



CONCUSSION/MILD TRAUMATIC BRAIN INJURY:
A WHOLE BODY CONDITION



A GUIDE TO HELP PARENTS AND FAMILIES RE-CONNECT THE
PIECES THROUGH EDUCATION AND RECOVERY STRATEGIES

YOUR FIRST ACTION WHEN DIAGNOSED WITH A CONCUSSION SHOULD BE TO SEEK MEDICAL HELP TO OPTIMIZE YOUR RECOVERY.

The following help guide is intended to provide patients and families with education, instruction and direction in the management of **CONCUSSION/MILD TRAUMATIC BRAIN INJURY (mTBI)**.

A concussed person is **NOT TO BE LEFT ALONE** for the 1st 24 hours in case of a delay in symptoms, but there is no need to be woken every hour.

2nd IMPACT SYNDROME is a rare but potentially fatal condition should you hit your head before your concussion symptoms have resolved, so **AVOID ANY RISK** of this happening.

SEEK IMMEDIATE MEDICAL HELP IF ANY OF THE SIGNS LISTED BELOW ARE OBSERVED FOLLOWING A HEAD INJURY:

Headache worsening	Very drowsy, can't be wakened
Seizures (convulsions or fixed stare)	Vomiting more than once
Unusual behavioral change	Slurred speech
Unsteadiness or clumsiness	Weakness or numbness in arms/legs
Blurred vision or unequal pupils	Blood or fluid coming from ears or nose

* aged \geq 65, tingling in extremities or dangerous mechanism

KEYS TO BEST PRACTICE

- Concussion is a treatable injury especially when early intervention strategies are adopted.
- No two concussions are the same, therefore they require a personalized and specialized approach.
- The following information is best utilized under the guidance of healthcare professionals experienced in concussion/mTBI management.

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CONCUSSION DEFINED

Concussions are mild traumatic brain injuries (mTBI), occurring with an impact or jolt to the head or body causing disruption in brain functioning with at least one of the following symptoms:

- Any occurrence of memory loss before, during or after the event
- Any alteration in mental state (dazed, fuzzy, feeling out of it or confused)
- Any neurological deficits (headache, dizziness, nausea etc.)
- Any loss of consciousness (less than 20%, however, get “knocked out”)
- Sleep disturbance following a head injury (insomnia)

mTBI's result in a number of symptoms that are **TYPICALLY SHORT LIVED** and are not revealed by standard neuro-imaging such as MRI or CT scans.

mTBI **SYMPTOMS CAN BE DELAYED** for days or weeks. Common Symptoms include:

PHYSICAL	BEHAVIOURAL/EMOTIONAL	THINKING/MEMORY (COGNITIVE)
Headache	Sleep more or less than usual	Difficulty thinking or concentrating
Nausea or vomiting	Drowsiness or fatigue	Memory problems
Dizziness or light headedness	Trouble falling/staying asleep	Trouble finding words
Imbalance	More emotional	Confusion
Sensitivity to light or noise	Irritable, anxious or depressed	Feeling mentally foggy

“Most of the important things in the world have been accomplished by people who have kept on trying when there seemed to be no hope at all” – Dale Carnegie

STEP 1: REST & REASSURANCE

HEALING: Good news, the brain has the capacity to heal and recover. The brain's capacity to heal is enhanced when the brain is not put under too many demands while healing.

Unlike an ankle sprain, which is easy to protect following injury, our brain doesn't have another leg to take up the slack. This highlights the importance of rest and early intervention strategies following concussion.

REST IS THE CORNERSTONE OF MANAGEMENT:

FIRST 48 HOURS LOW STIMULUS REST both physical and cognitive:

STOP:	School	Work	Sport	Physical activity	Alcohol	
RESTRICT:	TV, socializing	Computer, cell phone	Bright or loud environments	Reading	Driving	Grocery stores
ALLOW:	Increased sleep	Eat well, snack often	Hydrate regularly	Relaxing bath	Sitting in nature	Napping
Set 15 min timer for activities	Gentle stretching, Mindfulness	Slow walk around house/yard	Baking	Leisure activities (simple knitting, crafts)	Simple board game or cards	Listen to audio books, quiet music, movies, podcasts etc

* No need for total bed rest, or staying in dark room

COMING OUT OF REST, the next 12 days: research shows that most recover within ~ 2 weeks following a concussion, but this is a high-risk period termed:

THE WINDOW OF VULNERABILITY as the brain is still healing and does not function as efficiently as it did before your brain injury and so returning too quick to activities can lead to prolonged symptoms.

