



WPI Health Services Policy on Management of Traumatic Brain Injury (TBI)

Definition: A *traumatic brain injury (TBI)* or *concussion* is defined as:

A concussion results from a rotational acceleration or deceleration injury to the head that causes an alteration of mental status or various other symptoms such as headache or dizziness.

Concussion is defined as a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces. Several common features . . . include:

1. Concussion may be caused by a direct blow to the head, face, neck or elsewhere on the body with an “impulsive” force transmitted to the head.
2. Concussion typically results in the rapid onset of short lived impairment of neurologic function that resolves spontaneously.
3. Concussion may result in neuropathological changes but the acute clinical symptoms largely reflect a functional disturbance rather than a structural injury.
4. Concussion results in a graded set of clinical syndromes that may or may not involve loss of consciousness. Resolution of the clinical symptoms typically follows a sequential course.
5. Concussion is typically associated with grossly normal structural neuroimaging studies.

For the practicing clinician, perhaps a more useful working definition is a trauma-induced alteration in mental status that may or may not involve LOC.

(Meehan III W, Bachur R. Sport-Related Concussion. *Pediatrics*. 2009; 123: 114-123)

The following are guidelines for the management of Concussion, TBI, at WPI Health Services.

1. The Health Services will provide evaluation to students with concerns for a concussion and it is expected that the student will be honest in reporting symptoms and disclose all factors that may contribute to the evaluation and recovery of the concussion.
2. Students participating in Varsity Sports at WPI with a presenting concussion will be evaluated by Health Services and be referred to the Sports Medicine Department for ongoing evaluation and management. A progress note from Health Services staff will be sent to Sports Medicine regarding the initial student athlete’s evaluation at Health Services.
3. The Health Services staff will perform an evaluation of a concussion focusing attention: (Appendix A)
 - a. Complete history on initial evaluation
 - b. Assessment of the student symptoms using a graded symptom tool
 - c. Postural-stability testing: Modified BESS
 - d. Perform a physical exam for presenting complaints including a neurological exam
 - e. The staff will assess for any warning signs or focal neurological signs that need immediate referral to the Emergency Department (Appendix B)
 - f. Educate the student: (Appendix C)
 - i. What is a concussion
 - ii. Warning signs to go to ER
 - iii. Second Impact Syndrome
 - iv. Cognitive and Physical Rest

- v. How to take care of yourself after a concussion
 - vi. Return to full cognitive abilities guidelines
 - vii. Return to play guidelines (Appendix D)
4. The staff at the Health Services will communicate by email to the Office of Recreation, Intramurals, and Club Sports of WPI when:
 - a. A student is advised not to participate in activities
 - b. The stage of return to play guidelines for the individual student
 - c. When the student is cleared to participate full competition
 - d. Advise disqualification guidelines of ongoing participation (Appendix E)
5. The staff at Health Services will offer and advise the student access to an elevator key for housing in:
The staff will notify Residence Life & Housing Office to initiate this service.
6. The staff at Health Services will contact Academic Advising if given permission by student to communicate the need for cognitive rest and the gradual return to cognitive activities. Cognitive accommodations will be suggested to the student. The student is responsible for the communication with their professors regarding cognitive rest, discussing accommodations needed during the recovery phase of the concussion, and developing a plan to meet academic requirements utilizing support from the Class Dean if needed.
7. The staff at Health Services will offer and advise use of the Academic Advising and for assistance, support and guidance with planning and strategies for studying.
8. The staff at Health Services will refer to Neurology if the symptoms are prolonged or complex. A complex concussion is when symptoms persist, the student has sustained multiple concussions, or the student suffers sequel such as convulsions, LOC > 1 min or prolonged cognitive impairment (Meehan III W, Bachur R. Sport-Related Concussion. *Pediatrics*. 2009; 123: 114-123) or other post-concussive conditions: insomnia, headaches, cognitive dysfunction, and balance problem.
They staff will refer to the ER if indicated.

Appendix A: Evaluation of Concussion, TBI

Initial Subjective Assessment

1. *Date of injury*
2. *Mechanism of injury*
3. *Participating recreational, intramural, club activity*
4. *Alcohol related ? MVA ? Fall ? Accidental?*
5. *LOC, duration of LOC, retrograde amnesia, antegrade amnesia*
6. *Recent medication use to treat symptoms*
7. *PMH of concussion*
 - a. *How many and what age and mechanism of injury*
 - b. *Length of symptoms for each*
 - c. *Neurological testing performed: IMPACT*
 - d. *Imaging testing performed: CT, MRI, XRAY*
8. *PMH: especially ADD or ADHD, Headache or Migraine, Anxiety or Depression, Seizure, Sleep Disturbances, Psychiatric Diagnosis*
9. *Current Medications, especially NSAID or anticoagulants*
10. *PSH*
11. *Age, sex, HAND DOMINANCE*
12. *Other injuries, especially cervical neck*

