



## 1. What is a concussion?

Through the years, a number of definitions of concussion have been proposed, often leading to confusion. The most recent *Consensus Statement on Concussion in Sport* uses the following definition:

Sport related concussion [SRC] is a traumatic brain injury induced by biomechanical forces. Several common features that may be utilised in clinically defining the nature of a concussive head injury include:

- ▶ SRC may be caused either by a direct blow to the head, face, neck or elsewhere on the body with an impulsive force transmitted to the head.
- ▶ SRC typically results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously. However, in some cases, signs and symptoms evolve over a number of minutes to hours.
- ▶ SRC may result in neuropathological changes, but the acute clinical signs and symptoms largely reflect a functional disturbance rather than a structural injury and, as such, no abnormality is seen on standard structural neuroimaging studies.
- ▶ SRC results in a range of clinical signs and symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive features typically follows a sequential course. However, in some cases symptoms may be prolonged.

The clinical signs and symptoms cannot be explained by drug, alcohol, or medication use, other injuries (such as cervical injuries, peripheral vestibular dysfunction, etc) or other comorbidities (eg, psychological factors or coexisting medical conditions). (McCroly et al., 2017: 839)

## 2. Do you have to lose consciousness to have a concussion?

Perhaps the most important misunderstanding made when trying to define a concussion is that people mistakenly believe concussion must involve a loss of consciousness (LOC). LOC is not required to make a diagnosis of concussion. In fact, **most concussions occur without LOC.**

LOC is just one symptom of concussion, and, in fact, recent research has suggested that a brief (less than one minute) LOC is not necessarily as significant an indicator of concussion severity as once thought. It is important to realize that many people will report a loss of consciousness because they cannot recall events before, during or after their concussion. Unless this is witnessed as a true loss of consciousness, it may be that the person is experiencing amnesia, which is an important post-concussive symptom.

It is also important to note that **concussion is not simply caused by a direct blow to the head.** Blows to the face and to the jaw (which result in a force being transmitted to the brain) are also



common causes of concussion. Even a significant blow elsewhere on the body (for example a hard tackle in football or rugby; being bodychecked in hockey) can cause concussive symptoms through a rapid movement of the soft brain inside the hard case of the skull.

In some head injuries, there may be structural injuries to the brain, such as intracranial bleeds which, if suspected, are critical to rule out early in the management of head injury. However, by definition, concussion does not result in any structural injury. Concussion, which is typically caused by a sports injury or fall, is instead a functional injury to the brain cells. One way to explain this is to imagine the brain as a computer. If a computer is visibly damaged, this would define a structural injury, and the computer would not work well. In a concussion, the computer has no visible damage but internally is not working well (e.g., processing information slower), the same as a concussion. Advanced research protocols might show MRI changes but these are not “routine” or “conventional”. Given the lack of structural injury, routine neuroimaging studies will likely be negative.

### 3. Who gets a concussion?

The majority of concussions that a family physician will see are sport- or recreational activity-related. Sports that involve contact or collision (hockey, soccer, rugby) are among the most common sports where concussion is seen. Other sports, such as basketball, also often involve contact and are therefore a higher concussion risk than non-contact activities. Concussions related to participation in sport and recreation are most common in youth.

However, since a concussion occurs due to the brain shuffling within the cranial cavity, a concussion can occur in virtually any activity, including non-sporting activity where a blow to the head, face or jaw, or other force to the head occurs. Common examples include motor vehicle crashes, injuries at work and falls at home or elsewhere

(particularly in older adults). You should ask about potential concussion when you have a patient who notes a history of a whiplash injury, or an injury around the neck and shoulder area. For example, someone who fell directly on the shoulder may report mainly shoulder pain at the time, but may also have post-concussive symptoms that are important to deal with.

### 4. What are the signs and symptoms?

Post-concussive symptoms can be physical, cognitive, emotional or sleep-related.

