415: Education and Awareness of Head Injuries and Concussions in Youth Sports

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Conflict of Interest Disclosures

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Objectives

- Overview of Sports Concussion
- Recognition
- On-field management
- Treatment
- Risks
- Review resources available for concussion education
- Legislative Update

What is a concussion?

Definition

- Concussion:
  - "a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces." - Zurich Consensus Statement

- Features:
  1. Direct blow OR transmitted force
  2. Rapid-onset of relatively short-lived symptoms
  3. Functional, not structural disturbance
  4. Symptoms generally proceed towards resolution
  5. Standard Imaging is normal

Concussion: Old Way of Thinking

- Obvious injury
- Loss of consciousness
- Quick recovery
- Back to play in 0-7 days
- If a CT scan or MRI scan is O.K., there's no need to worry
Concussion: New Way of Thinking

- Concussion: change in mental status as a result of head trauma
- Concussion symptoms can be subtle
- Concussion symptoms can last week, months, or even longer
- Athletes with concussions usually have normal scans
- Young athletes are at risk for serious brain injury if they return to sports before recovery is complete.

Why do we worry about concussions?

Chronic Traumatic Encephalopathy (CTE)

- About 150 cases
- Boston University/West Virginia University
  - Contact sport athletes
  - Behavioral/Mood/ Cognitive Changes
  - Post-mortem histopathologic findings:
    - Neurofibrillary tangles
    - Neuritic threads

NFL Data

- Retired NFL players with history of concussion
  - Association between recurrent concussions and increased depression risk
  - Former players with 3+ concussions have increased risk cognitive impairment
    - Guskiewicz et al MSSE, 2007
    - Guskiewicz et al Neurosurg, 2005

NFL: Concussion research

- Study of >3400 former NFL Players
- ≥5 playing seasons 1959-1988
- Deaths about ½ of expected for age
- 10/384 deaths were due to neurodegenerative causes, 17/384 with neurodegenerative condition contributing to cause of death (3 x expected rate)
  - Lehman, Neurology, 2012
NCAA Data
- 1600 NCAA football players with 'mild' concussion
  - Symptoms persisted an average of 7 days
  - Cognitive function returned to baseline in 5-7 days
  - Balance returned to baseline in 3-5 days
  - McCrea et al, JAMA, 2003

Prospective study of 2900 football players
- Players with h/o 3+ concussion more likely to have subsequent concussions
- 93% of repeat concussions occurred in the first 10 days
- Slower recovery with history of previous concussions
  - Guskiewicz et al, JAMA, 2003

Concussion in Young Athletes: Epidemiology
- 200,000 sports-related non-fatal head injuries seen in the ED each year
  - Highest rates: age 10-14, then 15-19
- 13% of all high school sports injuries
- Boys football>boys hockey>boys lacrosse
- Girls soccer>girls lacrosse>girls basketball

High school athletes take longer to recover from concussion as compared to college athletes
  - Sim et al, J Neurosurg, 2008
  - Field, Collins and Lovell, J Pediatrics, 2003

High School athletes with h/o multiple concussions have more severe symptoms with subsequent injuries
  - Collins, Neurosurg, 2002

Concussion in Young Athletes
- Symptoms tend to be underreported
- Confidential survey of 1500 high school football players
  - 30% reported history of prior concussion symptoms
  - 15% incidence during season studied
  - Fewer than half reported symptoms

Second Impact Syndrome
- Concussive injury following incomplete recovery from a prior head injury
  - Occurs in the hematoma
  - Results in catastrophic injury or death
  - (Almost) exclusively in young athletes
  - Jaquan Waller, died of second impact syndrome in 2008, in North Carolina
Concussions: Sideline Management
- Make sure athlete is alert, does not have a spine injury, no need for EMS
- Physical exam, symptoms, behavior (ongoing)
- Determine need for emergency room evaluation
- Do not permit same day return
- Assign a chaperone

Athletic Trainers
- American Academy of Neurology recommends an ATC be present for contact sport practices and games
- Not personal trainers
- Trained to recognize signs of concussion on the field
- Currently in 40% of high schools in the US

