Current Concepts in the Office Treatment of the Concussed Athlete

R. Robert Franks, D.O., FAOASM
Medical Director Jefferson Comprehensive Concussion Program
Director Sports Concussion Institute
Rothman Institute
2015 BIANJ Conference
Eatontown, New Jersey
May 14, 2015
Objectives

• To discuss history clues in the office treatment of the concussed athlete
• To discuss the physical examination clues in the office treatment of the concussed athlete
• To discuss new treatment modalities and return to play criteria
• To discuss case studies and parental notification
Introduction

- Most common head injury in athletics.
- Fewer than 10 percent result in loss of consciousness.
- Estimated 250,000 to 2.25 million concussions unidentified each year.
Introduction

• At risk sports include football, boxing, hockey, wrestling, gymnastics, lacrosse, soccer, cheerleading and basketball.

• Once a concussion has occurred, a player is 4 to 6 times more likely to sustain a second concussion.
History

• Previous definitions of concussion limited in ability to truly define the symptoms of concussion.

• Previous definitions were unable to include minor impact injuries that result in persistent physical and/or cognitive symptoms.
Definition

• Applicable to children under age five through adulthood.
• “Concussion is defined as a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces. Several common features that incorporate clinical, pathological, and biomechanical injury constructs that may be used to define concussive head injury include the following:”
Definition

1. Caused either by a direct flow to the head, face, neck, or elsewhere on the body with an “impulsive” force transmitted to the head.

2. Typically results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously.
Definition

• 3. May result in neuro-pathological changes, but the acute clinical symptoms largely reflect a functional disturbance rather than structural injury.

• 4. Results in a graded set of clinical syndromes that may or may not involve loss of consciousness. Resolution of the clinical and cognitive symptoms typically follows a sequential course.
Definition

• 5. Typically associated with grossly normal structural neuroimaging studies.
Before Exam Begins

- Watch athlete walk to exam room
- CT Scan if done
- Computerized Neurocognitive Test Baseline and any post-tests
- SCAT3 or BESS Scores
- PPE of athlete with complete concussion history
- PHONE NUMBER OF YOUR ATC AT YOUR ATHLETE’S SCHOOL
Parental Notification

• Understand often parents know less about concussion then often realized – even in the presence of good scholastic education

• Understand medical advice varies greatly on the internet, between practitioners and among cases themselves.
Parental Notification

• Use best clinical judgment – symptoms often are delayed in onset
• Discuss school policy/state law requirements
• Use optometric examination
• Discuss time missed – one game is better than missing most of season
• Use examples parents can relate to – League of Denial, Real Sports
• Refer to NGB of patient’s sport
• Concussion is underreported and often unrecognized
• Do not have to involve loss of consciousness
• Number of symptoms has been associated with worse prognostic recovery
• Headache is most often reported symptom
• The adolescent brain recovers slower than the adult brain
• Emerging female predominance
Key Historical Points

• If an athlete has had a concussion, they are 4-6 times more likely to have a second
• Subsequent hits, although lesser in nature, may produce worse symptoms
• Thus, a complete history of past concussions, with emphasis on LOC and type of amnesia is critical
• Athletes with co-morbid headache history or associated ADHD may need special consideration
Key Historical Questions

• How many head injuries has the patient had in the past?
• How did they occur?
• What type of symptoms did they have?
• How long did the symptoms last?
• Were they associated with LOC or amnesia, and what type?
Key Historical Questions

- Do they have a pressure headache and does it get worse with school or exertion?
- Do they get dizzy with movement?
- Do they get fatigued at a certain point in the day?
- Are they more sensitive to light/noise?
- Are they more distracted?
- Are they have trouble falling/staying asleep?
- Are they more moody/irritable?
Key Historical Questions

• Do they feel “foggy”?  
• How many practices/competitions did they miss?  
• Did the symptoms affect classes and their grades?  
• How long did it take them to “feel themselves”?  
• Did they have any “dings” or hits to chest, neck, or face that radiated to head that were unreported as concussion?
UPMC Symptom Categorization

- Cervicogenic
  - Dysfunction to the cervical spine
UPMC Symptom Categorization

• Cognitive Symptoms
  – Attention Problems
  – Dysfunction
  – Fogginess
  – Fatigue
  – Cognitive Slowing
UPMC Symptom Categorization

- Emotionality
  - More emotional
  - Sadness
  - Nervousness
  - Irritability
UPMC Symptom Categorization

- Sleep Disturbance
  - Difficulty falling asleep
  - Sleeping less than usual
UPMC Symptom Categorization

• Vestibular

  – Ability of ophthalmologic and neurological systems and body (eyes, brain, and body) to work together
UPMC Symptom Categorization

• Ocular
  – Ability of ophthalmologic system to work appropriately
  – Are vergence and divergence, smooth pursuits, saccades, accommodation, convergence, VOR and VOR cancellation appropriate,
Optometric Affectation

- Disturbances to the visual system secondary to concussion is known as Post Trauma Vision Syndrome
- Several problems in the visual system may result from PTVS
Optometric Affectation

- Common disturbances with PTVS:
  - Tear Film Integrity
    - Distorted clarity or gritty sensation varies with blinking
  - Light Dark Adaptation
  - Light Sensitivity
Optometric Affectation

• Common disturbances with PTVS:
  Visual Field Integrity
    Loss of portion of visual field
  Accommodation
    Constant or transient blur
Optometric Affectation

• Common disturbances with PTVS:
  Versional Ocular Motility
    Difficulty sustaining or shifting gaze or inability to track targets
  Vergence Ocular Motility
    Constant or transient eyestrain or diplopia
Optometric Affectation

• Most common PVTS afflictions:
  – Vergence 56.3%
  – Versions 51.3%
  – Accommodation 41%
  – Strabismus 25.6%
  – CN Palsy (Most Common III) 6.9%
Optometric Conditions

