. Homework assignments are provided to each patient to carry out after therapy hours or on

weekends. Structured generalization is also a part of community-based practice. In a structured generalization session, a therapist accompanies a patient to a location in the community where alcohol may be purchased, such as a restaurant, convenience store, or even a sports bar. Patients are encouraged to enjoy themselves, i.e., order food, watch a football game, play pool without alcohol. The therapist is always present to encourage the patient to use appropriate strategies. Patients learn that they can enjoy community-based venues without using alcohol and in this way, they develop confidence in using skills and strategies to avoid relapse.

Finally, patient and family education sessions occur as part of the overall treatment plan. Topics such as, "what constitutes a drink", the association of alcohol with other health conditions (i.e., seizure disorders, cardiac arrhythmias, clotting disorder, hypertension, etc.), how alcohol affects the brain and behavior (particularly in recovery from brain injury), triggers, signals of relapse, etc., are shared with both the patient and family/support system. Written materials are placed in the patient's memory aid notebook for regular review.

V. Description of a Pilot Project

The treatment program described above was piloted on a small sample of persons with brain injury and co-occurring substance misuse. Consecutive admissions to a comprehensive, integrated post-acute brain injury rehabilitation program were consented and enrolled into the program.

Sample

Twelve patients were enrolled in the pilot project. Eleven were male, one was female. All patients had sustained severe brain injuries as evidenced by initial Glasgow Coma Scale (GCS) score, length of post-traumatic amnesia, or length of time following injury to consistently follow commands. In terms of injury etiology, 11 patients sustained a traumatic brain injury from a fall, motor vehicle accident, or gunshot wound; 1 patient sustained a stroke from a ruptured aneurysm. The average age of the sample was 31 (range: 20-47), and the time between injury and admission to post-acute rehabilitation was 4.5 months (range – 1-12 months). Substance Abuse Subtle Screening Inventory (SASSI) results showed that all 12 patients had a high probability of a substance use disorder, and 7 patients were under the influence at the time of injury; 6 had received chemical dependency treatment prior to brain injury.

Intervention

All patients received the multidisciplinary treatment program described above. Patients received treatment for substance misuse as part of an integrated, comprehensive post-acute rehabilitation program for brain injury.

Outcome

At 6-month follow-up post discharge, eight of the 12 patients (67%) reported no alcohol/drug use post discharge. Two patients reported some alcohol use but described their use as "controlled drinking". That is, they decided how much they planned to consume beforehand and had a friend, spouse or family member hold them accountable. Of the four patients that reported use after discharge, one was jailed for a crime, the other had returned to in-patient rehabilitation after a relapse. Living status improved with one patient living independently and 9 living independently in the family home. Productive activity also improved post discharge with 4 patients either returning to work or school, and 6 patients actively seeking employment.

VI. Harm Reduction Strategies

For the general population, “safe” levels of alcohol consumption have been established (i.e., levels of consumption that do not cause health problems, and may have some health benefit). For women, 1 drink per day and not exceeding 7 drinks per week, and for men, 1-2 drinks per day and not exceeding 14 drinks per week, have been established as “safe” levels of alcohol consumption. However, there is no established “safe” level of alcohol consumption following brain injury.

Harm reduction strategies evolved as an alternative to abstinence in cases where continued consumption of alcohol was inevitable. Harm reduction strategies have been associated with reduced morbidity and mortality associated with substance use in the general population but have not been rigorously studied in the brain injury population. Therefore, great caution should be taken when suggesting these strategies following a brain injury and should be suggested only after all other alternatives to abstinence have been exhausted. Harm reduction strategies involve utilizing public transportation (i.e., cab, Uber, etc.) after consuming alcohol; eating a meal before consuming alcohol; planning how much alcohol will be consumed prior to going out (planned use should follow “safe” consumption guidelines for the general population); providing time, preferably one hour, between drinks (a healthy liver and detoxify about one drink per hour), hydrating and perhaps consuming some food between drinks.

VII. Resources

There are several free or low-cost resources available to aid in treatment of substance misuse following a brain injury.

Helpful textbooks include: Motivational Interviewing by Miller and Rollnick (Guilford Press, 1991), and Addiction and Change: How Addictions Develop and Addicted People Recovery by DiClemente (Guilford Press, 2006).

Educational materials and workbooks with various exercises include: Substance Abuse/Brain Injury (SUBI) Bridging Project (available on-line); The Ohio State University Brain Injury Substance Abuse Education Project; and Rethinking Drinking available on-line through the National Institutes for Health (NIH)