- **Physical symptoms the patient may describe include:** headache, dizziness, nausea, feeling unsteady, feeling “dinged” or “stunned” or “dazed”, feeling like their “bell was rung”, seeing stars or other visual disturbances, tinnitus, double vision, simply “not feeling right”.
- **Physical signs of concussion include:** loss of consciousness or impaired consciousness, poor coordination, balance or gait difficulties, easy distractibility and poor concentration, slowness answering questions and following directions, vomiting, looking “glassy eyed”, photophobia, slurred speech, personality or behaviour changes (including inappropriate playing behaviour such as skating or running in the wrong direction) and significantly decreased performance or playing ability.
- **Cognitive symptoms include:** confusion, amnesia, disorientation, poor concentration, and memory disturbance.
- **Emotional symptoms include:** feeling of depression, being nervous or anxious, and moodiness/irritability.
- **Sleep disturbance:** drowsiness, insomnia

**It is important to note that not all concussions will include all of these features.** If any one of the aforementioned symptoms (or other similar symptoms) is present, concussion should be

suspected. Keep in mind that signs and symptoms may be more pronounced later or within a short time after the injury.

## 5. What exactly causes the symptoms?

The pathology behind concussion and its resultant symptoms is still at the infancy stages of being understood. Injury to the neurons will result in ionic shifts resulting in a metabolic crisis. This interferes with cell-to-cell communication in the brain. However, there is no simple “test” which will give all the answers about diagnosis and resolution of the problem. This is obviously a significant limiting factor in our assessment and management. Therefore, it is critical to be aware of the multiple post-concussive signs and symptoms, and of appropriate management, which will be described further below.

## 6. How do I make a diagnosis? What about grading systems?

If any of the above signs or symptoms is noted in a setting of potential head injury (and don't forget that head injury can occur in association with neck, shoulder and upper body injuries), the diagnosis of concussion should be considered. If there are no other obvious reasons for the symptoms, then it should be firmly diagnosed as a concussion. A patient diagnosed with concussion should be seen for follow-up within 1-2 weeks after diagnosis.

A comprehensive medical assessment for a patient presenting with concussion-like symptoms includes a clinical history, physical examination, and evidence-based use of adjunctive tests if indicated. Conducting the medical assessment is discussed in more detail in question 8 below.

The [ACE](#) (Acute Concussion Evaluation) and [SCAT5](#) (Sports Concussion Assessment Tool 5) are currently the typical types of tools in concussion diagnosis and assessment. While the SCAT5 is

tailored to evaluating concussions within the sports setting, the ACE is more conducive to and typically used within an ED setting.

The SCAT5 has a scoring system that allows the patient to evaluate 22 symptoms and obtain a symptom severity scale. This is probably useful because it can be repeated on subsequent visits and serve as a measure of recovery. Scoring on the SCAT5 should not be used as a stand-alone method to diagnose concussion, measure recovery or make decisions about an athlete's readiness to return to training or competition after concussion.

Every concussion and diagnosis should be dealt with on a case by case basis. Currently, there is no evidence-based system for determining or classifying the severity of a concussion. Thus, the **use of grading systems, while convenient, is discouraged due to lack of scientific evidence.**

## 7. I'm at the rink or the field and I suspect someone has sustained a concussion. How do I deal with this?

As with any injury, it is critical to assess airway, breathing and circulation first. If the player is unconscious, it is critical to understand that a spine injury could have occurred and the athlete must be dealt with accordingly, using full spine precautions and management techniques, and rapid transport to hospital by ambulance. If the player is conscious, but clearly confused and unable to provide a reasonable history (such as noting neck pain, feeling an extremity, etc.), then it is better to err on the side of caution and also treat this as a potential spine injury.

More typically, the player will exhibit symptoms and signs as discussed in question 3 above. It is critical to understand that the symptoms may not seem that significant initially, but may continue to evolve and become more severe with time. Thus, any player that you suspect to have had a concussion

should be removed from the game or practice and not allowed to return the same day. No medication should be given, and the signs and symptoms should be monitored for increasing severity.