• Optometric Issues
  – Convergence Insufficiency
    • Important for reading
    • Inability to use two eyes together as a team
  – Oculomotor Dysfunction
    • Permits accurate visual scanning and exploration
    • Important for reading and copying from board
    • Inability for eyes to together track a moving target and switch fixation from one target to another
Optometric Conditions

• Optometric Issues
  – Accommodative Infacility
    • Important for academic efficiency and comfort to focus on an object – i.e. copy from blackboard
    • Inability to allow rapid and accurate shifts of attention from one distance to another with instantaneous clarity
    • Inability to allow student to maintain focus at reading distance
Optometric Conditions

• Ophthalmologic Issues
  – Visual Intake-Visual Memory
    • Allows for optimal academic and athletic performance as affects proficiency in reading comprehension and spelling
    • Inability to obtain maximum visual information in the shortest possible time
    • Inability to retain this information over an adequate period of time
Optometric Conditions

- **Ophthalmologic Issues**
  - **Visual Motor Integration Deficit**
    - Inability to analyze a visual stimulus, integrate that information with other systems, and produce a motor response (inappropriate eye-hand coordination)
    - Needed to produce written language
  - **Fusional Instability**
    - Inappropriate binocular function
    - Needed for near and distant visual tasks
    - Cause of blur or double vision
Vestibular Affectation

• Anatomy
  – Central Vestibular System
    • Vestibular Nuclei
    • Cerebellum
    • Autonomic Nervous System
    • Thalamus
    • Cerebral Cortex
Vestibular Affectation

• Anatomy
  – Peripheral Vestibular System
    • Semicircular Canals
    • Otoliths – Utricle and Saccule
    • Vestibular Ganglia
    • Vestibular Nerve
Vestibular Affectation

- 2 systems affected
  - Vestibular Ocular Reflex System (VOR)
    - Stabilizes vision while head moves
  - Vestibular Spinal Reflex (VSR)
    - Balance control
Vestibular Symptoms

• Aural Symptoms
  – Tinnitus, fullness or hearing changes usually have worse prognostic recovery
  – May indicate a mixed central and peripheral vestibular disturbance that allows for slower and often incomplete recovery
Vestibular Symptoms

• Dizziness and Motion Dysfunction
  – Feeling of unease with fluid stimuli
  – Inability to seamlessly maneuver
  – Increased awareness of normal motion
  – Often coexists with migraine (migraine induced dizziness) or anxiety (migraine anxiety related dizziness)
Vestibular Symptoms

• Causes of Dizziness Status Post Concussion
  
  – Inner Ear
    • Benign Paroxysmal Vertigo
    • Labyrinthine Concussion
    • Perilymphatic Fistula
Vestibular Symptoms

• Causes of Dizziness Status Post Concussion
  – Central
    • Post Traumatic Migraine Related Dizziness
    • Brainstem Concussion
    • Autonomic Dysregulation/Postural Hypotension
    • Ocular Motor Abnormalities
    • Seizure
Vestibular Symptoms

• Causes of Dizziness Status Post Concussion
  – Cervicogenic Dizziness
Physical Examination

Vitals
Speech
Gait analysis
DTRs
MS UE and LE b/l
Sensation UE and LE b/l
Cranial Nerve Examination
Physical Examination

Romberg Test (Balance and Motor Coordination)
Pronator Drift Test (Upper Motor Neuron Testing)
Tandem Walk (Coordination)
Heel to Shin (Balance and Coordination)
Finger to Nose (Point to Point Coordination)

VOMS – Vestibular-Ocular Motor Screen
Vestibular Examination

• Ocular Motor Testing
  – Gaze holding/fixation
  – Pursuits
  – Saccades
  – Optokinetic Nystagmus
  – Convergence
  – Alignment
  – Vestibulo Ocular Reflex (VOR)
Vestibular Examination

- Ocular Motor Testing
  - Gaze Fixation
    - Maintain eye fixation on target without drift
    - Tested in neutral and up to 9 planes and in light and dark
    - Look for rebound nystagmus
      - Eye movement to direction of last movement after return to center
Vestibular Examination

• **Ocular Motor Testing**
  - **Smooth Pursuits**
    • Eyes follow a target
  - **Saccades**
    • Quick movement of eyes between targets
  - **Convergence**
    • Ability to focus on near target
    • Watch for convergence spasm
Vestibular Examination

• Ocular Motor Testing
  – Ocular Alignment
    • Look for misalignment – strabismus or lazy eye
      – Cover/Uncover Test
      – Cross Cover Test
      – Maddox Rod
Vestibular Examination

• Ocular Motor Testing
  – Vestibulo-Ocular Reflex (VOR)
    • Ability to focus on stationary object while moving head without blurriness or dizziness
  • Tests
    – Head Thrust Test
    – Clinical Dynamic Visual Acuity Test
    – Head Shake Nystagmus Test
VOMS Physician Examination

2. Saccades Testing

- Point to Point Discrimination in horizontal and vertical planes (Fingers 12 inches apart and patient looks between them for 15 seconds.)

