The Clinical Presentation of Co-occurring TBI and Substance Use Disorders

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Acknowledgements

This work was supported by a grant from the Ontario Neuro-trauma Foundation

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• Tim Godden
Learning Objectives

• Appreciation of complex interplay between neurological, cognitive and psycho-social factors associated with TBI and substance use disorders

• Links between injury in the developmental years and substance use disorders

• Appreciation for the impact of serious mental health problems

• The need for varied programming options
What does poor engagement with providers look like?

- Missed appointments
- Lack of follow-through
- Stubborn adherence to ideas
- Repeating problematic patterns
- Failure to recognize problems
- Poor problem-solving
- Lack of emotion/Inappropriate affect
What does Brain Injury look like?

- Missed appointments
- Lack of follow-through
- Stubborn adherence to ideas
- Repeating problematic patterns
- Failure to recognize problems
- Poor problem-solving
- Lack of emotion/Inappropriate affect
Overview

Three case illustrations

Joseph: Adult survivor of an adult injury—15 years post

Jill: Young adult survivor –5 yrs. post injury

Joe: Adult survivor of brain of childhood injury 25 years post injury
Intoxication is a factor for TBI

• More than half of all TBIs are alcohol-related.
• 20 to 70% of injuries may occur while intoxicated
• Binge drinking creates a specific risk for brain injury
• Increased risk for a second TBI
• 20 to 30% rate of pre-injury “Substance Abuse” in rehabilitation programs

(see reviews in Bjork and Grant, 2009; Graham and Cardon, 2008; Weil Corrigan and Karelin, 2016).
Substance use after injury

Moderate to severe injury
1-2 year period of reduced use.
  – Instruction to abstain
  – Participation in rehabilitation
  – Reduced access to alcohol

By 5 years, the overall number of individuals abusing alcohol decreased after hospitalized injury (Corrigan et al., 2014)

Estimated 20% of those with post-injury SUD did not have a SUD prior to injury (Corrigan, 1995)

(see reviews in Bjork and Grant, 2009; Graham and Cardon, 2008; Weil Corrigan and Karelina, 2016).
Correlates of Post-Injury SUD

- Intoxication at the time of injury
- Heavy drinking prior to injury
- Relatively less physical disability
- Combat-related TBI
- Anxiety
- Depression
- PTSD
- Injury before age 16

(see reviews in Bjork and Grant, 2009; Graham and Cardon, 2008; Weil Corrigan and Kareлина, 2016).
Terms defined

- **Risky or hazardous Drinking**
  - Exceeds safe guidelines

- **Problematic Substance Use**
  - Use that comes with harms

- **Substance Use Disorder**
  - Dependence
  - Addiction
How much is too much after a brain injury?
Joseph – Brief History

• 45 year old with a history of Severe brain injury at age 27 resulting from an MVA
• Bilateral frontal contusions and severe axonal shearing
• Intellectual functioning is generally well-preserved
• Executive impairments including impaired planning and problem solving as well as behavioural disinhibition and social pragmatics
• Living with his parents.
Joseph at assessment

• Referred for assessment following an episode of sexual assault (reached out and touched a woman’s breast).

• Family reported episodes of this type of behaviour when guests came to the home.

• Screening for substance use revealed one to two beers 1 to 4 times per month, usually in a social setting.

• All episodes of sexually disinhibited behaviour were related to episodes of drinking.
Any substance use can have bad effects after brain injury
Substance use in any amount can lead to difficulties

- Exacerbation of impulsivity
- Worsening of emotional dysregulation
- Increased risk of falls and re-injury
- Limiting recovery
- Adverse reactions with medications
- Increased seizure risk.
- Injury affecting Prefrontal and limbic Structures
- Self-medication

- Social environment that includes drinking
- Supportive Family

- Impaired planning
- Impaired memory
- Enhanced impulsivity

- Problematic Substance Use
- No evidence of dependence
CAMH/CHIRS Screening Project

- adaptation of the Ohio Valley Brain Injury Identification Method
- integrated into assessment protocol at main assessment site

1. Total Number Approached
   - N=3815

2. Total Number Screened
   - N=3340
Screened Clients

N=3389

- 76% No Brain Injury; no LOC
- 19% 1 injury with LOC
- 5% 2 or more inj w LOC
## Lifetime substance use in years

<table>
<thead>
<tr>
<th></th>
<th>No ABI with LOC N=2526</th>
<th>1 ABI with LOC N=626</th>
<th>2 or more ABI with LOC N=163</th>
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<tbody>
<tr>
<td>Alcohol</td>
<td>19.11</td>
<td>22.42</td>
<td>22.60</td>
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<td>Alcohol to intoxication</td>
<td>13.07</td>
<td>14.90</td>
<td>17.94</td>
</tr>
<tr>
<td>Cocaine</td>
<td>4.97</td>
<td>7.07</td>
<td>7.16</td>
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<tr>
<td>Cannabis</td>
<td>8.79</td>
<td>11.23</td>
<td>10.65</td>
</tr>
<tr>
<td>Lifetime DTs</td>
<td>.542</td>
<td>1.34</td>
<td>2.70</td>
</tr>
</tbody>
</table>