Concussion symptoms
- Examples
  - Dizziness
  - Headache
  - Feeling foggy
  - Sensitivity to light
  - Mood changes
  - Irritability
  - Difficulty sleeping

Office Treatment: Team Approach
- Primary Care Providers
- Sports Medicine Physicians/Team Physicians
- Certified Athletic Trainers
- School Nurses
- Neurology
- Neuropsychology
- Physical Therapy

Office Treatment
- Moderate Rest
  - Physical rest
  - Cognitive rest = ‘Brain rest’
- Average recovery is 2 weeks for high school students
- Referral for additional evaluation if symptoms are atypical/prolonged >6 weeks
Return to Play
- Once asymptomatic/at symptom baseline
- Consider computerized neuropsychological testing
  - Especially if baseline available
- Graded progression
  - Progress to next step only if asymptomatic

Return to Play
- Graded progression
  - Light aerobic activity
  - Light sport-specific drills
  - Complex sport-specific drills
  - Full contact practice
  - No restrictions

Deciding to Hold Clearance
- Prolonged symptoms
- Associated mental health concerns
- Any persistent exam findings
- Multiple concussions
  - Frequent
  - Increasing severity
  - Decreased force of impact required

Education
- Widely held misconceptions about concussions among youth sport coaches
  - Valovich, 2007, Cusimano, 2009
- Underreporting of concussion symptoms by athletes
  - McCrea, 2004

Resources
- IHSA: Ihsa.org
- CDC: Cdc.gov/concussion
  - Coach education module, printed materials, posters
- USA Football: usafootball.com

Questions about concussions?
Chicago Park District Junior Bears Football
- 20 Chicago Park District facilities
- 8-10, 11-13 year age groups
- 850 participants
- Partnership with Chicago Bears
  - Championship held at Soldier Field

Methods
- Target Population: Chicago Park District coaches and parents of football players
- Sites: Chicago Park District facilities
- Pre-season survey: 24 item surveys designed to assess:
  - Demographics
  - Concussion Knowledge
  - Source of Concussion Knowledge
  - Resources Desired

Sample Questions
- Does an athlete have to pass out/lose consciousness to have a concussion?
  1. Yes, for at least 5 minutes
  2. Yes, for at least 3 minutes
  3. Yes, for at least 1 minute
  4. No, an athlete does not have to lose consciousness to be diagnosed with a concussion
  5. I don’t know

Methods
- Concussion Education
  - Live Power Point presentations delivered by a physician or athletic trainer
  - Coaches and parents provided with contact information
  - Printed materials
    - Power point slides
    - Heads Up materials from CDC
  - Clipboards and coach cards for coaches (year 1)
  - Posters (year 1)
  - Follow-up e-mail and/or text message with concussion resources when requested

Results: Parent Surveys

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<thead>
<tr>
<th>Demographics</th>
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<tbody>
<tr>
<td>Time Point</td>
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<tr>
<td>2012</td>
<td>79</td>
<td>75.2</td>
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<tr>
<td>2013</td>
<td>26</td>
<td>24.8</td>
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<tr>
<td>Gender</td>
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<tr>
<td>Male</td>
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<td>Highest Grade Completed</td>
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<td>36</td>
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<tr>
<td>College Grad</td>
<td>32</td>
<td>30.5</td>
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Results: Parent Surveys

Total Correct by Time Point and Education Level

<table>
<thead>
<tr>
<th>Time Point</th>
<th>#</th>
<th>Mean Correct</th>
<th>SD</th>
<th>p-value</th>
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<td>75</td>
<td>76.5</td>
<td>16.4</td>
<td>0.588</td>
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<tr>
<td>2013</td>
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<tr>
<td>Highest Grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not High School Grad</td>
<td>7</td>
<td>72.7</td>
<td>11.3</td>
<td>0.001</td>
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<td>High School Grad</td>
<td>28</td>
<td>69.3</td>
<td>15.4</td>
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</tr>
<tr>
<td>Some College</td>
<td>34</td>
<td>80.6</td>
<td>13.4</td>
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</tr>
<tr>
<td>College Grad</td>
<td>33</td>
<td>81.9</td>
<td>13.3</td>
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Results: Parent Surveys

