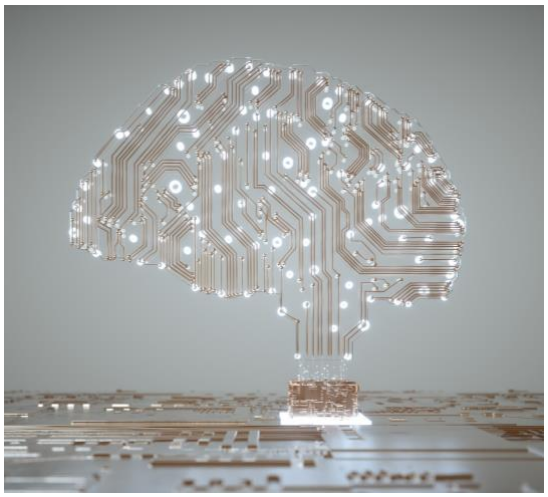


CONCUSSION STUDY GUIDE

For Family Medicine Residents, DFCM

Dr. Alice Kam – Supervising Editor

Dr. Aisha Husain – Supervising Editor

Dr. Denyse Richardson – Supervising

Dr. Brian Sum – Content Editor

Stephanie McFarland – Content Editor

Ching-Lung Huang – Content Editor

Maleeha Aslam – Design Editor

Version 10 Revision 2

Last Edit: June 27th 2022

Family & Community Medicine
UNIVERSITY OF TORONTO

PREFACE – This study guide was created to provide family medicine residents with a concise and comprehensive resource for the management of concussion. It is a compilation of the most relevant sections and algorithms from current concussion guidelines and resources (namely the 2018 Ontario Neurotrauma Foundation Guideline and the Centre for Effective Practice Provider Concussion Tool). It also provides links to an online discussion lecture series run by ECHO. The end of the guide also provides other resources for concussion training that may be better suited to your learning style. We hope this guide is helpful in providing and overview of concussion management in a primary care setting!

As of July 1st, 2021 **Rowan's Law (Concussion Safety)** removal-from/return-to-sport requirements will come into effect. After this date, all children and youth under the age of 25 who participate in organized sport and sport within schools will be required to seek medical assessment for two mandatory touchpoints:

1.Medical Diagnosis: All children and youth suspected of sustaining a concussion will require medical concussion assessment diagnosis by a physician or nurse practitioner, with a letter which confirms positive or negative diagnosis.

2.Medical Clearance for full contact sport or high-risk physical activity: All children and youth diagnosed with concussion will require medical clearance by a physician or nurse practitioner with a letter which confirms child or youth has met criteria to participate in unrestricted sport/physical activity participation.

In this study guide, there are short 3-min teaching video clips. These clips are developed over time based on learners' feedback on the curriculum.

The competency-based learning objectives of this curriculum are as follows:

- To recognize that concussion is a clinical diagnosis with specific diagnostic criteria & to rule out other organic causes
- To manage acute and chronic non-complex concussion symptoms and return to activities
- To utilize resources and initiate referrals early for complex concussion cases

I hope that this is helpful to support your learning!

Dr. Brian Sum, MD (PGY2)
Dr. Alice Kam, MD, MScCH (HPTE), FRCPC

Table of Contents

Section A: Concussion Overview

Please see a recording of the Diagnosis and Assessment of Acute Concussion (https://uhn.echoontario.ca/concussion-recordings) 0:00 - 10:00

Introduction

Background Information on Concussion/ Mild TBI and Prolonged Symptoms

Concussion/Mild Traumatic Brain Injury

Concusson/Mild traumatic brain injury (mTBI) is a significant cause of morbidity and mortality, with many survivors of concussion/mTBI dealing with persisting difficulties for years post-injury.[1-3] Over the years, various terms have been used synonymously with mild traumatic brain injury, such as mild head injury and concussion. ***It is important to note that all concussions are considered to be a mTBI however mTBI is distinguished from concussion when there is evidence of intracranial injury on conventional neuroimaging or there is persistent neurologic deficit.***

Definition of Concussion/mTBI

Concussion/mTBI denotes the acute neurophysiological event related to blunt impact or other mechanical energy applied to the head, neck or body (with transmitting forces to the brain), such as from sudden acceleration, deceleration or rotational forces. Concussion can be sustained from a motor vehicle crash, sport or recreational injury, falls, workplace injury, assault or incident in the community.

Clinical signs of concussion immediately following the injury include any of the following:

1. Any period of loss of or a decreased level of consciousness less than 30 min.
2. Any lack of memory for events immediately before or after the injury (post-traumatic amnesia) less than 24 hours.
3. Any alteration in mental state at the time of the injury (e.g., confusion, disorientation, slowed thinking, alteration of consciousness/mental state).
4. Physical Symptoms (e.g., vestibular, headache, weakness, loss of balance, change in vision, auditory sensitivity, dizziness).
5. Note: No evidence of Intracranial lesion on standard imaging (if present, suggestive of more severe brain injury)

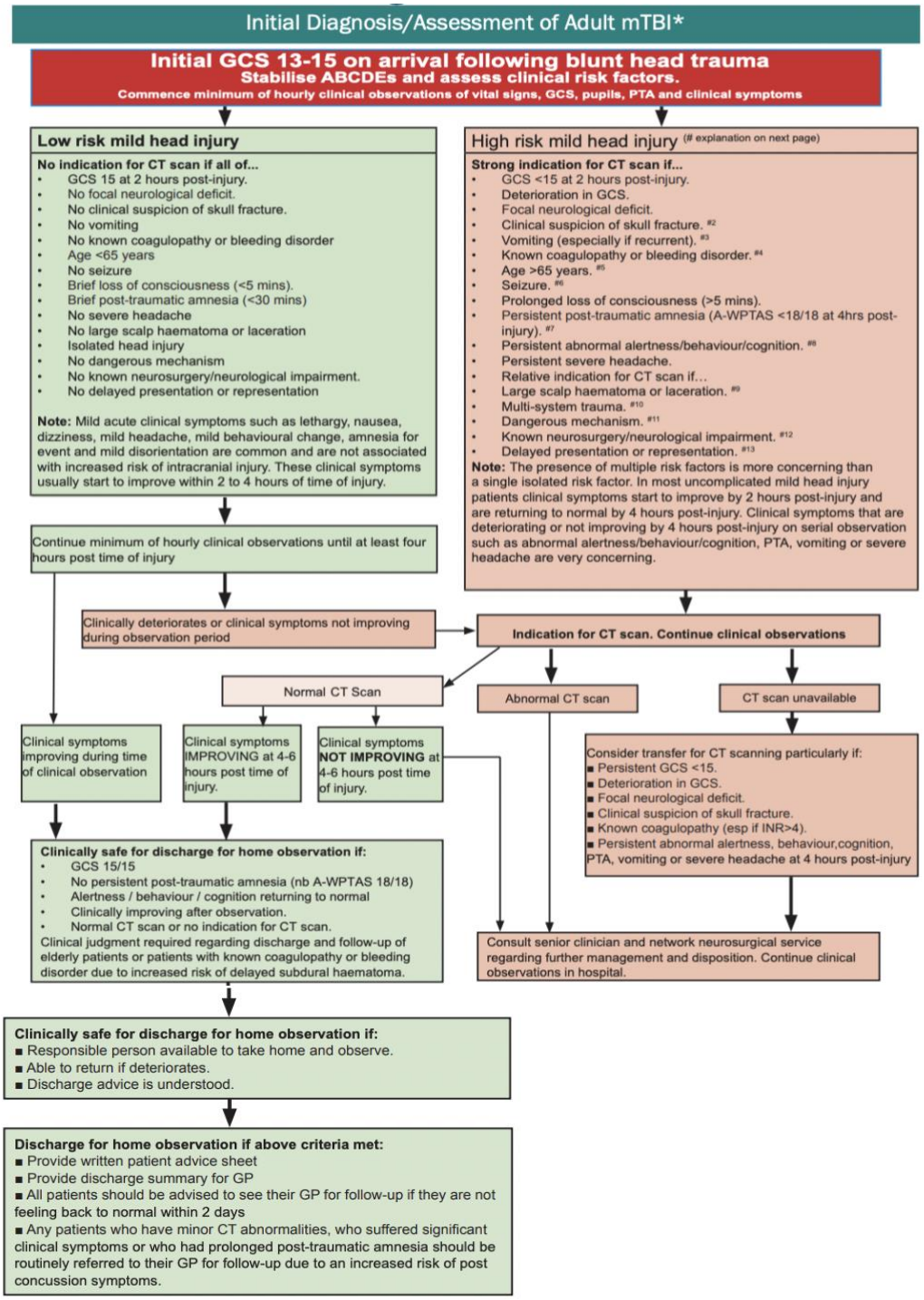
Clinical symptoms most commonly experienced following concussion are listed in Table A.

Concussion is a traumatic brain injury at the beginning of the brain injury spectrum ranging from mild to severe brain injury. Mild TBI is among the most common neurological conditions with an estimated annual incidence of 500/100,000 in the United States.[6] One Canadian study examining both hospital-treated cases as well as those presenting to a family physician calculated the incidence of mTBI in Ontario to lie between 493/100,000 and 653/100,000, depending on whether diagnosis was made by primary care physicians or a secondary reviewer.[7]

https://braininjuryguidelines.org/concussion/fileadmin/pdf/Concussion_guideline_3rd_edition_final.pdf

Section B: General Approach to Assessment and Management of Acute Concussion

Acute Assessment in the ED



https://braininjuryguidelines.org/concussion/fileadmin/pdf/Concussion_guideline_3rd_edition_final.pdf

Tools for Assessment of Symptoms:

The Rivermead Post-Concussion Symptoms Questionnaire*

After a head injury or accident some people experience symptoms which can cause worry or nuisance. We would like to know if you now suffer from any of the symptoms given below. As many of these symptoms occur normally, we would like you to compare yourself now with before the accident. For each one, please circle the number closest to your answer.

