

Become the Concussion Expert in Your Community: What You Need to Know [Part 1] Todd Turnbull, DC

I was coaching my high school snowboard team in a halfpipe competition when I saw a competitor from another team crash. He fell face down hitting his head on the snow. He stood up and immediately fell backwards. He stood up a second time trying to finish his run, and fell forward with no control over his balance. I was standing 400 feet away from him at the top of the halfpipe, talking to him in my mind, telling him to just lay still and wait for ski patrol. Thankfully he complied.

As a high school snowboard coach in the state of Oregon I am required by law to have concussion training annually as are all high school coaches in Oregon. “As of Dec. 21, 2012, 43 states and Washington, D.C., have passed laws protecting student-athletes from returning to play too soon after suffering the effects of a concussion.”[1] Online concussion certification is available to coaches and physicians on numerous websites and most of them are free of charge, including <http://www.nfhslearn.com> and <http://www.knowconcussion.org>.

“The diagnosis of acute concussion usually involves the assessment of a range of domains including clinical symptoms, physical signs, behavior, balance, sleep and cognition. Furthermore, a detailed concussion history is an important part of the evaluation both in the injured athlete and when conducting a pre-participation examination.”[2] Findings in only one clinical domain are enough to confirm the suspected diagnosis of concussion according to the findings at the Zurich Conference on concussions in sports. [2]

Concussion without loss of consciousness {850.0} and concussion with loss of consciousness {850.1} are the commonly used codes for acute concussions. Post-concussion syndrome {310.2} coding is used when symptoms persist for more than 7 days after the incident.

There are online training programs and clinical exam forms available to health care providers that assist in diagnosing concussions. The U. S. Centers for Disease Control and Prevention has developed the “Heads Up: Brain Injury in Your Practice” tool kit.[3] The kit includes a diagnosis and management booklet for mild traumatic brain injury (mTBI); the Acute Concussion Evaluation (ACE) form; an on-field palm card for medical staff and additional mTBI resources. They also have an online training course for coaches. There is no charge for the materials or training.

The ACE form scores the patient’s physical, cognitive and emotional status, includes injury history, risk factors for recovery, red flag warnings and follow-up action plans. It also includes the diagnosis codes for easy reference. The symptom check list uses a rating scale of 0-22 and gives a single point for each finding in the physical, emotional, cognitive and sleep symptoms. Follow-up testing of patients using the ACE form can document patient progress and help with management of return to activity planning. The form can be downloaded from their website at www.cdc.gov/concussion/headsup/pdf/ACE-a.pdf.

The on-field palm card for medical staff provides information for recognition and management of concussions. It has questions to help evaluate mental awareness and status, symptoms list, and sidelines management recommendations for returning athletes to participation. Repeated evaluation is recommended to be performed regularly (eg. every 5 minutes) to ensure symptoms

Become the Concussion Expert in Your Community: What You Need to Know [Part 1]

Todd Turnbull, DC

do not worsen. Off-field management suggestions include parental/caregiver notification, restriction from physical exertion and operating a motor vehicle, potential behavioral changes and follow-up medical and neuropsychological testing.[3]

In situations where you don't have an on-field reference guide and someone requires evaluation for potential concussion remember the mnemonic (BASE). I developed this to help remind me of the important signs and symptoms that need evaluated on-field:

Balance - always test one foot balance with eyes closed

Awareness - mental state, awareness of name/time/day/date/location/friends/competition

Symptoms - headache/nausea/dizziness/numbness/tingling

Eyes - pupil size/nystagmus/visual changes/sensitive to light

This is not as good as having a reference guide to follow but will help in emergency situations to cover many concussion signs until further evaluation can be performed.

Concussion evaluation in the doctor's office should include a comprehensive history, detailed neurological examination including gait and balance, progression/regression since the injury and determination of the need for neuroimaging.[2]

One of the signs of concussion is poor balance. The Balance Error Scoring System (BESS) is an objective exam used to determine neurological deficits associated with concussions. It consists of 3 tests lasting 20 seconds each, performed on two different surfaces, firm and foam:

- The athlete first stands with the feet narrowly together, the hands on the hips, and the eyes closed (double leg stance). The athlete holds this stance for 20 seconds while the number of balance errors (opening the eyes, hands coming off hips, a step, stumble or fall, moving the hips more than 30 degrees, lifting the forefoot or heel, or remaining out of testing position for more than 5 seconds) are recorded.
- The test is then repeated with a single-leg stance using the non-dominant foot, and
- A third time using a heel-toe stance with the non-dominant foot in the rear (tandem stance).

All three tests are performed on a firm surface, and again on a piece of medium-density foam. The test is scored by counting the errors, or deviations from the proper stance, accumulated by the subject.[4] The BESS protocol is also useful as an objective tool for monitoring patient progress. It can be downloaded for free from <http://www.sportsconcussion.com/links/concussion-management.htm>.

Neuroimaging studies may be necessary when the patient exhibits ongoing signs and symptoms. "Because computer tomography (CT) images are normal for most mTBI patients, little or no physical brain injury may be presumed; however, the magnetic resonance imaging (MRI) technique of diffusion tensor imaging (DTI) can now detect microscopic brain white matter tract lesions. These lesions are likely to be responsible for the postconcussive symptoms and may explain chronic difficulties experienced by some patients."[5]

The red flags section of the ACE form notes conditions that demand immediate referral to an emergency department. These include worsening headaches, seizures, repeated vomiting, changes in state of consciousness and other neurological deficits.

In my office all athletes and motor vehicle accident patients are evaluated for concussions. The majority of accident victim's heads experience hyper-flexion and hyper-extension along with a

Become the Concussion Expert in Your Community: What You Need to Know [Part 1]

Todd Turnbull, DC

direct impact into the headrest. Utilization of the ACE form makes diagnosing concussions much clearer for clinicians and is a great documentation tool for managing patient outcomes.

Diagnosing concussions can sometimes be elusive. There are many unknown factors regarding mTBI. Obtaining training and using readily available guides will assist the physician in making more accurate diagnoses. Documenting concussion signs and symptoms comprehensively will aid in monitoring the patient's recovery from concussion.

1. <http://usafootball.com/news/featured-articles/see-where-your-state-stands-concussion-law>. Retrieved 2013-03-25
2. McCrory, Meeuwisse, Johnston, Dvorak, Aubry, Molloy, Cantu. Consensus statement on concussion in sport – The 3rd International Conference on concussion in sport, held in Zurich, November 2008, *Journal of Clinical Neuroscience* 16 (2009) 755–763.
3. http://www.cdc.gov/concussion/HeadsUp/physicians_tool_kit.html, Retrieved 2013-03-25
4. <http://www.momsteam.com/health-safety/BESS-balance-error-scoring-system-assessing-balance-in-concussion+assessment#ixzz2OZgbNH81>. Retrieved 2013-03-25
5. Jun Maruta, Stephanie W. Lee, Emily F. Jacobs, and Jamshid Ghajar. A unified science of concussion. *Ann N Y Acad Sci.* 2010 October; 1208(1): 58–66.