* Welch robust test of equality of means  p<01

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Increase with greater brain injury load
**Mood Symptoms Lifetime**

- **Suicide Attempt**: 33.30%
- **Suicidal Thoughts**: 55.20%
- **Anxiety**: 80.20%
- **Depression**: 86.50%

Legend:
- Green: Two or More
- Red: One
- Blue: None
Other Symptoms Lifetime

- Violence: 62.50%
- Concentrating: 63.50%

Categories:
- Green: Two or More
- Red: One
- Blue: None
Impaired Processing of Reward

Ventral Tegmental Area – Monitors the state of pleasure/pain

Sends Dopamine to excite Nucleus Accumbens and Amygdala

Functional correlates
• Memory
• Processing of
  • emotions
  • rewards
  • social cues
• Focusing attention
...without the capacity to use emotion to regulate behaviour we are unable to meet the social contract...

Antonio Damasio
Neuro-behavioural/Cognitive

- Increased sensitivity to short term reward (impulsivity)
- General blunting of response to delayed consequences
- Impaired somatic marking
- Impaired planning and problem-solving
- Impaired theory of mind
- Impaired memory
Psycho-social

- Social isolation
- Peer acceptance related to substance use
- Self-medication
Jill - History

• At age 20 she fell ill with meningitis which resulted in confusion and incomplete paraplegia at the T-10 level
• Brain MRI “multiple scattered foci of altered signal” and “a new foci of ring-shaped enhancement within the right frontal lobe” at 2 weeks.
• 2 prior concussions one with brief LOC related to HS soccer
• HS graduate –honors student.
• Working in food service, living with 2 roommates.
• History of social (binge type) drinking pattern with no known harms.
• Father identifies as a recovered alcoholic (20+ years)
Jill at Assessment

• 25 years old, referred by disability support services at her university
• Living in a shared apartment with roommates
• Ambulatory with mild balance and lower extremity weakness and neuro-genic bladder
• Returned to drinking at 2.5 years post. At the time of assessment almost daily drinking (5-6 drinks), failed attempts at moderation.
• No other substance use
Clinical Presentation

Socialization revolves around drinking.
Limited adjustment to disability related to injury (tries to pass).
Client presents as anxious, depressed, emotionally disinhibited, impulsive with poor self esteem.
Complains of fatigue and poor initiation
Seems very motivated in session, but doesn’t follow-through
LE weakness, balance issues, bladder control
Substance Use at Assessment

- Nearly daily intake of 6-8 SD, in the evenings.
- Harms resulting from substance use:
  - Blackouts
  - Falls with injury
  - Lost employment
  - School failures
  - Family conflict
- Stage of Change = Contemplative
  - Aware of harms
  - Willing to discuss alternatives
  - Ambivalent about lifestyle changes
  - Attended a few AA meetings with Dad
ABI recovery at Assessment

• Grief and shame related to ABI (covering for impairments).
• Extra time on tests but no other disability supports
• Neurogenic bladder (no follow-up)
• Intermittent pursuit of strength/balance training
• Parents unaware of the client’s struggle with cognitive impairments
• Possible pseudo-bulbar affect
• Depressed/Anxious mood
Neuropsychological examination (three years post injury)

- Pre-morbid abilities estimated to be superior (94th percentile WRAT4 reading).
- FS IQ 86th percentile
- Working memory 70th percentile
- Processing speed /Perceptual motor speed high average/superior
- Moderately inefficient new learning
- Severely impaired delayed recall (both visual and verbal)
- Mild to moderately impaired recognition memory.
Family

• Father recovered self-defined alcoholic with a single episode of rehab.

• Other family members affected by SUDs in the extended family on Father’s side—some recovered with a single episode of rehab.
• Genetics
• Injury affecting Pre-frontal and limbic Structures
• Substance-related brain changes
• Early Injury

• Shame /Guilt
• Loss
• Anger

• Social environment dominated drinking
• Supportive Family with conflict

• Impaired planning
• Impaired memory
• Enhanced impulsivity
• Limited impact of delayed consequences

• Binge Pattern Substance use Disorder
Clinical Presentation

• Immediate lapses after two rounds of inpatient care (not specialized)
• Return to old environment
• Loads of change talk in sessions
• Poor follow-through
• Disrupted family relationships
• Conflict with roommate
• Not following through with medical appointments
• Poor organization (fails to register for school).
Integrated Care

- Inpatient SUD rehab with brain injury supports
- Community–based case management with integrated brain injury/addictions focus
  1. Brain injury education
  2. Cognitive compensation training
  3. Job/school supports
  4. Puppy proofing (engaging the client in creating a safe environment).
  5. Abilify to address lability/mood
  6. Trial of Adderall to address fatigue and initiation
Integrated care

• Memory Compensation
• Metacognitive strategy training
• Behavioural change focuses on accepting environmental supports
• Finding alternative reinforcement
• Integrated support for adjustment to disability
• Naltroxone?
Brain injury is associated with Concurrent mental health and substance use disorders

