



**Banging Your Head
Against the Wall:**

Understanding Expected &
Unexpected Aspects of Post-
Concussive Syndrome

QLI  QLIomaha.com @QLIrehab

Rebuilding Lives
is a combination of
Art and Science





Classification of TBI

Defined by relatively immediate post-injury presentation

Is based on observable physiological measures and evidence:

- Glasgow Coma Scale
- Loss of consciousness
- Post-traumatic amnesia



Glasgow Coma Scale

Eyes	Verbal	Motor	(Points)
n/a	n/a	Obeys commands	6
n/a	Oriented, normal conversation	Localizes painful stimuli	5
Eyes open spontaneously	Confused, disoriented	Flexion/withdrawal with pain	4
Eyes open in response to voice	Inappropriate speech (random)	Abnormal flexion to painful stimuli	3
Eyes open in response to pain	Incomprehensible sounds	Extension reflex to painful stimuli	2
No eye opening	No verbalization	No motor response	1

TBI severity classification metrics

LEVEL OF INJ. (relative percentage)	GCS	LOC	AOC	PTA	Abnormal imagery findings
Mild ~75-80%	13 - 15	0 – 30 min	< 1 day	< 1 day	Not as likely, though possible
Moderate ~10-13%	9 - 12	> 30 min, < 24 hours	> 1 day	>1 day, < 1 week	May or may not be present
Severe ~7-10%	3 - 8	> 24 hours	> 1 day	> 1 week	More likely to be present



Concussion

Definition

A type of traumatic brain injury (TBI) caused by a bump, blow, or jolt to the head or hit to the body that causes a disruption of neurotypical functioning.

The most common symptoms associated with mTBI/Concussion

- Headache
- Dizziness
- Nausea and vomiting
- Blurred vision
- Light sensitivity
- Difficulty concentrating
- Memory problems
- Fatigue
- Irritability

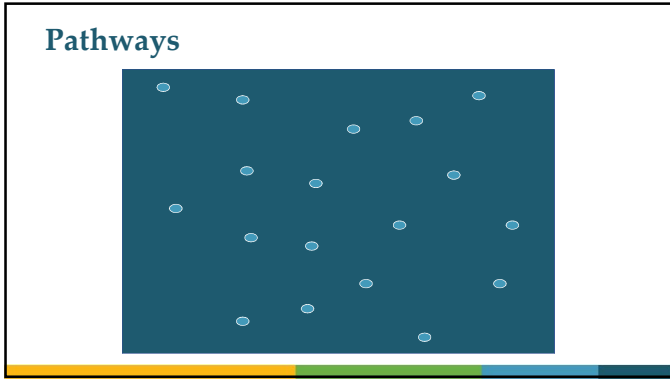
Important to keep in mind that the prognosis for mTBI is typically very good, in that most individuals recover fully within minutes to days. A small percentage, however, experience symptoms that may persist for weeks or even years.