0 = Not experienced at all
1 = No more of a problem
2 = A mild problem
3 = A moderate problem
4 = A severe problem

Compared with before the accident, do you now (i.e., over the last 24 hours) suffer from:

Headaches	0	1	2	3	4
Feelings of Dizziness	0	1	2	3	4
Nausea and/or Vomiting	0	1	2	3	4
Noise Sensitivity, easily upset by loud noise	0	1	2	3	4
Sleep Disturbance	0	1	2	3	4
Fatigue, tiring more easily	0	1	2	3	4
Being Irritable, easily angered	0	1	2	3	4
Feeling Depressed or Tearful	0	1	2	3	4
Feeling Frustrated or Impatient	0	1	2	3	4
Forgetfulness, poor memory	0	1	2	3	4
Poor Concentration	0	1	2	3	4
Taking Longer to Think	0	1	2	3	4
Blurred Vision	0	1	2	3	4
Light Sensitivity, Easily upset by bright light	0	1	2	3	4
Double Vision	0	1	2	3	4
Restlessness	0	1	2	3	4

Are you experiencing any other difficulties?

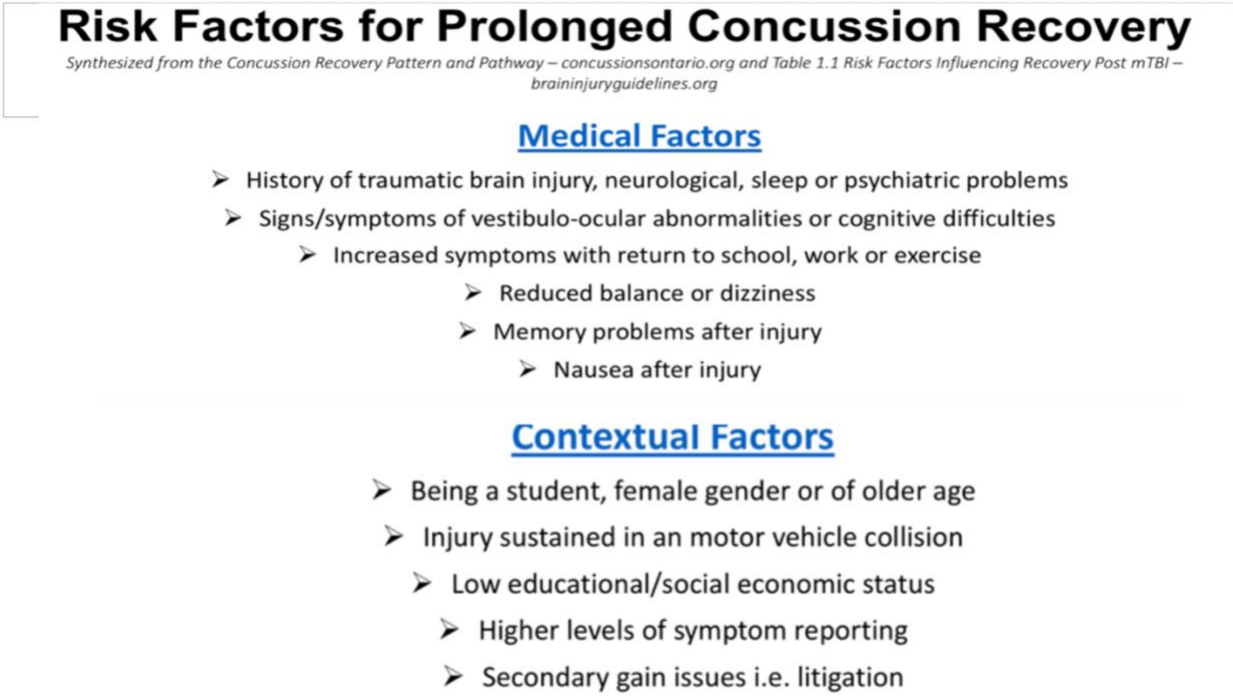
1. _____	0	1	2	3	4
2. _____	0	1	2	3	4

*King, N., Crawford, S., Wenden, F., Moss, N., and Wade, D. (1995) J. Neurology 242: 587-592

Pediatrics/Adult Assessment Considerations:

During initial assessment, take a comprehensive clinical history that includes

- ✓ Patient demographics (e.g., age, sex, gender).
- ✓ Assess injury mechanism and symptoms at the time of injury.
- ✓ Assess symptom burden at the time of initial presentation.
- ✓ Number, severity and type of symptoms.
- ✓ Presence of loss of consciousness, post-traumatic amnesia, and red flags (seizures, neck pain, focal neurological deficits).
- ✓ Current post-concussion symptoms (using age-appropriate standardized symptom inventory).
- ✓ Review family and patient mental health
- ✓ Past medical history (e.g., previous concussions, migraine or non-specific headaches, mental health disorders, coagulopathy). Note the duration until recovery from previous concussions (i.e., within 7-10 days or prolonged).
- ✓ Allergies/immunizations.
- ✓ Ask whether the child/adolescent/adult is taking any substances or medications: Prescribed or over-the-counter medications or supplements, alcohol, or recreational drugs including cannabis. These substances may mask or modify concussion symptoms.
- ✓ **Take a recent and pre-injury functional history. Ask about school, activities, work, driving and sports participation.**



Example template for calculation clinical risk scores for prolonged recovery in pediatrics:

- ☐ Screen completed <48 hours from concussion injury
- ☐ Screen completed >48 hours from concussion injury

	0	1	2
Age of patient	5 to <8 years	8 to <13 years	13 to <18 years
Sex of patient	Male		Female
How long did the patient's previous concussion last?	No previous concussion or recovery in less than 1 week	Recovery took 1 week or longer	
Does the patient have a history of migraines?	No	Yes	
Did the patient answer questions more slowly than normal as compared to before the injury?	No	Yes	
On the BESS Tandem stance balance testing, how many errors did the patient have in 20 seconds? (see below)	0-3 errors	4 or more errors, or could not complete the balance testing	
Does the patient have a headache?	No	Yes	
Does the patient have sensitivity to noise?	No	Yes	
Is the patient more fatigued?	No		Yes

TOTAL NUMBER OF RISK POINTS SCORE:	

https://www.5pconcussion.com/en/scorecalculator

Zemek, R., Barrowman, N., Freedman, S. B., Gravel, J., Gagnon, I., McGahern, C., … Moore, J. (2016). Clinical risk score for persistent postconcussion symptoms among children with acute concussion in the ED. JAMA – Journal of the American Medical Association, 315(10), 1014–1025. https://doi.org/10.1001/jama.2016.1203

Score	Level of risk for prolonged symptoms	Referral Recommendations
0-3	Low	Provide education and follow up with primary care
4-8	Medium	4-6 consider immediate referral for specialized care ≥ 7 action immediate referral for specialized care
9-12	High	9-12 action immediate referral to specialized care

Online: Predicting Persistent Post-Concussive Problems in Pediatrics (5P): Score Calculator

Online adult persistent risk calculator: https://kite-uhn.com/tricordrr

Other Tools:

SCAT-5: Standardized tool for evaluating sport's related concussion

Post Concussion Symptom Scale: Can be used to track symptoms over time

General Principles of Management:

Centre for Effective Practice Concussion Management Tool

Section B: General treatment plan (continued)

Management and recovery planning

Management strategy

- Relative rest for the first 1-3 days.[1,3,5,8] Avoid over-emphasizing rest. Current evidence indicates that regardless of symptomatic status, activity (as tolerated) is more likely to speed up rather than delay recovery.[1,10]
- Emphasize reassurance and self-management, and set patient expectations for recovery. Patients will not be symptom-free when they start to reintegrate activities and may be anxious about when they will feel better.[1]
- Normalize symptoms and self-management, and set patient expectations for recovery.
- Advise the patient to avoid high-risk activities while symptomatic.
- Advise the patient to gradually perform every day activities within 3 days of concussion.[1,3,8]
- Emphasize non-pharmacological interventions.[3] There is limited evidence to support the use of pharmacotherapy. Avoid prescribing medications that mask symptoms or changes in mental status.[1] For more information about pharmacotherapy, see Appendix A.
- Follow-up with the patient within 7-14 days after the diagnosis of a concussion.[2]

Avoid

- Do not adjust treatment strategy based on mechanism of injury.[4]
- Do not refer to a specialist clinic unless symptom persistence is prolonged.
  - Note: There is no consistent definition of prolonged or persistent symptoms in the literature. Depending on the source, prolonged or persistent symptoms refer to those lasting from beyond 2 weeks to beyond 3 months.[1,2,3,4,5,7] Clinicians should use their judgment on a case-by-case basis.
- Do not delay return to social and professional roles more than medically necessary. Delayed return can result in demoralization and worsened emotional symptoms.[1]

Talking Points

Emphasize non-pharmacological treatment, self-management and goal-setting.

"You are the best person to monitor your daily symptoms, with help from your family and friends. Use the Daily Symptom log to record how you're feeling. If your symptoms get worse, remember to step back activities or check the Red Flags. We will go over this log at our next appointment to see how your symptoms have been progressing."

The following are examples of return to school, sport, and work approaches, and can be adjusted based on each patient's specific needs. Please use them as a guidance.

Return to School Approach (Sample):

When can a child/adolescent return-to-school, activities, and sports after a concussion?

Begin by resting for the first 1-2 days. After this short rest, the child/adolescent should start activities (physical and thinking) that do not make symptoms worse or bring on new symptoms. These gentle activities are encouraged 1-2 days after a concussion, even if the child/adolescent still has symptoms. Avoid any activity where the child/adolescent could fall or hit their head.

It is important that all children/adolescents with a concussion make a gradual (step-by-step) return to school/activity/sport. Use the steps below to guide this gradual process. Each step should take about one day. If symptoms get worse, go back to the last step. Try it again until the child/adolescent can do it without bringing on new symptoms or making symptoms worse. It is important to get a doctor's note before returning to full contact sport or high-risk activities.

Return-to-school steps:

Steps	Activity	Example
1	Activities at home that do not make the child/ adolescent feel worse	Reading, texting, screen time and other activities that do not worsen symptoms. Start at 5-15 minutes at a time.
2	School activities	Homework, reading or other activities outside of the classroom
3	Return-to-school part-time	Getting back to school for a few hours or half days
4	Return-to-school full-time	Gradual return to full days at school

Return to Sport Approach (Sample):

Table 3.2. Graduated Return-to-Sport Strategy

Stage	Aim	Activity	Goal of each step
1	Symptom-limited activity	Daily activity that does not provoke symptoms.	Gradual reintroduction of work/ school activities
2	Light aerobic exercise	Walking or stationary cycling at slow to medium pace. No resistance training.	Increase heart rate
3	Sport-specific exercise	Running or skating drills. No head impact activities.	Add movement
4	Non-contact training drills	Harder training drills, e.g., passing drills. May start progressive resistance training.	Exercise, co-ordination and increased thinking
5	Full-contact practice	Following medical clearance, participate in normal training activities.	Restore confidence and assess functional skills by coaching staff
6	Return to sport	Normal game play.	
NOTE: An initial period of 24–48 hours of both relative physical rest and cognitive rest is recommended before beginning the RTS progression. There should be at least 24 hours (or longer) for each step of the progression. If any symptoms worsen during exercise, the athlete should go back to the previous step. Resistance training should be added only in the later stages (stage 3 or 4 at the earliest). If symptoms are prolonged (e.g., more than 10–14 days in adults or more than 1 month in children), the athlete should be referred to a healthcare professional who is experienced in the management of concussion.			

