DIDACTIC SESSION: POST-CONCUSSION SYNDROME

MANAGING PCS IN A NEURO SPORTS CLINIC PROGRAM SYLLABUS
2015 AAN Sports Concussion Conference  
July 24-26, 2015  
Didactic Session: Concussion  
Saturday, July 25, 2015  
8:00 a.m. – 11:30 a.m.

Program Directors  
Jeffrey S. Kutcher, MD, FAAN – Ann Arbor, MI  
Christopher Giza, MD – Los Angeles, CA

Program Schedule and Faculty  
8:00 AM – 8:15 AM Welcome and Day Overview  
8:15 AM – 8:55 AM Post-Concussion Syndrome Identification and Management Approach  
Nicole D. Reams, MD  
Ann Arbor, MI  
8:55 AM – 9:35 AM Managing PCS in a Neuro Sports Clinic  
Gillian A. Hotz, PhD  
Miami, FL  
9:35 AM – 9:50 AM Break  
9:50 AM - 10:30 AM Vestibular Therapy Approaches to PCS  
Kathryn Schneider, PhD  
Calgary, AB, Canada  
10:30 AM – 11:10 AM Post-Concussion Educational Intervention and Return to School  
Karen McAvoy, Psy.D  
Denver, CO  
11:10 AM – 11:30 AM Panel Q&A

Program Description:  
This three-day conference will focus on the science behind concussion. The conference will follow a new programming model to include five half-day sessions, each with its own general theme, faculty presentations, and a panel discussion. Poster presentations will occur on the first two days of the conference. The five half-day topics are: concussion, concussion research (epidemiology, biomechanics, and imaging), post-concussive syndrome, research (mTBI), and chronic Sequelae. In addition, there will be lunchtime breakout sessions targeted to the following audiences: professional sports, collegiate sports, high school sports, and youth sports.

Learning Objectives:  
Participants should be able to accurately and appropriately diagnose concussion; institute appropriate and clinically useful diagnostic tests when indicated; provide state-of-the-art management of concussed athletes and individuals; make safe and appropriate return to play, school, work, and life decisions; and educate athletes, non-health care professionals, and other health care practitioners on key issues related to concussion.

Recommended Audience:  
Neurologists, Athletic Trainers, Primary Care Physicians, Neuropsychologists, and Sports Medicine Professionals.

Accreditation  
The American Academy of Neurology is accredited by the Accreditation Council for Continuing Medical Education.
(ACCME) to provide continuing medical education for physicians.

AMA PRA Credit
The AAN designates these educational activities for a maximum number of hours in category 1 credit toward the AMA Physician's Recognition Award. The number of credits assigned to each individual program is outlined in the program's description. Each physician should only claim those hours of credit that he/she actually spent in the activity.

Certificates for Non-Physicians
Non-physician participating in the programs will receive a certificate of attendance indicating attendance at an activity designated for AMA PRA category 1 credit.

Education/Posters Disclaimer
The primary purpose of the AAN Sports Concussion Conference is to provide educational programs and information. Information presented, as well as publications, posters, technologies, products and/or services discussed, are intended to inform attendees about the knowledge, techniques, and experiences of physicians and other professionals who are willing to share such information with colleagues. A diversity of opinions exists in the medical field, and the view of the conference’s faculty and other presenters is offered solely for educational purposes. Faculty members’ and presenters’ views represent neither those of the AAN nor constitute endorsement by the AAN. The AAN disclaims any and all liability for all claims which may result from the use of information, posters, publications, products, and/or services discussed at the AAN Sports Concussion Conference.

Faculty's Disclosure of Commercial Relationships
Consistent with the AAN and ACCME policies, faculty must disclose any significant financial or other relationship with the manufacture(s) of any commercial product(s) or service(s) discussed in their course. This policy is intended to make participants aware of all speakers' financial or other relationship(s), so that attendees may form their own judgments about material discussed during the educational activity. Full disclosure of faculty's commercial relationships will appear in the individual program materials. All faculty must sign a letter of agreement stating explicitly that they understand and will adhere to AAN and ACCME guidelines that require full disclosure of commercial relationships, unlabeled use of products, and identification of data sources.