- Look for latency of onset, speed, accuracy and conjugate movement. Test failure is delayed, inaccurate saccades or disconjugate eye movement.
3. Vestibulo-Ocular Reflex (VOR) – Gaze Stability

- Ability to focus on stationary object while moving head without blurriness or dizziness

- Do with examiner finger stationary and patient moving head side to side while fixating on stationary finger

- Test in horizontal and vertical plane for 15 seconds

- Look for inability to hold focus
4. Fixation Suppression Test

- Response to optokinetic stimulation
- Patient focus on thumb as it moves side to side following its own thumb
- Look for inability to follow fixated object
5. Near Point Convergence Convergence Dysfunction Test

- Focus on writing on pen 6 cm from nose bridge
- Look for diplopia at greater than 6 cm
6. Test of Near Point Accommodation
   - Cover one eye
   - Bring object to face
   - Should accommodate – see clear at 15 cm
   - Can fatigue system by bringing closer
Ocular Assessment

• King Devick Test
  – Test of speed and accuracy of the visual system
  – Looks specifically at oculomotor function and saccades
  – Subject gets one practice trial and three test trials
  – Timing added from all three tests after concussion is often compared to baseline of time necessitated to take the test when not concussed
Vestibular Examination

- BESS (Balance Error Scoring System)
  - 3 Tests 6 different balance conditions lasting 20 seconds
  - Score determined by amount of errors recorded during different balance conditions – one point for each error
  - Increased error reflect increased problems with balance and coordination post concussion
Vestibular Examination

• Balance Testing
  – Patient self report (Activity Specific Confidence Scale or Falls Efficacy Scale)
  – BPPV Testing
  – Sway Balance
  – Testing Platform (i.e. Biosway)
  – Computerized Dynamic Posturography
Vestibular Examination

- Balance Testing
  - Dynamic Gait Index
  - Functional Gait Assessment
  - HiMAT (High Level Mobility Assessment Tool)
  - Dual Cognitive Task Paradigms
  - Five Time Sit to Stand
  - Timed Up and Go Test (TUG)
Vestibular Examination

• Dizziness and Motion Dysfunction Testing

  • VOR Cancellation
  
  • DHI – Dizziness Handicap Inventory
  
  • CTSIB – Clinical Test of Sensory Integration on Balance (Foam and Dome)
Classification

- Panel adopted that 80-90% of all concussions resolve in short 7-10 day period
Imaging

- Vienna conference recognized that conventional neuroimaging is usually normal.
- Use in cases where there is suspicion of cerebral bleed, prolonged disturbance of conscious state, focal neurological deficit, seizure activity or persistent clinical or cognitive symptoms.
Imaging

• CT usually test of choice as it will rule out an acute epidural or subdural hemorrhage.
• Athletes with concussion usually have normal CT scans and MRI scans.
Imaging

• Additional Neuroimaging Considerations
  – MRI (with DTI)
    • Use of gradient echo, perfusion and diffusion weighted images better choice to distinguish structural brain abnormalities
  – PET Scan
    • Used often in concussion research but not yet standard of care
  – Magnetic resonance spectroscopy
  – Functional connectivity
Imaging

• fMRI
  – Administration of MRI while patient undergoes cognitive challenge
  – See signaling in dorsolateral pre-frontal cortex corresponding to memory centers of brain
  – These areas often correspond with areas with altered brain metabolism seen with concussion research studies
Neuropsychological Assessment

• Most often done in asymptomatic athletes to aid in return to play decisions.
• Acceptable to do in symptomatic child and adolescent athletes to determine management.
• Should not be sole basis for management or return to play decisions but aid in clinical decision making.
Neuropsychological Assessment

• Should test cognitive domains of information processing, planning, memory, and switching mental set.

• Examples of tests include pen and paper tests, comprehensive protocols administered by neuropsychologists, and computerized test platforms.

• Ideally, there should be baseline pre-season testing followed by post-injury serial follow-up, especially true for elite athletes.
Neuropsychological Assessment

• Gold standard remains formal neuropsychological examination by a trained neuropsychologist ideally trained in Sports Medicine

• Today, most often, computer neuropsychological testing is performed on athletes for rapid screen and to assess recovery.

• These tests include ImPACT, CogSports, Head Minders, and CNS Vital Signs to name a few
Neuropsychological Assessment

- Computer neuropsychological testing looks at the following domains:
  - Verbal memory
  - Visual memory
  - Visual motor speed component
  - Reaction time
### InPACT Clinical Report

**Impact Application**

<table>
<thead>
<tr>
<th>Organization</th>
<th>[ ]</th>
</tr>
</thead>
</table>

**Date of Birth:**
- Gender: Female
- Age: 17
- Height: 63 inches
- Weight: 150 lbs

**Nationality:**
- Nationality: United States of America
- Ethnicity: [ ]

**English Language:**
- Years speaking: 5

**Years of education completed excluding night school:**
- 0

**Diagnosed learning disability:**
- No

**Attended special education classes:**
- No

**Current sport:**
- Soccer

**Current level of participation:**
- High school

**Number of times diagnosed with a concussion (including current injury):**
- 4

**Concussions that resulted in loss of consciousness:**
- 1

**Concussions that resulted in loss of consciousness:**
- 4

**Concussions that resulted in difficulty remembering events that occurred immediately after injury:**
- 4

**Concussions that resulted in difficulty remembering events that occurred immediately before injury:**
- 4

**Total time missed as a result of all concussions (in days):**
- 2

**Concussion date:**
- 9/30/2013, 6/18/2014, 9/30/2014, 11/1/2014

**Treatments for headaches or dizziness:**
- Yes

**Neurological symptoms:**
- Yes

**Prior history of concussions:**
- Yes

**Treatments for depression:**
- Yes

**Treatments for anxiety:**
- Yes

**History of neck pain:**
- Yes

**Treatments for neck pain:**
- Yes

**Treatments for headaches:**
- Yes

**Treatments for vertigo:**
- Yes

**Treatments for dizziness:**
- Yes

**Treatments for memory:**
- Yes

**Treatments for balance:**
- Yes

**Treatments for depression:**
- Yes

**Treatments for anxiety:**
- Yes

**Treatments for neck pain:**
- Yes

**Treatments for headaches:**
- Yes

**Treatments for vertigo:**
- Yes

**Treatments for dizziness:**
- Yes

**Treatments for memory:**
- Yes

**Treatments for balance:**
- Yes
### ImPACT® Clinical Report

**ImPACT® Applications**

<table>
<thead>
<tr>
<th>Task Type</th>
<th>Name</th>
<th>Post-concussion</th>
<th>Post-concussion</th>
<th>Pre-concussion</th>
<th>Pre-concussion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>09/04/2006</td>
<td>05/05/2006</td>
<td>09/01/2005</td>
<td>05/05/2006</td>
</tr>
</tbody>
</table>