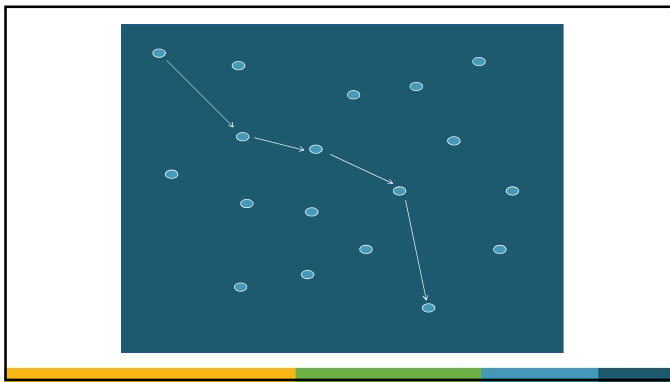


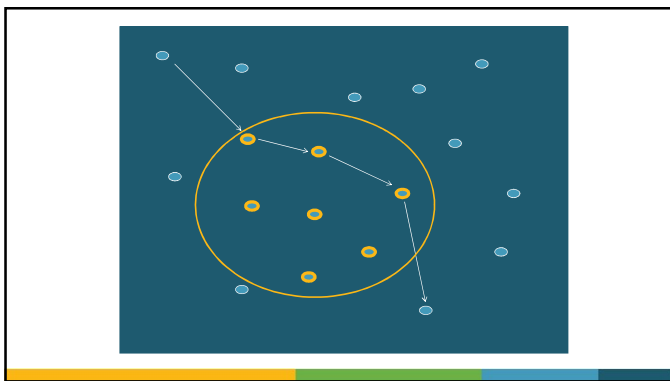
Post-concussive Syndrome

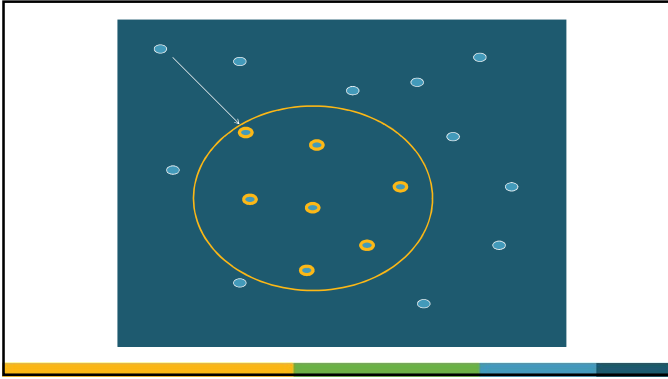
Definition

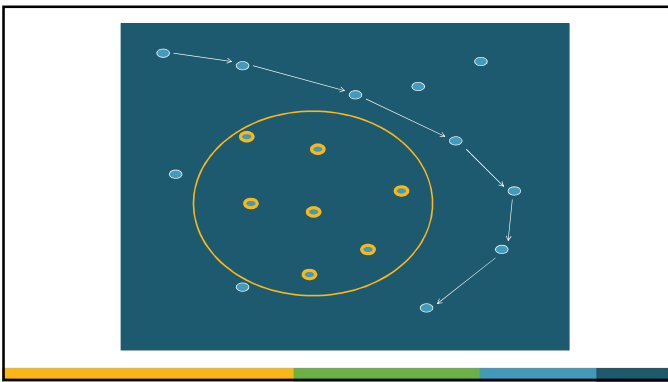
Occurs when concussion symptoms last beyond the expected recovery period after the initial injury. This is usually beyond a period of 90 days.

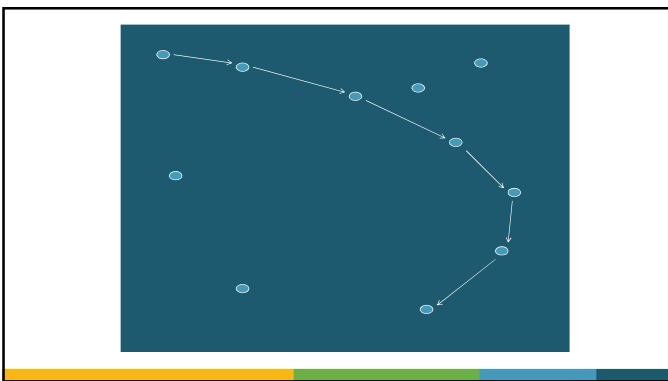












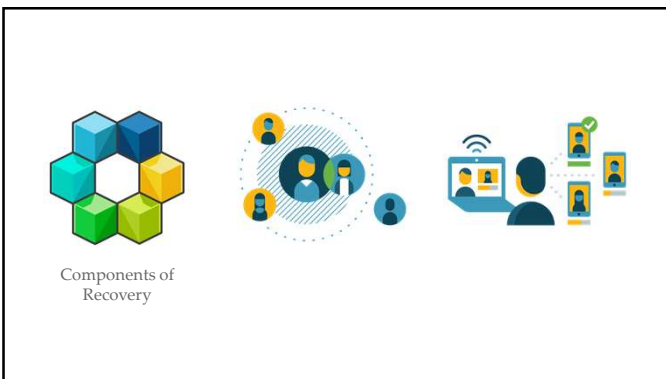


Neuroplasticity

Definition

- The ability of the brain to reorganize neural pathways based on new experiences
- Relates to adding or rerouting connections in response to experiences
- Enhanced by engagement, training, and repetition