Faculty Commercial Relationship Disclosures
- Jeffrey S. Kutcher, MD – Dr. Kutcher has received personal compensation for activities with the National Basketball Association Concussion Program as a director, with National Hockey League Players Association and ElMindA, Ltd. As a consultant. Dr. Kutcher has received research support from ElMindA, Ltd. For a research grant.
- Christopher Giza, MD – Dr. Giza has received personal compensation for activities with the Medical Education Speakers Bureau and for medicolegal consultation with Alcobra and Pearson TLC.
- Nicole D. Reams, MD – Dr. Reams has nothing to disclose.
- Gillian A. Hotz, PhD – Dr. Hotz has received royalty payments from Brooks publishing.
- Kathryn Schneider, PhD – Dr. Schneider has nothing to disclose.
- Karen McAvoy, Psy.D – Dr. McAvoy has nothing to disclose.

Unlabeled Use of Product Disclosure
The AAN, as an ACCME accredited provider, requires all faculty members to disclose if a product is not labeled for the use being discussed or that the product is still investigational.

Faculty Unlabeled Use of Product Disclosures
- Dr. Reams will not include any information on unlabeled use of products or investigational uses during the presentation.
- Dr. Hotz will not include any information on unlabeled use of products or investigational uses during the presentation.
- Dr. Schneider will not include any information on unlabeled use of products or investigational uses during the presentation.
- Dr. McAvoy will not include any information on unlabeled use of products or investigational uses during the presentation.
The UConcussion Program is a comprehensive program that provides a solution to the growing concern of concussions in youth, high school, collegiate and professional sports. Our 6 steps to “Play Safe” includes; pre-season baseline testing, sideline screening, re-testing post-concussion, clinic follow up, gradual return to play and a concussion injury surveillance. This presentation will focus on our high school concussion program and the assessment and treatment of PCS in our neuro sport clinic.

**Background:** With more than 7.5 million high school students participating in high school sports, concussions in this adolescent age group is getting more attention due to the potential for many years of play and concerns of multiple impacts to a young and developing brain.

**Objective:** A countywide concussion program (CCP) was designed to provide a comprehensive program to 35 public high schools in Miami Dade County in order to standardize the management of concussions.

**Methods:** The comprehensive program includes training and education of coaches, certified athletic trainers, and athletes, pre-season baseline neurocognitive computerized testing, acute care clinic follow up, return to play and learn and a concussion injury surveillance system (CISS). The neuro sport clinic with a neurologist as the medical director, focuses on acute management and treating all PCS and making recommendations for back to play and learn.

**Results:** Since August, 2011, the data from the CISS reports that over 25,000 student athletes have now been administered baseline testing (ImPACT), football accounts for the largest number of concussions per year about 67%, seniors have the highest rate of concussions (31%) and the average return to play of all athletes is 13.5 days. We also found that over a two year period we have provided classroom accommodations to 30% of the athletes we treat in clinic with 68% of those being football related.

**Conclusions:** The CCP was developed to improve concussion management of high school athletes and increase education and awareness to all those involved in the athlete’s care. This team approach has demonstrated a safer and organized way of returning an athlete to play. The program can now be used as a model for other counties to help deliver a comprehensive concussion management program.

**References:**


Definition

A MEDICAL DIAGNOSIS
...a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces. May or may not involve a loss of consciousness, however commonly there is an alteration of consciousness.
Countywide Concussion Protocol
6 steps to play safe

- Baseline ImPACT pre-season
- Re-Test ImPACT within 72 Hours
- Sideline King-Devick / SCAT3
- Clinic Neuro Assessment
- Return to Play GRTP / Accommodations
- Surveillance ATC / REDCap

Certified Athletic Trainer

- Act as our Gatekeeper
- Yearly training & education
- Employed by public & private High Schools & Colleges
TEAM APPROACH

UHealth Concussion Clinic

Utilizes a multidisciplinary approach to assess, treat, and manage concussions.

• Gillian Hotz, PhD
• Kester Nedd, DO
• Cliff Page, MD, CAQSM

• Services include:
  - Assessment
    • Neurological Assessment
    • ImPACT Baseline Testing
    • King-Devick & SCAT Sideline Testing
    • Neuropsychological Assessment
    • Neuroimaging
  - Treatment
    • Pharmacology
    • Psychotherapy/Behavioral Interventions
    • Nutrition
  - Management
    • Case Management/Referrals
    • Accommodations
  - Training & Education
    • Annual workshop ATCs/ADs
    • Coaches
    • Community physicians
    • Outreach
  - Injury Surveillance System
CLINIC

- **Pharmacological** - certain drugs are used to treat the symptoms of a concussion, to allow the patient increased functionality.

- **Therapy** - vestibular concussion patients can benefit from vestibular therapy which trains their brain to accommodate to the injury and can help them regain functionality.