A GRADUAL RETURN to cognitive and physical activity is recommended focused first on activities of daily living.

STOP If symptoms increase as you are pushing too hard, try again when symptoms are settled with appropriate modification.

ACTIVITY SUGGESTIONS:

- Limit tasks to 15 minutes initially with timers and build from there
- Switching tasks between thinking and doing (i.e. reading vs dishes)
- Perform one task at a time
- Perform more difficult tasks when at highest energy (i.e. in morning or after meal)
- Napping (try to keep to 20 minutes)
- Take brain breaks or rest periods often to recharge

Give yourself all the time you need to heal, and avoid putting yourself on a time-table.

STEP 2: UNDERSTAND YOUR INJURY

- 1.) **OVERSTIMULATION:** is an increase in symptoms due to your brain being overwhelmed by incoming information that you may or may not be aware of (i.e. lights, background noise, moving objects or busy environments).

AKA “Flooding” or being easily overwhelmed is often a result of the loss of the brains ability to filter information coming in. This is due to a post injury “fight or flight” response, which results in a heightened state of alertness.

- 2.) **ENERGY CRISIS:** Your injured brain now requires more energy for every day cognitive, physical and emotional tasks with less in reserve (Figure 2) at a time when there are less energy resources available.

Be careful with your mental and physical effort as during the early stages of recovery, altered blood flow to the brain leads to energy demands often exceeding supply.

BEFORE
Concussion

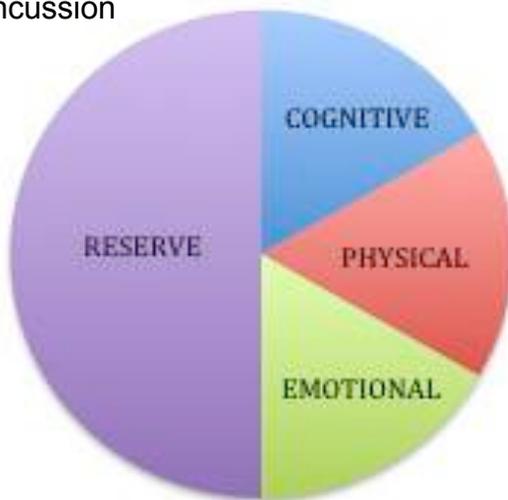


Figure 1. Energy allocation by the brain prior to Concussion/mTBI.

AFTER
Concussion

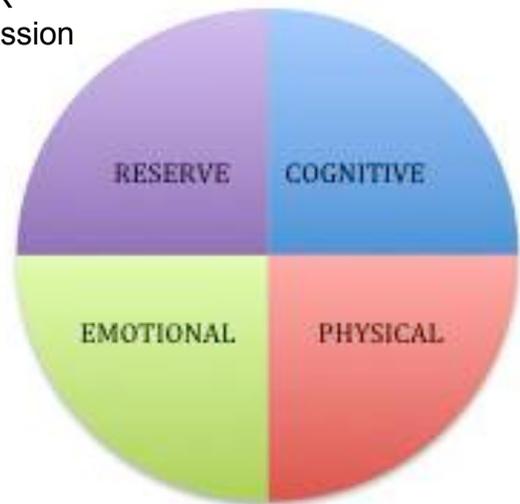


Figure 2. Lack of reserve energy to assist with recovery of the brain following a concussion/mTBI, in a time where you need excess energy for everyday function.

“The secret of change is to focus all of your energy, not on fighting the old, but on building the new” – Socrates

STEP 3: BRAIN INJURY MANAGEMENT STRATEGIES

Inevitably you will come across situations/tasks that provoke symptoms or create “flooding” and so when you do, follow the coping strategies below:

1. Flooding: 6 R's FOR COPING STRATEGIES



Recognize the things that trigger FLOODING and what the warning signs are. Symptoms often include headache, confusion, feeling overwhelmed or tired, irritability etc.



