Concussion Management – diagnosis, treatment, return to function.

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Take Part. Get Set For Life.™
Disclosures

- No financial relationships with any companies discussed in the presentation
- Medications discussed should only be used by providers with experience in concussion management
Concussion Management
Concussion

“Any alteration of mental function following a blow to the head that may or may not involve a loss of consciousness”

American Academy of Neurology, 1997
What is a Concussion?

- Mild Traumatic Brain Injury (mTBI)
- Neurological impairment which has *rapid onset*, and is *self-resolving* and *short-lived* (usually)
- Functional rather than structural disturbance (normal head imaging studies)
- Caused by a direct hit or indirect “jarring” of the head
Neurometabolic Cascade Following Cerebral Concussion

(Giza & Hovda, 2001)
Concussion
The Diagnostic and Return to School/Play Dilemma

How to recognize the moods of an Irish setter
How Often Do Concussions Occur?

- The CDC estimates 1.6 to 3.8 million sports-related concussions per year in USA
- 5-9% of all sports-related injuries in US
- 26% of all HS injuries in games & 18% of injuries in practice
  - 22% of all injuries in 2011 HS football season!
Evaluation: Signs

- Loss of consciousness - Occurs in less than 10% of concussions!
- Confused or dazed
- Balance and coordination problems
- Combative or overly aggressive or very silly manner
- “Glassy” eyed
- Repetitive questions
- Restless or irritable
<table>
<thead>
<tr>
<th>Cognitive</th>
<th>Emotional</th>
<th>Physical</th>
<th>Sleep</th>
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</thead>
<tbody>
<tr>
<td>Confusion</td>
<td>Anxious</td>
<td>Headache</td>
<td>Hard to fall asleep</td>
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<tr>
<td>Disoriented</td>
<td>Sad</td>
<td>Dizzy</td>
<td>Fatigued</td>
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<tr>
<td>Amnesia</td>
<td>Angry</td>
<td>Nausea</td>
<td>Drowsiness</td>
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<tr>
<td>Distractible</td>
<td>Irritable</td>
<td>Photophobia</td>
<td>Sleeping more</td>
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<tr>
<td>“Foggy”</td>
<td>Mood swings</td>
<td>Phonophobia</td>
<td>Sleeping less</td>
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<tr>
<td>Slow response</td>
<td>Different</td>
<td>Poor</td>
<td>Vision changes</td>
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<tr>
<td></td>
<td>personality</td>
<td>coordination</td>
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Evaluation: Tips

- Emergency Action Plan
  - Every field – game and practice

- Concussion Action Plan
  - For athletics
  - For hand-off to parents
  - For academics

- On-field/sideline assessment
  Several different tools (SAC, BESS, SCAT2), all with different accuracy
Evaluation: Tips

- When in doubt, sit them out
- No return to play on same day
- No return to activity if having symptoms
Management

- Every person is different
- Remember – they “look” normal
- Never let them be alone shortly after injury
- Don’t let drive home
- Speak with parent
- Sleep & BRAIN REST
  - If you are worried enough to consider waking them— they need to go to ER

How to recognize the moods of an Irish setter
Any athlete who exhibits signs, symptoms, or behaviors consistent with a concussion (such as loss of consciousness, headache, dizziness, confusion, or balance problems) shall be immediately removed from the contest and shall not return to play until cleared by an appropriate health-care professional. (Please see NFHS Suggested Guidelines for Management of Concussion).
Why Worry?
These are Not Benign Injuries

- Loss of cognitive function due to recurrent injury
  - Appears to consistently begin with 3rd concussion
- Second Impact Syndrome
  - Appears only in young athletes
  - Repeat injury (even mild) while still symptomatic
  - Rapid & massive brain swelling & bleeding
  - 50% have permanent brain damage
  - 50% die
Complications

- Post Concussion Syndrome/Disorder
  - Ill-defined and poorly understood
  - Weeks to months of symptoms
  - HA, dizziness, fatigue, irritability, insomnia, difficulty with concentration or memory, intolerance to stress & emotion

- Increased risk for mental health disorders
  - Exacerbates existing problems
  - Creates new problems
    - Post-traumatic stress disorder
    - Adolescents appear to be high risk!