- **Cognitive Rest** - Athletes with a concussion generally recover quicker when they allow their brains to rest. Taking time off of school and sports can expedite their recovery.

Outcomes are highly variable

Depending on the symptoms
Develop treatment pathways

Symptoms of Concussion

- Headache
- Nausea
- Balance problems or dizziness
- Double or fuzzy vision
- Sensitivity to light or noise
- Feeling sluggish
- Feeling “foggy”
- Change in sleep pattern
- Concentration or memory problems
Headaches

MOST COMMON
• Muscular-Skeletal type
• Vascular type
• Migraines

• Treatments for Headaches - drugs used to treat headaches depends on the type of headache

Graduated Return-to-Play

<table>
<thead>
<tr>
<th>Rehabilitation Stage</th>
<th>Functional Exercise at Each Stage of Rehab</th>
<th>Objective of Each Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. No activity</td>
<td>Complete physical and cognitive rest</td>
<td>Recovery</td>
</tr>
<tr>
<td>2. Light aerobic exercise</td>
<td>Walking, swimming or stationary cycling keeping intensity &lt;70% HRR, no resistance training</td>
<td>Increase HR</td>
</tr>
<tr>
<td>3. Sport-specific exercise</td>
<td>Running drills, no head impact activities</td>
<td>Add movement</td>
</tr>
<tr>
<td>4. Non-contact training drills</td>
<td>Progression to more complex training skills; passing drills; may start resistance training</td>
<td>Exercise, coordination, and cognitive load</td>
</tr>
<tr>
<td>5. Full contact practice</td>
<td>Following medical clearance, participate in normal training activities</td>
<td>Restore confidence and assess functional skills by coaching staff</td>
</tr>
<tr>
<td>6. Return to play</td>
<td>Normal game play</td>
<td></td>
</tr>
</tbody>
</table>

Return to Learn

*In order to return athlete to play…*

• Athlete needs to have no cognitive/or learning problems prior to return to contact sports.

• Commonly cognitive skills are not evaluated prior to an athlete returning to the game.

• Athlete needs to have pre-injury level of cognitive function before being cleared to return to play.
Immediate Post Assessment
Concussion Test (ImPACT)

King-Devick (K-D) : Sideline
ImPACT™ Testing

<table>
<thead>
<tr>
<th>Sport</th>
<th>2011 School Year</th>
<th>2012 School Year</th>
<th>2013 School Year</th>
<th>2014 School Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseball</td>
<td>935</td>
<td>360</td>
<td>328</td>
<td>308</td>
</tr>
<tr>
<td>Basketball</td>
<td>224</td>
<td>1047</td>
<td>747</td>
<td>526</td>
</tr>
<tr>
<td>Football</td>
<td>2455</td>
<td>1878</td>
<td>1847</td>
<td>1665</td>
</tr>
<tr>
<td>Lacrosse</td>
<td>178</td>
<td>61</td>
<td>29</td>
<td>41</td>
</tr>
<tr>
<td>Soccer</td>
<td>1610</td>
<td>811</td>
<td>919</td>
<td>777</td>
</tr>
<tr>
<td>Softball</td>
<td>485</td>
<td>231</td>
<td>240</td>
<td>223</td>
</tr>
<tr>
<td>Swimming</td>
<td>0</td>
<td>36</td>
<td>65</td>
<td>18</td>
</tr>
<tr>
<td>Volleyball</td>
<td>946</td>
<td>506</td>
<td>496</td>
<td>472</td>
</tr>
<tr>
<td>Water polo</td>
<td>242</td>
<td>115</td>
<td>75</td>
<td>93</td>
</tr>
<tr>
<td>Wrestling</td>
<td>576</td>
<td>365</td>
<td>309</td>
<td>213</td>
</tr>
<tr>
<td>Total</td>
<td>7681</td>
<td>5487</td>
<td>5045</td>
<td>4228</td>
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</table>

Total Post 1 Retest: 194, 206, 195

*For 35 MDC public high school contact sport athletes
*2014 School year as of July 1, 2015
*School Year 6 Aug 1 to July 31

Number of Concussions Reported by Surveillance System

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>137</td>
<td>130</td>
<td>194</td>
</tr>
<tr>
<td>Male</td>
<td>122</td>
<td>108</td>
<td>155</td>
</tr>
<tr>
<td>Female</td>
<td>15</td>
<td>22</td>
<td>39</td>
</tr>
<tr>
<td>Mean Age</td>
<td>16.16</td>
<td>16.14</td>
<td>16.15</td>
</tr>
</tbody>
</table>

