ESTABLISHING AN EFFECTIVE CONCUSSION MANAGEMENT PROGRAM: PERSPECTIVE FROM TWO DISTRICTS

Not everyone is a super hero..... so be vigilant
Key Points

- Organize & Document
- “Blanket” Philosophy
- Identify and Include key individuals
- Education is Paramount
- Portfolio Creation

“Blanket” Philosophy
In 2010, the American College of Sports Medicine concluded that

- that multiple symptom scales and assessment tools are available with no single tool showing clear superiority.
- many tools remain based more on expert opinion than rigorous scientific evaluation.
- a multifaceted approach to sports concussion is advised.

Sensitivity

Computerized Neuropsychological Testing
- Sensitivity: 52%
- Specificity: 92%

Self-Reported Symptoms
- Sensitivity: 95%
- Specificity: 80%

NeuroCom® Sensory Organization Test
- Full Test Battery: Sensitivity 85%
- Specificity: 62%
Why should more than one assessment tool be used?

- Verbal vs. graphic learners
- Language barriers
- No one perfect tool
- Comparison/complementation of tools
- Expanded perspectives on recovery

Identify Key Individuals

Within your system, who needs to know and who provides care?

NEEDS TO KNOW
Athlete, certified athletic trainer, coaches, teachers, school nurses, parents, friends, teammates

PROVIDES CARE
Parents, athlete, school nurse, ATC, physician, neuropsychologist

States with Concussion Laws

[Map showing states with concussion laws]
View from Texas (Natasha’s Law)
- Immediate removal from play of any athlete believed to have sustained a concussion
- Athletes believed to have sustained a concussion must be evaluated and cleared by a physician before RTP.
- Safe return to play of an athlete after sustaining a concussion using current recognized standards of care
- Concussion education for parents, coaches, and athletes

Concussion Oversight Team
- The governing body of each school district and open-enrollment charter school with students enrolled who participate in an interscholastic activity shall appoint or approve a concussion oversight team.

Concussion Oversight Team
- School board appoints and approves members of team.
- Sole purpose of COT is to develop the return to play protocol for the school district that is based on peer-reviewed scientific evidence.
- COT members are immune from liability based on service or participation on COT.
COT Membership

- At least one physician

- If school district employs an athletic trainer, the athletic trainer must be on the COT.

- Other members may include: advanced practice nurse, neuropsychologist, or physician assistant.

- Each member must have training in evaluation, treatment, and oversight of concussions.

DeSoto ISD Concussion Management

Question

- What is the difference between the athlete who is suspected of having a concussion and an athlete who is believed to have sustained a concussion?

Answer

- If a concussion is suspected, the athlete must be removed and referred for evaluation by a licensed health care professional specified in the law.

- If the licensed health care professional (AT) believes there are symptoms of a concussion, then Concussion Oversight Team protocol must be followed.

- Physician clearance only allows the athlete to begin the return to play protocol.
Acknowledgement Form

- A form explaining concussion prevention, symptoms, treatment, and oversight that includes return to play guidelines
- Must be signed by both parent and student each year prior to participation in interscholastic athletics

Multi-Disciplinary Approach creates a BLANKET of Care

- Friends
- Parents
- Physician
- Concussed Player
- Athletic Trainer
- Teachers/Coach
- Neuropsychologist
- School Nurse
Creating a Comprehensive Concussion Portfolio

1. Baseline NCT
2. Initial Injury Assessment
3. Head History
4. 7 Day Self-Assessment
5. Balance Assessment
6. Vestibular Assessment
7. Evaluation Log
8. Communication Log
9. Follow Up NCT
10. School Personnel Sign Off
11. Parent’s Sign Off
12. Coach’s Sign Off
13. Physician Sign Off
14. 2-8 Week Follow Up

1. Baseline NCT

There are several commercially available software packages.
• CNS Vital Signs @ www.concussionvitalsigns.com
• Axonsports @ www.axonsports.com
• Cogstate Sport @ www.cogsport.com
• HeadMinder CRI (Concussion Resolution Index) @ www.headminder.com
• Impact (Immediate Post-Concussion Assessment and Cognitive Testing) @ www.impacttest.com

<table>
<thead>
<tr>
<th>Test</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pencil &amp; Paper</td>
<td>8 ≤ 30 min. Extensive Psychometric Evidence Alternate forms</td>
<td>1-on-1 administration Trained examiner / interpretation No consensus on battery of tests Low reliability 8 ≤ 30 min.</td>
</tr>
<tr>
<td>Computerized NP Tests</td>
<td>Ease of administration Baseline testing Alternate forms Data storage</td>
<td>Psychometric evidence Training &amp; qualifications Interpretation Hardware/Software Issue Cost</td>
</tr>
</tbody>
</table>
Computerized Neuropsychological Testing

A recent study found computerized neuropsychological testing was used to assess fully 4.10 concussions suffered by high school athletes during the 2009-2010 school year up from one-fourth (25.7%) in the short space of just one year.

