Under-Identification of Students with Long Term Disability from Moderate to Severe TBI in Schools

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Learning Objectives

At the conclusion of this activity participants will be able to:

- describe the estimated discrepancy between numbers of children getting moderate-severe brain injury and the numbers of children served in schools under the IDEA Special Education category of TBI

- state 3 reasons for the under-identification of children with TBI in schools

- identify 3 potential solutions to improve identification of TBI in Schools and in Special Education
What are the long-term consequences of brain injury?

- Short- or long-term problems and requiring help in performing activities of daily living
- A wide range of problems in thinking, sensation, memory, learning, language, behavior, emotions
- Mental health problems
  - severe depression
  - anxiety
  - difficulty controlling anger
  - alcohol or substance abuse
- Other Disorders
  - Epilepsy
  - Increased risk for both Alzheimer’s and Parkinson’s diseases
  - Other brain disorders associated with increasing age, Chronic Traumatic Encephalopathy (CTE)
How are students identified with TBI in School?

- TBI is a special education eligibility category under the Individual with Disabilities Education Act (IDEA).

- Unlike other special education categories (e.g., autism, specific learning disabilities), the numbers of students identified with TBI have not significantly increased over the years.

- Discrepancies between TBI hospitalization data, estimates of long-term disability due to TBI, and the number of students identified under the TBI category in each state.
Methodology of under-identification analysis

- data of students hospitalized with TBI for every state for each school age group
- students who would be expected to have long term, persistent problems requiring significant learning supports
- compared those numbers in each state to the actual number of Special Ed identified students with TBI
Methodology of under-identification analysis

- To get from incidence to prevalence a multi-year cohort factor was applied to get an average prevalence estimate in any given year.

- Only 1 state met or exceeded the expected numbers based on hospitalizations, Massachusetts.

- Massachusetts was excluded from the analysis.
Results of under-identification analysis

- 33% of the students projected to have moderate to severe TBI were represented in state child counts under the Special Education TBI category

- Under-identification ranged from only 19% of those expected being identified, to 75% being accurately identified
Results of under-identification analysis

Possible explanations:

• students with TBI are not identified for special education services
• are served under other special education categories
• communication between medical - school systems are inadequate
• some students don't manifest problems until years after injury
How Common is Under-Identification?

Estimated Average Annual Number of TBI in the United States, 2002–2006

- 52,000 Deaths
- 275,000 Hospitalizations
- 1,365,000 Emergency Department Visits
- ??? Receiving Other Medical Care or No Care
Undiagnosed Brain Injuries

- Brain Injury is often referred to as the “hidden” disability

- Individuals may
  - Drop out of school
  - Start misusing substances
  - Fail at relationships
  - Become victims
  - Become homeless
  - End up in mental health system
  - Be unable to obtain or maintain employment
  - Get into trouble with the law
Potential Effects of Under-Identification

- Koponen et al, 2002 report that 48.3% of patients with TBI had an axis I psychiatric disorder that began after traumatic brain injury
  - major depression (26.7%)
  - alcohol abuse or dependence (11.7%)
  - panic disorder (8.3%)
  - specific phobia (8.3%)
  - psychotic disorders (6.7%)

- Reekum, et al in 2015 report there is a strong association between TBI and mood and anxiety disorders.
Potential Effects of Under-Identification

- 50% of youth offenders have a history of loss of consciousness, with repeat injuries being very common (Davies et al., 2012; Kaba et al., 2013)

- 30% of women victims of domestic violence had LOC, and 67% report residual problems related to head injury (Corrigan, et al., 2007)

- Rates of homelessness are higher for those with a history of brain injury
  - systematic review done in 2012, rates were as high as 53%
Potential Effects of Under-Identification

- 42% of people who meet the CDC’s definition of brain injury did not seek medical attention (Corrigan & Bogner 2007)

- Criminal behavior appears to increase after TBI (Farrer & Hedges, 2011; Brooks et al., 1986; Fazel et al., 2011; McIsaac et al., 2016; Timonen et al., 2002; Elbogen et al., 2015)

- Rate of TBI is 3 to 8 times higher among juvenile offenders (Hughes et al., 2015)

- 60% of inmates have a history of brain injury prior to incarceration (Shiroma, et al., 2010)
Ages at which episodes occurred (n=428)
Brain injury in juvenile justice

- Kaba et al. (2013) report in a study of adolescents in the NY City Jails that 67% of screened detainees reported a history of at least one brain injury.