Signs of a structural brain injury could include: increasingly severe headaches, decreasing level of consciousness, increasing tiredness and confusion, any lateralizing weakness, seizure temporally remote from the injury, or persistent vomiting.

**Anyone with these symptoms needs immediate emergency assessment.**

If you, as a physician, are dealing with a concussion at the rink or the field, it is important to do only what you feel comfortable within your level of expertise. If you have extensive experience dealing with concussion, the player may not need further medical assessment. If not, the player should be referred for further assessment, whether in the emergency department acutely, or to another physician with more concussion expertise as soon as possible. All concussed individuals should be seen by a physician.

In many cases, you may be asked to discuss concussion assessment and management with parents, coaches, and trainers. The previously mentioned principles apply. When a potentially concussed athlete is being assessed by a non-physician, it is important that the athlete be assessed by a physician as soon as possible after the injury.

Here are some of the critical considerations of a sideline assessment:

- The player should be evaluated by a physician or other licensed healthcare professional<sup>1</sup> onsite using standard emergency management principles and particular attention should be given to excluding a spine injury.

- The appropriate disposition of the player must be determined by the treating healthcare provider in a timely manner. If no healthcare provider is available the player should be safely removed from practice or play and urgent referral to a physician arranged.
- Once the first aid issues are addressed, an assessment of the concussive injury should be made using the ACE, SCAT5, Child SCAT5 or other sideline assessment tools.
- The player should not be left alone following the injury and serial monitoring for deterioration is essential over the initial few hours following injury.
- A player with suspected concussion should not be allowed to return to play (game or practice) on the day of injury.

## 8. A concussed athlete comes into my office for assessment. How do I do this?

An individual clinical assessment must include:

- A medical assessment including a comprehensive history and detailed neurological examination including a thorough assessment of mental status, cognitive functioning, gait and balance.
- A determination of the clinical status of the patient including whether there has been improvement or deterioration since the time of injury. This may involve seeking additional information from parents, coaches, teammates and eyewitnesses to the injury.
- A determination of the need for adjunctive tests, especially emergent neuroimaging to exclude a more severe brain injury involving a structural abnormality.

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<sup>1</sup>A licensed healthcare professional is a healthcare provider who is licensed by a professional regulatory body to provide concussion-related healthcare services that fall within their licensed scope of practice. Examples include medical doctors, nurses, physiotherapists, and athletic therapists.

### Clinical History

A thorough clinical history and physical examination are the key to diagnosis and management. The clinical history captures information that may point to features that may place patients at an elevated risk of developing prolonged symptoms, such as:

- Age and gender (female)
- Loss of consciousness or post-traumatic amnesia
- Previous concussion or TBI
- History of ADHD, learning disability, or migraine
- Higher severity of self-reported concussion symptoms in the first day post-injury.

It is most helpful if the concussed athlete comes to the office with a friend, parent or other person who can provide some of the history that may be difficult for the concussed person to remember. Start by asking about the injury: What happened? Was there a loss of consciousness, and if so for how long? (A more prolonged loss of consciousness is significant). Is there any amnesia for the event? What are the symptoms? What is the clinical course of the symptoms (improving, worsening)?

It is also extremely important to ask about a past history of concussions, and to get specific details regarding these. It has been found that there may be an increased risk of sustaining subsequent concussive injuries after a first concussion. Thus, the athlete with multiple concussions may be at significantly more risk. The athlete who is becoming concussed more and more easily, and frequently, with more severe and longer lasting symptoms, is of significant concern. When asking about previous concussions it is important to not just ask about documented concussions, but about any episodes where the person had any post-concussive symptoms. Many will not make the connection between the symptoms and the fact that they may have been concussed. For example “having your bell rung” or “seeing stars” are often not perceived as a concussion by many, but are in fact consistent with post-concussive symptoms even if only transient.