• Questions missed by more than 30% of parents
  – Concussion can occur with a hit to the jaw
  – Mild dizziness/headache after being hit are likely a concussion
  – Children recover more slowly from concussion
  – Emotional symptoms can be part of concussion

Results: Parent Surveys

- Resources desired for concussion education

<table>
<thead>
<tr>
<th>Resource</th>
<th>#</th>
<th>%</th>
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<tr>
<td>A talk or class on sports concussion</td>
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<td>62.9</td>
</tr>
<tr>
<td>Printed handouts w/info about concussions</td>
<td>66</td>
<td>62.9</td>
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<tr>
<td>Links to concussion education materials</td>
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<tr>
<td>Podcasts</td>
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<td>20.0</td>
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<tr>
<td>An informational dinner w/ health care professionals</td>
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<td>43.8</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
<td>6.9</td>
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Results: Parent Surveys

Top ways parents have learned about concussions

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<thead>
<tr>
<th>Name</th>
<th>#</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Television</td>
<td>57</td>
<td>54.3</td>
</tr>
<tr>
<td>Printed Materials</td>
<td>55 (50 at CPD)</td>
<td>52.4 (48.1 at CPD)</td>
</tr>
<tr>
<td>Heard health professional talk</td>
<td>47 (35 at CPD)</td>
<td>44.8 (33.7 at CPD)</td>
</tr>
<tr>
<td>Coaches</td>
<td>46 (39 at CPD)</td>
<td>43.8 (37.5 at CPD)</td>
</tr>
<tr>
<td>Internet</td>
<td>41</td>
<td>39.0</td>
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Results: Coach Surveys

Total Correct by Time Point and Education Level

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<thead>
<tr>
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<th>#</th>
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<th>SD</th>
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<tr>
<td>2013</td>
<td>18</td>
<td>82.2</td>
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<tr>
<td>Highest Grade</td>
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<tr>
<td>High School Grad</td>
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<td>82.4</td>
<td>17.7</td>
<td>0.156</td>
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<td>Some College</td>
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<td>86.1</td>
<td>7.57</td>
<td></td>
</tr>
<tr>
<td>College Grad</td>
<td>25</td>
<td>89.2</td>
<td>6.65</td>
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</table>

Results: Coach Surveys

• Questions missed by more than 30% of coaches
  – Concussions are treated with physical and cognitive rest
  – Emotional symptoms can be part of concussion
Results: Coach Surveys

- Resources desired for concussion education

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<td>14</td>
</tr>
<tr>
<td>An informational dinner w/ health care professionals</td>
<td>29</td>
</tr>
<tr>
<td>Dinner (mandatory biannual concussion training for active coaches)</td>
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Results: Focus groups

- Demographics:
  - Focus group 1:
    - 9 participants: 6 females and 3 males
    - Parents of Junior Bear athletes
  - Focus group 2:
    - 13 participants: 8 females and 5 males
    - Parents of Junior Bear athletes
    - Two parents were also coaches

Major Themes

- Sports are beneficial for kids
  - Physical fitness, social skills, discipline, leadership, sportsmanship
  - Bonding with parents, parents networking, social support
  - Safe place for youth to exercise, blow off steam

Major Themes

- Concern about injuries
  - Musculoskeletal Injuries
  - Concussions
  - Weight inequalities increasing risk of concussion
  - Tempered by recognition that injuries are ‘part of the game’

Major Themes

- Ways to make football safer
  - Educate coaches
  - Educate parents
  - Medical professionals at games
  - Make sure safety rules, weight categories are enforced
  - Research to find better equipment
  - Safe place for youth to exercise, blow off steam

Major Themes

- Evaluation of concussion education
  - Coach knowledge
  - Parent information sessions
  - Printed materials
  - Some confusion about what printed materials address
  - Posters: not seen but good idea

Major Themes

- Ways to make football safer
  - Educate coaches
  - Educate parents
  - Medical professionals at games
  - Make sure safety rules, weight categories are enforced
  - Research to find better equipment
  - Safe place for youth to exercise, blow off steam