Adapted from *McCrory P, Meeuwisse W, Dvořák J, et al. Consensus statement on concussion in sport. Br J Sports Med 2017;51:838-847*

Medical clearance for full contact sport or high-risk activity:

Introduction: Medical clearance to return to full-contact sports or high-risk activities should be made on an individual basis using clinical judgment based on the findings of the medical follow-up. Presently there is no objective test to confirm physiological recovery following concussion. Medical clearance is not required for low risk cognitive or social activities (i.e. academic activities at school). The child/adolescent should have returned to all school activities, including writing exams without accommodations related to their concussion/post-concussion symptoms before medical clearance is given for returning to full-contact sports or high-risk activities.

I. Consider patients for medical clearance to return to full-contact activities and sport/game play if clinical criteria have been met.
The following clinical criteria should be considered or met before recommending that a child/adolescent returns to full-contact activities and sport/game play:

- Child/adolescent has successfully returned to all school activities including writing exams without symptoms above their previous pre-injury level or requiring accommodations related to their concussion/post-concussion symptoms, (e.g., child/adolescent may have

pre-existing accommodations or new accommodations related to something other than their concussion).

• Normal neurological and cervical spine examination.

• Asymptomatic at rest (or back to the pre-injury state in patients with pre-existing conditions such as baseline headaches or mental health conditions).

• Tolerating physical activities and non-contact activities without any symptoms.

• No longer taking any drugs or substances atypical to their pre-injury functioning that could mask symptom presentation.

• For children/adolescents with complex medical histories (e.g., repeated concussion, baseline concussion-like symptoms), see Recommendation 5.1 for information regarding returning to full-contact sports or high-risk activities, or retirement from full-contact sports or high-risk activities.

II. Provide patients with a letter indicating medical clearance to return to all activities when medically cleared.

III. Advise medically cleared patients to seek immediate medical attention if he or she develops new concussion-like symptoms or sustains a new suspected concussion.

Return to Work Approach (Sample):

Return to Work

This tool is a guideline for managing an individual's return to work following a concussion and does not replace medical advice. The goal for each stage is to find the 'sweet spot' between doing too much and doing too little. Timelines and activities may vary by direction of a health care professional.

AT HOME

STAGE 1:

Initial physical and cognitive rest

- Rest in a quiet and calm environment.
- Try activities that do not aggravate symptoms (e.g., listening to quiet music or colouring).
- Sleep as much as your body needs while trying to maintain a regular night sleeping schedule.

Limit:

- Lengthy social visits.
- Screen time (smartphone, computer, television) and reading.

Avoid:

- Sports or physical activities that increase your heart rate or cause you to break a sweat.

NOTE: It is recommended to discuss driving with a licensed medical professional for safety considerations.

Rest

When symptoms start to improve OR after resting for 2 days max,
BEGIN STAGE 2

STAGE 2:

Light activity

- Gradually increase cognitive activity by trying simple, familiar tasks (e.g., reading, watching TV, using the computer or drawing).
- Go for walks or try other light physical activity (e.g., swimming, stationary bike, light housework), without becoming short of breath.
- Take frequent rest periods; keep napping to a minimum.
- Begin with brief periods of activity, up to 30 minutes.
- Start thinking about returning to work: communicating with the workplace, a return to work plan, and your commute.

Gradually increase activity

When 30 minutes of activity is tolerated,
BEGIN STAGE 3

STAGE 3:

Prepare to return to work—at home

- Continue to increase cognitive activity.
- Continue to return to pre-injury physical activities (e.g., grocery shopping, gardening, jogging, light weight training).
- Contact workplace to discuss a tailored Return to Work plan.
- Attempt to commute to work to assess if it aggravates symptoms or drains energy.
- A regular sleeping schedule supports a successful return to work.
- Work your way up to 2 hours of activity, with breaks as needed.

Prepare to return to work—at work

- Work accommodations can include: flexible hours, reduced workload, extra time for tasks, access to a quiet, distraction-free work environment.
- Arrange to return to work on a graduated basis. Consider number of hours per day and appropriate accommodations.
- Work your way up to an additional 2 hours of activity, with breaks as needed.
- Have a plan to leave work and return to Stage 2 if symptoms worsen.

Prepare to return to work

When 4 hours of activity is tolerated, with breaks as needed,
BEGIN STAGE 4

AT WORK

STAGE 4:

Begin graduated return to work

- Return to work according to your graduated return to work plan, with the agreed upon number of hours per day and accommodations.
- At work, start with less demanding activities before more difficult ones.
- Gradually increase working hours week-to-week, or sooner, as appropriate.

Return to work with accommodations and a personalized *Return to Work* plan

When ready for regular work hours with accommodations,
BEGIN STAGE 5

STAGE 5:

Regular work hours with modifications, as needed

- Decrease accommodations as energy and capacity increases.
- Accommodations can be phased out in "trial" periods, to ensure that they are no longer needed.
- Monitor energy levels for completing household tasks and participating in social or recreational activities after the work day.

Adjust workplace accommodations, as needed

When regular work hours are tolerated with min. accommodations,
BEGIN STAGE 6

STAGE 6:

Full return to work

- Full regular work schedule with usual expectations for productivity, without accommodations.

NOTE: Only return to job duties that may have safety implications for you or others when cleared by a licensed medical professional (e.g., operating heavy equipment, working from heights, driving).

Full return to work

Once you have **COMPLETED STAGE 6,** *Return to Work* strategy completed

Recognizing that workplace environments vary by industry and occupation, returning to work may focus more on a return to cognitive activity, physical activity, or a combination of both. It is normal to experience symptoms during recovery; you do not have to wait to be symptom free before returning to work. However, after Stage 2, if new or worsening symptoms appear at any stage, go back to the previous stage for at least 24 hours. You many need to move back a stage more than once during the recovery process.

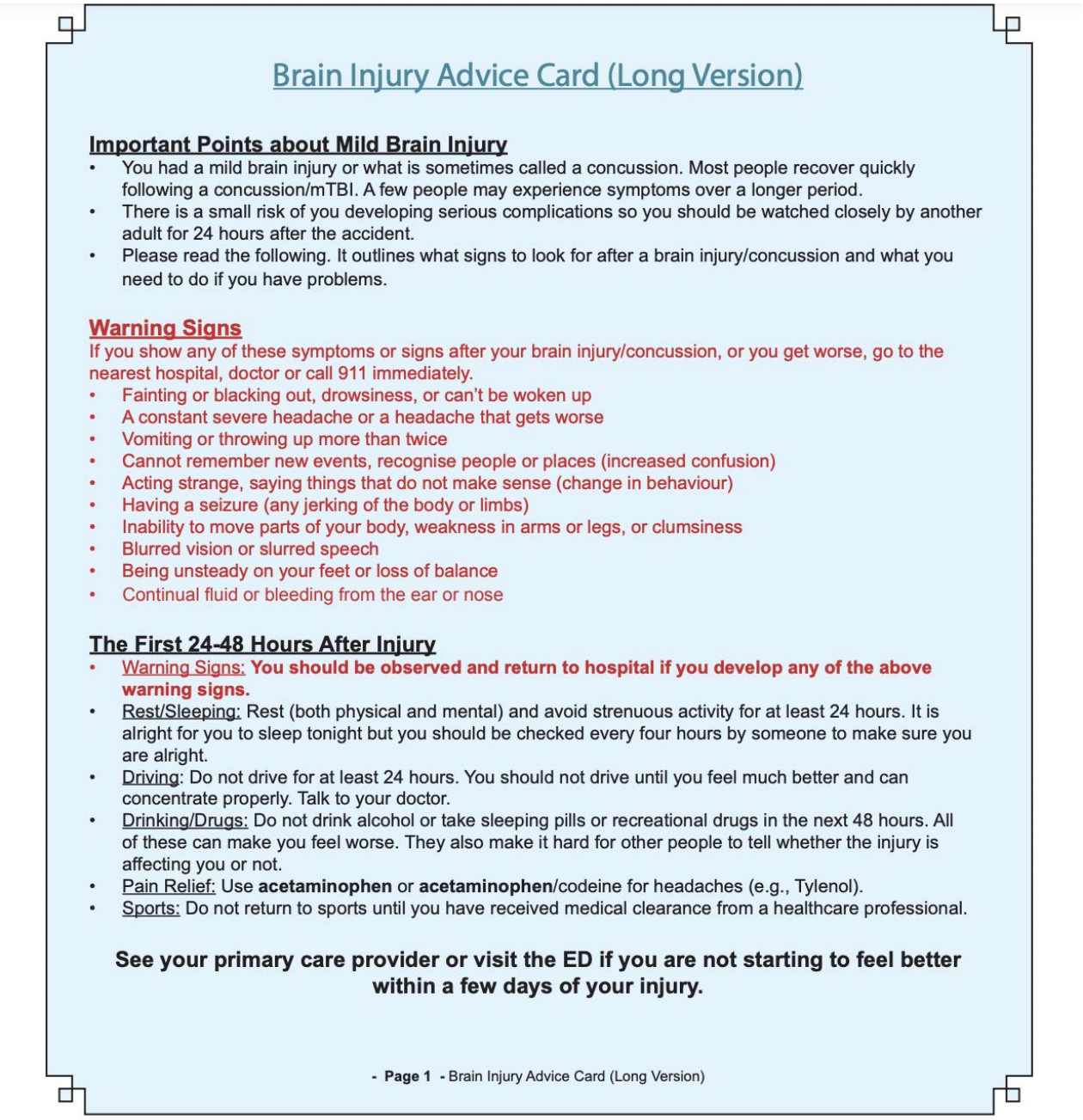
www.cattonline.com

CATT | CONCUSSION AWARENESS TRAINING TOOL

BC INJURY research and prevention unit
www.injuryresearch.bc.ca

Silverberg ND, Iverson GL (2013). doi: 10.1097/HTR.0b013e31825ad658.