Reduce exposure to situations or places that induce over stimulation or sensory overload.

This may involve wearing shades or brimmed hats to reduce bright lights, going shopping during quieter periods and making shopping lists, reducing excessive noise or background noise with ear buds or plugs or by avoiding busy places,



Retreat from triggers that are resulting in FLOODING and redirect to another thought or activity or simply walk away.



Relax from FLOODING by calming your brain with a BRAIN BREAK OR BOOST.



Rethink what you are doing and implement wellness strategies to manage FLOODING.



Return to what works and modify what does not while setting realistic goals for success. Strengthen neural connections by working on progressive trigger exposure, starting with the mildest first for a few minutes. Repeat exposure to the trigger several times a week and gradually increase exposure only when comfortable and while avoiding FLOODING.

Adapted from the Northern Brain Injury Association Webcast

With education, practice and determination, you can overcome what's holding you back.

2. ENERGY CONSERVATION & BUDGETING

Due to post concussion reduced brain blood flow, your brain is in an energy crisis.

If we liken brain energy resources to money in the bank, then energy conservation is like being on a budget.

It is essential you are frugal with your energy funds to avoid blowing your reduced energy budget.

BEFORE
Concussion



AFTER
Concussion



Examples of common brain energy “deposits” and “withdrawals” include:

Deposits (Brain Breaks or Boosts)		Withdrawals (Biggest Expenditures)
1.	Eating and drinking	Talking - phone, while others talking
2.	Sitting in nature	Visually Stimulating environment/activities - Evil Triad: bright, colorful and moving
3.	Walking	Driving - Even as a passenger, worse when raining, snowing or at night
4.	Relaxation	Activity that requires ‘Filtering’ - Any noise in the background
5.	Sleep	Cognitive Tasks (↑ attention and processing) - reading, computer, cross words
6.	(Fill In Your Own)	Physical Activity - requires more energy than before injury
7.	(Fill In Your Own)	(Fill In Your Own)
8.	(Fill In Your Own)	(Fill In Your Own)

You manage your energy budget by making deposits and withdrawals based on requirements. This is best done through **PLANNING, PACING & PRIORITIZING**.

The difference between a brain that is resourceful and functioning well and one that isn't is only a 100 milli-seconds of brain speed.

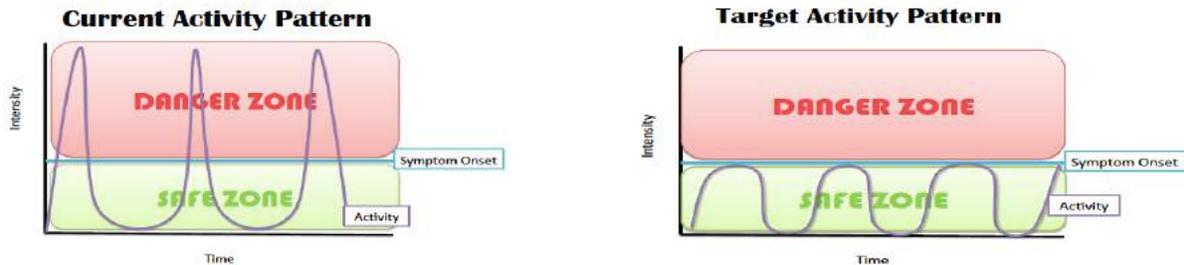
3. PLANNING, PACING & PRIORITIZING

Due to a limited energy budget and heightened alert system, it is easy to overwhelm your brain at a critical time when it is trying to recover.

With the pacing graphs below, the **safe zone** represents when you are **symptom free**, with the **danger zone** representing **increased symptoms**.

CURRENT ACTIVITY PATTERN (often acutely): your injured brain can easily be overwhelmed so be careful when doing activities so as to not go into the danger zone or push through symptoms. Crossing into the danger zone can lead to set backs in recovery (Graph 1).

TARGET ACTIVITY PATTERN: The goal is to perform activities that avoid going into the danger zone (Graph 2) to promote optimal recovery. These activities that put you in the danger zone can vary day to day, so it is important to be aware of how you are feeling daily.



PLAN your day/week in advance, which allows you to schedule necessary rest breaks and spread activities across days/week.

