Banging Your Head Against the Wall:
Understanding Expected & Unexpected Aspects of Post-Concussive Syndrome

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

<table>
<thead>
<tr>
<th>Eyes</th>
<th>Verbal</th>
<th>Motor</th>
<th>(Points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n/a</td>
<td>n/a</td>
<td>Obey commands</td>
<td>6</td>
</tr>
<tr>
<td>n/a</td>
<td>Oriented, normal conversation</td>
<td>Locates painful stimuli</td>
<td>5</td>
</tr>
<tr>
<td>Eye open spontaneously</td>
<td>Confused, disoriented</td>
<td>Flexion/withdrawal with pain</td>
<td>4</td>
</tr>
<tr>
<td>Eye open in response to voice</td>
<td>Inappropriate speech (random)</td>
<td>Abnormal flexion to painful stimuli</td>
<td>3</td>
</tr>
<tr>
<td>Eye open in response to pain</td>
<td>Incomprehensible sounds</td>
<td>Extension reflex to painful stimuli</td>
<td>2</td>
</tr>
<tr>
<td>No eye opening</td>
<td>No vocalization</td>
<td>No motor response</td>
<td>1</td>
</tr>
</tbody>
</table>

Glasgow Coma Scale

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

<table>
<thead>
<tr>
<th>Step</th>
<th>Rehabilitation stage</th>
<th>Functional exercise at each stage of rehabilitation</th>
<th>Objective of each step</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rest and recovery</td>
<td>No activity</td>
<td>Recovery</td>
</tr>
<tr>
<td>2</td>
<td>Light aerobic activity</td>
<td>Increase activity and cognitive set</td>
<td>Increase activity and cognitive set</td>
</tr>
<tr>
<td>3</td>
<td>Specific exercise</td>
<td>Increase activity and cognitive set</td>
<td>Increase activity and cognitive set</td>
</tr>
<tr>
<td>4</td>
<td>Training</td>
<td>Increase activity and cognitive set</td>
<td>Increase activity and cognitive set</td>
</tr>
<tr>
<td>5</td>
<td>Return to sport</td>
<td>Increase activity and cognitive set</td>
<td>Increase activity and cognitive set</td>
</tr>
<tr>
<td>6</td>
<td>Return to full sport</td>
<td>Increase activity and cognitive set</td>
<td>Increase activity and cognitive set</td>
</tr>
</tbody>
</table>

Zurich Consensus Working Group (2012)

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Components of Recovery

Interdisciplinary Approach

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Continuum of Care Transitions Learning Concepts

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Children's Hospital of Orange County (2023)
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
Continuum of Care
(Full Continuum – Time)

Initial Injury → Acute Care → Primary Care Physician → Community-Based Care

Continuum of Care
(Partial Continuum – Time)

Initial Injury → Primary Care Physician → Community-Based Care
Continuum of Care
(Normal Recovery - < 90 Days)

Continuum of Care
(Atypical Recovery - > 90 Days)
Continuum of Care
(Atypical Recovery -> 90 Days)

Injury

Continuum of Care
(Atypical Recovery -> 90 Days)

Injury

Continuum of Care
(Atypical Recovery -> 90 Days)

Injury

Continuum of Care
(Atypical Recovery -> 90 Days)

Injury
Community-Based
(Traditional Therapy Team)

Community-Based
(Interdisciplinary Therapy Team)

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
Resources