### Physical Examination

Following the history, a focused physical examination should be performed and include these components:

- Scalp/basal skull fracture assessment
- Neurological exam
- Cervical spine exam
- Any other exams identified during the clinical history

Examine the patient’s head, neck (it is very common in the setting of a blow to the head or the face that neck pain can result, and can contribute to symptoms such as headaches), eyes, ear, nose and throat. Watch for signs of basal skull fracture, such as cerebrospinal fluid leakage from the nose or ears, blood behind the eardrum, and bruising behind the ears or around the eyes (“raccoon eyes”); these may indicate a more severe intracranial injury.

A full neurological exam is important to rule out structural injury or other neurologic causes of symptoms. In addition, an assessment of cervical spine range of motion and central and paraspinal tenderness should be performed. Coordination, gait and balance testing should be included.

In addition to physical tests, cognitive tests must be done. The standard mini mental status exam is not adequate. Tests of orientation, memory and concentration should be performed.

Tests of orientation are usually more useful right after the injury, and can include: Who are you playing? Where are we now? What is the score? Memory testing can be done by giving the patient five words to remember, and asking them to repeat them right away (immediate memory) and five minutes later (short term memory). Concentration tests include reciting the months of the year backwards, and reciting strings of digits backwards. Serial subtraction tests such as “Serial 7’s” are often poorly performed even by non-concussed people, so are no longer used in assessment.

It may be hard to tell whether or not an impairment exists in cases with very mild symptoms. However, if the athlete is obviously significantly impaired in memory and concentration relevant to their age or academic standing, then these tests will bring this out fairly clearly. Their performance in the test can also be used to track improvement as they are reassessed.

Depending on the clinical scenario, additional testing might be indicated, particularly in patients presenting with dizziness, vertigo, and/or visual disturbance, or presenting following a syncopal episode.

### Adjunctive Tests

Depending on clinical presentation, the evidence-based use of adjunctive tests may be considered. These tests might include neuroimaging, cervical spine imaging, neuropsychological testing, EEG, automated visual field testing or blood work.

If and when following a neuropsychological (NP) approach to diagnosis, it is important to remember that a NP assessment may be useful in overall assessment but:

- It should NOT be the sole basis of management decisions, but an aid to clinical decision-making.
- It often includes computerized NP screening tools as part of clinical neurological assessment by treating physician.
- Interpretation should be performed by a trained, registered neuropsychologist.
- May be helpful in guiding management in patients with cognitive deficits.
- Baseline testing with or without computerized methods is not mandatory and widespread use in children and youth is not recommended.

## 9. Do I need to order any imaging?

As noted previously, concussion is a functional injury not a structural injury, and thus, imaging studies will not be useful. Use clinical decision-making rules, such as the Canadian CT Head Rule, where applicable to avoid unnecessary exposure of patients to radiation and use of valuable resources.

**If there is any suspicion of a structural injury**, such as a bleed (for example increasingly severe headaches), then imaging with a CT, or MRI in select circumstances, may be indicated. If there is any concern about associated injuries, such as facial fractures, injuries to the neck, etc, then appropriate imaging should be ordered. Alternative imaging technologies are still at early stage of development in concussion and not recommended other than in a research setting.

## 10. How can I manage this player? What sort of treatment options do I have?

This is certainly where things appear to get tough. However, by following a few simple management guidelines, you can successfully, and safely, guide the injured athlete or other concussed person through the post-concussive phase and reintroduce them to activity.<sup>2</sup>

As was previously discussed, when a player shows any signs or symptoms of concussion, they should not be allowed to return to play the same day. They should not be left alone and regular monitoring for deterioration is essential given that symptoms can progress.

Concussion management begins with physical and cognitive rest until symptoms improve, or two days

<sup>2</sup> The Ontario Neurotrauma Foundation addresses the full spectrum of management within its *Guideline for Concussion/Mild Traumatic Brain Injury & Persistent Symptoms: 3rd Edition*.

maximum of rest. While rest in the first 24–48 hours following a concussion may be beneficial, prolonged rest has not been found to improve concussion recovery, and may even delay recovery.

Effectively communicating what physical and cognitive rest entails to the patient is very important.