- Most frequent causes were assaults (55.5%) followed by falls (41%).

- Inmates with brain injury were more likely to be users of mental health services.

- Emotional dysregulation and impaired processing speed are likely may be linked to criminal justice involvement.
Brain injury in juvenile justice

Perron and Howard (2008) found that youth with TBI display significantly more:

- Psychiatric distress
- Earlier onset of criminal behavior
- Earlier onset substance abuse behavior
- More lifetime substance abuse and suicidality
Challenge of interpreting behavior

- Effects of brain injury can appear to be lack of co-operation or disrespect
  - Failure to respond quickly to directives
  - Inability to initiate requests for assistance
  - Difficulty remembering prior discussions
  - Inconsistent attention
  - Difficulty following directions
  - Difficulty learning routines
  - Difficulty expressing needs
  - Impulsivity, emotional dyscontrol
Undiagnosed Brain Injuries

- Systems that have primary functions other than Brain Injury will not document Brain Injury
  - Unless medical documentation available
  - Brain Injury screening is in place

- Many brain injuries are undiagnosed

- A need for screening exists
A young man, in his mid-twenties, hospitalized in a mental health unit, was admitted with the following complaint, “There is something wrong with my head and I can’t keep a job.” During a clinical interview, he revealed that his father had not been in his life for almost twenty years. His father had been physically abusive and he was subsequently hospitalized for broken bones. When he was school age, he was hit by a car, resulting in hospitalization for multiple injuries. He was placed in Special Education, as he had trouble learning and controlling his behavior in class. As an adolescent, he began using multiple drugs as well as alcohol. While still a teen, he was involved in another incident, resulting in hospitalization for several days. Thereafter, his ability to concentrate, remember, and control his temper became even worse.

After high school, he enlisted in the National Guard and served in Iraq for several months. He was injured in an attack, later describing this experience as ‘severe PTSD’. Once he was back in the states, he could not keep a job. His use of drugs and alcohol escalated and he was jailed for various offenses. He had nowhere to sleep except his car. A mental health crisis resulted in hospitalization. The clinician recognized the likelihood of traumatic brain injury (TBI). Neuropsychological testing revealed to the multidisciplinary treatment team problems with his multiple conditions.
Potential Cost to Society

➤ Brain Injury *left untreated* can lead to:
  • Academic failure and dropping out
  • Un-employment or under-employment
  • Homelessness
  • Use of illegal drugs
  • Psychiatric problems
  • Repeated brain injury
  • Criminal Justice involvement
How to address the problem of brain injury under-identification?

- Screening to identify individuals with ABI
- Building a trained ABI workforce
- Providing information about ABI to families and referrals to appropriate service providers
- Facilitating access to services through resource facilitation
Identifying youth injury in juvenile justice with brain injury

- Provide brain injury education, training and consultation to:
  - Detention Center Staff
  - Families
  - Schools
  - Probation Officers
  - Residential Treatment Facilities
  - Community Providers
  - Link to Voc Rehab
Under-identification specific objectives

- Identify youth with brain injury through screening and neurocognitive testing
- Utilize information gleaned from neurocognitive evaluation activities to plan and guide the delivery of interventions that will best address the needs of students with cognitive impairments
- Provide NeuroResource Facilitation to make connections to brain injury resources in the community
Screening for history of brain injury

- **OSU-TBI-ID** (Corrigan & Bogner, 2007)
  - Semi-structured interview instrument
  - Designed to screen for acquired brain injury
  - Administered by a trained staff person who is familiar with TBI and has training in basic interviewing techniques
  - Supplemented with questions about education history and performance as well as symptoms
### Step 1
Ask questions 1-5 below. Record the cause of each reported injury and any details provided spontaneously in the chart at the bottom of this page. You do not need to ask further about loss of consciousness or other injury details during this step.

