Traumatic Brain Injury

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Acquired Brain Injury

Traumatic Brain Injury

 Defined as "an alteration in brain function or other evidence of brain pathology caused by an external force" (Menon et al 2010)

Non Traumatic Brain Injury

- Anoxia
- Brain tumours
- Encephalitis
- Metabolic encephalopathy
- Toxic effects
- Vascular insults
- Other brain disorders & infections
- Fetal Alcohol Spectrum Disorder

Mild Traumatic Brain Injury/Concussion?

 Mild TBI/Concussion is a complex pathophysiological process affecting the brain, induced by biomechanical forces resulting in a traumatically induced physiological disruption of brain function:



The head strikes a hard object creating a concussion-type injury



Mild Traumatic Brain Injury

Indicators: American Congress of Rehab Medicine 1993

- 1. Any period of loss of consciousness;
- 2. Any loss of memory for events immediately before or after the accident;
- 3. Any alteration in mental state at the time of the accident (eg, feeling dazed, disoriented, or confused); and
- 4. Focal neurological deficit(s) that may or may not be transient; but where the severity of the injury does not exceed the following:
 - loss of consciousness of approximately 30 minutes or less;
 - after 30 minutes, an initial Glasgow Coma Scale (GCS) of 13–15; and
 - posttraumatic amnesia (PTA) not greater than 24 hours.
- Majority of concussions, (especially first time) resolve within 1-3 months.
- ~ 30% of children and youth continue to be symptomatic at 3 months.
- Risk factors for persistent symptoms include: Sex (female) Age (children, youth and older adults), history of previous concussion, sleep disorders, migraines, learning disability and ADHD.

Moderate-Severe TBI

Moderate TBI:

 Loss of consciousness from > 30minutes to 6 hours and a Glasgow Coma Scale rating of 9 to 12.

Severe TBI:

- Loss of consciousness of greater than 6 hours and a Glasgow Coma Scale of 3 to 8. (i.e. less than 9)
- Length of coma and duration of post traumatic amnesia (lack of ability to create new memories) also indicators of severity

Traumatic Brain Injury: A Disease Process; Not an Event

- Meets the World Health Organization criteria for chronic disease (Masel, 2010)
- Has chronic and evolving neurological consequences (Wilson et al., 2017)
- Should be viewed as and thus managed as a chronic disease and defined as such by policy makers, health care and insurance providers (Masel, 2010)

Pediatric TBI: A Neurodevelopmental Disability and Global Public Health Concern

- Worldwide incidence of pediatric TBI ranges broadly and varies greatly by country, with most reporting a range between 47 and 280 per 100,000 children. (Dewan et al., 2016)
- Majority of injuries (> 80%) are considered mild. (Dewan et al., 2016)
- In Ontario, 1 in 5 middle- and high-school students report having suffered at least one head injury that knocked them unconscious for more than five minutes or required overnight hospitalization. (Ilie et al., 2015)



Pediatric TBI: A Global Public Health Concern

- Bimodal age distribution typically described with children age 0-4 years, adolescents and young adults age 15-24 years among those with the highest risk for sustaining a TBI, with an overall prevalence of ~30% (McKinley et al., 2009)
- > Age 3, males have higher rates of TBI than females. (Dewan et al., 2016)
- ~ 1/3 of children and youth who experienced a TBI went on to have one or more additional injuries. (McKinley et al., 2009)
- Link with alcohol, cannabis and energy drinks, with frequent users showing "significantly higher odds" of a head injury in the past year than their peers who do not use substances. (McKinley et al., 2009; Ilie et al., 2015)

Pediatric TBI: Neurodevelopmental Disability

How are Kids Different?

- Composition and mechanical properties of head and brain differ in youth v. adults making them more vulnerable to injury.
 - Brain water content, degree of myelination, skull geometry, suture elasticity, and neck strength
- Younger children recover from TBI at a slower rate than adults likely due to the vulnerability of developing skills and lack of cerebral maturity. (Cermak et al., 2018)
- Pediatric TBI can result in 'later developmental emergence of deficits' (Wiseman-Hakes et al., 2000)



Later Developmental Emergence of Deficits

- Children need to be monitored at every developmental stage and through transitions into adulthood.
- Problems can occur at each developmental stage and so the child needs to 'recover' again at each new stage of development. (Bond-Chapman et al., 2016)
- Frontal lobes are particularly vulnerable to injury and so deficits may not occur immediately but manifest during adolescence.
- Yes, new emerging behaviors, challenges, cognitive stall can be related to original injury! Keep the doors open for services.



Pediatric TBI: What does this look like?

- TBI is a hidden disability! Challenges are often misinterpreted as poor behaviour, lack of motivation
- Kids with TBI often present with impairments in language, cognitive communication, and social communication.
- These are integral to the ongoing development of emotional, cognitive, and behavioral function.
- Communicative abilities include listening, speaking, gesturing, reading, and writing.



The Impact of TBI on Cognition and Communication: How We Think and How We Interact With Others



Pediatric TBI: What we know

- These impairments can have a significant impact on community reintegration, academic and social success.
- Longitudinal studies report lasting cognitive and behavioral effects as cognitive and performance demands increase into adulthood.