Components of Recovery

Concussion recovery protocol



Table 1 Graduated return to play protocol

Rehabilitation stage	Functional exercise at each stage of rehabilitation	Objective of each stage
1. No activity	Symptom limited physical and cognitive rest	Recovery
2. Light aerobic exercise	Walking, swimming or stationary cycling keeping intensity <70% maximum permitted heart rate	Increase HR
3. Sport-specific exercise	No resistance training Skating drills in ice hockey, running drills in soccer. No head impact activities	Add movement
4. Non-contact training drills	Progression to more complex training drills, eg, passing drills in football and ice hockey May start progressive resistance training	Exercise, coordination and cognitive load
5. Full-contact practice	Following medical clearance participate in normal training activities	Restore confidence and assess functional skills by coaching staff
6. Return to play	Normal game play	

Zurich Consensus Working Group (2012)

Concussion recovery protocol



Children's Hospital of Orange County (2023)

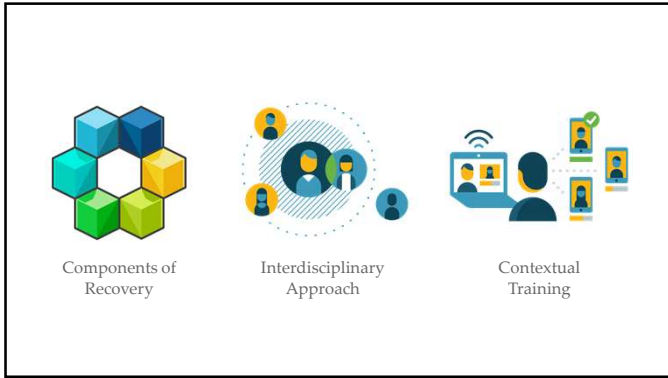


Components of Recovery



Interdisciplinary Approach



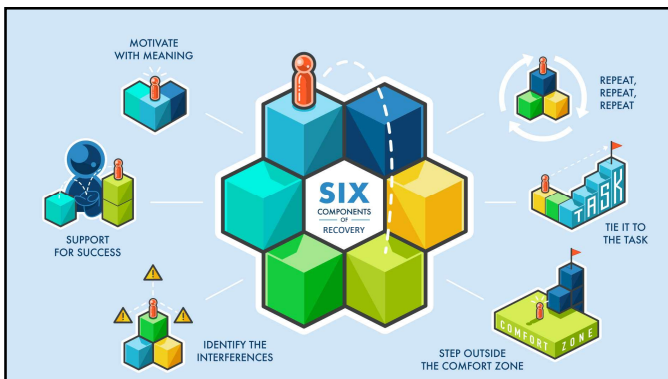


Opportunity Knocks

Stop Banging Your Head

Leverage these powerful tools.

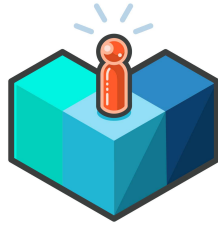
- Use the Components of Recovery to Your Advantage
- Avoid the Traps of a Siloed Approach
- Take it to the Real World



Motivate with Meaning

The desire for change is rooted in a strong, underlying purpose.

Identify what inspires action and change, write it down so it is clearly articulated, then revisit it anytime obstacles or setbacks arise to help reinvigorate and refocus efforts..

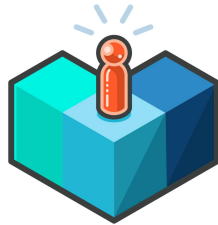


Motivate with Meaning

Find the Core Desire

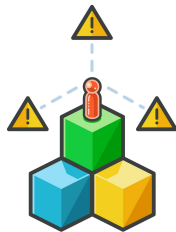
Identify the goal(s). Write down the reasons the client is motivated to embark on the journey.

- Health
- Security (providing for self/others)
- Relationships



Identify the Interferences

To achieve the level of attention and awareness necessary for skill development, barriers and distractions must be identified, eliminated, or reduced. Look for interferences like physical difficulties, emotional barriers, and environmental or psychological factors.

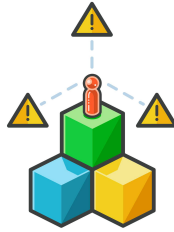


Identify the Interferences

What Will Get in the Way?