- **Physical rest** includes no: exercise, weight training or heavy lifting, sports, activities requiring exertion
- **Cognitive rest** includes limiting activities requiring focus, concentration, memorization or multi-tasking, such as: school work, texting, video games, computer use, driving.

After an initial period of rest, resuming light daily activities with regular sleeping habits is important. A gradual return to more demanding cognitive and physical activities will follow. Resuming cognitive and physical activities too quickly can increase post-concussion symptom severity and prolong the recovery period. If their symptoms are worsened, they should reduce their level of activity.

No individual should return to full participation in sport until they have been medically cleared to do so.

### Symptom Management

Headache is the most common symptom of concussion, and often the most distressing to patients. The treatment of headaches should be individualized and tailored to the clinical features and patient preferences, and may include:

- Identifying and mitigating triggers for headache.
- Non-pharmacologic interventions focused on healthy lifestyle including nutrition, hydration, and sleep.
- Pharmacologic interventions as appropriate (e.g. limited use of acute headache medications such as NSAIDs or Acetaminophen)

Detailed [clinical practice guidelines](#) are available for symptom management.

The majority of patients will recover without specialized concussion care. If a patient's symptoms are persistent, consider referral to medically-supervised multidisciplinary care.

### Critical Points of Advice for the Patient

Key information about concussion and its management should be explained to the patient and provided in an [information sheet](#). Here is important information to include:

- what a concussion is, the signs and symptoms
- when to go to an emergency department, for initial assessment or if symptoms worsen
- expectations for recovery
- strategies to manage their symptoms
- the risks of returning to sport without medical clearance
- recommendations regarding a gradual return to school and sport activities.
- where to find additional resources
- the importance of not sustaining another concussion

## Warning signs to watch for

Concussed patient must be advised that problems could arise over the first 24 – 48 hours. The athlete should not be left alone and must go to a hospital at once if they:

- Have a headache that gets worse
- Are very drowsy or can't be awakened
- Can't recognize people or places
- Have repeated vomiting
- Behave unusually or seem confused; are very irritable
- Have seizures (arms and legs jerk uncontrollably)
- Have weak or numb arms or legs
- Are unsteady on their feet
- Have slurred speech

Clinicians are encouraged to work carefully with the patient to create a well-paced return to school/work, return to sport, and return to life treatment plan that includes reassurance, positive expectations of recovery, reasonable and gradual re-introduction to activity and consideration of other physical and psychosocial factors that may affect outcome (Moser et al., 2014).

## 11. When should I provide clearance to return to play if I am asked to do so?

A graduated increase in activities should be undertaken. The lack of this graduated, step-wise increase is a chief cause of very prolonged post-concussive courses in many. One way to explain it to your patients is that it is a series of single steps forward. If symptoms return at any step, the patient simply takes one step back, rather than two or three steps forward, then six steps back.

**Note that Return-to-School must come before full Return-to-Sport.** [This Return-to-School Strategy](#) details the stages of the recovery process for a concussed student. The principles of this strategy can also be applied to adults for a gradual return to cognitive activities and the workplace.

A typical graduated return to sport or physical activity strategy is described below. Note that each level is a stage, not a day. It may take more than one day to proceed between each stage. However, each stage should take a minimum of 24 hours.

1. Daily activities that do not provoke symptoms, such as moving around the home and simple chores.
2. Light aerobic exercise such as walking or stationary cycling at a slow to medium pace. No heavy lifting or resistance training (e.g., bodyweight exercises, weight training).
3. Individual physical activity with no risk of contact, such as going for longer walks or shooting a basketball. No resistance training.

4. Practice or training drills with no contact. Add in longer and more challenging physical activity. Start to add in resistance training if appropriate.

**Medical clearance from a physician is required before moving on to Stages 5 and 6.**

5. Participate in practice with body contact, if involved in a contact sport.
6. Full participation in game play or competition.

