Current Concepts in Evaluation and Management of Sports Related Concussion

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BI/SCI Expo at Carolinas Rehabilitation
October 15, 2012
Trauma found in late Penn football star’s brain

Routine Goal-Line Play Leads to Sudden Death and Unsettling Questions

‘Dings’ are out: Football analysts cast new eye on concussive injuries

Former NFL star Junior Seau reportedly commits suicide

May 2, 2012
“Most every pro football prospect out there has dreamed of playing in the NFL since he first put on cleats and a helmet. Along the way he has been told that he’ll have an opportunity to turn that dream into reality if he continues to work hard. But will he? More to the point, should he?”

“Currently more than 1,000 former and current players are plaintiffs against the NFL, claiming the league failed to adequately treat concussions and educate players about potential long-term consequences of brain trauma.”
Corruption and a growing concern for head injury have put college football in the spotlight. Are football programs’ millions in profits exploitation? Or are they still a celebration of amateur sport? Does football’s inherent danger and violence have any place in institutions of higher learning? Or does it provide young men with educational opportunities they would not otherwise have?

Arguing for the motion will be Malcolm Gladwell and Buzz Bissinger, arguing against will be Jason Whitlock and Tim Green.

May 8, 2012 – On-line debate FOR A.tv
“During the past 7 years the practice has been too prevalent of allowing players to continue playing after a concussion. Again this year this is true. Sports demanding personal contact should be eliminated after an individual has suffered a concussion.”
Concussion Defined

• American Academy of Neurology (AAN):
  - Traumatically induced alteration in mental status caused by a direct or indirect blow to the head
  - Emphasizes that concussions may occur w/o LOC

• Functional NOT Structural Injury
Concussion Epidemiology - *Current Trends*

*Football, ice hockey, soccer and lacrosse* have the highest concussion incidence rates when calculated by athlete exposure (*HS & College combined*).

*Competition* concussion incidence rates are consistently higher than *practice* rates.

In sports with the same rules (*basketball & soccer*), recent research suggests the reported concussion incidence rate is higher in females.

Reported differences between the incidence of concussion between *adolescent* and *adult* athletes is inconclusive.

*(Lincoln et al., 2011; Hootman et al., 2009; Gessel et al., 2007)*
## Sport-related Concussion

### Short Term Risks of Mismanagement

**What are the risks of trivializing the injury?**

<table>
<thead>
<tr>
<th>Risk</th>
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<tbody>
<tr>
<td>Worsening of post-concussive signs and symptoms</td>
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<tr>
<td>Repeat concussion with post concussion syndrome</td>
</tr>
<tr>
<td>School-related issues in student athletes</td>
</tr>
<tr>
<td>Second Impact Syndrome (younger athletes)</td>
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### Long Term Risks of Mismanagement

**What are the risks of ignoring recurrent concussions?**

<table>
<thead>
<tr>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prolonged concussion symptoms (daily basis)</td>
</tr>
<tr>
<td>Depression, cognitive impairment, dementia, CTE</td>
</tr>
<tr>
<td>Long-term academic issues in student athletes</td>
</tr>
<tr>
<td>Decreased Quality of Life</td>
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</tbody>
</table>
THAT’S GOTTA HURT...
Pittsburgh Steelers running back Destry Wight lies injured on the field Sunday night after he dislocated his right ankle and broke his right leg.
Bridging the gap between research and clinical practice
Objectives: Clinical Dilemmas

- How to objectively assess concussion
- Return to Play?
- Home care instructions
- How many is too many?
- Cumulative Effects?
- Grading Scales?
- To rest or not to rest?
- School and other ADLs?
- Rehabilitation?
Concussion as a predisposition to future injury

196 total injuries/ 4,251 NCAA FB players (4.2%)

\[ \chi^2 = 30.11, \text{ df} = 3, P < .001 \]

Guskiewicz, McCrea et al, JAMA 2003
**Fact or Fallacy**: The FIRST WEEK is critical:
- Average of 7 days for full recovery
- 75% of repeat concussions within first 7 days
- 92% of repeat concussions within first 10 days

Guskiewicz, McCrea et al, JAMA 2003
How should I refer to the injury?