There are typically three categories our interferences fall into.

- Skills & competency
- Internal beliefs
- External factors



Tie it to the Task

Training should closely mimic the skills needed for successful completion of any activity. Identify and train the key components that are directly related to the desired end goal.



Tie it to the Task

Be Clear on the End Goal

Developing a "road map" is a great strategy to promote action and limit frustration.

- Be clear on the end goal
- Identify the key steps along the way
- Pick a place to start to get a quick "win"



Step Outside the Comfort Zone

Altering the intensity or complexity of a task promotes new learning so long as the task does not feel too easy or too hard. Choose activities that are challenging enough to avoid boredom, but not so hard they cause frustration or discouragement – the learning 'sweet spot'.



Step Outside the Comfort Zone

Get in the Zone

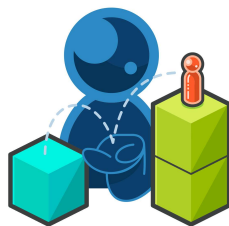
Learn to identify the three zones and prioritize activities that are just the right amount of difficulty.

- Comfort zone
- Danger zone
- Learning zone



Support for Success

Receiving the right amount of support at the right time promotes progress and improved performance. Support can be provided by an external source, like a coach or internally through self-reflection and analysis.

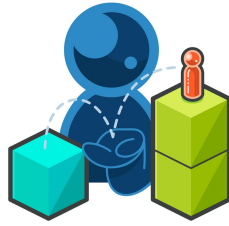


Support for Success

Get a Helping Hand

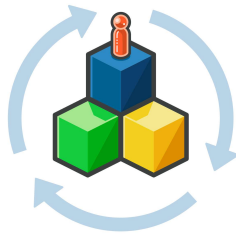
Having a coach to guide the process and maintain accountability is a great tool.

- Identify external supports
- Identify internal strategies
- Determine the right amount and when



Repeat, Repeat, Repeat

Repetition is key for change, learning, and habit formation. Create an environment that maximizes high quality and functional repetitions to learn new skills.