#### Word Memory

- **RPG 0-7**:
  - Hits (correct): 9
  - Misses (incorrect): 11
  - Trials: 12
  - Percentage correct: 57%
- **RPG 0-3**:
  - Hits (correct): 11
  - Misses (incorrect): 12
  - Trials: 12
  - Percentage correct: 93%

#### Design Memory

- **Hits (correct)**:
  - Trials: 11
  - Percentage correct: 8%
- **Misses (incorrect)**:
  - Trials: 11
  - Percentage correct: 9%

#### Visual Matching

- **Total correct (visual)**:
  - Trials: 11
  - Percentage correct: 8%
- **Total miss (visual)**:
  - Trials: 11
  - Percentage correct: 9%

#### Color Matching

- **Total correct**:
  - Trials: 11
  - Percentage correct: 8%
- **Total miss**:
  - Trials: 11
  - Percentage correct: 9%

#### Three Letters

- **Total response correct**:
  - Trials: 11
  - Percentage correct: 5%
- **Total trials correct**:
  - Trials: 11
  - Percentage correct: 10%
- **Percentage of trials correct**:
  - Trials: 11
  - Percentage correct: 8%

#### Reading Difficulty

- **Total trials correct**:
  - Trials: 11
  - Percentage correct: 5%
- **Total trials correct**:
  - Trials: 11
  - Percentage correct: 10%
### ImpACT® Clinical Support

**ImpACT Applications**

<table>
<thead>
<tr>
<th>Date Tested</th>
<th>Baseline</th>
<th>Post-concussion</th>
<th>Post-concussion</th>
<th>Post-concussion</th>
<th>Post-concussion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>06/14/2005</td>
<td>07/16/2005</td>
<td>08/20/2005</td>
<td>09/18/2005</td>
<td>10/22/2005</td>
</tr>
<tr>
<td>Last Concussion</td>
<td>06/14/2005</td>
<td>07/16/2005</td>
<td>08/20/2005</td>
<td>09/18/2005</td>
<td>10/22/2005</td>
</tr>
</tbody>
</table>

**Composite Scores**

- Memory Immediate Recall: 0%
- Memory Immediate Recall* 75%
- Memory Immediate Recall Delay: 75%
- Visual Motor Speed Composite: 54.0
- Auditory Memory Composite: 45.9
- Executive Composite: 85.0

**Consensus**

- Loss of consciousness
- Retrospect amnesia
- Amnesia of events
- Confusional state
- Balance disorder
- Temporal discord
- COTSD: size of head
- Multisystem injury
- Multisystem evaluation

**Description of injury and additional information**

---

The information provided by this expert should be viewed as only one source of information regarding the athlete's level of function. Diagnostic or return to play decisions should not be based solely on the data generated by ImpACT. This report should be considered as one piece of information in conjunction with other clinical findings. The athlete's return to play should be determined by the treating physician and should be followed carefully by the athlete's primary care provider.

Consultation is recommended to help facilitate proper interpretation of this report and standard. For consultation please contact: Dr. Mark Brotzman or Dr. Karen Colina of the University of Pittsburgh Center for Sports Medicine. To arrange for proper interpretation of the test, please call the above contact person for the state you reside.
ImPACT Critical Numbers

- Verbal memory – 90
- Visual memory – 80
- Visual Motor Speed Composite – 40
- Reaction Time – less than 0.55
- Symptom Score – 9
ImPACT RCI Scores

- Verbal memory – greater than 8.75
- Visual memory – greater than 13.5
- Visual Motor Speed Composite – greater than 4.98
- Reaction Time – greater than 0.06
- Symptom Score – greater than 9.6
# Impact® Clinical Report

**Impact Applications**

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Baseline</th>
<th>Post-concussion</th>
<th>Post-concussion</th>
<th>Post-concussion</th>
<th>Post-concussion</th>
<th>Post-concussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Nausea</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Vomiting</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Balance Problems</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dizziness</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fatigue</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Trouble falling asleep</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sleeping more than usual</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sleeping less than usual</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Drowsiness</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sensitivity to light</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sensitivity to noise</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Irritability</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sneeze</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nasal congestion</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Feeling more emotional</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Membranes or leaking</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Feeling slowed down</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Feeling mentally foggy</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Difficulty concentrating</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Difficulty remembering</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Visual problems</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total Symptom Score</td>
<td>57</td>
<td>23</td>
<td>9</td>
<td>26</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

**Page 4**  10/20/2020 23504
# ImPACT Clinical Report

ImPACT Applications

<table>
<thead>
<tr>
<th>Baseline</th>
<th>Hours slept last night</th>
<th>Mediation</th>
<th>Subject comments</th>
<th>Supervisor comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10.0</td>
<td></td>
<td>INSTRUCTIONS: the instructions were clear</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>COMPUTER: keyboard was fine except sensitive when typing in inc at the beginning</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ENVIRONMENT: environment was good</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Supervisor comments</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Post-concussion</th>
<th>Hours slept last night</th>
<th>Mediation</th>
<th>Subject comments</th>
<th>Supervisor comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-concussion</td>
<td>Hours slept last night</td>
<td>Mediation</td>
<td>Subject comments</td>
<td>Supervisor comments</td>
</tr>
<tr>
<td></td>
<td>7.6</td>
<td>admixture</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-concussion</td>
<td>Hours slept last night</td>
<td>Mediation</td>
<td>Subject comments</td>
<td>Supervisor comments</td>
</tr>
<tr>
<td></td>
<td>7.6</td>
<td>arimidine</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The information provided by this report should be viewed as only one source of information regarding the athlete's level of functioning. Decisions or return-to-play decisions should not be based solely on the data generated by ImPACT but should be based on an evaluation by medical personnel in accordance with usual and standard medical practice. If an athlete is suspected of suffering a concussion, an injury or concussion, this individual should be evaluated by medical personnel and should be followed carefully for the emergence of symptoms.