Patient Resource for Expected Symptoms and Recovery Course: **Brain Injury Advice Card** (page 1 of 4 shown below)



Brain Injury Advice Card (Long Version)

Important Points about Mild Brain Injury

- You had a mild brain injury or what is sometimes called a concussion. Most people recover quickly following a concussion/mTBI. A few people may experience symptoms over a longer period.
- There is a small risk of you developing serious complications so you should be watched closely by another adult for 24 hours after the accident.
- Please read the following. It outlines what signs to look for after a brain injury/concussion and what you need to do if you have problems.

Warning Signs

If you show any of these symptoms or signs after your brain injury/concussion, or you get worse, go to the nearest hospital, doctor or call 911 immediately.

- Fainting or blacking out, drowsiness, or can't be woken up
- A constant severe headache or a headache that gets worse
- Vomiting or throwing up more than twice
- Cannot remember new events, recognise people or places (increased confusion)
- Acting strange, saying things that do not make sense (change in behaviour)
- Having a seizure (any jerking of the body or limbs)
- Inability to move parts of your body, weakness in arms or legs, or clumsiness
- Blurred vision or slurred speech
- Being unsteady on your feet or loss of balance
- Continual fluid or bleeding from the ear or nose

The First 24-48 Hours After Injury

- Warning Signs: **You should be observed and return to hospital if you develop any of the above warning signs.**
- Rest/Sleeping: Rest (both physical and mental) and avoid strenuous activity for at least 24 hours. It is alright for you to sleep tonight but you should be checked every four hours by someone to make sure you are alright.
- Driving: Do not drive for at least 24 hours. You should not drive until you feel much better and can concentrate properly. Talk to your doctor.
- Drinking/Drugs: Do not drink alcohol or take sleeping pills or recreational drugs in the next 48 hours. All of these can make you feel worse. They also make it hard for other people to tell whether the injury is affecting you or not.
- Pain Relief: Use **acetaminophen** or **acetaminophen**/codeine for headaches (e.g., Tylenol).
- Sports: Do not return to sports until you have received medical clearance from a healthcare professional.

See your primary care provider or visit the ED if you are not starting to feel better within a few days of your injury.

Section C: Prolonged Symptoms of Concussion

Introduction:

4 General Recommendations Regarding Diagnosis/Assessment of Prolonged Symptoms

Special Contributors:
Deanna Quon & Mark Bayley

While full recovery is expected within 3 months after concussion/mTBI,[1,2] not all patients experience such rapid recovery, with minimally 15% or more experiencing prolonged symptoms.[3,4] A more recent study showed 20 – 48% of veterans had prolonged symptoms up to 60 months post-concussion.[5] A number of factors influence the rate of recovery, including the mechanism and setting for the initial injury; for example, concussion/mTBI due to non-sport-related causes can be unexpected, emotionally charged, or associated with multiple or even life-threatening injuries. Other potential risk factors (see Table 1.1) may signal the need to monitor patient recovery more closely, given that these individuals are at higher risk for prolonged symptoms and poorer outcome.[6-8] For persons with prolonged symptoms at 1 month post-injury, referral for specialized assessment in an interdisciplinary concussion clinic may be indicated. Patients with prolonged symptoms 3 months post-injury should be referred for interdisciplinary treatment if available.

There is controversy regarding the diagnosis of prolonged post-concussion symptoms because there is significant symptom overlap with other diagnoses that can result as a consequence of a traumatic experience, for example, depression, anxiety, and post-traumatic stress disorder, as well as the sequelae of pain related to comorbid conditions such as post-traumatic headache or whiplash-associated disorder (see Table 4.1, Appendix 4.1). Regardless of formal diagnosis (e.g., prolonged post-concussion symptoms versus depression), prolonged symptoms following mTBI have the potential to cause functional limitations and need to be addressed in a coordinated and directed fashion in order to assist recovery. Thus, the priority for primary care providers remains managing symptoms and encouraging patients to gradually return to activity guided by symptom tolerance to prevent delays in recovery. Patients who receive education and treatment earlier are more likely to have fewer persisting symptoms later.[9] The assessment and monitoring of symptoms following mTBI may be facilitated using valid assessment tools, such as the *Rivermead Post Concussion Symptoms Questionnaire* (Appendix 1.5) or the *Post Concussion Symptom Scale* (Appendix 1.6).

Table 4.1. Differential Diagnoses Related to Concussion/mTBI

Major depressive disorder
Generalized anxiety disorder
Post-traumatic stress disorder (PTSD)
Chronic pain syndrome
Cervical strain/whiplash associated disorder
Substance abuse or polypharmacy
Somatic symptom disorder
Factitious disorder
Malingering
Post-traumatic headache
Post-traumatic dizziness
Fibromyalgia syndrome (secondary)
Primary sleep disorder: e.g., obstructive sleep apnea

It is also important to note that there is frequently an interplay of symptoms, social circumstances, and subsequent development of complications (e.g., depression) that can complicate and negatively influence recovery. The particular cluster of presenting symptoms will vary among patients, necessitating an individualized approach to management. Accordingly, one of the primary aims of the guideline is to assist in providing recommendations for management of these patients at risk using a symptom-based approach. See the individual sections for more specific treatment information.

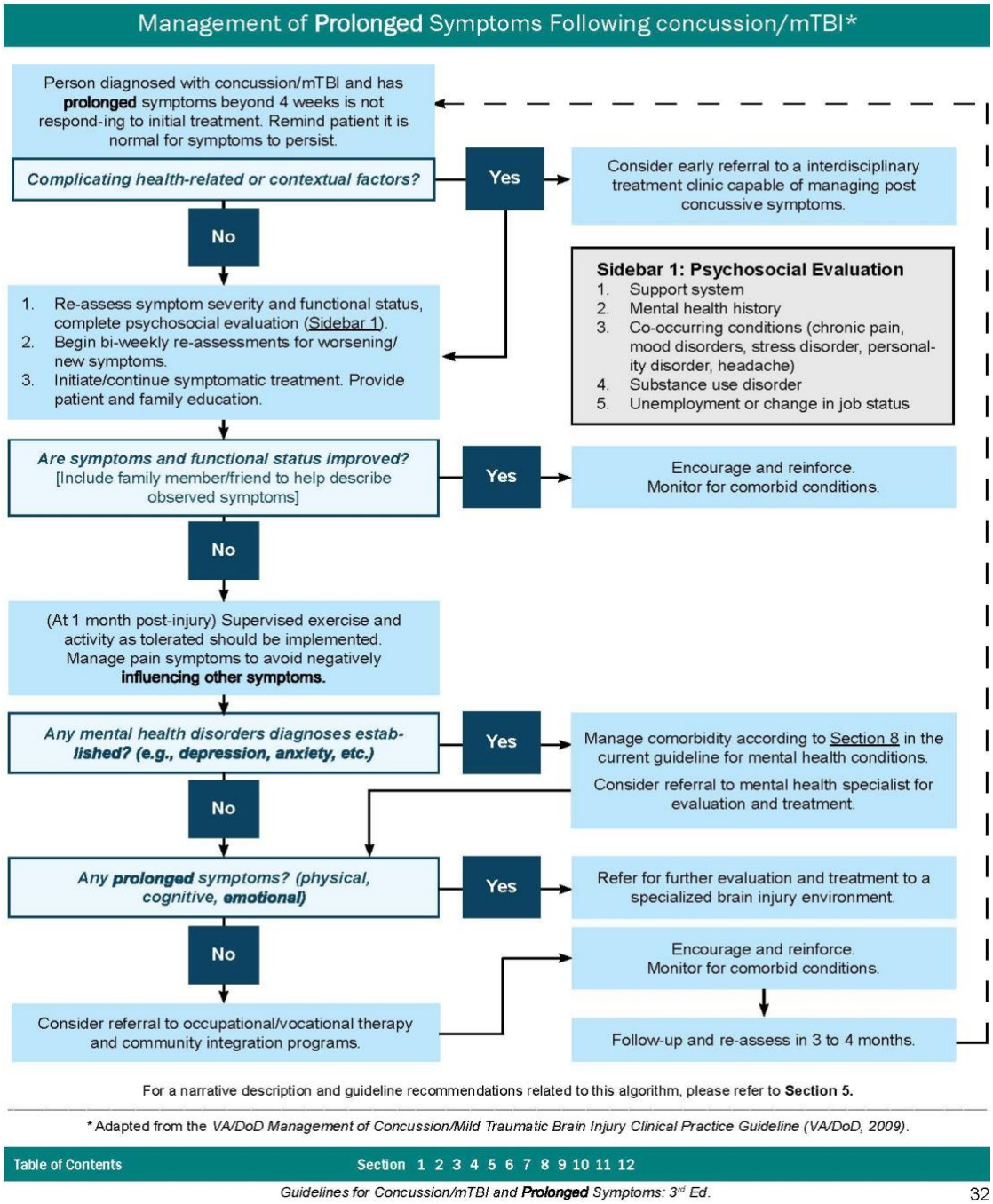
https://braininjuryguidelines.org/concussion/fileadmin/pdf/Concussion_guideline_3rd_edition_final.pdf

Approach to Management and Referral:

Referral Process for Chronic Concussion:https://youtu.be/R5MrxOiNsFY

Referral Process Post-Acute Concussion:https://youtu.be/02OnxDC1w4Y

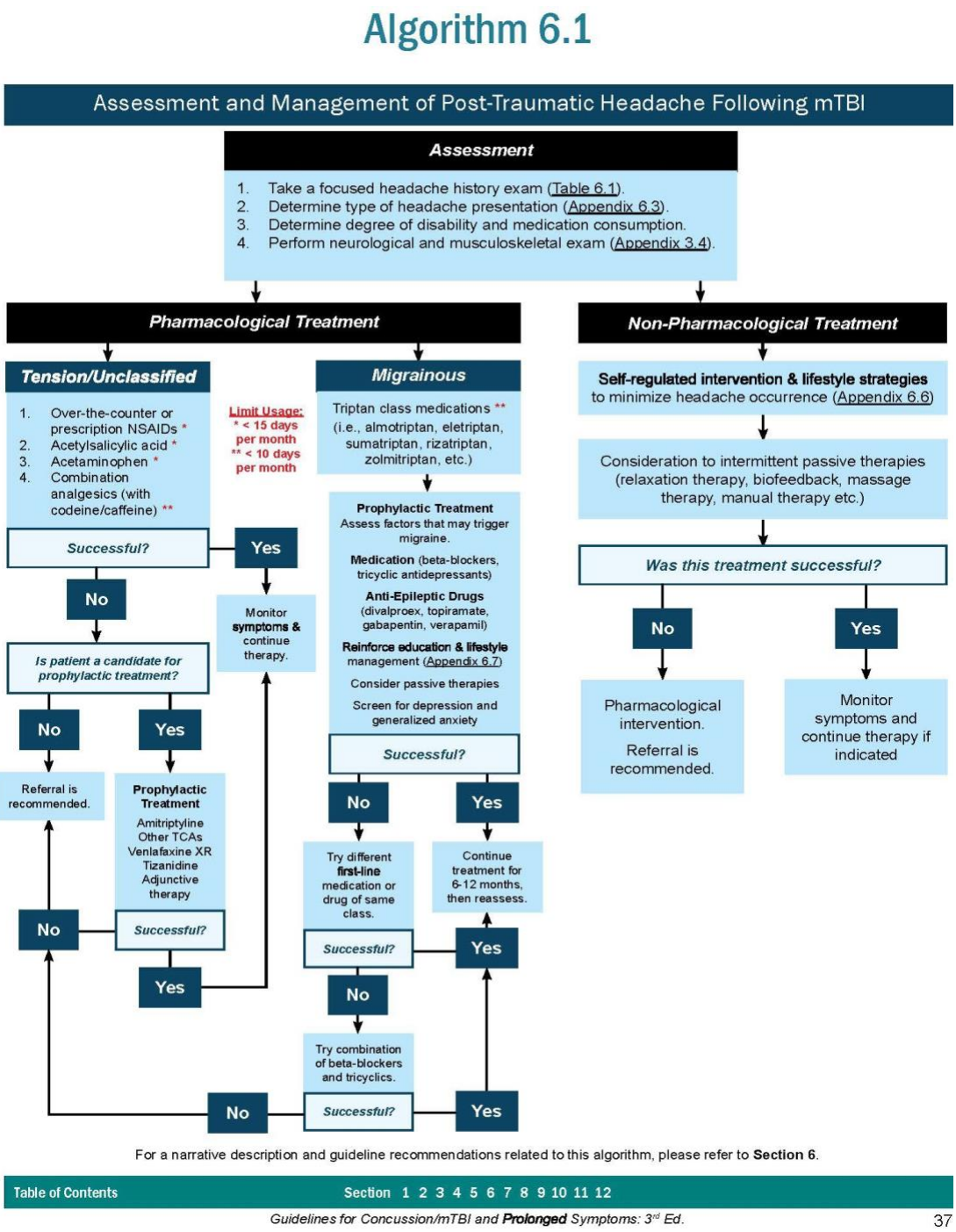
Algorithm 5.1



https://braininjuryguidelines.org/concussion/fileadmin/pdf/Concussion_guideline_3rd_edition_final.pdf

Post-Traumatic Headache following mTBI

Post-Concussion Headaches Physical Examination:https://youtu.be/sn4YrzH7mg8



https://braininjuryguidelines.org/concussion/fileadmin/pdf/Concussion_guideline_3rd_edition_final.pdf

Self-Regulated Intervention and Lifestyle Strategies to Minimize Headache Occurrence

Simple Self-regulated Intervention Strategies*

- Apply a cold or hot back to the neck or head
- Tie something tight around the head
- Stretching and self-massaging the head and/or neck and shoulders
- Perform breathing exercises
- Visualization or other mindfulness-based exercises
- Go to a quiet place
- Lie down
- Go outside to get fresh air

* Note. When relevant, there are a variety of allied-health professionals who can guide individuals to perform appropriate home-based neck and shoulder stretching.

Lifestyle Strategies to Minimize Headache Occurrence

a) Sleep: It is well-known that sleep deprivation or inconsistent sleep-wake cycles can precipitate headaches or preclude improvement. Accordingly, it is important to educate individuals with post-traumatic headache (PTH) on the importance of going to bed at the same time each night and waking up at the same time each night and, if possible, avoiding day-time naps. If insomnia continues to be a significant problem, please refer to section 7 for an approach to the management of insomnia

b) Regular Meals: It is well-known that skipping or delaying meals can trigger headaches in some people. As such, it is important to ensure that patients with PTH consume breakfast (ideally a high-protein breakfast), lunch and dinner and avoiding delaying or skipping meals.

c) Hydration: It is thought that dehydration can be a trigger for headaches in some susceptible individuals. As such, it is important to maintain good hydration – this means consuming 4-6 drinks per day of water, juice, milk or other non-caffeinated beverages. Regular daily caffeine-consumption (i.e., coffee, soft-drinks) should be avoided as caffeine consumption and withdrawal can precipitate headaches (when an individual does not consume caffeinated beverages regularly, a caffeinated beverage may be helpful to minimize intermittent bad headaches). Diet soft-drinks should be further avoided as, in some, aspartame may trigger headaches.

d) Stress: It is well-known that in many individuals stress, worry, anxiety or anger can be a significant trigger for headaches. These symptoms are particularly common in individuals who have sustained a traumatic brain injury and, as such, can have a major impact on the frequency and severity of PTH. As such, using relaxation strategies, doing activities such as meditation, yoga, and exercise can assist with coping with stress and avoiding stress-induced worsening of headaches. The assistance of an occupational therapist, psychologist, GP-psychotherapist or psychiatrist may be necessary.

e) Exercise: In the initial period after a traumatic brain injury, physical rest is often endorsed. However, as the weeks go by, inactivity is frequently counter-productive and a sedentary lifestyle without any cardiovascular exercise may, in some, perpetuate the headaches. Accordingly, a brisk walk (particularly a morning walk outside), riding a stationary bicycle, walking or jogging on a treadmill or elliptical machine or swimming can be very helpful in headache management. An exercise program should be undertaken as tolerated with gradually increasing duration and intensity. For some, exercise triggers a headache and in these individuals the intensity and/or duration of the exercise should be reduced or an alternative exercise should be trialed.

Persistent Sleep-Wake Disorders

Brief Definitions of Sleep Disorders Most Frequently Reported Following mTBI*

Insomnia

Main feature	Dissatisfaction with the quality or quantity of sleep.
Common symptoms	Subjective complaints of difficulty falling asleep, difficulty maintaining sleep (with frequent awakenings and/or difficulty returning to sleep after awakenings), early morning awakenings (with insufficient sleep duration) and/or nonrestorative sleep.
Additional criteria	To be considered as an insomnia disorder, symptoms have to be present at least 3 nights/week, last more than 1 or 6 months (depending on the nosology being used), and cause significant distress or impairment in daytime functioning.

Sleep-related breathing disorders

Main feature	Altered respiration during sleep.
Main subtypes	Obstructive sleep apnea (OSA): breathing alteration associated with complete (apnea) or partial (hypopnea) obstruction of the upper airway during sleep. Central apnea: breathing alteration associated with temporary loss of ventilatory effort.
Common symptoms	Daytime sleepiness, frequent awakenings to restart breathing, restless and nonrestorative sleep, snoring.
Additional criteria	Presence of at least 5 polysomnography-documented apneas or hypopneas per hour of sleep.

Narcolepsy

Main feature	Rare disorder characterized by recurrent unplanned daytime napping or sleep episodes.
Common symptoms	Tetrad of classic symptoms (that are not always all present): daytime sleepiness, cataplexy (i.e., episodic loss of muscle function), hypnagogic hallucinations (i.e. dream-like experiences while falling asleep, dozing or awakening), and sleep paralysis (i.e., transitory, inability to talk, or move upon awakening).

Post-traumatic hypersomnia

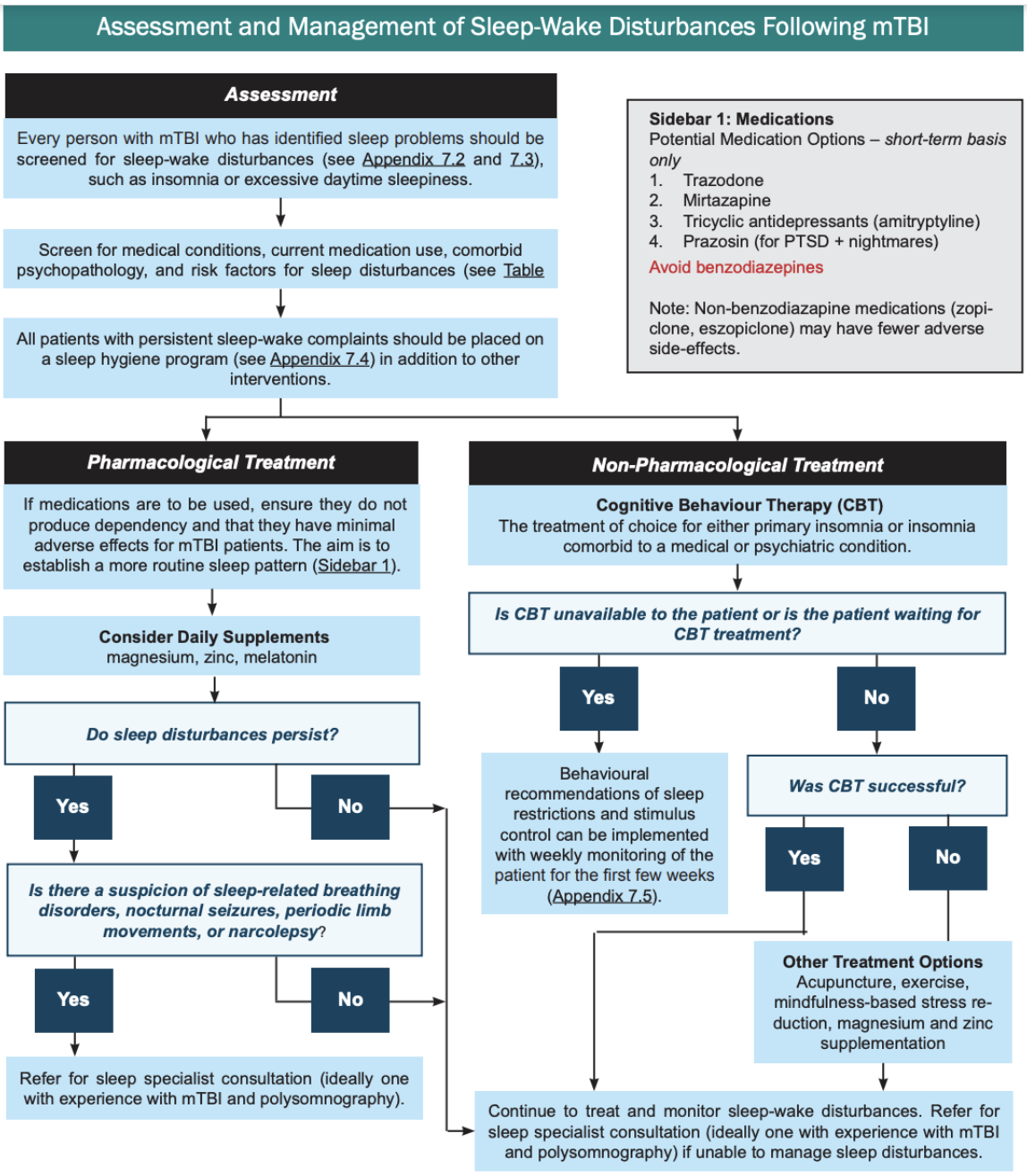
Main feature	Hypersomnia because of medical condition (TBI) when other primary sleep disorders have been ruled out.
Common symptoms	Excessive daytime sleepiness, increased sleep duration.