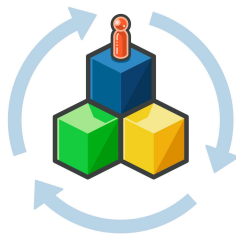


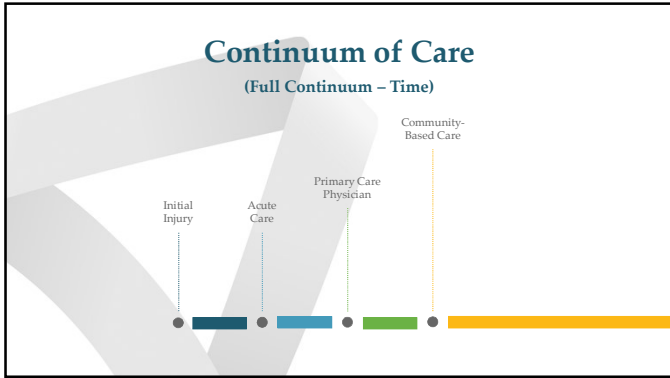
Repeat, Repeat, Repeat

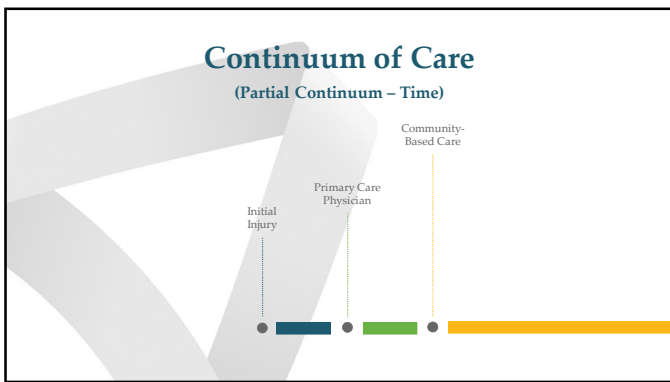
It's the Key to Habit Formation

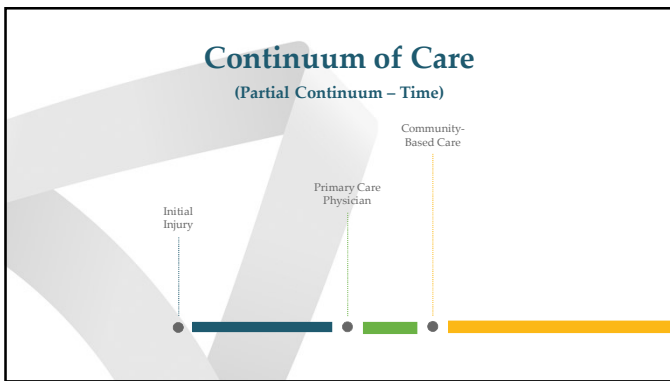
Balance formal training and functional opportunities within the flow of the day.

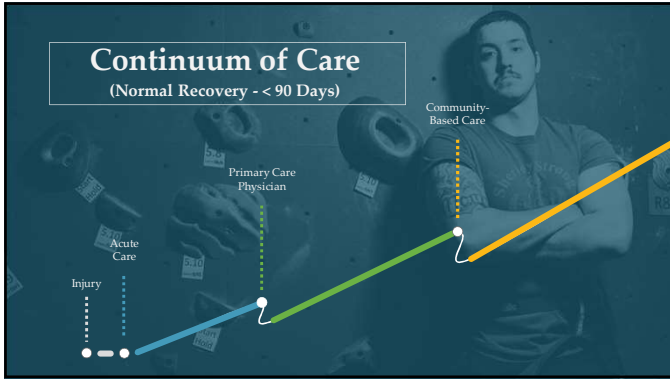
- Be creative!
- Schedule time throughout the week, and be disciplined
- Identify other opportunities to practice that don't take extra time – this is where the "magic" happens

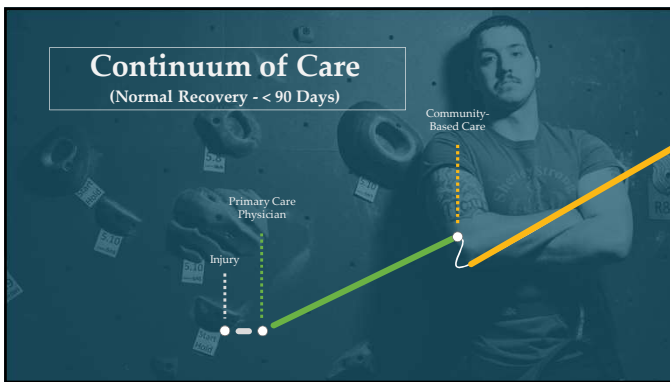


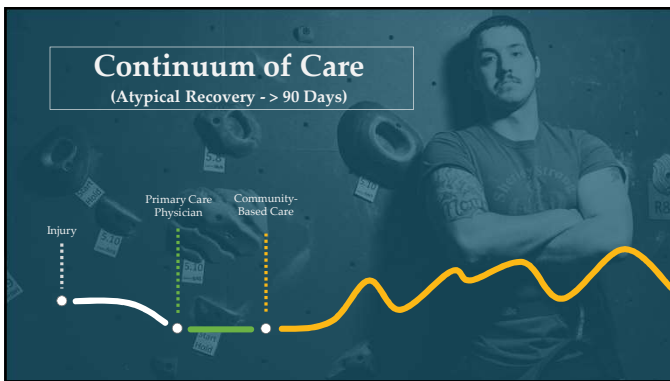


















Community-Based
(Traditional Therapy Team)



- Injured Person
- Support System
- Physician(s)
- Physical Therapy
- Occupational Therapy
- Speech-Language Therapy
- Psychology

Community-Based
(Interdisciplinary Therapy Team)



- Injured Person
- Support System
- Physician(s)
- Physical Therapy
- Occupational Therapy
- Speech-Language Therapy
- Psychology

Rehabilitation
Program Considerations



- Medical Management
- Physical Activity & Energy Management
- Vestibular Function & Balance
- Sleep Hygiene
- Nutrition
- Cognitive Skills & Function
- Vision
- Emotional Wellbeing
- Social Relationships



Rehabilitation

Service Delivery Considerations


- In-person v. Virtual v. Hybrid Approach
- Contextual assessment & training
- Support network involvement
- Routine & structure



