Concussions In School Age Children: The Essentials

Hirsch Handmaker, M.D.

Respectfully Presented to:
2015 Pima County Public Health in Schools Conference

June 30th, 2015
On November 1st, 2010, Sports Illustrated awakened the world to the issue of sports-related concussions.
Since that time, daily headlines and newscasts tell of the complications that can arise from repeat mild Traumatic Brain Injury, or mTBI, as concussions are referred to in the medical world.
While the topic of the effects of concussions on current and former professional athletes gain most of the media's attention, the frequency and side effects of premature Return to Play decisions are even more serious in the most vulnerable population, young athletes from 6-14 years of age – the incompletely myelinated brain.
“If I could tell youth athletes one thing, it would be to take care of your health. If you’re suspected of having a concussion, don’t go back into the game, no matter how you feel when the adrenaline is flowing. It makes me feel proud when I hear about Lystedt Laws being passed in other states. Sharing my story is important—I don’t want anyone else to live through what I’ve had to live through every day. I take it one day at a time and feel better most days. I’m motivated by the friends and family who believe in me.”

- ZACKERY LYSTEDT
DEFINITION OF CONCUSSION

- A complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces including:
  - Direct blow to body or head
  - Rapid onset of short lived impairment of neurological function that usually resolves spontaneously
  - Traditional imaging (CT and MRI 1.5T)
    - usually normal
  - May or may not involve Loss of Consciousness (LOC)*
The Problem

- **1.6 - 3.8 million** sports and recreational related concussions per year
- **Players:** 34% with 1 concussion, 20% with multiple concussions
- **Individual Risk:** 19% per year of play in contact sports
- 1 concussion per team per 3 games
Perhaps the most difficult decision that must be made by Team Physicians, coaches, managers, parents, Certified Athletic Trainers (ATCs) and the athletes themselves is when it is safe and prudent to *Return to Play (RTP)*.
The commonly accepted methods for determining whether an athlete of any age has suffered a concussion during practice or in a game include...

A Physical Examination, with special attention to neurological signs and symptoms
Computerized Neurocognitive Testing

ImPACT: A computer-based neurocognitive test - preseason “Baseline” for comparison after a concussion occurs and to follow the results of treatment and confirmation of recovery
Neurocognitive (ImPACT) Testing

- Traditionally administered on Days 2, 5, 7, and 10 following mTBI
- Results compared to *baseline* testing
- College/Professional recovery curves indicate about 5 days on average
- High School recovery curves about 7-8 days
Individual Recovery From Sports MTBI: How Long Does it Take?

N=134 High School Male Football Athletes

Collins et al., 2006, Neurosurgery

All Athletes  Blue  No Previous Concussions  Green  1 or More Previous Concussions
Balance Testing
Contemporary Eye Movement detection devices combine the latest in electronic and computer technology to evaluate the three critical eye movements which have been reported to become abnormal immediately after concussions.
The Concussion Puzzle

- Physical Examination
- Balance Testing
- Eye Movement Assessment
- Neurocognitive Testing
Return To Play Guidelines

• Asymptomatic at rest
• Asymptomatic with exertion
• Neurocognitive Testing at or above baseline
• Resolution of vestibular dysfunction
• Normal CT/MRI if done
Multiple Concussions

Following the first episode of an mTBI, an athlete is 4X more likely to experience another mTBI and 3X more likely to experience an mTBI in the same season.
Second Impact Syndrome

- Occurs in athletes or patients with a prior concussion and then a relatively minor second impact
  - Can occur up to 14 days post-injury
  - Athlete returns to risky situation/competition before symptoms have resolved
- Catastrophic increase in intracranial pressure
  - Massive swelling, herniation and death
- Most often occurs in athletes < 21 years old
  - Developing (unmyelinated) brain at higher risk
YOUTH CONCUSSION STATISTICS

• Traumatic Brain Injury (TBI) is the leading cause of death and disability for America’s youth
• Concussions are one of the most common injuries in many amateur and professional sports
• Approximately 3.8 Million sports and recreation-related concussions occur in the US each year (figure only includes athletes who lost consciousness)
• Likelihood of a contact sport athlete experiencing a concussion may be as high as 19% per athlete per season
• Over 767,000 American youth annually visit emergency room because of TBI
  • 80,000 are hospitalized
  • 11,000 die
Recent Publications and Data

Epidemiology, trends, assessment and management of sport-related concussion in United States high schools.