• Concussions are injuries to the brain
• Should not be dismissed as “ding” injuries
  - “Ding”/Grade 1 injuries resulted in neurocognitive deficits 36 hours after injury (Lovell et al., 2004)
• The grading dilemma:
  - Grade the concussion at time of injury - NO!
  - Grade concussion after symptoms have resolved - Maybe
  - *Always focus attention on recovery of S/S, NP testing, and balance*
Is concussion grading still recommended?

<table>
<thead>
<tr>
<th>Grade 1 (Mild)</th>
<th>No LOC*; PTA† &lt;30 minutes; PCSS‡ &lt;24 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 2 (Moderate)</td>
<td>LOC &lt;1 minute or PTA ≥30 minutes &lt;24 hours or PCSS ≥24 hours &lt;7 days</td>
</tr>
<tr>
<td>Grade 3 (Severe)</td>
<td>LOC ≥1 minute or PTA ≥24 hours or PCSS ≥7 days</td>
</tr>
</tbody>
</table>

*Loss of Consciousness
†Post Traumatic amnesia (anterograde/retrograde)
‡Post Concussion signs/symptoms other than amnesia

How do I evaluate a head injury?

- Baseline testing can be beneficial

- No different than any other injury:
  - Primary survey (Basic Life Support)
    - ABCs
    - Life threatening or Limb threatening
  - Secondary survey
    - Conduct normal injury evaluation
    - Focus on neurological deficits

- Don’t just assume it’s a typical concussion!
Red Flags...

- S/S lasting longer than 7-10 days
- Extensive loss of consciousness or amnesia
- Deterioration over time instead of resolution
- Compounded by multiple concussions
- Personality changes
- Other neurological disorders present
Concerns

- Epidural Hematoma - Arterial Bleed and Fast

- Subdural Hematoma - Usually Venous and Slower

- Subarachnoid Hematoma

- Second Impact Syndrome
Second Impact Syndrome
Second Impact Syndrome

• Occurs when an athlete sustains a second head injury before symptoms from first have resolved (Cantu & Voy, 1995)
  - Loss of autoregulation of blood flow throughout the brain

• Different professionals discuss the condition in different ways

• 100% Morbidity, 50% mortality
Figure 14-1. In second impact syndrome, vascular engorgement within the cranium increases intracranial pressure, leading to herniation of the uncus of the temporal lobe (arrows) below the tentorium in this frontal section (A), or to herniation of the cerebellar tonsils (arrows) through the foramen magnum in this midsagittal section (B). These changes compromise the brain stem, and coma and respiratory failure rapidly develop. The shaded areas of the brain stem represent the areas of compression.
Prevention of Catastrophic Brain Injury

- Proper preparedness for on-field & sideline medical management of head injury becomes paramount when dealing with a more serious and quickly deteriorating condition.

- If GCS <8, posturing, or not oxygenating well - be prepared to perform manual ventilations (endotracheal intubation, bag-valve-mouth resuscitation).

- Reduce ICP by elevating head to 30 deg and ensuring that the head and neck are maintained in a midline position to optimize venous outflow from the brain.

- Hyperventilation and intravenous diuretics such as mannitol (0.5-1.0 g/kg.) may also be used to decrease ICP.

- Being prepared for immediate transfer to a medical facility is extremely important under these conditions.
Concussion Assessment Protocol

- History
- Observation
- Palpation
- AROM/ PROM
- Strength Tests
- Stress Tests
- Functional Tests
Sports as a Laboratory Assessment Model (SLAM*)

Pre-Concussion Baseline Testing

1-3 Days

Day 5-10

Day 12-16

*Barth et al., 2002
Sports as a Laboratory Assessment Model (SLAM*)

Pre-Concussion Baseline Testing

1-3 Days

Concussion

*Barth et al., 2002
History

• General History

• Determine *level of consciousness*:  
  - alert  
  - lethargic  
  - stuporous  
  - semicomatose  
  - comatose