- Post traumatic headaches and dizziness
Chronic Traumatic Encephalopathy
Chronic Neurocognitive Impairment

- CTE - progressive degenerative disease of the brain found in athletes (and others) with a history of repetitive brain trauma
  - Tau protein deposits
- Examples
  - Normal brain
  - 45 yo former NFL player
  - 73 yo boxer
Chronic Traumatic Encephalopathy
Chronic Neurocognitive Impairment

- CTI – can present in postconcussive syndrome or after years of symptom-free interval
- Need more studies
Problems

- We now realize that concussions occur more often than previously thought
  - Bigger, stronger, faster kids = harder hits & more concussions
  - More awareness = more recognition
  - Earlier age for contact sports = more concussion

- Young athletes are at risk for serious short-term and long-term problems
  - Over 20-30% of adolescents have symptoms >3 weeks
Concussion Legislation

- First concussion bill enacted in 2009 – Washington State (*Zackery Lystedt Law*).
- Currently, only five states do not have concussion legislation in effect or pending.
- Model concussion protocol contains three components:
  - Education of coaches, parents, student-athletes and annual information forms to be signed.
  - Removal of athlete from activity if suspected of sustaining a concussion.
  - Evaluation by licensed health-care provider trained in concussion management prior to return to activity.
Maine Concussion Management Initiative

"The Mission of MCMI is to improve the safety of Maine’s youth by reducing activity related concussions."
Our Goal

Provide Consistent Concussion Management through:

- Establishing a network of Maine professionals trained in concussion management
- Increasing education and awareness about concussion in sports
- Standardizing return-to-function (play) guidelines
- Offering computerized neurocognitive testing (ImPACT) to assist with concussion evaluation and management
1. Abandonment of grading scale approach, recommend individualized management of injury.

2. When player exhibits any signs/symptoms of concussion, he/she should be removed from contest and **not allowed** to return to play in that same contest (Zurich allows RTP in same game in athletes >18 years after prudent evaluation).

3. Following concussion, athlete should engage in stepwise exertional progression prior to RTP

4. Objective tools (e.g. neurocognitive/balance testing) should augment post-injury clinical evaluation. **No athlete should return to play if any symptoms, neurocognitive, or balance deficits persist at rest or with exertion.**
NATA Position Statement

Management of Sport-Related Concussion

- ATC’s and team physicians should agree on a philosophy for managing a sport-related concussion before the start of the athletic season.
- Consider baseline cognitive and postural-stability testing.

NATA Position Statement

Management of Sport-Related Concussion

• Once symptom free and back to baseline on cognitive and postural-stability testing, then incremental increases in activity are begun.
• Start with an initial cardiovascular challenge, followed by a stepwise progression of sport-specific activities which do not place the athlete at risk for concussion.
• The athlete is released to full participation only after the functional progression is completed, symptom-free.

Computerized Testing

- Very popular, but it is just a tool!
  - If implementing, have a plan for use
  - Have a HCP that is trained & experienced with concussion AND use of the programs
  - May increase accuracy & safety with concussion management
Baseline Computerized Testing

- Baseline or pre-injury test
  - Ideally every 2 years or less
    - High risk sports
    - Students with concussion history
    - Students with ADD, learning disorders, mental health disorders
  - Quiet, supervised area with minimal distractions
  - Sandbagging – P Manning “I just try to do badly on the first test”
    - Baselines can be invalid
  - Tests can be used without baseline, but requires experience
Neuropsychological testing

- Computer = “Cliffs Notes”
- Written test = “the novel”
  - Expensive
  - Time-consuming
  - Require a trained neuropsychologist to perform and interpret
  - The most detail
  - Can assess for other factors
    - Mental health
    - ADD/ADHD
    - Learning disorder
Management: Limited Stimulation/Exertion