Consultation is recommended to have a facilitated proper interpretation of the outlined test scores. For consultation please feel free to contact Dr. Mark Lovell or Dr. Wesley Collins at the University of Pittsburgh Center for Sports Medicine. To reinforce proper interpretation of the test data, there will be no charge for the initial post-injury consultation.

Dr. Mark Lovell can be reached at:
412-648-5610 (Office)
412-648-5610 (Pager)
lmlovell@gruhs.pitt.edu

Dr. Wesley Collins can be reached at:
412-648-5610 (Office)
412-648-5610 (Pager)
collinsw@gruhs.pitt.edu
Case One

- 10 y. o. white male basketball player
- Concussion caused by collision and kick to head
- No LOC, RGA, PTA
- Concussed one month with main complaint of HA, nausea, dizziness, foggy, slowed down, drowsy
- PMH of Personal Headache
- No history of past developmental or psychiatric issues.
- History of 5 past concussions – one with LOC
Case One

- 15 y. o. white female soccer player
- Concussion caused by hit to head on team bus
- No LOC, PTA, RGA for hit itself
- Main complaints headache and balance issues
- No history of past headache, developmental or psychiatric issues.
- One past concussion 10/12 with no loss of consciousness, no amnesia
### New Concussion Evaluation

**Injury Information**
- **Date:** 2/2013
- **Sport:**

#### Injury Description:
- Field trip, hit head on bus window.
- SIS: HA was in school, but not full days. Until Summer break. No problem over Summer. SIS once school started, saw PEP, saw neurology.

#### Symptoms:
- Evidence of forcible blow to the head: Y
- Evidence of skull fracture: Y
- Location of impact:
- Retrograde Amnesia: Y
- Duration: __________
- Anterograde Amnesia: Y
- Duration: __________
- Loss of Consciousness: Y
- Duration: __________

#### Immediate Treatment:
- Athletic Trainer: Y
- Emergency Room: Y
- Diagnostic Imaging: ______

#### Symptom Checklist (Score: ______)

<table>
<thead>
<tr>
<th>PHYSICAL (10)</th>
<th>COGNITIVE (4)</th>
<th>SLEEP (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>Feeling mentally foggy</td>
<td>Drowsiness</td>
</tr>
<tr>
<td>Nausea</td>
<td>Feeling slowed down</td>
<td>Sleeping less than usual</td>
</tr>
<tr>
<td>Vomiting</td>
<td>Difficulty Concentrating</td>
<td>Sleeping more than usual</td>
</tr>
<tr>
<td>Balance Problems</td>
<td>Difficulty Remembering</td>
<td>Trouble falling asleep</td>
</tr>
<tr>
<td>Dizziness</td>
<td>COGNITIVE TOTAL:</td>
<td>SLEEP TOTAL:</td>
</tr>
<tr>
<td>Visual Problems</td>
<td>EMOTIONAL (4)</td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td>Irritability</td>
<td>Exertion:</td>
</tr>
<tr>
<td>Sensitivity to light</td>
<td>Sadness</td>
<td>Physical Activity:</td>
</tr>
<tr>
<td>Sensitivity to noise</td>
<td>More emotional</td>
<td>Cognitive Activity:</td>
</tr>
<tr>
<td>Numbness/Tingling</td>
<td>Nervousness</td>
<td>Y</td>
</tr>
<tr>
<td>PHYSICAL TOTAL:</td>
<td></td>
<td>NA</td>
</tr>
</tbody>
</table>

#### Previously Diagnosed Concussions:

<table>
<thead>
<tr>
<th>Month</th>
<th>Year</th>
<th>Activity</th>
<th>RA</th>
<th>AA</th>
<th>LOC</th>
<th>How Long</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>10</td>
<td>car-trunk</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>2-7 weeks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td></td>
</tr>
</tbody>
</table>

#### Developmental History
- Learning Disability:
- ADD/ADHD:
- Other:
## Case One

<table>
<thead>
<tr>
<th>Exam Type</th>
<th>Baseline</th>
<th>Post-Injury 1</th>
<th>Post-Injury 2</th>
<th>Post-Injury 3</th>
<th>Post-Injury 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Tested</td>
<td>08/26/2013</td>
<td>07/23/2014</td>
<td>08/20/2014</td>
<td>09/17/2014</td>
<td>02/25/2015</td>
</tr>
<tr>
<td>Last Concussion</td>
<td>05/05/2013</td>
<td>05/04/2014</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exam Language</td>
<td>English</td>
<td>English</td>
<td>English</td>
<td>English</td>
<td>English</td>
</tr>
<tr>
<td>Test Version</td>
<td>2.1</td>
<td>2.1</td>
<td>2.1</td>
<td>2.1</td>
<td>2.1</td>
</tr>
</tbody>
</table>