PACE yourself by slowing things down (set timers to restrict from overdoing), doing one task at a time or break up tasks over day/week.

PRIORITIZE: perform more difficult tasks when you have more energy i.e. after eating/drinking, in the morning or after rest when your brain energy bank is topped up.

CREATING AGENDAS or NOTE TAKING so you don't have to waste resources on memory.

TRACKING activities can help you determine if there is relationship between certain activities and symptom onset.

LONG TERM ACTIVITY PLAN: over time your safe zone will increase while your danger zone decreases indicating the brain is healing.

Adapted from Parkwood Hospital Outpatient ABI Team



"Insanity is doing the same thing over and over again and expecting different results" – David Boswell

Tracking your daily activities and how they effect your symptoms can be very helpful following a concussion to optimize management.

DAILY SCHEDULE AND ACTIVITY LOG

Time	Planned Activity	Actual Activity	Symptoms
7:00 am 8:00 am			<input type="radio"/> No change <input type="radio"/> Up <input type="radio"/> Down Primary Symptom:
9:00 am 10:00 am			<input type="radio"/> No change <input type="radio"/> Up <input type="radio"/> Down Primary Symptom:
11:00 am 12:00 pm			<input type="radio"/> No change <input type="radio"/> Up <input type="radio"/> Down Primary Symptom:
1:00 pm 2:00 pm			<input type="radio"/> No change <input type="radio"/> Up <input type="radio"/> Down Primary Symptom:
3:00 pm 4:00 pm			<input type="radio"/> No change <input type="radio"/> Up <input type="radio"/> Down Primary Symptom:
5:00 pm 6:00 pm			<input type="radio"/> No change <input type="radio"/> Up <input type="radio"/> Down Primary Symptom:
7:00 pm 8:00 pm			<input type="radio"/> No change <input type="radio"/> Up <input type="radio"/> Down Primary Symptom:
9:00 pm 10:00 pm			<input type="radio"/> No change <input type="radio"/> Up <input type="radio"/> Down Primary Symptom:
11:00 pm 12:00 pm			<input type="radio"/> No change <input type="radio"/> Up <input type="radio"/> Down Primary Symptom:

"The road to success is always under construction" – Lily Tomlin

4. WELLNESS STRATEGIES

SLEEP:

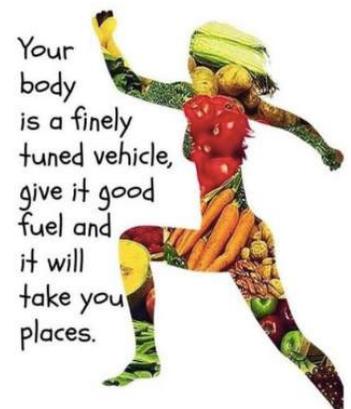
Lack of sleep affects our daily function as well as our physical and mental wellbeing. It is critical following a head injury that you get good restorative sleep every night, as it is a function of a strong recovery.

- Extra sleep may be necessary in the days immediately following a head injury, but approximately 8 hours of sleep every night is optimal.
- Get on a good sleep routine (consistent sleep and wake times) and limit daytime napping to approximately 20 minute sessions.
- Allow at least 1 hour before bedtime to unwind. Best to avoid stimulants like TV, computer use and phone, caffeine and late eating before bed.
- **If not getting restorative sleep, be open to sleep aids such as medication**

NUTRITION:

It is important to note that what we eat affects our brain and that consuming select nutrients can influence neural function.

- Eat small meals every 3-4 hours to maintain blood sugar levels.
- Snack about every hour through the day to boost or top up energy.
- Try to stick to a regular schedule of eating, as the body likes routine.
- Make shopping lists and shop when it is least crowded at the grocery store.
- Ensure you are well fed before physical or mental activities in order to meet adequate brain energy needs
- Stay hydrated by drinking water about every hour
- Nutrients with possible brain health benefits:
Fish, poultry, dairy, meat, nuts and turmeric, to name a few.



OVERSTIMULATION:

Overstimulation is inevitable, but realize you have control of how this affects you. The first step is listening to your body and recognizing the source and putting strategies in place to reduce it.