- Screen time
- School work
- Watching sports/practice
- Video games
- Text messaging
- After school jobs
- Loud music, bright lights and commotion (i.e. shopping at the mall, going to a dance, changing classrooms).
Management: Home

- Find what student can do that does not flare symptoms – small bites
- Have escape route
Management: Headaches

- Rest & sleep
- Avoid stimulation/exertion
- Ensure good hydration & diet
- OTC acetaminophen preferred to ibuprofen
  - Long-term ibuprofen use = rebound headaches
- Prescription medications
- Physical therapy, biofeedback, acupuncture
Management: Sleep

- Good sleep hygiene
  - No electronics in bedroom
  - Consistent bedtime
  - Avoid caffeine, alcohol, smoking, drugs

- Naps
  - Prefer 30-40 minute “power naps”

- Medications
  - Melatonin
  - Prescription medications
Management: Return to School

- Often need to miss time
  - Concussion is not like mononucleosis – students cannot do their homework if a classmate brings it home

- Return to partial days as tolerated
  - If symptoms flare during school – go home or rest in nurse’s office
  - Progress to full days as tolerated

- Some kids improve quickly, some don’t
# Guidelines for Post-Concussion Academic Accommodations

<table>
<thead>
<tr>
<th>Stage</th>
<th>Goals/Key Ideas</th>
<th>Expected Duration</th>
<th>Teacher’s Actions</th>
<th>Student’s Actions</th>
</tr>
</thead>
</table>
| I     | Complete rest  | 2-6 days          | • Contacted by school nurse  
       |                 |                   | • Explanation of injury and current plan of care  
       |                 |                   |                   |                   |
|       | Significant deficits in processing and concentration. Cognitive activity as tolerated | 2-14 days | Develop lists of three categories for all assignments:  
1. Not to be made up.  
2. Responsible for content, not process. May be notes or work shared by a classmate, or may be covered in a review sheet.  
3. Must be completed by student and will be graded. | • Out of school  
       |                 |                   |                   | • Strict limits for use of computer, cell phone, texting, video games  
       |                 |                   |                   | • No Physical/Sports Activity  
       |                 |                   |                   | • In school as tolerated  
       |                 |                   |                   | • When present, observing not participating. Get copies of notes, handouts, etc.  
       |                 |                   |                   | • Communicate with teachers about progress/challenges.  
       |                 |                   |                   | • Be patient with slow recovery, just do your best.  
       |                 |                   |                   | • No Physical/Sports Activity  
       |                 |                   |                   | • Communicate with teachers on your progress with assignments. Communicate with teachers and parents on the pace of resuming a full workload and completing make-up work.  
       |                 |                   |                   | • No Physical/Sports Activity  
       |                 |                   |                   | • Resume all normal activities.  
       |                 |                   |                   | • Progress with athletic trainer – supervision resumption of participation in athletics.  
       | Gradual increase of time and energy, slowly resuming full workload | Variable duration. Hopefully 3-7 days, possibly more. | • Prioritize assignments with student, both make-up work and new work.  
       | Complete resumption of normal activities |                   | • Continue to use lists with the three categories for assignments until all work is completed, and assist with setting a timeline for completion of assignments. |  

*OA*
Classes to Avoid

- Music, choir, band
- Shop or Tech Ed
- Computer classes
- Physical Education
  - Don’t make them watch- use time effectively as tutoring/study hall or rest
- Lunchroom
  - Eat in quiet room or office
Management: Activity

- No contact activity
- No aerobic training
  - Conditioning or practice
- No weight lifting
- UNTIL MEDICALLY CLEARED
  - Symptoms must have resolved
  - Coaches or teammates that pressure the athlete should be educated
Concussion in Sports: Post concussive Activity Levels, Symptoms, and Neurocognitive Performance

Exertion

• **Conclusions:** Activity level after concussion affected symptoms and neurocognitive recovery.

• Athletes engaging in high levels of activity after concussion demonstrated worse neurocognitive performance.