• Determine *symptoms*:  
  - headache  
  - tinnitus  
  - nausea  
  - dizziness  
  - blurred vision  
  - tenderness  
  - numbness or weakness  
  - photophobias
## Post Concussion Symptom Checklist

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>NONE</th>
<th>MILD</th>
<th>MODERATE</th>
<th>SEVERE</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td></td>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Headache</td>
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<tr>
<td>Nausea/ Vomiting</td>
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<tr>
<td>Balance Problems</td>
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<td></td>
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<tr>
<td>Dizziness</td>
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<tr>
<td>Sensitivity to Light</td>
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<tr>
<td>Blurred Vision</td>
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<tr>
<td>Sensitivity to Noise</td>
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<td></td>
</tr>
<tr>
<td>Nervousness</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Numbness/ Tingling</td>
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<tr>
<td>Feeling Slowed Down</td>
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<tr>
<td>Feeling Like “In a Fog”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty Concentrating</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty Remembering</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Neck Pain</td>
<td></td>
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<td></td>
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<tr>
<td>Fatigue/ Drowsiness</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Difficulty sleeping</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Sadness</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Irritability</td>
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</tbody>
</table>
What does concussion “look like”?

**Somatic**
- Headache
- Nausea
- Vomiting
- Balance Problems
- Sensitivity to Light
- Sensitivity to Noise
- Numbness/Tingling

**Neurobehavioral**
- Sleeping more
- Drowsiness
- Fatigue
- Sadness
- Nervousness
- Trouble Sleeping

**Cognitive**
- Feeling Slowed Down
- Feeling in a Fog
- Difficulty Concentrating
- Difficulty Remembering

Piland et al, 2007
Symptomatology

• Most important guideline:
  - No athlete returns to participation while still symptomatic

• Using a graded symptom checklist allows for objective assessment of...
  - variety of symptoms
  - severity of symptoms
  - duration of symptoms (i.e. - “resolution pattern”)

• Important- Symptoms are Subjective
  - ~38% of athletes reporting no symptoms may still demonstrate neurocognitive deficits (Broglio, 2008)
Observation

• Watch athlete closely throughout evaluation
  - Aphasia - difficulty finding or saying the right words
  - Obvious deformities/abnormal positions of body parts
  - Coordination (how they walk off the field, etc)
  - Pupillary signs: (PEARRL)
    • size
    • response to light
    • eye movement and tracking
  - Respirations
  - Overall demeanor
Palpation

- Additional info, can be gained through palpation once a baseline is established
  - Pulse
  - Blood Pressure
  - Palpate for signs of trauma:
    - Painful areas
    - Deformities
    - Swelling
    - Crepitus
ROM and Strength

• AROM and PROM
  - Check neck ROM
  - Any other ROM you think may be affected

• Strength
  - Assess neck strength
  - Any other strength deficits you think you might observe

• Dermatomes and Myotomes
Stress Tests: Cognition

Cognitive functioning:
- 3 word recall
- Serial 7’s
- Recite months of year in reverse order
- Recite days of week in reverse order
- Mental Status Assessment
- Neuropsychological Testing
Sideline mental status tests: SAC

- Orientation
- Immediate memory
- Exertional maneuvers
- Neurological screening
- Concentration
- Delayed recall
- Total score is computed

(McCrea)
# SCAT2 - Serial evaluations

<table>
<thead>
<tr>
<th>Tool</th>
<th>Test domain</th>
<th>Time</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Date tested</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Days post injury</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SCAT2</th>
<th>Symptom score</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Physical signs score</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Glasgow Coma score (E + V + M)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Balance examination score</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coordination score</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SAC</th>
<th>Orientation score</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Immediate memory score</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Concentration score</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Delayed recall score</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>SAC Score</strong></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>SCAT2</th>
<th></th>
</tr>
</thead>
</table>

**Symptom severity score (max possible 132)**

<table>
<thead>
<tr>
<th>Return to play</th>
<th>Y</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>Y</td>
<td>N</td>
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<tr>
<td></td>
<td>Y</td>
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<td></td>
<td>Y</td>
<td>N</td>
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<tr>
<td></td>
<td>Y</td>
<td>N</td>
</tr>
</tbody>
</table>
SCAT2 - Concussion injury advice

Concussion injury advice (To be given to concussed athlete)

This patient has received an injury to the head. A careful medical examination has been carried out and no sign of any serious complications has been found. It is expected that recovery will be rapid, but the patient will need monitoring for a further period by a responsible adult. Your treating physician will provide guidance as to this timeframe.