Circadian rhythm sleep disorders

Main feature	Mismatch between one's sleep-wake rhythm and the 24-hour environment. In addition to the sleep-wake cycle, melatonin secretion and body temperature rhythms can be disrupted.
Common symptoms	Delayed sleep phase disorder: prolonged delay in the sleep-wake episodes relative to conventional times; Advanced sleep phase disorder: advance in the sleep-wake episodes relative to conventional times; Irregular sleep-wake rhythm: high day-to-day variability in sleep onset and offset.
Additional criteria	Sleep disturbances when trying to conform with conventional times (inability to fall asleep or remain asleep); normal sleep quality and duration when choosing the preferred schedule.

* Taken with permission from Ouellet MC, Beaulieu-Bonneau S Morin CM. Sleep-Wake Disturbances. In Eds. Zasler ND, Katz DI, Zafonte RD. Brain Injury Medicine: Principles and Practice. New York; Demos Medical Publishing LLC; 2012.

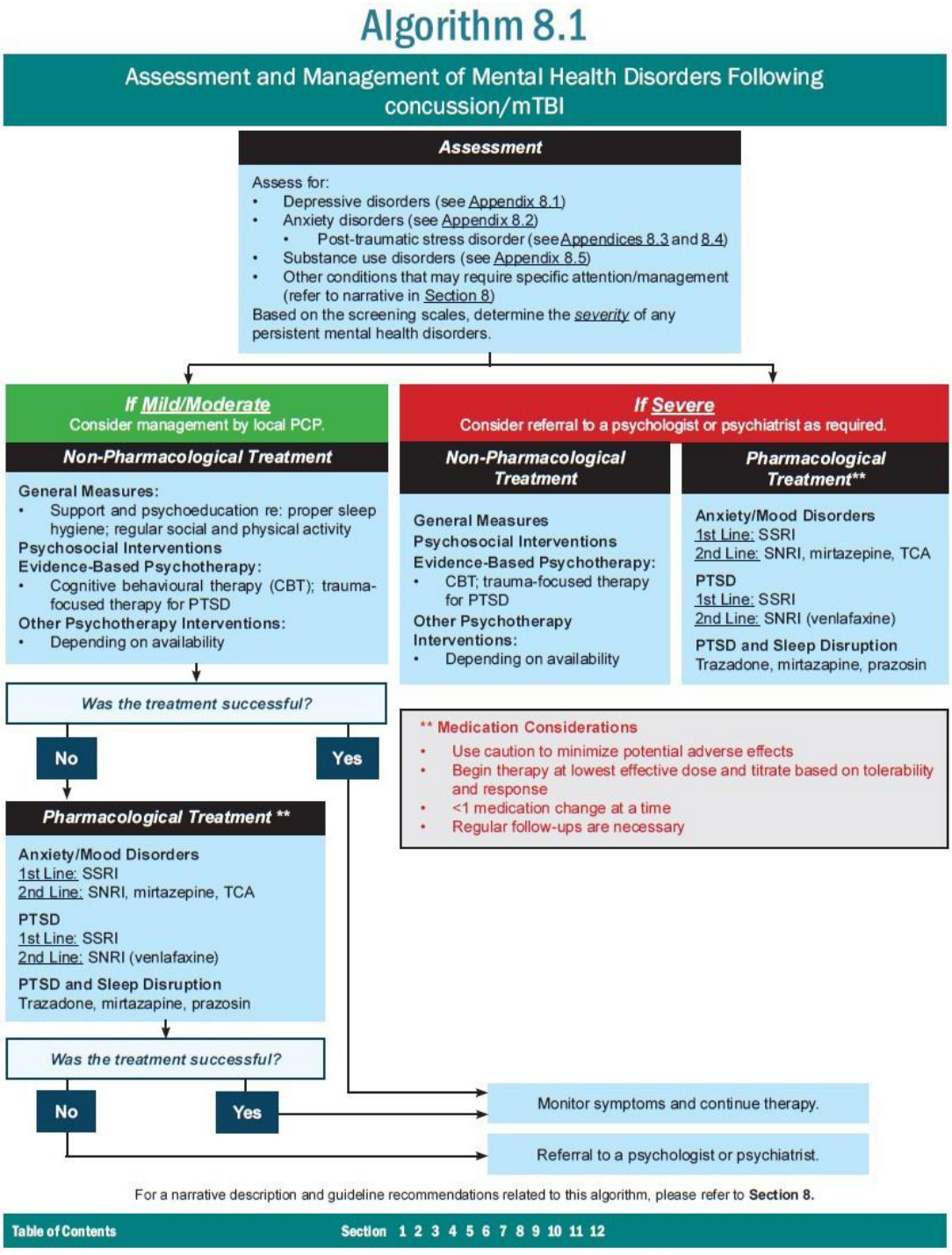
https://braininjuryguidelines.org/concussion/fileadmin/pdf/Concussion_guideline_3rd_edition_final.pdf



For a narrative description and guideline recommendations related to this algorithm, please refer to **Section 7.**

https://braininjuryguidelines.org/concussion/fileadmin/pdf/Concussion_guideline_3rd_edition_final.pdf

Persistent Mental Health Disorders



https://braininjuryguidelines.org/concussion/fileadmin/pdf/Concussion_guideline_3rd_edition_final.pdf

Persistent Cognitive Difficulties

- Post-Concussion Headaches Physical Examination:https://youtu.be/sn4YrzH7mg8
- An Approach to Post Concussion Dizziness:https://youtu.be/sThRqvtwSzA

RECOMMENDATIONS FOR ASSESSMENT OF COGNITIVE DIFFICULTIES		
		GRADE
9.1	A patient sustaining a concussion should be evaluated for the presence of cognitive difficulties, and consideration taken to the impact of such difficulties on functional areas such as performance at work or school and completing tasks within the home and community, etc. This can be done through a focused clinical interview regarding symptoms and administration of a validated post-concussion questionnaire [e.g., *Rivermead* (Appendix 1.5), *PCSS* (Appendix 1.6) or *SCAT5* (Appendix 3.1)] for the purpose of assessing and tracking symptoms.	**B**
9.2	Since certain comorbidities can exacerbate cognitive symptoms (e.g., ADHD, learning disabilities, anxiety or mood disorders, pain, fatigue, sleep disturbance, neuroendocrine dysfunction, substance abuse, existing medications) patients should be provided with education highlighting that their cognitive symptoms may be intensified and prolonged by these comorbidities.	**B**
9.3	*A patient with a first-time concussion should be advised through early education, support and/or assurance that a full recovery of symptoms, including cognitive functioning, is typically seen within as early as a few days up to 1 to 3 months post-injury.**	**A**
9.4	Patients who have cognitive symptoms that are not resolving and continue to interfere in daily functioning (e.g., school or work) beyond 4 weeks should be considered for referral for specialized cognitive assessment (e.g., neuropsychological assessment). The evaluation may assist in clarifying appropriate treatment options based on individual patient characteristics and conditions.	**A**

** NOT AN ORIGINAL RECOMMENDATION - REPEAT OF 2.3*

RECOMMENDATIONS FOR TREATMENT OF COGNITIVE DIFFICULTIES		
		GRADE
9.5	Evidence-based neurorehabilitation strategies should be initiated if: a. The individual exhibits persisting cognitive impairments on formal evaluation, and/or b. To facilitate the resumption of functional activities, work and school.	**A**
9.6	If persisting cognitive deficits are identified by neuropsychologists or other healthcare professionals, implement temporary work or school accommodations or modifications and provisions for assistance (e.g., implement schedules, avoid excessive anxiety, pace activities, etc.). See Section 12.	**C**

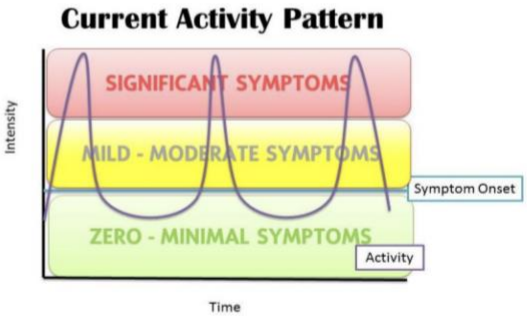
https://braininjuryguidelines.org/concussion/fileadmin/pdf/Concussion_guideline_3rd_edition_final.pdf

The Parkwood Pacing Graphs

The Pacing Graphs Explained

The green (safe zone) represents when you are symptom-free, or your baseline symptoms. The red (danger zone) represents when your symptoms are increased.

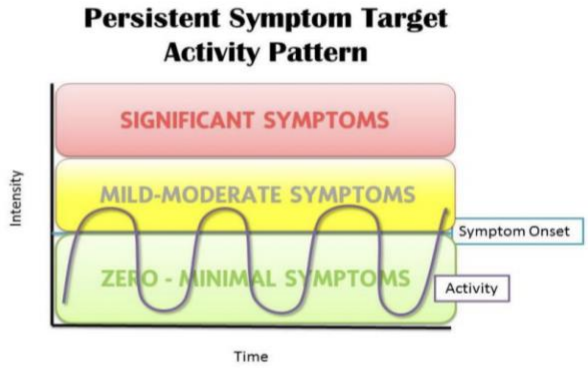
Your Current Activity Pattern may look like this if you continue to work, study, exercise, and in effect push through your symptoms into the 'red zone'. Unfortunately, you end up crashing and may need hours or days to return to baseline.