• Those engaging in moderate levels of activity demonstrated the best performance.
Return to Activity/Sports

- Return to activity/sports program
  - Should be at full academics
  - Normalized neuropsychological testing
  - No symptoms
  - Off medications

- Maximum of ONE step per day
  - If symptoms recur – stop program and discuss with provider
  - If multiple concussions or long-term symptoms, consider a slower return
Return to Activity

- **STEP 1**
  - Cleared by physician to progress
  - Light aerobic activity (15-20 mins)
    - Walking, stationary biking, slow jogging

- **STEP 2**
  - Moderate aerobic activity (20-40 mins)
    - Sport specific (skate, run, etc).
    - NO EQUIPMENT
Return to Activity

- **STEP 3**
  - Non-contact training drills in full equipment
  - May begin resistance training

- **STEP 4**
  - Begin contact in practice

- **STEP 5**
  - Return to game play
Prevention

- Rule changes – banning ‘spear tackling’, no ‘checking from behind’
- Fair Play
- Teach athletes correct playing techniques and appropriate behavior
- Limiting contact practices to reduce exposure
- Protective equipment has not yet shown a role in concussion reduction
- Neck strengthening may help
- Education still key
Prevention

- **Soccer headgear**
  - No proven benefit in reducing concussion risk

- **Mouth guards**
  - No proven benefit in reducing concussion risk – very effective at preventing peri-oral and dental injury

- **Helmets**
  - Designed to prevent skull fractures
  - Best helmet – not covered in opponent’s paint
  - PROPER FIT & PROPER TECHNIQUE
  - VT STAR study helmet ranking
    - Should not be considered accurate – too many limitations
Prevention

- Helmets
  - Impact sensors (Shockbox, Shok-SpotR, Heads-up Stabilizer™)
Prevention

- Shockstrip – Allowed for use on football helmets (per NFHS), but not recommended or endorsed. Need helmet manufacturers to weigh-in.
What Can You Do?
State Associations & Schools

- Be aware of current state laws on concussion
- Define who is an appropriate health-care professional
  - Usually in state law or state association
- Define return to play criteria
- Determine the mechanics for removal or re-entry for return to play for the same contest
- Educate school staff on concussion recognition and management
- Help schools educate officials, parents, athletes and the media on concussion
What Can You Do?

Coaches

- Be educated about concussion recognition and management
- Need to understand the role of the official and appropriate health-care professional
- Follow school district and state association policies on return to play
NFHS Suggested Guidelines for Management of Concussion

In the Appendix in all of the 2011-12 NFHS Rules Book
Concussion In Sports - What You Need To Know

Unit 1: Concussion Overview
- Introduction
- What is a concussion?
- What happens to the brain?

Unit 2: The Problem
Unit 3: Your Responsibility
Unit 4: Review
Course Evaluation

When in doubt, sit them out!

Hi, I’m Dr. Mick Koester, Chair of the NFHS Sports Medicine Advisory Committee and Director of the Slocum Sports Concussion in Eugene, Oregon.

As you are well aware, concussions have become a huge topic of discussion over the past few years. Unfortunately, they are a common problem in sports and have the potential for serious complications if not recognized early and managed correctly.

What may appear to be only a mild jolt or blow to the head or body can result in a concussion. While concussions occur at all levels of sports, it is very important for coaches, athletes, parents, and administrators to understand the risks and recognize the signs of a concussion.
NFHS Sports Medicine

- 2011, 4th edition
  - Concussion chapter
- NFHS Position statement
  - Further information
  - Parents’ guides
- State Associations
- CDC Tool Kit
Conclusions

- Early diagnosis & cognitive rest are very important
- People dealing with young athletes must be aware of the signs, symptoms, and ramifications of concussions
  - *When in doubt, sit them out!!*
- Education is a continuing process and must involve everyone who interacts with high school athlete
Conclusions

- Organizations/schools should have EAP, evaluation and RTP policies & procedures in place to ensure appropriate care
- Computerized neuropsychological testing may play a role – but CANNOT stand alone
Thank you!