### Composite Scores

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory composite (verbal)</td>
<td>66 (1%)</td>
<td>87 (49%)</td>
<td>89 (59%)</td>
<td>85 (44%)</td>
<td>99 (97%)</td>
</tr>
<tr>
<td>Memory composite (visual)</td>
<td>46 (1%)</td>
<td>53 (5%)</td>
<td>58 (12%)</td>
<td>60 (15%)</td>
<td>79 (88%)</td>
</tr>
<tr>
<td>Visual motor speed composite</td>
<td>31.73 (16%)</td>
<td>34.55 (28%)</td>
<td>36.13 (37%)</td>
<td>36.72 (38%)</td>
<td>40.8 (51%)</td>
</tr>
<tr>
<td>Reaction time composite</td>
<td>0.63 (30%)</td>
<td>0.62 (33%)</td>
<td>0.68 (14%)</td>
<td>0.69 (12%)</td>
<td>0.59 (34%)</td>
</tr>
<tr>
<td>Impulse control composite</td>
<td>4</td>
<td>5</td>
<td>8</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Total Symptom Score</td>
<td>36</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

Cognitive Efficiency Index: 0.17 0.38 0.4 0.52 0.48
Case Two

- 14 y. o. white female soccer player
- Concussion caused by hit to head on ground after slide tackle
- No LOC, RGA, PTA for “indeterminate” number of seconds
- Complaints of all symptomatology except vomiting, numbness/tingling, and noise sensitivity
- History of past migraine headache on Topamax, significant anxiety disorder on Lexapro, no developmental or past concussion history
Case Two

Injury Information:
- Date: 9/1/14
- Sport: PE
- Soccer tackle by classmate, hit back of head on grass
- Sis: Sore vision, headache, nausea, no ete
- Dr: 9/21 - recommended rest, no school until 11/20
- 112 days now

- Evidence of forcible blow to the head: Y
- Evidence of skull fracture: N
- Location of impact:
- Anterograde Amnesia: Y
- Duration: 
- Retrograde Amnesia: Y
- Duration: 
- Loss of Consciousness: Y
- Immediate Treatment
- Athletic Trainer: Y
- Emergency Room: N
- Diagnostic Imaging: CT Scan

Symptom Checklist (Score: 0)

<table>
<thead>
<tr>
<th>Physical (10)</th>
<th>Cognitive (4)</th>
<th>Sleep (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>Feeling mentally foggy</td>
<td>Drowsiness</td>
</tr>
<tr>
<td>Nausea</td>
<td>Feeling slowed down</td>
<td>Sleeping less than usual</td>
</tr>
<tr>
<td>Vomiting</td>
<td>Difficulty Concentrating</td>
<td>Sleeping more than usual</td>
</tr>
<tr>
<td>Balance Problems</td>
<td>Difficulty Remembering</td>
<td>Trouble falling asleep</td>
</tr>
<tr>
<td>Dizziness</td>
<td>COGNITIVE TOTAL:</td>
<td>SLEEP TOTAL:</td>
</tr>
<tr>
<td>Visual Problems</td>
<td>EMOTIONAL (4)</td>
<td>Exertion:</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Irritability</td>
<td>Physical Activity:</td>
</tr>
<tr>
<td>Sensitivity to light</td>
<td>Sadness</td>
<td>Y</td>
</tr>
<tr>
<td>Sensitivity to noise</td>
<td>More emotional</td>
<td>N</td>
</tr>
<tr>
<td>Numbness/Tingling</td>
<td>Nervousness</td>
<td>Y</td>
</tr>
<tr>
<td>PHYSICAL TOTAL:</td>
<td>EMOTIONAL TOTAL:</td>
<td>Cognitive Activity:</td>
</tr>
</tbody>
</table>

Previously Diagnosed Concussions:

Developmental History:
- Learning Disability: 
- ADD/ADHD: 
- Other: 

Smartboards, math
# Case Two

<table>
<thead>
<tr>
<th>Exam Type</th>
<th>Post-Injury 1</th>
<th>Post-Injury 3</th>
<th>Post-Injury 4</th>
<th>Post-Injury 1</th>
<th>Post-Injury 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Tested</td>
<td>11/11/2014</td>
<td>01/13/2015</td>
<td>02/03/2015</td>
<td>03/10/2015</td>
<td>04/10/2015</td>
</tr>
<tr>
<td>Last Concussion</td>
<td>09/18/2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exam Language</td>
<td>English</td>
<td>English</td>
<td>English</td>
<td>English</td>
<td>English</td>
</tr>
<tr>
<td>Test Version</td>
<td>2.1</td>
<td>2.1</td>
<td>2.1</td>
<td>2.1</td>
<td>2.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Composite Scores</th>
<th>Percentile scores if available are listed in small type.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory composite (verbal)</td>
<td>66 1%</td>
</tr>
<tr>
<td>Memory composite (visual)</td>
<td>44 1%</td>
</tr>
<tr>
<td>Vis. motor speed composite</td>
<td>25.63 1%</td>
</tr>
<tr>
<td>Reaction time composite</td>
<td>0.75 5%</td>
</tr>
<tr>
<td>Impulse control composite</td>
<td>14</td>
</tr>
<tr>
<td>Total Symptom Score</td>
<td>70</td>
</tr>
</tbody>
</table>

Cognitive Efficiency Index: 0.04 0.02 0.14 0.33 0.21
Treatment Goals

- Prevent Second Impact Syndrome
- Prevent cumulative effects of concussion
- Prevent Post Concussion Syndrome
- Alleviate symptoms
First Line Overall Treatment

• Athlete should be placed at complete mental and physical rest
  – Includes
    • NO PE
    • NO tests/quizzes/projects
    • No video games
    • No texting
    • Limited computer
    • No concerts
    • No loud indoor events
    • No long TV watching or reading
Vestibular Therapy

- Helps with dizziness, vertigo, balance, and vision/visual discrimination associated with concussion
- Uses current VT, PT and OT maneuvers
- May be used alone or as adjunct therapy
Vestibular Therapy

• Mean duration of vestibular therapy in significant concussions can be as long as 33 days
Vestibular Therapy