1. In your lifetime, have you ever been hospitalized or treated in an emergency room following an injury to your head or neck? Think about any childhood injuries you remember or were told about.
   - [ ] No  [ ] Yes—Record cause in chart

2. In your lifetime, have you ever injured your head or neck in a car accident or from crashing something other moving vehicle like a bicycle, motorcycle or ATV?
   - [ ] No  [ ] Yes—Record cause in chart

3. In your lifetime, have you ever injured your head or neck in a fall or from being hit by something (for example, falling from a bike or horse, rollerblading, falling on ice, being hit by a rock)? Have you ever injured your head or neck playing sports or on the playground?
   - [ ] No  [ ] Yes—Record cause in chart

4. In your lifetime, have you ever injured your head or neck in a fight, from being hit by someone, or from being shaken violently? Have you ever been shot in the head?
   - [ ] No  [ ] Yes—Record cause in chart

5. In your lifetime, have you ever been nearby when an explosion or a blast occurred? If you served in the military, think about any combat-related incidents?
   - [ ] No  [ ] Yes—Record cause in chart

### Interviewer instruction:
If the answers to any of the above questions are “yes,” go to Step 2. If the answers to all of the above questions are “no,” then proceed to Step 3.

### Step 2
Interviewer instruction: If the answer is “yes” to any of the questions in Step 1 ask the following additional questions about each reported injury and add details to the chart below.

- Were you knocked out or did you lose consciousness (LOC)?
  - If yes, how long?
  - If no, were you dazed or do you have a gap in your memory from the injury?
  - How old were you?

### Step 3
Interviewer instruction: Ask the following questions to help identify a history that may include multiple mild TBIs and complete the chart below.

- Have you ever had a period of time in which you experienced multiple, repeated impacts to your head (e.g. history of abuse, contact sports, military duty)?
  - If yes, what was the typical or usual effect—were you knocked out (Loss of Consciousness - LOC)?
  - If no, were you dazed or did you have a gap in your memory from the injury?
  - What was the most severe effect from one of the times you had an impact to the head?
  - How old were you when these repeated injuries began?  Ended?

### Table: TBI-ID

| Step 1 Cause | Step 2 Loss of consciousness (LOC)/knocked out | Dazed/Mem Gap | Age |
|--------------|-----------------------------------------------|---------------|-----|
| No LOC       | < 30 min                                      | Yes           | No  |
|              | 30 min-24 hrs                                 | No            |     |
|              | > 24 hrs                                      |               |     |

If more injuries with LOC:
- How many? Longest knocked out? How many > 30 mins? Youngest age?

| Step 3 Cause of repeated injury | Typical Effect | Most Severe Effect | Age |
|---------------------------------|----------------|-------------------|-----|
| Dazed/ memory gap, no LOC       | LOC            | LOC               |     |
| LOC > 30 min                    | Began          | EndED             |     |

Adapted with permission from the Ohio State University TBI Identification Method (Cromak, JD, Bogner, JA (2007). Initial reliability and validity of the OSU TBI Identification Method. J Head Trauma Rehabil, 22(6):318-329.
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### Interpreting Findings

A person may be more likely to have ongoing problems if they have any of the following:

- **WORST**
  - One moderate or severe TBI
- **FIRST**
  - TBI with loss of consciousness before age 15
- **MULTIPLE**
  - 2 or more TBIs close together, including a period of time when they experienced multiple blows to the head
- **RECENT**
  - A mild TBI in the last weeks or a more severe TBI in the last months
- **OTHER SOURCES**
  - Any TBI combined with another way that their brain function has been impaired

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### For more information about TBI or the OSUTBI Identification Method visit:

- Ohio Valley Center at OSU
  - www.ohiovalley.org/informationeducation
- BrainLine.org
  - www.brainline.org

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### Step 1

| Cause | Step 2 | Dazed/Mem Gap | Age |
|-------|--------|---------------|-----|
| No LOC | Loss of consciousness (LOC)/knocked out | Yes | No |
| < 30 min | 30 min-24 hrs | > 24 hrs | |

If more injuries with LOC: How many? Longest knocked out? How many ≥ 30 mins? Youngest age?