Your Goal: To gradually increase activity tolerance without significantly increasing symptoms or crossing the symptom threshold (into the 'danger zone'). Therefore, planning and pacing of activities is very important. You need to find the right level of activity whereby your symptoms are either eliminated or manageable, and then as your symptoms are better controlled, you can gradually increase your activity level.

You should aim to remain below your significant symptom threshold to promote recovery.

Use your timer to set time restrictions for activities to ensure that a task is stopped soon after symptom onset (i.e. if symptoms increase by 2-3/10 and then return back to baseline within 30-60 min, this is an appropriate amount). This will allow you to monitor your response to activity and teach you how to self-pace and self-monitor. You need to challenge the system in a manageable way in order to change it.



Additional Strategies

- Start with shorter bouts of exercise or activity with rest in between OR
- Try switching between different types of activities (e.g., switching from reading to walking).
- **Doing nothing at all will not promote recovery, but doing too much each day may cause prolonged symptoms.** Therefore, completing structured, paced activities throughout the day with rest breaks as appropriate is ideal.

---

https://braininjuryguidelines.org/concussion/fileadmin/media/appendices/appendix-2-2.pdf

Vestibular Dysfunction:

*** MUST RULE OUT ORGANIC CAUSES***

An Approach to Post Concussion Dizziness:https://youtu.be/sThRqvtwSzA

Vestibular (Balance/Dizziness) Dysfunction Persistent vertigo, dizziness, imbalance and visual disturbance are common symptoms of patients with concussion/mTBI and are often associated with objective impairments of the vestibular system. Vestibular impairments can occur peripherally in the inner ear, or centrally in nuclei that integrate vestibular signals in order to maintain balance and posture. The vestibular system also affects eye movement through a variety of mechanisms including the vestibulo-occular reflex (VOR).

BPPV

The most common cause of post-traumatic peripheral vestibular dysfunction is benign paroxysmal positional vertigo (BPPV). Patients experience episodes of vertigo, nystagmus and nausea with sudden changes in position, often including rolling over in bed or looking up. These attacks typically last less than 30 seconds but can be quite disabling and can occur multiple times per day.

This diagnosis can be confirmed with the **Dix-Hallpike Maneuver**. If this maneuver is positive, the **Eply Maneuver** should then be performed.

Vestibular Dysfunction

Along with the Dix-Hallpike Maneuver, a VOMS Assessment (Vestibular-Ocular-Motor) is helpful to assess concussion. The components to this screen are as follows:

1. Horizontal Pursuits
2. Saccades – Horizontal
3. Saccades – Vertical
4. Convergence
5. VOR – Horizontal
6. VOR – Vertical

Please see this video link for examples of how to perform the VOR Screen:
https://www.youtube.com/watch?v=CJF6kJcFGqE

Vestibular rehabilitation is typically provided by a specialized a healthcare professional with specialized training and involves various movement-based regimens to bring on vestibular symptoms and desensitize the vestibular system, coordinate eye and head movements, and improve functional balance and mobility.

Persistent Fatigue

Table 11.1 Fatigue: Assessment and Management Factors for Consideration

Characteristics	• Frequency • Intensity • Time of day • Aggravating factors
Assessment	• Focused history • Physical examination • *Barrow Neurological Institute (BNI) Fatigue Scale* to assess fatigue (Appendix 11.1) • Consider blood test screening if appropriate (CBC, TSH, electrolytes)
Secondary Causes of Fatigue	• Affective disorder, including depression, anxiety • Sleep disorder post-concussion/mTBI • Metabolic causes, including hypothyroidism, anemia • Electrolyte abnormality (e.g., hyponatremia, hypocalcemia, etc.) • Polypharmacy or medication adverse effect

RECOMMENDATIONS FOR ASSESSMENT AND MANAGEMENT OF FATIGUE		
		GRADE
11.1	Determine whether cognitive and/or physical fatigue is a significant symptom by taking a focused history and reviewing the relevant items from administered questionnaires (see Appendix 11.1).	C
11.2	Characterize the dimensions of fatigue (e.g., physical, mental, impact on motivation) and consider alternative or contributing, treatable causes that may not be directly related to the injury. Please refer to Table 11.1 for further information about primary and secondary causes, as well as appropriate treatment strategies for different types of fatigue.	C
11.3	*After a brief period of rest during the acute phase (24–48 hours) after injury, patients can be encouraged to become gradually and progressively more active as tolerated (i.e., activity level should not bring on or worsen their symptoms).**	C
11.4	If identified as a significant symptom, some key considerations that may aid in the management of persistent fatigue can include: • Aiming for a gradual increase in activity levels (see Appendix 11.4) that will parallel improvement in energy levels, including exercise below symptom threshold. • Reinforce strategies of cognitive and physical activity pacing (see Appendix 2.6) and fragmentation across the day to help patients achieve more without exceeding tolerance levels. • Encouraging good sleep hygiene (especially regularity of sleep-wake schedules, and avoidance of stimulants and alcohol), and proper relaxation times. • Using a notebook or a diary to plan meaningful goals, record activity achievement and identify patterns of fatigue. • Acknowledging that fatigue can be exacerbated by low mood or stress. • Provide patients with a pamphlet containing advice on coping strategies for fatigue (see Appendix 11.3).	C

* *NOT AN ORIGINAL RECOMMENDATION - REPEAT OF 4.5*

https://braininjuryguidelines.org/concussion/fileadmin/pdf/Concussion_guideline_3rd_edition_final.pdf

Section D: Additional Resources/YouTube Videos

For Physicians:

Guideline for Concussion/Mild Traumatic Brain Injury and Prolonged Symptoms - 3rd Edition: Published by the Ontario Neurotrauma Foundation in 2018

UHN Echo Concussion Recordings: Didactic recordings based on the ONF Guidelines

CEP Concussion Tool

Concussion Awareness Training Tool: Link to e-Learning course and other resources

For Residents

YouTube Videos:

1.) Referral Process Post-Acute Concussion:https://youtu.be/02OnxDC1w4Y

2.) Referral Process for Chronic Concussion:https://youtu.be/R5MrxOiNsFY

3.) Post-Concussion Headaches Physical Examination:https://youtu.be/sn4YrzH7mg8

4.) An Approach to Post Concussion Dizziness:https://youtu.be/sThRqvtwSzA

For Patients:

https://concussionsontario.org/patienteducation/resources-for-patients-and-families-2/

https://abinetwork.ca/individuals-families/concussions/concussion-resources/

Appendix A – Common Medications for Symptoms of Concussion

Note: Please follow the symptom specific algorithm for guidance on when to initiate pharmacological therapy

Post-Traumatic Headache

Tension Type/Unclassified	
OTC or Prescription NSAIDs	*Limit usage to <15 days/month
Acetaminophen	*Limit usage to <15 days/month
Combined Analgesics with codeine/caffeine	*Limit usage to <10 days/month
Migrainous	
Triptans – e.g. sumatriptan	50-100 mg PO once, may repeat dose after 2 hours (maximum 100 mg per dose and 200 mg in 24 hours) – *limit to less than 10 days/month
Prophylaxis	
First Line	
Tricyclic Antidepressants – e.g. amitriptyline	10 mg PO QHS, increasing by 10 mg every 1-2 weeks to maximum of 50-100 mg
Beta Blockers – e.g. propranolol	20 mg TID, increasing by 20 mg q5days up to maximum of 80 mg TID
Second Line	
Anti-Epileptics – e.g. topiramate	12.5 mg QHS, increase by 12.5 mg every week to a maximum of 100 mg
Gabapentin	100-300 mg QHS, increasing by 100-300 mg q5days to maximum of 600 mg TID
Third Line	
Verapamil	40 mg TID, titrating up to 80 mg TID

Sleep-Wake Disorders (consider for short-term basis only)

Trazodone	25 mg PO QHS, titrate up to maximum 200 mg QHS
Mirtazapine	7.5 mg PO QHS, titrate up to 15 mg PO QHS
Tricyclic Antidepressants – e.g. amitriptyline	10 mg PO QHS, increasing by 10 mg every 1-2 weeks to maximum of 50-100 mg
Consider supplements with magnesium, zinc, melatonin	
**Avoid Benzodiazepines*	

Mental Health Disorders

First Line	
SSRI – e.g. Citalopram	10 mg PO once daily, titrate up to 20-40 mg daily
Second Line	
SNRI – e.g. venlafaxine	37.5 mg PO once daily, can increase to 75 mg after 1 week, titrate up to maximum dose of 225 mg daily
Mirtazapine	7.5 mg PO QHS, titrate up in 7.5 mg increments to maximum dose of 45 mg

Appendix B – Patient Education/Counselling Script and Phases

Phrases taken from the Hull-Ellis Concussion and Research Clinic Patient Education Script for Physicians

Week 1:

What is a Concussion?

A concussion is a type of traumatic brain injury where the brain gets shaken inside the skull. It is not fully understood; we believe that changes in the brain are not necessarily permanent

Recovery Expectations:

Trend in Most people: The good news is that most people's concussion resolve fully within a short period of time, although the time varies from person to person.

You should expect full recovery within a few days or weeks. Your symptoms will start to improve with time. The 'normal' recovery process means you will see gradual improvements in your symptoms and getting back to your routine

If you have had a previous concussion, you may take a little longer than other to recover, but you will get there. The studies out there are mainly for athletes with increased contact sport exposures. We are not sure if this phenomenon is applicable to the general population as the general population usually does not have the same environmental risks.

Symptom Management

General principle is to reassure patients that symptoms of headache, sleep, fatigue, difficulty concentrating, dizziness, cognition, and mood can occur following a concussion

Tailor your discussion depending on the symptoms that the patient is experiencing

Return to Activity

After the first 2 days of rest following a concussion we generally recommended activity as tolerated and dictated by your symptoms. The plan is to gradually progress from limited activity to return to work and or sports when your symptoms allow

Once your symptoms start to settle, you can try to increase your activities as tolerated (the doctor will advise you of your current 'stage' of recovery).

You might experience some increased symptoms as you do so. Increase your activities in a gradual, measured way. Please refer to the pacing handout for activity guidance.

A maximal intensity effort or exercise is not recommended in the first 2 weeks after concussion

Week 2

Expectations

Not everyone recovers at the same rate or experience the same symptoms at the same intensity levels at a given point in time of their recovery.

It is important to recognize that your recovery may vary from others and focus on what might work for you and be more effective in managing your symptoms. It may require you to be patient with your self and manage your expectations and anxiety levels with regards to your recovery time.