• 5 Main Categories of Exercise
  – Eye-Head Coordination
    • Involve movement of head and/or eyes for purpose of VOR gain adaptation, symptom habituation or oculomotor re-education
Vestibular Therapy

• 5 Main Categories of Exercise
  – Eye-Head Coordination
    • Exercises
      o VOR x 1
      o VOR Cancellation
      o Smooth Pursuits
      o Anticipatory Gaze Shifts
      o Imagined Target
      o Saccades
Vestibular Therapy

• 5 Main Categories of Exercise
  – Sitting Balance Exercises
    • Maintain balance while sitting upright, weight shifting side to side or bouncing
Vestibular Therapy

• 5 Main Categories of Exercise
  – Standing Static Balance Exercises
    • Patient stands with feet in place while upright or weight shifting
    • Can be asked to stand on one leg, stand on a rocker board, or stand with one foot on a step
    • Includes the sit to stand exercise
Vestibular Therapy

• 5 Main Categories of Exercise
  – Standing Dynamic Balance Exercises
    • Patient stands and moves without walking
    • Patient may march in place, step forward, step backward, step to the side, step up and down, or turn around
Vestibular Therapy

• 5 Main Categories of Exercise
  –Ambulation Exercise
    • Patient walks forward, backward, on stairs, with turns and practices braiding, skipping, jogging, and running
Vestibular Therapy

- 5 Main Categories of Exercise
  - 10 modifiers to describe exercise characteristics
    - Posture
    - Surface
    - Size of base support
    - Position of trunk
    - Position of arms
Vestibular Therapy

• 5 Main Categories of Exercise
  – 10 modifiers to describe exercise characteristics
    • Direction of head movements
    • Direction of whole body movements
    • Visual input
    • Presence or absence of a dual cognitive task
    • Special circumstances
Vestibular Therapy

• 5 Main Categories of Exercise
  – Exercises are recorded in frequency and duration
Vestibular Therapy

• Most commonly prescribed exercises
  – Eye-head coordination – 95%
  • VOR x 1
  • VOR Cancellation
  • Convergence
Vestibular Therapy

• Most commonly prescribed exercises
  – Static Balance – 88%
    • Standing upright on level and foam surfaces
    • Single leg stance
    • Weight shifting exercises in various directions
    • Sit to stand
Vestibular Therapy

• Most commonly prescribed exercises
  – Ambulation – 76%
    • Forward
    • Backward
    • Walking with turns
Vestibular Therapy

• Maneuvers
  – Gaze Stability Training
  – Eye and Head Motion Training
  – Binocular Vision Exercises
    • Dot Card
    • Brock String
    • Pencil Push Ups
    • Two Targets
  – Oculo-motor Exercises
    • Increases coordination between eyes, brain and vestibular system
Vestibular Therapy

• Maneuvers
  – Epley Maneuver
    • Treats positional vertigo
  – Balance Retraining
    • Improves balance by having brain use all systems affecting balance
  – Motion Tolerance Exercises
    • Retrains brain to adapt to specific movements without dizziness
Vestibular Therapy

• Maneuvers
  – Cervicogenic Rehabilitation
    • Manual Therapy
    • ROM
    • Strength Training
    • Injection
    • OMT
    • Accupuncture
Vestibular Therapy

• Maneuvers
  – Exertional Tolerance Activity
    • Bike
    • Treadmill
    • Resistance Training
    • Sports Specific Activity
Psychological Treatment

• Definitive application in concussion.
• Significant benefit to treat affective symptoms such as depression often associated with concussion.
• Early recognition and intervention is key in treatment.
Cognitive Therapy

- Written as last part of neuropsychological assessment
- Can be done in out-patient or school setting
- Breaks cognition into component parts and uses cues and retraining to assist and reteach learning
- May assist in shaping IEP or 504 plans
Optometric Treatment

• Treatment may be intra-office or via home
• Can often be done with spectacle use and computers
Optometric Treatment

• Treatment Modalities
  – Anti-refractive coating and corrective lenses
  – Correcting prism
    • High convergence excess
    • Vertical deviations
    • Fixation disparities
    • Selective Occlusions
Optometric Treatment

• Treatment Modalities
  – Yoked Prism
    • Visual Midline Shift Syndrome
    • Progressive Supra Nuclear Palsy
    • Visual Field Defects
    • Certain Visual Perceptual Processing Defects
    • Ocular Motion Restriction
Optometric Treatment

• Treatment Modalities
  – True Optometric Rehabilitation
    • Improve convergence and eye teaming abilities
    • Improve accommodative ability
    • Improve visual tracking skills
    • Improve short term visual memory
    • Done via intra office exercises using charting, tracking and computers and can also be then transferred to home computer
Pharmacological Treatment

• Should be performed by those experienced in treating concussion.

• Should be done in one of two of following instances:
  – Control of specific symptoms in concussion.
  – To modify the underlying pathophysiology of concussion to shorten the symptom duration.
Pharmacological Treatment

• NSAIDs should be avoided as they can cause rebound headache. Use Acetaminophen only in those under 18.

• Ultracet can be used in those over 18 and without co-morbid seizure disorder.