Computerized tests have four significant advantages over traditional pencil and paper neuropsychological tests:

1. Rapid scoring: tests take less time (more traditional pencil and paper neuropsychological tests usually take an hour or more to administer).
2. Ease of administration: the tests do not need to be administered by a neuropsychologist.
3. Increased test-retest reliability. Some tests allow for infinite variety in the test questions that reduce the practice or learning effects seen with more traditional neuropsychological test batteries.
4. Greater accessibility: The computerized test batteries are accessible to a wide range of clinicians, including athletic trainers and, even to parents of athletes (although experts strongly caution against use by untrained or undertrained personnel in "cookbook fashion."

Neuropsychological Testing

- Computerized programs
  - Easily accessed
  - Can be done quickly with immediate results
  - Can obtain "baseline" data on all athletes
  - Can assess reaction times and processing speed

2. Initial Assessment

Find the one you like; be certain it is used regularly and retained with date, time, mechanisms of injury, witnesses’ comments as well as conversations with the athlete’s caregivers.

Examples of concussion assessment forms include:

- Standardized Assessment of Concussion (SAC) which was designed to assess orientation, immediate memory, concentration and delayed memory and exertion maneuvers.
- The National Athletic Trainers’ Association (NATA) produced a Graded Symptom Checklist that allows a Likert-type rating of concussion-related symptoms, permitting the qualifications of severity and/or duration. www.nata.org
- Acute Concussion Evaluation (ACE) includes a myriad of components such as injury characteristics, a symptom checklist risk factors for protracted recovery, and a list of red flags for acute emergency management. It is available from the Centers for Disease Control and Prevention (CDC) www.cdc.gov/concussion
- Sports Concussion Assessment Tool 2/3 combines features from the SAC, Glasgow Coma Scale, Maddocks sideline assessment questions and balance assessments. It includes an information sheet to give to the athlete and provides immediate assessment as well as follow-up parameters.
- CDC Checklist is included within the Heads Up To Schools. Know Your Concussion ABO. The checklist provides nine observed signs, nine physical symptoms, five cognitive symptoms and four emotional symptoms to be reviewed immediately after a possible concussion and again in 5, 30 and 60 minutes post-injury and at later intervals.
3. Head History

Head History is NOT a history of this episode
You need to know something about the head/brain that was just concussed

☐ Have you had any other head/face/jaw injuries previously? Explain
☐ Are you or did you have retrograde amnesia with this injury?
☐ Have you or a family member ever been treated for migraines?
☐ Have you ever had any seizure episodes following a head injury?
☐ Do you have any allergies that produce headaches?
☐ Do you have TMJ problems?
☐ Do you have any identified learning disabilities?
☐ Do you have a 504 plan at school?
☐ Do you have an IEP at school?
☐ Have you or are you currently being treated for ADHD?

4. 7-Day Self Assessment

Consistent adult supervision and intervention is critical to ensure quality concussion care. Having the concussed athlete report daily for the initial 7-14 days to assess what they are feeling is an important step toward avoiding unforeseen difficulties.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>0 (None)</th>
<th>1 (Mild)</th>
<th>2 (Moderate)</th>
<th>3 (Severe)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headaches</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dizziness</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Sensation in ears</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vision changes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ringing in ears</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Balance</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Sleep disturbance</td>
<td></td>
<td></td>
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<tr>
<td>Nausea</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Light or noise sensitivity</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Migraines</td>
<td></td>
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<tr>
<td>Numbness</td>
<td></td>
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<tr>
<td>Tinnitus</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Days Since Injury</th>
<th>Rate how you feel the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
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<tr>
<td>2</td>
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<td>3</td>
<td></td>
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<tr>
<td>4</td>
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<tr>
<td>5</td>
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<tr>
<td>6</td>
<td></td>
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<tr>
<td>7</td>
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</tbody>
</table>
5. Balance Error Scoring System (BESS)

Developed by researchers and clinicians at the University of North Carolina’s Sports Medicine Research Laboratory, Chapel Hill, NC 27599-8700

6. Vestibular Assessment

The vestibular system sends signals primarily to the neural structures that control eye movements and to the muscles that keep us upright.

