• No financial disclosures

• No conflicts of interest
Sleep

• Primary purpose of sleep is likely brain restoration and repair
  – Brain may flush out toxins during sleep using the glymphatic system
  – Memory consolidation and pruning (efficiency)
For Good, Restorative Sleep, Good Sleep Hygiene is Essential

• No caffeine after 2 pm
• Avoid eating heavy fatty meals late in the evening as the digestion of these meals takes longer and will interfere with sleep
• Avoid computers or TV within 1.5 to hours of bedtime as these tend to wake the brain up.
Continued...

• Create a bedtime ritual which will help your body learn it is time to shut down, such as: a warm bath 60 minutes before bedtime (heat increases the release of melatonin, a hormone that promotes sleep), but not right before bedtime because if the body is too warm it cannot fall asleep; a warm cup of decaffeinated tea and perhaps a light carbohydrate snack such as a graham cracker. Give yourself a foot massage or listen to some quiet music.

• Avoid reading anything of any depth just before bedtime as this will wake your brain up due to the concentration involved.

• Create a comfortable sleeping environment: room temperature should be 65 degrees, no warmer; comfortable bed sheets and clothing of calming colors; no TV in the bedroom. If you have significant sleep problems the bed should be used for only one thing, sleep. Otherwise you give your body and brain confusing signals.
Even more...

- Lights out should be no later than 10:00 P.M. This is to take advantage of rising melatonin levels, which peak somewhere between 1 and 2 A.M. and then drop off rapidly. At the same time your cortisol (pick me up and go-go hormone) is rising. You want to take advantage of your hormonal peaks and valleys.

- Get regular exercise; this increases deep sleep.

- Get regular sunlight as this helps keep your sleep clock set, even on a cloudy day.
Sleep Deprivation Results In:

- Increased accidents at school/work, on the road and at home
- Impaired memory and concentration
- Increased fatigue and pain
- Poor digestion
- Elevated blood sugars
- Increased anxiety and irritability
Systematic Review and Meta-analysis of Adolescent Cognitive-Behavioral Sleep Interventions

Matthew J. Blake\textsuperscript{1} · Lisa B. Sheecer\textsuperscript{2} · George J. Youssef\textsuperscript{3,4} · Monika B. Raniti\textsuperscript{1} · Nicholas B. Allen\textsuperscript{1,5}

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• Teen/adolescent sleep insufficiency/ poor quality is an epidemic and vital health care problem

• Age group should be obtaining 8-10 per night

• Most report:
  – Insufficient sleep (especially on school nights)
  – Delayed sleep onset
  – The need for more sleep
  – Wake feeling unrefreshed

• 30-40% of US youth experience inadequate sleep

• 30% have a sleep disorder
  – Insomnia
  – Delayed Sleep Phase Disorder
“The Perfect Storm”...for young zombies

- Predisposition to cognitive-emotional hyperarousal
- Physiological Development
- Parental control over bedtime lessens
- Homework, friendships, employment, sports
- Electronic devices
Youth Sleep and Injury Risk

• Improving sleep duration in collegiate athletes shown to improve sport performance.
  – Increase in free throw percentage
  – Increase in serving accuracy
  – Increase sprint time

• Sleep deprivation may hinder reaction time, judgment, balance, coordination, proprioception, and cognition.
  – Sleep deprived youth more likely to get in bicycle accident, or accident injury at school or home.
  – Increased risk of illness susceptibility (4x increased risk of catching a cold with 6 or less hours of sleep)
Sleep & Concussion

• Adolescent athletes with <8hrs per night almost twice as likely to sustain a sport related injury than peers sleeping >8hrs.

• Poor sleep negatively impacts ImPACT test and increases symptom reporting post injury.
  – Confound RTP decisions, including to >21 days

• Obtaining 8 or more hours sleep the night before taking post-injury ImPACT may reduce likelihood that reported symptoms are secondary to sleep deprivation rather than post-concussive.
  – Milewski et al. (2014)
  – Silverberg et al. (2016)
  – Mihalik et al. (2013)
  – Kostyun et al. (2015)
  – McClure et al. (2014)
  – Murdaugh et al. (2018)
Sleep disturbances are common following all severities of TBI.