*For 35 MDC public high school contact sport athletes
*2014-2015 School year as of July 1, 2015
*School Year 6 Aug 1 to July 31
**Surveillance Data**

*For 35 MDC public high school contact sport athletes
*2014-2015 School year as of July 1, 2015
*School Year is Aug 1 to July 31

**2012-2013 Grade Breakdown**

- Freshman: 25%
- Sophomore: 20%
- Junior: 25%
- Senior: 20%
- Unknown: 10%

**2013-2014 Grade Breakdown**

- Freshman: 22%
- Sophomore: 25%
- Junior: 29%
- Senior: 24%
- Unknown: 3%

**2014-2015 Grade Breakdown**

- Freshman: 23%
- Sophomore: 18%
- Junior: 25%
- Senior: 30%
- Unknown: 2%

**2012-2013 Sports Breakdown**

- Baseball: 1%
- Basketball: 8%
- Football: 75%
- Lacrosse: 0%
- Soccer: 11%
- Softball: 1%
- Swimming: 0%
- Volleyball: 5%
- Water Polo: 1%
- Wrestling: 0%
- Unknown: 3%

**2013-2014 Sports Breakdown**

- Baseball: 2%
- Basketball: 10%
- Football: 65%
- Lacrosse: 14%
- Soccer: 0%
- Softball: 5%
- Swimming: 1%
- Volleyball: 3%
- Water Polo: 0%
- Wrestling: 0%
- Unknown: 2%

**2014-2015 Sports Breakdown**

- Baseball: 3%
- Basketball: 7%
- Football: 55%
- Lacrosse: 0%
- Soccer: 1%
- Softball: 1%
- Swimming: 9%
- Volleyball: 4%
- Water Polo: 1%
- Wrestling: 0%
- Unknown: 4%

**Conclusions Reported by Football Position for 2012-2013, 2013-2014, and 2014-2015 School Years**

*For 35 MDC public high school contact sport athletes
*2014-2015 School year as of July 1, 2015
*School Year is Aug 1 to July 31
**RTP According to Surveillance Data**

<table>
<thead>
<tr>
<th>Complication</th>
<th>2012-2013 School Year</th>
<th>2013-2014 School Year</th>
<th>2014-2015 School Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>97</td>
<td>118</td>
<td>158</td>
</tr>
<tr>
<td>No</td>
<td>5</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Loss to Follow Up</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Will Not Return to play</td>
<td>5</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>Unknown</td>
<td>30</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>End Of Season</td>
<td>0</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>137</td>
<td>130</td>
<td>194</td>
</tr>
</tbody>
</table>

*For 35 MDC public high school contact sport athletes
*2014-2015 School year as of July 1, 2015
*School Year is Aug 1 to July 31

**Return to Play (RTP) for Concussions Reported in 35 Miami-Dade County Public High Schools by Sport (excluding outliers>31 days)**

<table>
<thead>
<tr>
<th>SPORT</th>
<th>INCDV with RTP Data</th>
<th>MINIMUM</th>
<th>MAXIMUM</th>
<th>AVERAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseball</td>
<td>2</td>
<td>15</td>
<td>30</td>
<td>22.50</td>
</tr>
<tr>
<td>Basketball</td>
<td>13</td>
<td>4</td>
<td>28</td>
<td>16.54</td>
</tr>
<tr>
<td>Football</td>
<td>89</td>
<td>1</td>
<td>30</td>
<td>15.39</td>
</tr>
<tr>
<td>Lacrosse</td>
<td>0</td>
<td>3</td>
<td>29</td>
<td>17.44</td>
</tr>
<tr>
<td>Soccer</td>
<td>16</td>
<td>13</td>
<td>13</td>
<td>13.00</td>
</tr>
<tr>
<td>Softball</td>
<td>1</td>
<td>5</td>
<td>28</td>
<td>16.80</td>
</tr>
<tr>
<td>Volleyball</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Water polo</td>
<td>0</td>
<td>12</td>
<td>23</td>
<td>17.50</td>
</tr>
<tr>
<td>Wrestling</td>
<td>2</td>
<td>13</td>
<td>13</td>
<td>13.00</td>
</tr>
<tr>
<td>Other/Unknown</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>129</td>
<td></td>
<td></td>
<td>14.69</td>
</tr>
</tbody>
</table>

*For 35 MDC public high school contact sport athletes
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*School Year is Aug 1 to July 31

**HIGH SCHOOL CONCUSSION EDUCATION PROGRAM**
Concussion Rap

SLI concussion education video