Pediatric TBI: What we know

- TBI severity is not the sole predictor of outcome and performance;
- Other factors contribute to cognitive communication outcome and recovery including;
 - age at time of injury,
 - family and school support
 - access to ongoing rehabilitation
- In addition to the later developmental emergence of impairments, developing skills at time of injury are most susceptible to impairment. (Cermak et al., 2018)



Social Communication and Cognition



Impairments in the ability to:

- Read emotional expressions visually and by tone of voice
- Learn from consequences
- Theory of Mind (infer mental state of other)
- Infer intent of other person
- Adapt communication to the context (e.g. speaking differently to a police officer or teacher than to a friend) and,
- Difficulty interpreting sarcasm, irony, abstract humour
- Alexithymia (lack of awareness of emotion and lack of emotion vocabulary)
- Have higher negative attribution bias (adult literature) (Neumann 2019)

The Good News

- In many cases, pediatric TBI in of itself, does not equal poor outcomes.
- There are many comprehensive evidence based supports and interventions available.
- Families, educators, speech language pathologists, social workers, occupational therapists, psychologists, behaviour therapists, art therapists, music therapists, nurses, case managers, recreation therapists, intimacy and sexuality counsellors, child and youth workers, can and DO make a difference in outcomes!

The Clinical Perspective: Implementing Supports and Strategies

- Involve the individual in specific, measureable, achievable, realistic/relevant and timed (SMART) goals and use Goal Attainment Scaling. (Thamar et al., 2009)
- Facilitate development of insight, metacognitive awareness.
- Be the 'external brain' to compensate for emerging executive function impairments.
- Slow down and limit presentation of information to compensate for processing impairments.
- Provide education regarding the person's strengths and challenges and insure consistency of approach across environments where possible

The Clinical Perspective: Implementing Supports and Strategies

- Goal, obstacle, plan, do, review (Ylvisaker 2006)
 - Self-awareness of strengths and limitations
 - (What's hard to do; what's easy to do?)
 - Goal setting
 - What are potential obstacles? How do we plan for them??
 - Planning/organizing
 - Initiating
 - Inhibiting
 - Self-monitoring and evaluating: What worked, what didn't work?
 - Strategic thinking and acting.... What do we need to do differently??
 - Flexible shifting, adjusting, benefiting from feedback

The Clinical Perspective: Implementing Supports and Strategies

- Big deal/Little deal (Ylvisaker 2006)
- Create everyday routines (Ylvisaker)
- Understand the impact of poor sleep, stress and fatigue on behavior and performance. Celebrate successes... "I really like how you" Next time what could you do differently?
- Identity mapping; who do you want to be and what does that look like? How does that person think and act? (Ylvisaker)
- Goal Attainment Scaling (Thamar et al., 2009)

Take Home Messages

- TBI is a chronic disease and should be managed across the lifespan
- Injury severity is not the only predictor of outcomes
- Family, school and community support is critical
- Children may experience additional impairments at each developmental stage; support and interventions needed at each development transition: Keep the doors open for service!
- Early Intervention is critical to facilitate success and prevent social failures, as welling as involvement in the criminal justice system and or homeless as TBI is overrepresented in these groups.
- Collaboration, communication, consistency and resilience are key!

Resources

Cognitive Rehabilitation for Pediatric Neurological Disorders

GIANNA LOCASCIO AND BETH S. SLOMINE



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Section 1 – Evidence-based Cognitive Rehabilitation

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Evidence-based Cognitive Rehabilitation

Chapter

Section 1

Language, Cognitive-Communication, and Social-Communication Interventions

Catherine Wiseman-Hakes, Lisa Kakonge, and Susan Summerby-Murray

Introduction

The development of language, communicative abilities (listening, speaking, gesturing, reading, and writing), and social communication (recognizing communication intent, interpreting social cues, understanding emotional intent, using eye contact, using language to resolve conflict)¹ are integral to the ongoing development of emotional, cognitive, and



Roberta DePompei | Jean L. Blosser



- The authors' proactive approach encourages strong collaborative partnerships that encourage family, healthcare, and education providers to join forces in order to acquire the insights, knowledge, and tools needed to identify problems and implement personalized solutions.
- Functional assessment and treatment approaches are recommended to facilitate positive reintegration experiences.
- Information about extending services beyond the walls of hospital and school settings.
- Authors stress the importance of focusing on cognitive-communication skills and supporting reintegration and functional success in home, school, community and work situations.

Additional Resources

- http://obia.ca/
- https://www.braininjurycanada.ca/
- <u>http://onf.org/documents/guidelines-diagnosing-and-managing-pediatric-concussion</u>
- <u>https://bianj.org/wp-content/uploads/2014/10/Brain Injury Guide Educators 2012.pdf</u>
- https://www.brainline.org/children-tbi
- <u>http://www.projectlearnet.org/tutorials/sr_ef_routines.html</u>

Integrating Brain Injury, Mental Health, and Addictions

Colantonio, A. (PI). Chan, V. Mann. R., Balogh, R., Kirsh, B., Nalder, E., Kontos, P., Wiseman-Hakes, C., Matheson, F., Riopelle, R., Grigorovich, A., Haag, L.





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Project Goal

To facilitate the integration of services for persons with traumatic brain injury (TBI) and mental health and/or addiction (MHA), by addressing relevant knowledge gaps about TBI and MHA, promoting meaningful cross-sectoral engagement with decision makers through research and knowledge translation (KT) activities.

Explicit consideration of sex and gender throughout

Addresses significant fragmented care

Generously Supported By

- Canadian Association of Elizabeth Fry Society
- Canadian Mental Health Association
- COTA
- Evidence Exchange Network, CAMH
- Human Services Justice Coordinating
 Committee
- John Howard Society of Ontario
- March of Dimes Canada
- Ontario Brain Injury Association
- Ontario Neurotrauma Foundation
- Ontario Shores Centre for Mental

Health Sciences

- Probation Officers Association of Ontario
- Provincial Acquired Brain Injury Network
- Rehabilitation Sciences Sector, University of Toronto
- Waypoint Centre for Mental Health
- WomenatthecentrE
- Women's Habitat
- Women's Shelters Canada
- Individuals with Lived Experience

"In the long history of humankind, those who learned to collaborate and improvise most effectively have prevailed." – Charles Darwin



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