- Wear sunglasses or brimmed hat to dim light exposure when necessary.
- Wear ear buds/plugs to decrease noise when necessary

"You are what you eat."– Jean Anthelme Brillat-Savarin

MINDFULNESS

- Mindfulness is the process of mentally focusing on being in the present moment. It has proven to be an effective tool to help people with a concussion/mTBI manage their thoughts and emotions and calm their mind.
- The act of being mindful is learning that you do not have to be attached to your thoughts and feelings as you have control over your reaction to them.

Three Minute Breathing Space: use this quick mindfulness meditation whenever you need to have a “Brain Break” or settle your mind.

○ **STEP 1: Becoming Aware**

Try sitting straight up in a chair with feet lightly resting on the ground if possible. Close your eyes and bring your awareness to your inner experience for 1 minute:

- What is your experience right now?
- What thoughts are going through your mind?
- Are there any sensations of tightness or stiffness?



○ **STEP 2: Gathering**

As best you can re-direct your focus to breathing, the feeling of the belly moving in and out, expanding as the breath goes in and falling back when the breath falls out. Follow the breath in all the way and out, using each breath, anchor yourself in the present moment for 1 minute.

○ **STEP 3: Expanding**

Breathe into your whole body, so you are expanding your awareness. Sense your body as a whole, feeling the whole body rise and fall with each inhalation and exhalation for 1 minute.

For further information on mindfulness, visit Jon Kabat-Zinn’s website at www.mindfulnesscds.com, or download the App **Calm, or Headspace**.

“Knowledge is power to a brain injured person” – Larry Jameson

5. SYSTEMS CHECK

- Following a concussion it is common to have symptoms associated with the eyes, ears, neck, balance, dizziness and/or headaches.
- It is best to be assessed by a health care practitioner experienced in concussion management to determine the source of symptoms and implement corrective strategies.

	SYSTEM'S AFFECTED	SYMPTOMS	TREATMENTS	WHO CAN HELP?
	Inner Ear (vestibular) - Gravity detector - Speed of movement - Head + eye coordination	- Dizziness/vertigo - Imbalance	- Vestibular Rehab	- ENT - Audiology - Physiotherapy
	Visual - Converge/diverge - Saccades - Smooth pursuit	- Blurry or double vision - Eye strain - Headache	- Visual re-training	- Optometry - Occ. Therapy
	Cognition Cardiovascular	- Mental - Fatigue/foggy - Slowed processing - Headache	- Neuro-feedback - Cognitive training - Graded exerciser retraining	- Psychiatry - Psychology - Osteopath
	Anxiety/Mood	- Anxious - Stressed - Depression - Irritability	- Counseling - Mindfulness/meditation - Restorative yoga - Float Therapy	- Chiropractor - Massage Therapy
	Neck	- Headache - Imbalance - Neck pain and restriction	- Manual therapy - Dry needling - Acupuncture - Cranial sacral	- Dr / GP - Sports Med Dr

- Neuroplasticity is the brain's ability to change itself and so the good news is the brain is trainable.
- One of the effects of training is through compensation, which relates to the brain's ability to generate new pathways or connections in response to brain injury or dysfunction.
- If symptoms return, they can once again be settled by the very exercises and management strategies that settled them previously.
- As with any exercise, the gains made are often lost when you stop working out. The brain is no different, so if you want to keep the gains then keep up a maintenance routine.

"Forget all the reasons why it wont work and believe the one reason why it will" – Unknown

STEP 4: RETURN TO LEARN, WORK AND SPORT

RETURN TO LEARN before WORK and SPORT in a gradual step by step way with guidance.

* SEE US FOR MORE DETAILED RETURN PROTOCOLS

Only progress to the next stage if no symptoms (1 stage a day). If any symptom increase such as headache, nausea or dizziness during exercise **STOP**, go back a step or try again the next day.

RETURN TO LEARN

6	FULL SCHOOL Exams
5	FULL TIME SCHOOL No exams
4	PART TIME SCHOOL Attend school with class and academic modifications
3	HOMEWORK AT HOME: Gradually reintroduce learning and assignments
2	GETTING READY TO GO BACK TO SCHOOL (max 2 weeks in stage) Gradually reintroduce TV, computer, reading and socializing, light aerobic exercise
1	REST Physical and mental rest until asymptomatic: With guidance research suggests progressing to stage 2 if symptoms last >2 weeks.