Return to Activity

Resuming regular routine is an important part of recovery. Effective pacing is a way of increasing your physical activity and returning to your daily activities. You can pace yourself to your previous activity level by

a) slowing things down b) doing one task at a time and c) taking frequent breaks while on task.

"Layering" your activities can also be helpful. This involves alternating types of activity throughout the day like "layers of cake". For example, light exercise followed by light reading, followed by brief screen use,

followed by in house chores, followed by a break, followed by light socializing, followed by a short out of the house errand etc

Return to Exercise

If you haven't commenced a low impact aerobic exercise program yet it is strongly recommended that you

do so. The benefits of light, low impact aerobic exercise are well documented after concussion.

Return to Work

Depending on your symptoms, the type of work you do and the length of your work day/shift, I will make recommendations.

I may ask you to start working short hours and or modified work, and build it up to your full time hours of work.

Having symptoms is still normal during this time period but research is showing it is safe and recommended to initiate and even progress at return to work/school protocol with symptoms.

Week 8

Expectations

Not everyone recovers at the same rate or experience the same symptoms at the same intensity levels at a given point in time of their recovery. While the majority of patients recover by the week 8 mark, there is still a significant minority (10-20%) that are still recovering at this point. This does not mean that you will not recover; it means your recovery is taking longer.

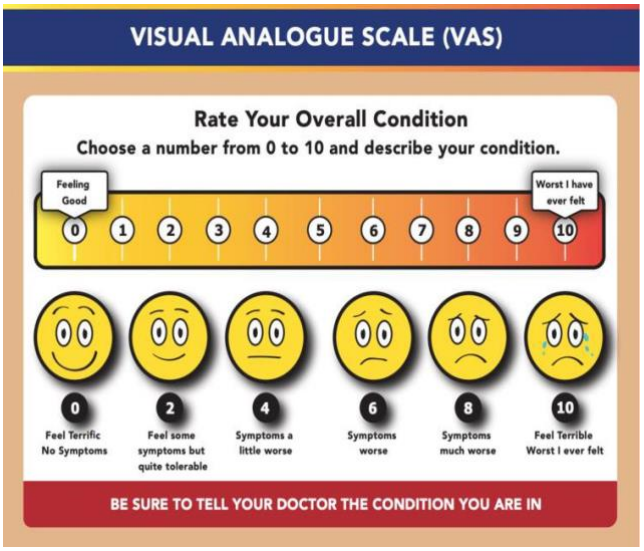
Return to Exercise

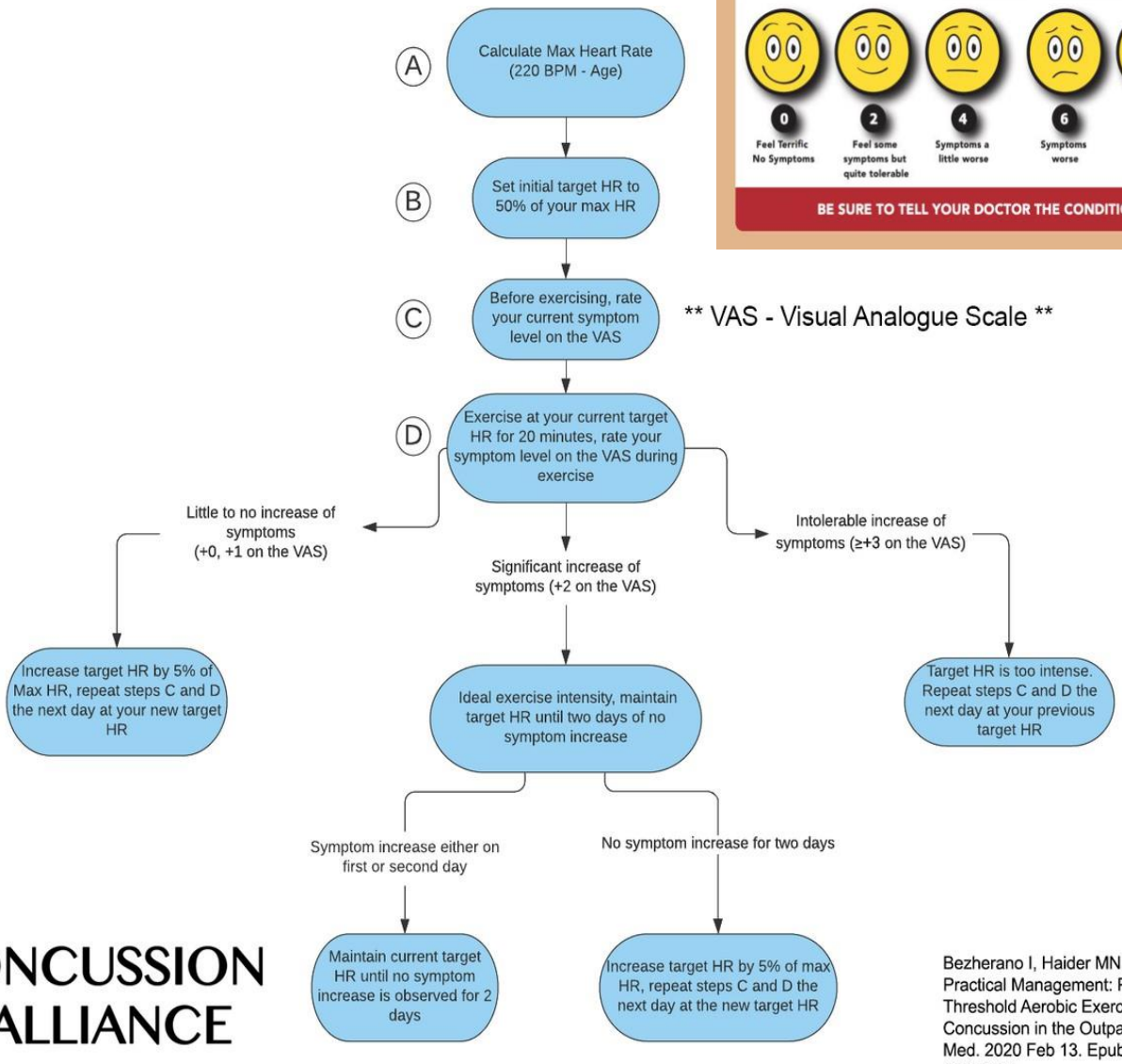
The principle of returning to exercise is the same as what we have discussed in your previous appointments; we want you doing what you are able to do, and we want to continue to progress each week, within your tolerance

Appendix C – Aerobic Exercise Prescription Principles

The following flowchart is based on the Buffalo Treadmill Protocol. This protocol was designed to assess patient's exercise tolerance following a concussion using patient's heart rate and subjective symptoms in response to a graded exercise regimen. The specific protocol requires a treadmill and specialized assessment, but the following flowchart follows the same principles.

This information is meant to be used as a guide. Target heart rate should be adjusted to each individual patient based on their fitness level and other medical comorbidities.





CONCUSSION ALLIANCE

Bezherano I, Haider MN, Willer BS, Leddy JJ. Practical Management: Prescribing Subsymptom Threshold Aerobic Exercise for Sport-Related Concussion in the Outpatient Setting. Clin J Sport Med. 2020 Feb 13. Epub ahead of print. PMID: 32058454

Appendix D – Specialized Concussion Clinics

Bridgepoint Active Healthcare	**Mailing Address**: 14 St. Matthews Road Toronto, ON, M4M 2B5 **Phone**: 416-461-8252 **Fax:** 416-461-5696 **Email:** info@bridgepointhealth.ca **Website**:http://www.bridgepointhealth.ca/ Utilization Specialist, Neuro Rehab and Activation: 416-461- 8252, ext. 2305; Patient Referrals: Ambulatory Care Centre Extension: 416-461- 8252, 2371; Case Manager: 416-461-8252, ext.: 2278	Neuropsychology, Nursing, Occupational Therapy, Physiotherapy, Social Work, Speech-Language Pathology, Mindfulness Based Stress Reduction program, Pain Management program, Medical Rehab.
Holland Bloorview	**Mailing Address:** 150 Kilgour Road, Toronto, ON, M4G 1R8 **Phone:** 416-424-3804 **Fax:** 416-422-7036 **Early Care: Referral Form** **Persistent Care: Referral Form**	Early Care: Early specialized care best suited for children and youth who present with delayed common modifiers Persistent Care: Multidiscplinary team best suited for children and youth who have prolonged symptoms which have significant impact on return to activities
St. Michael's Hospital: Head Injury Clinic	**Mailing Address**: 30 Bond Street Toronto, ON, M5B 1W8 **Phone**: 416-360-4000 **Trauma and Neurosurgery; Head Injury Clinic**: 416-864-5520 **Website**:http://www.stmichaelshospital.com/programs/trauma/headinjury-clinic.php	Cognitive Services, Medical Services, Patient and Family Education and Support, Psychiatry Services, Psychosocial Services.
Sunnybrook Health Sciences Centre - Mild to Moderate TBI Clinic	**Mailing Address**: 2075 Bayview Avenue North York, ON, M4N 3M5 **Phone**: 416-480-4095 Fax: 416-480-4613 **Email**: Elke.McLellan@sunnybrook.ca **Website**:http://sunnybrook.ca/content/?page=bsp	Patients are seen within the first 3 months after injury. Brain Injury Education, Occupational Therapy, Physical Therapy, Emotional, behavioral, cognitive,

		psychological and psychiatric symptom management
Sunnybrook Health Sciences Centre Traumatic Brain Injury Clinic: St. John's Rehab Hospital	**Mailing Address**: 285 Cummer Avenue Toronto, ON, M2M 2G1 **Phone**: 416-226-6780 **Website**:https://sunnybrook.ca/content/?page=sjr-patvis-prog-bot	For mild to moderate brain injury. Physiotherapy, occupational therapy, nursing, speech-language pathology, pharmacists, physicians, dietary, social work, psychology and spiritual care.
University Health Network: Hull-Ellis Concussion and Research Clinic	**Mailing Address**: 550 University Avenue East Wing – 10th floor Toronto, ON, M5G 2A2 **Phone**: 416-597-3422, ext. 3226 **Fax**: 416-597-7169 **Website**:http://www.uhn.ca/TorontoRehab/PatientsFamilies/Clinics_Tests/HullEllis_Concussion_Research	Physicians, Clinic coordinator, Psychologists, Physiotherapists