Initial and Follow-up Subjective Assessment

1. *How is this affecting your ability to do your school work*
2. *How is this affecting your emotional adjustment to not playing*
3. *Symptoms Evaluation: Rated none, mild:1-2, moderate:3-4,severe:5-6*
 - a. *Dizziness*
 - b. *Headache*
 - c. *Pressure in the head*
 - d. *Neck pain*
 - e. *Nausea or Vomiting*
 - f. *Visual problems: blurred or focus complaints*
 - g. *Confusion*
 - h. *Fatigue or low energy*
 - i. *Difficulty concentration*
 - j. *Difficulty remembering*
 - k. *Irritability*
 - l. *Balance problems*
 - m. *Sensitivity to light*
 - n. *Sensitivity to noise*
 - o. *ringing in the ear or hearing problem*
 - p. *Don't feel right*
 - q. *Feeling ding or dazed*
 - r. *Feeling slowed down*
 - s. *Feeling like in a fog*
 - t. *Drowsiness*
 - u. *More emotional*
 - v. *Sadness*
 - w. *Nervousness or anxiety*
 - x. *Trouble falling asleep*
 - y. *Sleeping more than usual*
 - z. *Sleeping less than usual*
 - aa. *Other:*

Initial and Follow – up Objective Assessment

1. *Mental status*
2. *Cognitive Immediate memory: 5 words repeat back any order*
3. *Cognitive Orientation: month, date, day, year, time*
4. *Concentration: repeat back string of 3,4,and 5 numbers backwards*
5. *Concentration: repeat months backwards December to January*
6. *Cognitive Delay memory: recall 5 words and repeat back any order*
7. *Observation and palpation of head injury*
8. *Observation and palpation of neck injury*
9. *Observation and evaluation of other injuries or complaints and physical exam as indicated including: HEENT, Lung, Heart, Abdominal, and Muscular-Skeletal*
10. *Cranial Nerve assessment: II – XII*
11. *Coordination: Finger to nose (5 successive in <4sec) : Heel to shin*
12. *Deep tendon reflexes*
13. *Motor Strength upper and lower extremities*
14. *Sensation to light touch to upper and lower extremities*
15. *Balance-Modified BESS: eyes closed 20 seconds count BESS Errors 1. Hands off iliac crest. 2. Open eyes. 3. Step, stumble, or fall 4. Lift forefoot or heel. 5. Remain out of position for > 5 seconds. Maximum Score 10 for each for total maximum 30.*
 - a. *Double Leg Stance: feet together, hands on hips, eyes closed*
 - b. *Single Leg Stance: on non-dominant foot, 30 degree hip flexion, 45 degree knee flexion, hands on hips*
 - c. *Tandem Stance: non-dominant foot in back, hands on hips*
16. *Physical examination to any systems, i.e. Eyes, ears, nose, mouth, lungs, cardiovascular, abdomen, musculoskeletal, nervous, vascular or skin, as needed.*

Appendix B: Warning Signs to go to Emergency Department

If you or another person notices

1. *Any symptoms that is getting worse and won't go away, such as headache, nausea, or sleepiness*
2. *Unusual changes in behavior*
3. *Increased, confusion, significant irritability, feeling unusually restless, disturbed or agitated*
4. *Nausea that does not go away*
5. *Severe headache or neck pain*
6. *Difference in size of pupils: one larger than other, bigger than normal pupils, or unreactive pupils*
7. *Weakness or numbness of arms and legs*
8. *Decreased Coordination*
9. *Trouble walking or slurred speech*
10. *Repeated Vomiting*
11. *Seizures or convulsions*
12. *Inability to recognize people or places*
13. *Drowsiness or inability to wake up*
14. *Loss of consciousness*
15. *Drainage of fluid from ears, excessive drainage from nose, periorbital ecchymosis: "Raccoon eyes", retroauricular ecchymosis: "Battle sign", blood behind the tympanic membrane with a blue to purple hue (signs of skull fracture)*

Appendix C: Head Injuries: Concussions (handout for students)

Head Injuries: Concussions

Head injuries are caused by a bump, blow, or jolt to the head suffered in an injury, assault, auto accident, fall, or sporting event that causes the brain to move quickly. A concussion is a type of Traumatic Brain Injury, (TBI). Many people have symptoms that fall into four areas:

Concussion: Signs and Symptoms

THINKING/REMEMBERING: difficulty concentrating thinking, concentration, remembering

PHYSICAL: headache, blurred vision, dizziness / balance problems, nausea, sensitivity to light /noise, fatigue

EMOTIONAL/MOOD: irritability, sadness, more emotional, nervous/anxious

SLEEP: sleeping more than usual, sleep less than usual, trouble falling asleep

These symptoms usually go away in a few weeks and require Cognitive and Physical Rest. Avoid any activity that may put you at risk for another head injury while you are recovering!