The key to this approach is that the patient should only continue to the next level if symptoms are not exacerbated by activity at the current level. If any symptoms worsen or reappear, then they should drop back to the previous stage and then try to progress again after a day or so.

As you can appreciate, this strategy means that it will take a minimum of one week before an athlete can return to full participation. However, it is critical to note that the athlete may not be able to progress from one step to another on a daily basis. So, when asked “How long will I be out?” by the athlete, parent or coach, it is clear that it is impossible to give a specific answer.

**There is no perfect test to confirm physiological recovery, but patients should be considered clinically recovered when they are:**

- asymptomatic at rest (or at pre-injury state in patients with pre-existing conditions);
- tolerating full-time school or work without symptoms;
- tolerating full non-contact practices without symptoms (in athletes); and,
- have a normal neurological examination.

Always remember, a patient should never return to activities that worsen symptoms! They should definitely not return to play on the same day as their injury, even if they show no signs of a concussion. And, **“when in doubt, sit them out!”**



## 12. What about somebody who has had multiple concussions? When should I be telling them it is not a good idea to return to contact or collision sports?

This is always a very difficult question to deal with, as we still do not completely know the pathophysiology behind concussion. It has certainly been observed that once a person has had one concussion, they have an increased risk of subsequent concussive injuries. However, there are multiple factors that come into play, including possibly genetics. Thus, it is not possible to give a “cookie cutter” type answer to this. If you have an athlete who has had numerous concussions especially within a short period of time such as a few weeks or months, it is wise to be very careful, and to seek further opinion from a physician with expertise in dealing with concussion.

Three concerning scenarios are when:

1. an athlete has had numerous concussions, with each concussion seemingly more easily sustained, and with symptoms which are more severe and longer-lasting;
2. an athlete has residual neurocognitive problems after other symptoms have all resolved (e.g., memory or concentration impairment); and,
3. an athlete has protracted, prolonged symptoms.

These are people potentially at risk for significant long-term problems and would best be advised to give up any contact or collision activities which put them at risk. However, it would be best to involve the advice of a concussion expert in this regard where possible.

## 13. Are children managed differently?

The evaluation and management recommendations in the *Consensus Statement on Concussion in Sport*, and contained here, can be applied to children and adolescents 12 years and older. However, with children, it is extremely important to be conservative, and always err on the side of caution as they may take longer to recover than adults. While typical recovery time for adults is up to two weeks, youth under 18 typically recover within four weeks.

Validated, age-appropriate tools should be used where available. The [Child SCAT5](#) is a version of the SCAT5 that can be used in children aged from 5 to 12 years. [PECARN](#), the Pediatric Head CT Rule, is an example of a clinical decision-making tool for paediatric head injury patients.

The concept of “cognitive exertion” is very important in children; activities like school attendance, computer or mobile device use, and video games may exacerbate concussion symptoms. Thus, cognitive rest is important, followed by the gradual re-introduction of activities.

Students often find that going to school makes their symptoms worse, so may need to stay home until they feel better. They should then start back to school part-time (e.g., half days), progressing to full time as their symptoms decline. This can often be frustrating for the student, their parents and teachers, as it is impossible to state specifically how long they will need to be at a reduced level of learning. When a student returns to school after a concussion, they may require accommodations to their workload and/or learning environment to help them get back to full school participation. It is important for teachers, parents, students, and healthcare providers to communicate.

## 14. Is there anything I can do to try to prevent a concussion?

Absolutely! Protective equipment use is often highlighted in relation to head injury prevention, but it is not the only prevention strategy. A physician is in an excellent position to educate and encourage patients, parents, and coaches on ways to reduce the risk of concussion and to recognize the injury if it does occur. Recognition of the injury is of primary importance, since appropriate management is critical to the patient's outcome and can begin only when concussion is recognized.