### Step 2

| Cause of repeated injury | Typical Effect | Most Severe Effect | Age |
|--------------------------|---------------|--------------------|-----|
| Dazed/mem gap, no LOC | LOC | Dazed/mem gap, no LOC | LOC | LOC | Began | Ended |
| LOC < 30 min | LOC 30 min - 24 hrs. | LOC > 24 hrs. | |

(Updated July 2013)
OSU-TBI-ID Scoring (Corrigan & Bogner, 2007)

WORST — there has been one moderate or severe TBI (i.e., any TBI with 30 minutes or more loss of consciousness)

FIRST — TBI with any loss of consciousness before age 15

MULTIPLE — had 2 or more TBIs close together, including a period of time when they experienced multiple blows to the head even if apparently without effect

RECENT — a mild TBI in recent weeks or a more severe TBI in recent months

OTHER SOURCES — any TBI combined with another way that their brain has been impaired
Questions about non-traumatic conditions that could cause brain injury

- Epilepsy or seizure disorder
- Oxygen deprivation (anoxia)
- Brain infections such as meningitis, encephalitis
- Stroke
- Exposure to toxic chemicals
NeuroCognitive Testing

- Administered to individuals who screen positive for an event that could have caused a brain injury

- Goal is to determine whether there are impairments associated with the events that are likely to interfere with success in performance in the community
Case Example: Juvenile

- 16 year old youth
- 3 possible events on screening, including a concussion “that changed everything”
- Severe neurocognitive impairment on testing
- Evidence of post-concussion symptoms
- Referrals to BrainSTEPS, OVR, and medical specialists in brain injury
- Lengthy detention with release to on-site youth placement
NeuroCognitive Testing

- Wide Range Assessment of Memory and Learning- Second Edition (WRAML-2)
- Wechsler Individual Achievement Test-Third Edition (WIAT-III) - Reading Comprehension and Math Problem-Solving
- Behavior Rating Inventory of Executive Function, 2nd Edition-Self-Report Version (BRIEF-2-SR)
- Delis-Kaplan Executive Functioning System (D-KEFS)
### Summary WRAML-2 Performance:

|                          | Immediate Percentile | Range  | Delayed Percentile | Range  | Recognition Percentile | Range  |
|--------------------------|----------------------|--------|--------------------|--------|-------------------------|--------|
| **Story Memory**         | 9<sup>th</sup> Percentile | Low Average Range | 9<sup>th</sup> Percentile | Low Average Range | 5<sup>th</sup> Percentile | Borderline Range |
| **Design Memory**        | 2<sup>nd</sup> percentile | Borderline Range |                    |        | 2<sup>nd</sup> percentile | Borderline Range |
| **Verbal Learning**      | 5<sup>th</sup> percentile | Borderline Range | 5<sup>th</sup> percentile | Borderline Range | 1<sup>st</sup> percentile | Extremely Low Range |
| **Picture Memory**       | 2<sup>nd</sup> percentile | Borderline Range |                    |        | 1<sup>st</sup> percentile | Extremely Low Range |
NeuroCognitive Testing

- **Visual-Motor Sequencing** - performance on the Trail Making Test of the D-KEFS indicates a weakness in letter sequencing - Scaled score was a 4, which falls in the Borderline range

- **Disinhibition** - performance on the Color-Word Interference Test of the D-KEFS indicates a weakness in inhibiting automatic verbal responses, as well as a strength in cognitive flexibility - Scaled scores ranged from 4 to 5, which fall in the Borderline range
Juvenile justice results