- The student should not be left alone. Ask a roommate, friend or RA to check on student for the first 24 hours following a head injury and educate them on the warning signs to observe for in first weeks:

If any of the following signs are noted - call Public Safety @ 5555 immediately

- Any symptom that is getting worse: headaches, nausea, or sleepiness.
- Unusual changes in behavior: confusion, inability to recognize people or places, increased irritability, feeling unusually restless, disturbed or agitated
- Nausea that doesn't go away or repeated vomiting
- Severe headache or neck pain
- Difference in the size of your pupils, one larger than the other, or bigger than normal pupils
- Trouble speaking or slurred speech
- Weakness or numbness in the arms or legs
- Decreased coordination or trouble walking
- Seizures or convulsions
- Drainage of fluid from the ears or nose or bruising around eyes and behind ears
- Drowsiness or inability to wake up
- Loss of consciousness

Concussion care

1. Inform a friend or roommate regarding your concussion and educate them on the warning sign that would require you to go to the Emergency Room by calling Public Safety @ 5555.
2. Avoid any activity that may put you at risk for a head injury
3. No alcohol use or substance use
4. Do not use medications that affect your cognition: Benadryl
5. Do not use medications that may affect ability to make a blood clot: Ibuprofen or Motrin or Aleve
6. Use Tylenol / Acetaminophen 325 mg 2 tablets every four hours with maximum of 6 doses day if directed by your healthcare provider and Use ice for areas of discomfort
7. Wear sunglasses for bright sunlight
8. Balance your socialization so that your stress is minimized
9. Return to Health Services for evaluation regularly until you are better

Second Impact Syndrome occurs after a person has had a concussion from which they are still symptomatic and then receive a second injury to the head. This second injury may be minor. Also, any injury that causes an accelerated force to the head, even by a blow to the chest or trunk, that causes an autoregulatory control of the brain to be disrupted. As a result there is increased pressure

in the brain results in rapid decompensation: the person becomes unresponsiveness with dilated pupils, has respiratory failure, and results in death.

COGNITIVE AND PHYSICAL REST

*The key to recovery is **RESTING** both **COGNITIVELY** and **PHYSICALLY** and **AVOIDING** any activity that could put you at risk for another head injury. Resting is usually for a few days. Cognitive rest is avoidance of mental challenges that would make your symptoms worse or reappear. The goal is to avoid exacerbating the symptoms of your concussion and thus possibly delaying the recovery. Each individual and their concussion are different and how they balance the demands on their brain varies. One must evaluate their symptoms and do what is needed for cognitive activity and physical activity, but must avoid exceeding the threshold that produces symptoms. Simple concussions resolve usually in 7 to 10 days.*

Cognitive Rest

1. No school for few days: your brain needs to heal. Consider rest at home.
2. Inform your Professors.
3. Visit the Class Dean.
4. No school work, but may read for pleasure. Ask a friend to take notes for you from class.
5. Minimize texting, screen time, word games, and video games that over stimulate brain.
6. Avoid stimulating, noisy, or crowded environments or assemblies.
7. Sleep and take naps (in a quiet dark room) and take breaks.
8. Call Health Services 508-831-5520 to use quiet area to rest: Mind Body Connection or Illness Room
9. Avoid stress: **ONLY DO THINGS THAT ARE RELAXING AND CREATE NO SYMPTOMS**

Physical Rest

1. No physical activity besides the daily required.
 2. No work. No extracurricular or volunteer activities.
 3. Eat small frequent meals and stay hydrated.
 4. Sleep and take naps.
 5. No sexual activity.
 6. No driving or bike riding or skateboarding.
 7. No excessive walking or climbing.
 8. No activities that elevate heart rate. No sports. No weightlifting, heavy lifting, or exercise bands.
- Health Service can assist you by putting these temporary services in place for you:**
9. Consider assistance ambulating on campus by contacting Campus Police Dispatcher 508-831-5433
 10. Consider access to an elevator key and contact Residence Life.
 11. Provide permission for Health Services to contact your Academic Advising.