RETURN TO WORK

6	FULL ACTIVITY No restrictions
5	INTENSIVE ACTIVITY Full time similar task duration and intensity
4	MODERATE ACTIVITY Part time Increased task intensity and complexity
3	LIGHT OCCUPATIONAL ORIENTATED ACTIVITY Part time light mental and physical tasks
2	LIGHT ROUTINE ACTIVITY Cleaning, shopping, cooking, computer, TV, socializing, light aerobic exercise.
1	REST Physical and mental rest until asymptomatic. With guidance research suggests progressing to stage 2 if symptoms last >2 weeks.

RETURN TO SPORT

6	FULL ACTIVITY No restrictions
5	FULL CONTACT SPORT DRILLS Following medical clearance Ex: tackling, heading, scrimmage
4	NON CONTACT SPORT DRILLS Easy skating, skiing, boarding, XC biking
3	SPORT SPECIFIC EXERCISE (Avoid head impact risk) Ex: Running, dribbling, shooting, body weight exercises
2	LIGHT AEROBIC EXERCISE Swimming, walking, stationary bike all at talking pace to start
1	REST Physical and mental rest until asymptomatic. <u>With guidance</u> research suggests progressing to stage 2 if symptoms last >2 weeks.

STEP 5: EDUCATING OTHERS ON YOUR LIMITATIONS

- **Expectations:** brain rehabilitation takes time, often being measured in months or years. Please resist expecting me to be who I was, even though I appear fine on the outside.
- **Rest:** is an active part of my recovery. I need more rest than I used to as it now takes more energy for me to complete the same tasks as before.
- **Stamina:** even though I may look better on the outside, my stamina will fluctuate with some days being better than others. Pushing too hard or through symptoms can lead to increased symptoms and setbacks.
- **Patience:** is the gift you can give me, for example:
 - **Socially:** I may not be as social or as outgoing during the beginning stages of my recovery. Visually demanding and loud environments can quickly overload my brain. Limiting my exposure or having to leave the area all together is a management strategy, not avoidance.
 - **Pacing:** slowing down and alternating periods of activity with “brain breaks” allows me to work deliberately and at my own pace helping me rebuild healthy brain pathways. Rushing and multi-tasking can make symptoms worse and slow recovery.
 - **Listening:** please listen to me with patience and try not to interrupt. Allow me to find my words and my thoughts.
 - **Conversation:** If there is more than one person talking it is difficult for me to process the information quickly enough to keep up. I may need to take a break, not because I am being rude, but because my brain is being overloaded.
 - **Breaks:** If I say I need to stop, I need to stop NOW. This is not because I am avoiding the subject or task. I just need time to process the information and take a break from concentrating.
 - **Memory:** know that not remembering does not mean I don't care, my brain is just not working yet like it was.
 - **Behavior:** I may get easily angered or upset in response to something I normally wouldn't or the reaction itself may seem more intense than usual. This is an indication of my current inability to cope with specific situations or environments.
 - **Sensitivity:** to light, noise and emotions is part of the change to my brain which may require me to leave over stimulating environments from time to time.

I need cheer leaders now as I begin to recover, just like children do when they are learning and growing up. Please help me and encourage all my efforts. Please don't be negative or critical as I am doing the best I can.

“Perseverance is not a long race; it is many short races one after another” – Walter Elliot

Things to keep in mind during your recovery

You will question whether you are able to function as you once did, but part of the process is to learn to accept new limitations, while knowing in your heart that some limitations are temporary.

Healing doesn't mean becoming exactly who you once were, but coming to terms with what you once had and didn't have then moving forward with life; a process of learning to begin again.

The "gift of mTBI" is described by some as a new perspective on their life and their place in the world. Like a blind person whose other senses become more acute, a person with mTBI often develops a deeper intuition, a keener awareness about the world and the people around them.

While a concussion/mTBI is generally a treatable condition, if symptoms persist it is recommended you see your Dr for further medical management options.

Call Us For A Detailed Concussion Assessment and Rehabilitation Program as Well As Baseline Screening



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