- 80% screened positive for TBI
- 25% at least 1 moderate or severe TBI (LOC >30 min)
- The weighted sum of TBIs was associated with increased complexity:
  - Homelessness
  - Personality disorder (borderline and anti-social)
  - Psychotic disorder
  - PTSD
  - Arrests and incarcerations
- Injury before age 15 was associated with arrests
- Early injury associated with psychotic disorders versus mood disorders

McHugo, et al 2016 JTHR
US and Canadian Statistics
Mental Health and Addictions Settings

• Over 20% of people seeking services for addictions have had a brain injury with loss of consciousness (LOC)

• 25 to 50% of all people who seek treatment for mental health issues have a history of brain injury (15% with moderate to severe injuries)

• High prevalence among marginalized populations: homeless, prison
Outcomes of Childhood Injury

- psychological distress (AOR = 1.52),
- attempting suicide (AOR = 3.39),
- prescribed medication for anxiety, depression, or both (AOR = 2.45)
- dangerous alcohol use (AOR = 2.4)

Gabriella Illie et al, (2014-2015), St. Michael’s Hospital
Longitudinal Evidence

New Zealand Birth Cohort study (McKinlay et al, 2009)

- Children injured before the age of 5 were at 3.6 times the risk of alcohol abuse in adolescence and diagnosis of SUD by age 25
- Those hospitalized with 1st TBI 16-21, 3 times more likely to be diagnosed with drug dependence
- TBI highly associated with likelihood of arrest
Childhood Brain Injury

• Early insults alter the future development of the brain.
• Apparently mild injuries may have devastating long-term impacts.
Social Factors

- Multiple TBI associated with abuse may be under-reported.
- Children grow into problems associated with emotional/behavioural regulation.
- Supportive environments may mitigate the risk of early injury.
Joe

- 42 year old man with a history of mild developmental disability and severe brain injury at age 12 while in the custody of child protective services
- Housed in mental health/treatment settings until the age of 20.
- Unstable housing for the majority of his adulthood with periods of homelessness
- No history of employment
- Diagnosed variously with schizophrenia, borderline personality disorder and organic brain syndrome
- Several assault charges, incarcerations and forensic hospitalizations
Joe at the time of Assessment

• Referred for neuropsychological assessment by an Assertive Community Treatment Team (ACTT).
• Homeless and failed a trial of supported apartment living.
• Daily habit of crack cocaine use
• Periodic use of alcohol
• Seizure disorder (also apparent pseudo-seizures)
Neuropsychological Examination

• Full Scale IQ 20\textsuperscript{th} percentile
• Moderate cognitive slowing
• Profoundly impaired verbal and visual new learning and memory
• Moderately to severely impaired working memory and cognitive control
• Abstraction and reasoning severely impaired
Mental Health

• Paranoid ideation—particularly while using—leads to aggressive outbursts

• Episodes of encephalopathy which required hospitalization

• Depression and anxiety lead to episodes of self mutilation (cutting), pseudo seizures, aggression against property

• Miss-use of ER and psychiatric hospitalization
Health

• Hep c positive
• Elevated cholesterol and blood pressure
• Periodontal disease
• Seizure disorder (well controlled when he is compliant with medication, but made worse with substance use)
Substance use

- Attended 12 week program and remained abstinent from Crack for several months while living in supported housing outside of the city, but used alcohol and marijuana.
- Moved to a brain injury supported housing program and remained abstinent of crack for 6 months before beginning to elope to go to his old neighborhood monthly to use.
- Slowly improving meaningful engagement.
- Gradual escalation of his use over 2 year period resulted in discharge from the brain injury residence. Returned to daily crack use, panhandling and selling items to support his habit.
- Dismissed from Brain injury residence after assault on a staff member and bringing drugs to residence
- Happy in harm reduction housing. No motivation to change.
Physiological
- Injury affecting Pre-frontal and limbic Structures
- Substance-related brain changes (severe)
- Developmental disability

Self-medicating
- Severe Emotional Dysregulation

Social
- Homelessness
- Incarceration
- No family support
- Public Guardian
- History of institutionalization

Cognitive
- Moderate global impairment
- No impact of delayed consequences

Substance Use
- Severe poly-substance disorder

Medical
- Seizure Disorder
- Hep-C
- Hypertension
- Parodontal disease

Psychiatric
- Paranoid psychosis
- Borderline features
- Self-mutilation
- Aggression
Integrated care

• Team
  – concurrent disorder case management
  – brain injury case management
  – Housing provider
  – Medical (including addiction medicine)
  – Public guardian

• Harm reduction housing

• Harm reduction programing
  – Encourage meaningful participation
  – MI to encourage return to treatment
Comprehensive, Continuous, Integrated System of Care (CCISC) Model

- Addictions-based Intervention
- Specialized Integrated Care
- Medical Center (ER/Rehab) Screening and Brief Treatment
- ABI rehabilitation-based Intervention Screening, treatment Shared care