Once you are symptom free: Return to full cognitive abilities

You can start returning to your normal cognitive abilities slowly once you have no symptoms. Discuss any concerns with your Class Dean and Professors. Go gradually back to your academic schedule. You may need some school modifications as you recover. Talk with your professors about your needs during your recovery and ask for help. Visit Academic Advising for an appointment for assistance, support, and guidance with planning and strategies for studying. Academic modifications suggested:

1. Sit up front so that you can see and hear better, ask your professor if seating is available.
2. Shorten your day – attend one class and evaluate your symptoms and gradually increase attendance to class.
3. Test your symptom threshold: for example do 15, 30, 45, 60 min to see how long you can sustain concentration without symptoms increasing. By timing yourself to see when symptoms reoccur, you can plan breaks to avoid symptoms. If symptoms return, this is a warning that you are doing too much and need to rest your brain.
4. Take breaks based on your symptom threshold. Re-evaluate your threshold as you recover.
5. Space out your work as you increase your cognitive stimulation.
6. Utilize new strategies for memory: repetition, write things down, use cues and break down information into smaller segments, and break down the task to shorter work loads.
7. Ask for an extension for your work or postpone your work if needed.
8. Ask for no timed testing, your brain needs extra time to think now while healing while you recover.
9. Ask if your work can be temporarily modified: shortened paper or reading or use of a calculator.
10. Asking for academic modifications and support is only temporary as your brain is healing.

Appendix D: Return to Sports Guidelines: Following a Concussion - General (handout for students)

**Return to Sports Guidelines
Following a Concussion - General**

Athlete Name: _____ Completed By: _____

Following a concussion, to ensure the athlete has fully recovered, a medically supervised 5 STEP Gradual Return to Play program must be successfully completed (symptom-free) before final clearance to return

Instructions: The Gradual Return to Play (RTP) program is initiated only when there is no doubt the athlete has had no symptoms at rest for at least one to two days. Below are the 5 progressive steps that the athlete must complete when cleared for gradual return to play. Start with Step 1. Wait at least 24 hours (or longer) in between each Step. Ask the athlete if any symptoms appeared over the past 24 hours. In the RTP Status Box, circle response, record date, and initials. If no symptoms are reported over the 24 hours, go to the next Step. If any symptoms return at any time during this program, stop working out. Rest until symptom-free for 24 hours. Then return to Step 1 and repeat the 5 Step sequence. If symptoms return or get worse, seek medical attention. All 5 Steps must be successfully completed (symptom-free), and FINAL WRITTEN MEDICAL CLEARANCE must be obtained before return to full competition.

Step 1: Light General Conditioning Exercises:

- NO CONTACT
- Begin with a sport specific warm up.
- Do a (15-20 minute) workout which can include: stationary bicycle, fast paced walking or light jog, rowing or freestyle swimming.

RTP Status

Step 1 Date: _____

Symptoms No Symptoms
(Circle one)

Initials: _____

Step 2: General Conditioning and Sport Specific Skill Work; Individually:

- NO CONTACT
- Continue with the sport specific warm-up.
- Slowly increase intensity and duration of workout (20-30 minutes).
- Begin skill work within the workout.
- Begin sport specific skill work within the workout, but no spins, dives, or jumps.

Step 2 Date: _____

Symptoms No Symptoms
(Circle one)

Initials: _____

STEP 3: General conditioning, skill work: individually and with a team-mate:

- NO CONTACT
- Continue with general conditioning (up to 60 minutes). Increase intensity and duration. Begin interval training.
- Continue with individual skill work.
- May begin skill work with a partner.
- May start beginner level spins, dives and jumps.

Step 3 Date: _____

Symptoms No Symptoms
(Circle one)

Initials: _____

STEP 4: General conditioning, skill work and team drills::

- NO CONTACT Do not play live scrimmages.
- Resume regular conditioning and duration of practice.
- Increase interval training and skill work as required.
- Gradually increase skill level of spins, dives and jumps.
- Review team plays with no contact.

Step 4 Date: _____

Symptoms No Symptoms
(Circle one)

Initials: _____

Step 5: Full Team Practice with Body Contact:

- Join team in a full practice with controlled body contact.
- If a full practice is completed with no symptoms, get Final Medical Clearance form signed. Give to the coach. You are ready to return to competition.

Step 5 Date: _____

Symptoms No Symptoms
(Circle one)

Initials: _____



Final Medical Clearance Instructions: For final medical clearance, send this completed form to your medical provider at the successful completion of the 5-step program.

Provider: _____
Phone: _____ Email: _____ Fax: _____

Appendix E: Guidelines for Student Athlete Disqualification

- On the day of concussive event
- Permanent disqualification should be discussed with the student-athlete, parents (if a minor), and physician after 3 or more concussions that resulted in a slow recovery.