Major Themes

- Concern about injuries
  - Musculoskeletal Injuries
  - Concussions
  - Weight inequalities increasing risk of concussion
  - Tempered by recognition that injuries are ‘part of the game’
Concussion Legislation & Policy

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Where we are today

• Concussion laws:
  – 50 states
  – District of Columbia
  – Often referred to as “Return to Play” (RTP) laws
• 3 key facets:
  – Removal from play
  – Permission to return to play
  – Education of coaches, parents and athletes

History

• Education, Awareness and Institutional Guidelines preceded legislation
  – The CDC developed the "Heads Up" program
  – NFHS established concussions guidelines

Consensus Statement on Concussion in Sport: 4th International Conference

• Onsite evaluation by a physician or licensed healthcare provider
• Remove from play
• No RTP day of injury

Discussion

• Survey results
  – Overall knowledge is good, especially for coaches
  – Intervention is delivered in preferred method
  – Some facets could be improved
  – Posters—better distribution
  – Reevaluate printed materials

Major Themes

• Suggestions for improvement/future directions
  – Education for refs
  – Having parents and coaches sign off on printed materials
  – Official certification

Send them home with something that needs to be signed
American Academy of Pediatrics

- Coaches and athletic trainers must be trained to identify concussion
- Refer to licensed physician for evaluation

National Federation of State High School Associations: Sports Medicine Advisory Committee

- "Suggested Guidelines for Management of Concussion in Sports"
  - Remove from play
  - Evaluation by a health-care professional
  - Inform athlete's parents regarding possible injury/risks
  - Keep athlete out of play until cleared by health-care professional (no return day of injury)

First Concussion Law

- Washington, 2009
- Zackery Lystedt

Common Themes of Legislation:

1. Removal from Play
2. Medical Clearance
3. Education & Informed Consent
4. Organizations Affected

Remove from Play

- All states require removal if a concussion is suspected
- Suspected concussion vs symptoms present
  - Minimum of remainder of day/24 hours (48 states)

- Arizona & South Carolina allow return to play the same day
  - if cleared by a healthcare professional
  - MD, NP, PA or ATC

Medical Clearance/RTP

- All states require some type of medical clearance
  - "Health care provider"
  - MD, PA, ATC APRN, NP, DO, RN, PsyD
Education (Coaches)

- ~1/2 state laws require coaches to complete a concussion management training program, while 80% require coaches to get information on recognizing concussions.

- Required Training
  - Annual 31%
  - Biennial 19%
  - Every 3-5 years 8%
  - One-time education 6%
  - No specific timeframe provided 33%

- ** Illinois revised its law on 2014 and now requires coaches complete online education every 2 years

Not All Schools are Affected Equally

**Public Schools**
- 24% only apply to high schools
- 24% apply to middle & high schools
- 53% apply to athletes K-12, ages 7 to 18 or ages 18 & under

**Private/Charter Schools**
- 20% of these laws extend to private entities
- Private organizations using public property
- Application of laws if fees are involved

(Applies to public schools in ALL States) (Only Applies to SOME schools; varies by state)

How do these laws affect Park Districts & Youth Leagues?

- Mandated to follow legislation -
  - Alabama
  - Georgia
  - Louisiana
  - Maryland
  - Michigan
  - Minnesota
  - Mississippi
  - Nevada
  - Ohio
  - Oregon
  - Tennessee
  - Utah
  - Virginia
  - Wisconsin

- Encouraged to follow legislation -
  - Idaho
  - Pennsylvania
  - Rhode Island
  - Illinois

Illinois Legislation

**Recent Illinois Law as of 2014**
- Only applies to public secondary schools competing under the IHSA for RTP
- Informed consent (athlete & parent)
- Written clearance to RTP
- Coach education every 2 years (amended in 2014)

**New Illinois Law “An Act Concerning Concussions”**
- Public Act 099-0245 (SB 7)
  - Applies to all schools (Public, Private & Charter) grades K-12
  - Encourages youth sports leagues & Park Districts to comply
  - Adds education for officials/referees & HCPs
  - EAP for all schools
  - Concussion oversight teams
  - Return to Learn policy
  - Effective 9/1/16
Long history of legislating sports injuries