Vestibular assessments are intended to test balance when the eyes/head are made to move rapidly, eyes closed or used in coordination with body motion.
**Vestibular Sheet**

1. Feet together, eyes closed, arms horizontally at sides.
2. Repeat 1 on dominant leg only.
3. Repeat with fingers placed at about membrane and chin levels. Eyes move equally vertically with no head movement.
4. Examiner holds index fingers 12 inches in front and as wide as athlete's ears. Athlete moves eyes horizontally between the fingers rapidly. No head movement.
5. Repeat 4 with fingers 18 inches in front of athlete's eyes. Moving the fingers slowly toward athlete's nose. At what distance does convergence become blurry?

Alternatively:

To test for loss of auditory function:

6. Athlete grasps examiner's index finger and the test is repeated with examiner holding the finger at the athlete's nose. Athlete then repeats 6 with examiner holding the finger at the athlete's forehead and chin levels. No head movement.

7. Lying prone with head off table or forward flexing to touch toes count to 20 and return head up.

**Evaluation Recording Sheet**

<table>
<thead>
<tr>
<th>Date</th>
<th>Evaluation Tool Used</th>
<th>Results</th>
</tr>
</thead>
</table>

**Communications Recording Sheet**

<table>
<thead>
<tr>
<th>Date Spoke With</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td></td>
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</tbody>
</table>
9. Follow Up NCT
Post-injury NCT’s may be given while the athlete is still symptomatic. Lau et al. found that when concussed athletes were tested within 3 days of injury, slowed reaction time and impaired visual memory scores on NCT tests was highly predictive of >10 days recovery. When used in conjunction with baseline scores, NCT tests can be a valuable tool in the healthcare provider’s toolshed.

10. School Personnel Sign Off
Student-athletes are typically students more hours each day than they are athletes. Accommodations are necessary to promote healing and minimize symptoms.
• If they can’t handle their normal academic load are they really symptom free?
• Invisible effects of concussions can extend after the visible symptoms are gone.
• The importance of cognitive rest and properly timed inclusion cannot be overstated. “Return to Learn” takes priority over “Return to Play” with student-athletes.
11. Parents' Involvement

- Parents must be a part of the process
- "Take a Break!" should be the first thing parents tell their concussed child

Mental & Physical Activities VS Rest & Heal
Parents’ Involvement

Parents should work with school personnel to make academic adjustments, help athletic personnel make physical restrictions and work with the physician to oversee the entire process to monitor safe and gradual return to all activity safely.

### Parent’s Sign Off

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative changes in headache intensity</td>
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<tr>
<td>Severe changes in sleeping habits</td>
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<td>Negative personality changes; appears depressed</td>
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<tr>
<td>Lethargic, not interested in family or friends</td>
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<tr>
<td>Easily upset, loses temper quickly</td>
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<tr>
<td>&quot;Out of it&quot;; forgetful, repeats questions in 6 Step Return-to-Play process</td>
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<tr>
<td>Difficulty; balance problems; complaints of &quot;fuzzy&quot; vision</td>
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<tr>
<td>Does well one day and poorly the next</td>
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<tr>
<td>Tantrums; impulsive, irrational or aggressive at times;</td>
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<td></td>
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<tr>
<td>Has trouble maintaining mental focus</td>
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</tbody>
</table>

### 12. Coach’s Sign Off

Educated coaches are in an ideal position to observe and assess the athlete during the 6 Step Return-to-Play process. Since athletic trainers, physician or nurses often are unable to provide uninterrupted time to observe one athlete, the coach is a good alternative. The coach need only observe, inquire and then record comments about athlete’s performance.
13. Physician Sign Off

The overwhelming majority of states which have enacted legislation governing high school athletic concussion care require a physician to clear the athlete to return. Likewise, this clearance is based on successfully completing the 6-Step Return-to-Play Process from the 2008 Zurich Conference which created the Concussion Statement on Concussion in Sports: the 3rd International Conference on Concussion in Sport.
Return-to-Play Recording Sheet

Athlete __________________________
Date of Concussion ______________________
Doctor ____________________________

Step | Activity | Results/Reactions | Date
--- | --- | --- | ---

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As a physician trained in the evaluation and management of concussions, I provide the following recommendations/decisions based on my examination of this athlete and the pertinent information that I have received as indicated below:

- Head History
- Initial Sideline Assessment
- Athlete’s Symptom Self-Assessments
- Vestibular Assessments
- NCT post-injury test(s)
- Balance Assessments
- School Personnel Sign Off
- Parental Sign Off
- Coach's Sign Off
- Return-to-play steps w/ dates of completion

On this date, I make the following recommendations:

- Athlete is not cleared to return to activity including physical education
- Athlete may begin Zurich Conference 6 Steps to Return to Play
- Athlete should continue Zurich Conference 6 Steps Return to Play
- Athlete to return to see me on ____________________.
- Athlete may return upon supervised successful completion of the Zurich 6 Steps Return to Play

Signed __________________________ Date __________

Parent and Athlete Consent RTP
**Management Strategies- 8 Week Follow up**

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### SYMPTOMS

<table>
<thead>
<tr>
<th>Thinking and Learning Changes</th>
<th>Weeks</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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<tbody>
<tr>
<td>Confused or in a fog</td>
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<tr>
<td>Mixes up time and place</td>
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<td>Lower attention/concentration</td>
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<tr>
<td>Forgets difficulty with memory</td>
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<td>Gets frustrated with new learning</td>
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<tr>
<td>Homework takes longer</td>
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<td></td>
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<tr>
<td>Hard to organize thoughts or words</td>
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<tr>
<td>Misunderstands things</td>
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</tbody>
</table>

### Behavior Changes

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restless or irritable</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Impulsive actions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easily upset and loses temper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Sad or depressed mood</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Anxious or nervous</td>
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</tbody>
</table>

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### Management Strategies- 8 Week Follow up Checklist

**Post Conussion 8 Week Checklist**

<table>
<thead>
<tr>
<th>Student</th>
<th>Parent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of Concussion</td>
<td>Doctor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Changes (none = 0, some = 1, a lot = 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYMPTOMS</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Headaches</td>
</tr>
<tr>
<td>Dizzy or lightheaded</td>
</tr>
<tr>
<td>Vertigo or nausea</td>
</tr>
<tr>
<td>Numbness or tingling</td>
</tr>
<tr>
<td>Losses balance, drops things, trips</td>
</tr>
<tr>
<td>Feels worn out/exhausted, tires easily</td>
</tr>
<tr>
<td>Drowsy, sleepy or needs extra sleep</td>
</tr>
<tr>
<td>Trouble falling asleep</td>
</tr>
<tr>
<td>Light or noise sensitive</td>
</tr>
<tr>
<td>Blurry vision</td>
</tr>
<tr>
<td>Ringing in ears</td>
</tr>
</tbody>
</table>

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**Final Sign Out Check Sheet**

- Neurocognitive test (NCT) baseline test: Date Completed
- Head History: Date Completed
- Initial Sideline Assessment: Date Completed
- Athlete’s Symptom Self-Assessments: Date Completed
- NCT post-injury test (s): Date Completed
- Balance Assessments: Date Completed
- Evaluation Records: Date Completed
- Communication Log: Date Completed
- Coaches’ Sign Off: Date Completed
- School Personnel Sign Off: Date Completed
- Parental Sign Off: Date Completed
- Return-to-play Steps: Date Completed
- Physician Sign Off: Date Completed
- 8 Week Follow Up: Date Completed
- add your own: Date Completed
Beyond Education and Policy

• Rules making and enforcement
  – Leading with helmet
  – Rough play
  – Limiting contact in practice?
• Can we prevent concussions?
• Should there be a “mandatory retirement” rule?
• What if they just say, “I’m fine?”

Prevention

• “Concussion prevention” is now being marketed to parents and schools
  – Soccer head gear
  – Girl’s Lacrosse head gear/helmets
  – Pole vaulting helmet
• New football helmets, soccer head pads, mouth guards- NO PROVEN PROTECTION FROM CONCUSSION!!

Litigation on the Rise

“...our brain injury lawyers represent brain injury victims caused during high school sports ...nationwide. We have the resources and experience with complex brain injury lawsuits to fully assess your injuries and take your case to a jury. If you or your loved one has suffered a brain injury while playing high school sports, please email or call us today.”
Conclusions

• Educate
  – Everyone dealing with young athletes must be aware of the signs, symptoms, and ramifications of concussions

• Mandate or Legislate?
  – Concussion management policies must be in place at every level
  – If you don’t do it, someone will do it for you

Questions?
Contact Kent Willette
kent.willette@pearson.com
800-627-7271 ext 267147