- Insomnia
- Hypersomnolence
- Delayed phase shift
- Sleep fragmentation (frequent awakenings)

The duration of daytime sleep mediates the relationship between the severity of brain injury and the recovery of cognition function.

- e.g., Chiu et al., 2013
Original Article

Relationship among subjective sleep complaints, headaches, and mood alterations following a mild traumatic brain injury

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b Division of Trauma Research, Department of Surgery, Hôpital du Sacré-Coeur de Montréal, Université de Montréal, 5400 Blvd Gouin West, Montreal, Que., Canada H4J 1C5
• Chart review of 443 patients who sustained mTBI

• Data were retrieved in 2 time courses: 10 days and 6 weeks.

• Headache highest rated symptom at both time points: 46.8% and 39.3%.

• Subjective sleep complaints are 3 times more likely to develop concomitant headaches in the first 6 weeks following an MTBI.
  – Also more likely to have depressive symptoms and irritability.
CONCUSSION – RETURN TO LEARN MEDICAL RELEASE

Return to Academics after Concussion

When students have symptoms after a concussion, they may need a gradual return to their pre-injury academic load. This progression can speed recovery and support the student’s return to a full academic load. Important things to remember:

- The stages are flexible based on the student’s tolerance to school activities.
- Depending on symptoms, a student may start at any step and remain at each step as long as needed.
- If symptoms worsen, the student should return to the previous step.
- Daily check-ins with the student regarding how they are tolerating school is recommended.
- Depending on symptoms, some students can begin limited physical activity early after injury.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Suggested Accommodations</th>
<th>Criteria for Progression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rest – Limited mental activity</td>
<td>Limited mental exertion (computer, texting, video games, or homework), no driving.</td>
<td>30 minutes of mental exertion without symptom exacerbation.</td>
</tr>
<tr>
<td>Part-time school with accommodations</td>
<td>Accommodations based on symptoms (e.g., shortened day/schedule, built-in breaks, no significant classroom or standardized testing).</td>
<td>Full day of school with accommodations.</td>
</tr>
<tr>
<td>Full-time school with accommodations</td>
<td>Accommodations based on symptoms (e.g., shortened day/schedule, built-in breaks, no significant classroom or standardized testing).</td>
<td>Handles all class periods in succession without symptom increase.</td>
</tr>
<tr>
<td>Full pre-injury academic load</td>
<td>Complete return to pre-injury status</td>
<td>N/A</td>
</tr>
</tbody>
</table>

For more information, including a detailed list of suggested accommodations, visit CBIRT.org.

If you have questions contact your School Nurse, Athletic Trainer, Counselor or staff at the Center on Brain Injury Research and Training (CBIRT) at 541.346.0593.
A concussion is a type of brain injury that changes the way the brain normally works. A concussion is most often caused by a direct blow to the head, but it can also result from body actions that snap the head forward or back, shaking the brain around in the skull hard enough to cause a brain injury, such as a whiplash injury. It is possible to sustain a concussion without being directly hit in the head. Children and adolescents are among those at greatest risk for concussion. A concussion is a brain injury and should be taken seriously.

A TBI can Result from:

- Falls
- Car wrecks
- Sports injuries
- Collisions with objects or other people
- Being shaken
- Any trauma to the head