Nonetheless, it is important to ask about protective equipment when assessing a patient for concussion. Although helmets provide excellent protection against injuries such as fractures and lacerations, they cannot effectively prevent all concussions. **There is no such thing as a concussion-proof helmet.** It is important to try to determine if the helmet is in good condition, and whether it is being worn properly. If you are unsure about this yourself, try to consult someone in your community who may be more expert in this regard (a sporting good manufacturer, hockey trainer, etc.). A helmet that is not worn properly or done up properly may not protect the head. In addition, any helmet that has sustained structural damage will also not protect the head. Helmet liners, whether made of foam, or polystyrene, will deteriorate with time, even though they may look normal. Perfumes, shampoos, and hair gels will contribute to this. There is no definite consensus, but it is often felt that hockey helmets, for example, should be replaced every year or two in someone who plays on a regular basis. Other helmets may come with replacement recommendations from the manufacturer. Helmets should be encouraged in other sports such as skiing, snowboarding, inline skating and cycling. Newer types of head gear are now being seen in soccer.

Mouthguards are a controversial area. To date, there is no good scientific evidence that a mouthguard will definitely reduce the risk of concussion. But, theoretically, it is very possible that it will, when a blow comes to the jaw area. Scientific evidence is clear that mouthguards will help to prevent against dental injury, so should be worn for this reason in many sports anyway.

While there is no evidence, strengthening of the neck muscles may one day prove to be useful in reducing concussion risk as well, particularly in sports where significant collisions occur, and with heading in soccer.

Discussing the concepts of fair and clean play with your patient, as well as encouraging them to improve playing style and technique (for example learning how to go into the boards appropriately in hockey) are also very important. Advocating for enforcement of rules and rule changes to make games safer is also very important and the physician plays a significant role in this regard as a community expert. Try to be aware of educational resources available. Parachute may be able to connect you to local community groups for this purpose.

## 15. What does the future hold? Is there research going on?

There are still significant gaps in our knowledge about concussion. Extensive research is going on throughout the world to try to answer some of these very important questions. Key future research is on acute management, biomarkers and diagnostic modalities, imaging techniques, and concussion evaluation in complex cases.

It is our hope that the answers to the above questions will help to make physicians more comfortable and confident in dealing with concussion.

## Summary

Here are the key points to remember:

1. Concussion is a functional injury to the brain. You do not have to be knocked out to have sustained a concussion.
2. Concussions do not appear on standard imaging tests.
3. It is always unsafe to risk sustaining another head injury while still recovering from a current one, thus “When in doubt, sit them out”.
4. Concussion management begins with injury recognition and initial rest, after which a gradual, step-wise return to activities should be followed.
5. It is important to provide patients with information about their injury and management strategies.
6. If you are not sure, seek the help of a physician with concussion expertise where possible.
7. Prevention is critical.

## Training

### CATT Medical Professionals

<https://cattonline.com/medical-professional-course/>

The Concussion Awareness Training Tool for Medical Professionals is a free, accredited online course designed to help you:

- effectively assess a patient’s concussion situation within the initial hours post-injury;
- optimally manage concussion care during the first 2-4 weeks post-injury in order to decrease long term effects including management of symptoms, return to school and play activities, etc.; and,
- identify when referral to specialty care is required.

CATT is accredited for Section 3 credits with the Maintenance of Certification (MOC) program through the Royal College of Physicians and Surgeons of Canada.

## Additional Resources

### Parachute: Concussion Resources for Health Professionals

<http://www.parachutecanada.org/injury-topics/item/concussion-resources-for-health-professionals>

### Guideline for Concussion/Mild Traumatic Brain Injury & Persistent Symptoms: 3rd Edition

<https://braininjuryguidelines.org/concussion>

### Return-to-School Strategy

<http://www.parachutecanada.org/downloads/resources/Concussion-ReturnToLearn.pdf>

### Return-to-Sport Strategy

<http://www.parachutecanada.org/downloads/resources/Concussion-ReturnToSport.pdf>

### Canadian Guideline on Concussion in Sport

<http://www.parachutecanada.org/guideline>

### Concussion: Baseline Testing

<http://www.parachutecanada.org/downloads/injurytopics/BaselineTesting-FactSheet-Parachute.pdf>