Telerehabilitation

The Obvious Reasons

- Convenience
 - Rural location – travel time
 - Limited access to transportation
 - Unable to tolerate riding in car
 - Easy to schedule around other activities
- Access to expertise & specialty care
- Patient preference
- Patient compliance



Components of Recovery Interdisciplinary Approach Contextual Training



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Resources

Cancelliere, C., Coronado, V., Taylor, C., Xu, L. (2017). Epidemiology of isolated vs. non-isolated mild traumatic brain injury treated in emergency departments in the United States, 2009-2012: Sociodemographic characteristics. *Journal of Head Trauma Rehabilitation*, 32(4), E37-E42. <https://doi.org/10.1097/HTR.0000000000000260>

Clarke, D. J., & Forster, A. (2015). Improving post-stroke recovery: The role of the multidisciplinary health care team. *Journal of Multidisciplinary Healthcare*, 8, 433-442. <https://doi.org/10.2147/JMDH.S68764>

Grzol, A. M., Aglipay, M., Momoli, F., Meehan, W. P., Freedman, S. B., Yeates, K. O., Gravel, J., Gagnon, I., Boulis, K., Meeuwisse, W., Barrowman, N., Ledoux, A., Osmond, M., H., & Zemek, R. (2016). Association between early participation in physical activity following acute concussion and persistent postconcussive symptoms in children and adolescents. *Journal of the American Medical Association*, 316(23), 2504-2514. <https://doi.org/10.1001/jama.2016.17396>

Harmon, K., Clugston, J. R., Dec, K., Hainline, B., Herring, S., Kane, S. F., Kontos, A. P., Leddy, J. J., McCrea, M., Poddar, S. K., Putukian, M., Wilson, J. C., & Roberts, W. O. (2019). American Medical Society for Sports Medicine position statement on concussion in sport. *British Journal of Sports Medicine*, 53(4), 213-225. <https://doi.org/10.1136/bjsports-2019-100338>



Resources

Ruff, R. M., Iverson, G. L., Barth, J. T., Bush, S. S., Broshek, D. K., & the NAN Policy and Planning Committee. (2009). Recommendations for diagnosing mild traumatic brain injury: National Academy of Neuropsychology education paper. *Archives of Clinical Neuropsychology*, 24(1), 3-10. <https://doi.org/10.1093/arclin/acp006>

Silverberg, N.D., & Iverson, G.L. (2022). Expert panel survey to update the American Congress of Rehabilitation Medicine definition of mTBI. Presented at the 99th Annual ARCM conference, Chicago, IL, November 10, 2022.

Stroke Unit Trialists' Collaboration. (2013). Organized inpatient (stroke unit) care for stroke. *Cochrane Database of Systematic Reviews*. <https://doi.org/10.1002/14651858.CD000197.pub3>

Thomas, D. G., Apps, J. N., Hoffmann, R. G., McCrea, M., & Hammeke, T. (2015). Benefits of strict rest after acute concussion: A randomized controlled trial. *Pediatrics*, 135(2), 213-223. <https://doi.org/10.1542/peds.2014-0966>

 Resources

Voormolen, D. C., Crossen, M. C., Polinder, S., von Steinbuechel, N., Vos, P. E., & Haagsma, J. A. (2018). Divergent classification methods of post-concussion syndrome after mild traumatic brain injury: Prevalence rates, risk factors, and functional outcome. *Journal of Neurotrauma*, 35(11), 1233-1241. <https://doi.org/10.1089/neu.2017.5257>

Williams, W. H., Potter, S., & Ryland, H. (2010). Mild traumatic brain injury and post-concussion syndrome: A neuropsychological perspective. *Journal of Neurology, Neurosurgery, and Psychiatry*, 81(10), 1116-1122. <https://doi.org/10.1136/jnnp.2008.171298>

Yagura, H., Miyai, I., Suzuki, T., & Yanagihara, T. (2005). Patients with severe stroke benefit most by interdisciplinary rehabilitation team approach. *Cerebrovascular Diseases*, 20(4), 258-263. <https://doi.org/10.1159/000087708>

Zurich Consensus Working Group (2012). *Consensus statement on concussion in sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012*. <http://dx.doi.org/10.1136/bjsports-2013-092313>