Common Symptoms of TBI

<table>
<thead>
<tr>
<th>Cognitive/Communication</th>
<th>Emotional/Behavioral</th>
<th>Physical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeling dazed or in a fog - disorientation</td>
<td>Irritability</td>
<td>Dizziness</td>
</tr>
<tr>
<td>Confusion</td>
<td>Quick to anger</td>
<td>Weakness</td>
</tr>
<tr>
<td>Difficulty concentrating slowed information processing learning problems</td>
<td>Decreased motivation</td>
<td>Changes in balance</td>
</tr>
<tr>
<td>Difficulty with memory difficulty juggling multiple tasks</td>
<td>Anxiety</td>
<td>Headaches</td>
</tr>
<tr>
<td>Communicating in “socially unacceptable” ways</td>
<td>Depression</td>
<td>Changes in vision</td>
</tr>
<tr>
<td>Difficulty with concentration and attention</td>
<td>Social withdrawal</td>
<td>Changes in hearing</td>
</tr>
<tr>
<td></td>
<td>Does not get the “gist” of social interactions</td>
<td>Sleep disturbance</td>
</tr>
<tr>
<td></td>
<td>May comment on or react to things that seems random to others</td>
<td>Fatigue</td>
</tr>
</tbody>
</table>

Any variety of the symptoms listed above can have a negative impact on a student’s learning and school experience. Recovery may be delayed when students push through symptoms. Therefore, it is important to avoid stimuli that increase symptoms. We ask that you modify learning activities vs. postpone them. Remember, injuries are unique and what increases symptoms in one student may not in another.
Temporarily Accommodations Plan for Concussion

Student Name: ____________________________ Date of Evaluation: __________

After a concussion/mTBI, students who receive academic accommodations without penalty for missed work are more successful and better able to manage school demands. For most students, accommodations can be made without formal written plans such as a 504 or IEP. Students with symptoms lasting longer than three to four weeks may benefit from a more detailed assessment by a concussion specialist, who may recommend a 504 plan. If accommodations are needed longer than four months, the team should consider special education. These recommendations are based on the student’s current symptom level and tolerance to mental exertion. As the student improves or new learning needs emerge, these guidelines may be adjusted. This form is designed to outline a strategy to minimize symptoms and facilitate optimum recovery.
GENERAL RECOMMENDATIONS:

☐ No return to school until specified. To be re-evaluated on: _______________________

☐ Return to school with the following supports: ________________________________

☐ Adjust class schedule (i.e., every other day, shortened day, shortened classes, breaks)
  Shortened day: _________ hours/day or _________ classes/day or _________ days/week _________

☐ No physical education classes. However, the student can exercise for _________ minutes if there is no significant increase in symptoms. Walk, run, exercise bike, lift weights, other: ______________________

☐ Limit classes with “noisy environments” (i.e., band, choir, shop, drama, lunch).

☐ Reduce in-class work and homework (select most important or critical tasks and concepts only, consider maximum hours of nightly homework, limit number of problems, questions, or pages to read, offer alternative ways for student to demonstrate knowledge).

☐ Delay testing (standardized tests, midterms, finals, etc.) until student reaches “yellow” stage.

RECOMMENDATIONS FOR COGNITIVE ISSUES:

☐ Shorten, unweight grade and/or provide extended time to complete assignments.

☐ Shorten, unweight grade and/or provide extended time to take tests in a quiet environment (including across multiple class periods).  *Do not mark if student is deferred from test taking*

☐ Stagger tests, so the student only needs to prepare for one per day.  *Do not mark if student is deferred from test taking*

☐ Provide concise written instructions for homework.

☐ Provide class notes by teacher or peer (i.e., online notes, recording, teacher provides notes).
RECOMMENDATIONS FOR FATIGUE/PHYSICAL ISSUES:
- Allow time to visit the health room or school nurse for treatment of symptoms such as headache.
- Allow rest breaks during the day such as resting head down on desk or resting in health office.
- Allow “hall passing time” before or after the crowds have cleared.
- Allow student to wear sunglasses and/or hat or visor indoors to control for light sensitivity.
- Allow student to wear earplugs (not with music) to control for noise sensitivity.
- Provide quiet environment for lunch.

RECOMMENDATIONS FOR EMOTIONAL ISSUES:
- Share progress and difficulties with parents, nurse, teacher, counselor, doctor and/or athletic trainer.
- Develop an emotional support plan for the student; this may include an adult with whom he/she can talk, if feeling overwhelmed.

Family signed an information release for bi-directional communication with ____________________________

Signature: ____________________________ Date: ____________________________
Take Away

• Direct communication
• Get some sleep
• #Bekind
Thank You!