Screening ($n=415$)
Ages ranged from 12 years to 20
Average age = 16
80% male, 20% female
Juvenile justice results

**Screening Outcomes**

52% Positive History BI Event
48% No History BI Event

Average # BI Events = 2.8 per juvenile
Juvenile justice results

**Cognitive Testing Outcomes**

- 52% demonstrated cognitive impairments
- 48% within normal limits
Juvenile justice results

**Overall level of impairment**
- Mild Impairment – 52%
- Moderate Impairment – 26%
- Severe Impairment – 22%
Juvenile justice results

Cognitive Testing - Common Impairments

- Delayed recall story info: 46%
- Sort recognition: 32%
- Inhibition/switching: 30%
- Letter number switching: 28%
- Inhibition: 26%
Juvenile justice results

Cognitive Testing Self-Reported Outcomes

- Behavioral regulation: 64%
- Inhibition: 52%
- Monitor: 52%
- Emotional control: 52%
- Planning/organization: 52%
What if we have screening but no testing available?

- NeuroCognitive Testing could be accomplished through other resource systems

- Voc Rehab – generally if the youth is 17 or 18 years old, and they request services through Voc Rehab, a diagnostic service can be done through a vendor

- Schools – although neuropsych is not considered a school service, many school neuropsychologists are trained in how to administer the tests in a NeuroCognitive Screen
What if we have screening but no testing available?

- Colorado Kids with Brain Injury
  - Site for professionals and family members
  - Building blocks

http://cokidswithbraininjury.com/educators-and-professionals/brain-injury-matrix-guide/
NeuroResource Facilitation

➢ Provide education on brain injury to adolescent and family/support system

➢ Make connections to resources:
  • School Re-entry Supports – BrainSTEPS in PA
  • Medical Rehabilitation/Community Re-Entry Programs/Vocational Rehabilitation Services for supported employment
  • Community Colleges – Office on Students with Disabilities
  • Work-oriented technical and training programs
  • WIOA Job Shadowing and Work Based Learning Experiences
NeuroRehabilitation services that can help

- **Post Acute Rehabilitation Services**
  - Outpatient including PT, OT, SP, NeuroPsych, Physiatry
  - Community Re-Entry Services including Return to School, Return to Work, Return to Life
  - Community Residential Programs
  - Structured Day Programs, including Clubhouse, Vocational
  - Supported Employment Programs, including Job Development, Job Placement, Job Coaching
  - Cognitive Rehabilitation
Traditional interventions

- Require cognitive skills that may be impaired following brain injury
  - recall what was discussed in the session/class
  - relate what was discussed to their own situation;
  - develop insights about how they might alter future behavior
  - evaluate how a situation in which they find themselves in the future is similar to something discussed in treatment
  - plan, organize, and implement their intentions
Neurocognitive challenges to traditional treatment or traditional educational approaches

- Difficulty benefitting from experience
  - May not remember from one session/class to the next
  - Intention and behavior may be disconnected
  - Have trouble perceiving, understanding, and conforming to norms
  - Have difficulty with regulation of thoughts, feelings and behavior
  - Difficulties with communication and basic learning skills
Why do those with brain injury need a different approach?

- Executive dysfunction
- Emotional dysregulation
- Memory impairment
  - Variability of memory
  - Prospective memory

The impact of brain injury may not be immediately evident given age-related demands.
How to change the trajectory

- Brain Injury Screening
- Neurocognitive Testing
  - Brief neurocognitive assessment battery
- Brain Injury Education and Counseling
- Education and Support of Related Systems
- NeuroResource Facilitation
- Education and Advocacy of Related Systems
Need for brain injury screening in multiple settings

- Public/private schools
- Pediatric/primary care settings
- Juvenile justice settings
- Adult corrections settings
- Mental health settings
- Psychiatric hospitals
- Drug and alcohol treatment programs
- Domestic violence programs
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