• The number of high school athletes being diagnosed with sport-related concussions is rising.

• An estimated 2.5 reported concussions occur for every 10,000 athletic exposures, in which an athletic exposure is defined as one athlete participating in one game or practice.

Recent Publications and Data

Concussion in the adolescent athlete.

In the school-aged athlete, new concepts, such as complete brain rest, have made school management decisions as important as sport Return-to-Play decisions

Recent Publications and Data

Premature return to play and return to learn after a sport-related concussion

- In 43.5% of concussion cases, the patient returned to sport too soon and in 44.7% of concussion cases, the patient returned to school too soon.
- Patients with a history of previous concussion required more days of rest before being permitted to participate in any physical activity than those patients without a previous history of concussion.
- Many students with sport-related concussions experience a recurrence or worsening of symptoms after premature RTP or RTL, suggesting that they have not adequately recovered.

Recent Publications and Data


• Students will require cognitive rest and may require academic accommodations such as reduced workload and extended time for tests while recovering from a concussion.

• The primary concern with early RTP is decreased reaction time leading to an increased risk of a repeat concussion or other injury and prolongation of symptoms.

• Long-Term Effects:
  ➢ There is an increasing concern that head impact exposure and recurrent concussions contribute to long-term neurological sequelae.
  ➢ Some studies have suggested an association between prior concussions and chronic cognitive dysfunction.

• Greater efforts are needed to educate involved parties, including athletes, parents, coaches, officials, school administrators and healthcare providers to improve concussion recognition, management and prevention.

Recent Publications and Data

Supporting the Student-Athlete's Return to the Classroom After a Sport-Related Concussion

• Educators should understand that recovering students may not be able to meet the usual expectations for class participation and homework completion until symptoms have cleared and neurocognitive function has returned to normal.

• Post-concussion symptoms often interfere with a student-athlete's ability to do academic work, participate in the classroom setting, and function interpersonally with peers and parents. Fatigue and sleep disruption may leave the student-athlete without the mental energy to participate in a full day of class work and evening studies. Cognitive deficits, which can exist even when student-athletes claim they are symptom free, may further undermine school participation.

• In more severe cases, the student-athlete may have to drop classes or even an entire semester of studies if all attempts at accommodation fail and if disabling symptoms continue even

Just as there are no two grains of sand on the beach that are the same, there are no two concussions which are alike.
State of the Art

If you’ve seen one concussion, you’ve seen one concussion...
Expected opening: September 1, 2015
INTERIM CONTACT INFORMATION

CONCUSSION PROFESSIONALS

- **Michael Hamant, MD**
  - Family Practice / Sports Medicine Physician
  - 520-298-2313

- **Tanya Polec, OD, FCOVD**
  - Neuro-Optometrist
  - 520-299-4100

- **Patricia Beldotti, PsyD**
  - Neuropsychologist
  - 520-404-7553

- **Tom Sanderson, PT, GPS**
  - Physical Therapist
  - 520-733-6227
TAKEAWAYS

- Concussions Will Happen
- Baseline Testing – A Standard of Care
- Sideline ATCs have a critically important role to play here
- Return To Play and Return To Learn Decisions
  - Made by qualified professionals trained in concussion diagnosis and management
- Short and Long-Term Risks Decrease When Patients Fully Recover From Concussions
- Legal Implications
“When in doubt, sit ‘em out!”

www.conqueringconcussions.com

www.CACTIS.org