• Consider the use of vitamin therapy
  – B2
  – Mg
  – Coenzyme Q
  – Vitamin E
Somatic Symptoms

• Vestibular Therapy
• Headache Prophylaxis
  – Propranolol (OLU)
  – Verapamil (OLU)
  – Amitriptyline (OLU)
  – Lexapro
  – Zoloft
Emotional Symptoms

• SSRIs
  – Lexapro
  – Zoloft
• Psychotherapy
Cognitive Symptoms

- Amantadine (Symmetrel) (OLU)
- Concerta (OLU)
- Strattera (OLU)
Sleep Symptoms

- Melatonin
- Trazodone
Educational Component

• Guidance Office, Child Study Team and teachers should be made aware of patient’s concussed status
  – Student may have difficulty concentrating or paying attention
  – Student may have difficulty remembering older material or learning new material
  – Longer time may be needed for tasks, tests and assignments
  – There is often greater irritability and decreased ability to cope with stress
  – Symptoms increase with schoolwork and testing
  – Premorbid ADD, ADHD, depression or anxiety may worsen
Educational Component

- No or adaptive PE as conditions warrant
- Remove from loud environment – i.e. cafeteria
- Allow sunglasses and ear plugs for photophobia and phonophobia
- Education assistance
  - Extra Help
  - Extra Time
  - 504 Plans/IEP
  - Change in class difficulty level
  - Alternative testing
  - Limited computer use
- Important to differentiate comprehensive vs. computational dysfunction (i.e. inability to focus or converge vs. true cognitive dysfunction)
Educational Component

• Test Taking
  – Extra time to complete tests (Time and a half)
  – Testing in quiet environment
  – Allow testing across multiple sessions
  – Reduce test length
  – Eliminate tests when possible
  – Reformat free response to multiple choice tests or use of cueing
  – Highly demanding activities increase symptoms and learning is not as effective or rapid with concussion
Educational Component

• Note Taking
  – Obtain copies of class notes, powerpoints, outlines, or photocopied student notes before class
  – Concussion makes multitasking skills difficult and increases vestibular and optometric symptoms
  – Use of iPad to enlarge notes and powerpoints
Educational Component

• Workload Reduction
  – Decrease amount of make up work, class work and homework by 50 to 75 %
  – Shorten tests and projects
  – Decrease length of essays
  – Do every other problem in a problem set
  – Only test relevant topics
  – Increased memory problems and decreased speed of learning are present with concussion. Pushing through often worsens symptoms and delays recovery
Educational Component

• **Breaks**
  
  – Break according to symptom onset
    • Head down at desk for minimal symptoms
    • Report to Nurse’s Office for severe symptoms
Educational Component

- Extra Time
  - Allow student extra time to complete tests, quizzes and assignments and allow to turn in late
  - Concussion symptoms can be erratic and may be increased at certain times requiring cessation of activity and turning in assignments late
Educational Component

• Attendance Restrictions
  – Consider half days alternating between AM and PM classes
  – Consider homebound education for severely concussed
Return to Play

• Never return player who still has concussive symptoms.
• Patient requires physical and cognitive rest
• This includes activities that require concentration and attention
  – School Work
  – Video Games
  – Text Messaging
• If symptoms have resolved with rest, test patient with exertion.
Return to Play

• Player should proceed stepwise.
• If post-concussive symptoms recur, the athlete should drop back to previous asymptomatic level and attempt progression again in 24 hours.
• Should not be taking any pharmacological agents that may effect or change symptoms of concussion.
• Should have neuropsychological testing return to baseline
Return to Play

• No activity
  – Complete rest
  – Recovery Phase

• Once asymptomatic for 24 hours, proceed to step 2
Return to Play

• Light aerobic exercise
  – Walking
  – Swimming
  – Stationary Cycling
    • All Less Than 70 % MHR
    • No Resistance Training

• – Increase HR
Return to Play

• Sport-specific training
  – Skating drills in ice hockey
  – Running in soccer
  – No head impact activities
  – Add movement
Return to Play

• Noncontact training drills
  – Progression to more complex training drills
    • Passing drills in football
    • Passing drills in hockey
    • May begin progressive resistance training
  – Exercise, coordination, and cognitive load
Return to Play

• Full-contact training after medical clearance
  – Restore confidence and assess functional skills by coaching staff
• Return to game play
Return to Play

• No child or adolescent athlete, including the collegiate athlete, no matter the skill level, should return to play on the same day.

• Some NFL studies have shown no risk of recurrence or sequelae with same day RTP in presence of physicians with experience and rapid neurocognitive assessment.

  — However, full clinical and cognitive recovery must occur before consideration of RTP
Concussion PPE

- ATHLETES OFTEN DO NOT RECOGNIZE PRESENT AND/OR PAST CONCUSSIONS!
- Inquiry about concussive history should be part of the standard Pre-Participation Physical Examination.
- Ask about previous symptoms of concussion and not just perceived number of past concussions.
Concussion PPE

• Ask about past trauma to head, face, or neck.
• Ask if concussion symptoms, if elicited, have increased progressively with each progressive impact.
• Coaching and teammate perception of concussion have been unreliable in study.
Concussion PPE

- Previous incidents of LOC, amnesia, and post-concussive symptoms are all key data in establishing the existence and extent of concussion.
- Further research is being carried out now to see how these interact and relate to severity of concussion.
- PPE is also a good time for concussion counseling.
Concussion PPE Questions

• Have you ever had a head injury or concussion?
• Have you ever had a hit or blow to the head that caused confusion, prolonged headache, or memory problems?
• Do you have a history of seizure disorder?
• Do you have headaches with exercise?
Education

• Imperative that coaches, players and parents understand the medical issues involved in concussion.

• Athletes must know of consequences of premature return of play.

• Athletes must also know that not every concussion results in automatic removal from sports.
Heads Up Concussion Kits

http://www.cdc.gov/ncipc/tbi/Coaches_Tool_Kit.htm

CDC Concussion Tool Kit
Good sites for athletes to check for understanding of concussion.

- http://www.bianj.org
- http://impacttest.com
- www.concussionwise.com
- www.sportsconcussions.org
- www.cdc.gov/concussion
- http://www.thinkfirst.ca
Medicolegal Aspects of Concussion

• Currently all 50 states have some kind of concussion legislation
• It is imperative that you know the specifics concerning the laws of the state(s) in which you practice.
• Washington state was first state with an official concussion law – The Lystedt Law
References


References


Thank You