If you notice any change in behaviour, vomiting, dizziness, worsening headache, double vision or excessive drowsiness, please telephone the clinic or the nearest hospital emergency department immediately.

Other important points:
- Rest and avoid strenuous activity for at least 24 hours
- No alcohol
- No sleeping tablets
- Use paracetamol or codeine for headache. Do not use aspirin or anti-inflammatory medication
- Do not drive until medically cleared
- Do not train or play sport until medically cleared

Clinic phone number
Neuropsychological Testing

• Assess cognitive factors such as memory, concentration, impulse control, and reaction time

• Paper and pencil tests:
  - Good: a lot of normative data exists
  - Bad: time-consuming (manpower and actual testing); and inability to assess reaction time

• Computerized NP tests:
  - Good:
    • Neuropsychologists not needed for test administration
    • Test multiple subjects at once
    • Reaction time can be assessed
  - Bad: reliability, sensitivity, and validity have been questioned (Randolph et al. 2005; Broglio et al. 2009)
## Managing Functional Academic Deficits

<table>
<thead>
<tr>
<th>Neuropsychological Deficit</th>
<th>Functional School Problem</th>
<th>Management Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention/ Concentration</td>
<td>Short focus on lecture, classwork, homework</td>
<td>Shorter assignments, break down tasks, lighter work load</td>
</tr>
<tr>
<td>“Working” Memory</td>
<td>Holding instructions in mind, reading comprehension, math calculation, writing</td>
<td>Repetition, written instructions, use of calculator, short reading passages</td>
</tr>
<tr>
<td>Memory Consolidation/ Retrieval</td>
<td>Retaining new information, accessing learned info when needed</td>
<td>Smaller chunks to learn, recognition cues</td>
</tr>
<tr>
<td>Processing Speed</td>
<td>Keep pace with work demand, process verbal information effectively</td>
<td>Extended time, slow down verbal info, comprehension-checking</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Decreased arousal/ activation to engage basic attention, working memory</td>
<td>Rest breaks</td>
</tr>
</tbody>
</table>
Fact or Fallacy?
NP green light means “Go”
Stress Tests: Balance/Coordination

Balance Error Scoring System (BESS)

- **Clinical test battery:**
  - 6 20-second trials
  - Uses 3 different stances (double, single, tandem)
  - 2 different surfaces (firm, foam)
  - All performed with eyes closed

- **Recorded errors:**
  - Hands lifting off iliac crests
  - Opening eyes
  - Step, stumble, or fall
  - Moving into >30° of hip flexion or abduction
  - Remaining out of test position for >5 sec.
  - Lifts toes or heel off the floor or foam
Balance Error Scoring System (BESS)
Clinical Recovery

### Amnesia

- Graded Symptom Checklist Change from Baseline (n=374)
  - Overall P = 0.0394
  - Slope P = 0.5553

### LOC

- Overall P = 0.4675
  - Slope P = 0.9024

### Concussion Hx

- Overall P = 0.5858
  - Slope P = 0.0868

### Balance

- BESS Change from Baseline (n=204)
  - Overall p = 0.2255
  - Slope p = 0.0503

### Symptoms

- Male (n=301)
  - Female (n=73)

- Overall p = 0.9029
  - Slope p = 0.2558

### Brief Mental Status

- SAC Change from Baseline (n=204)
  - Overall p = 0.1288
  - Slope p = 0.6776
Serial Evaluations

**TOI:** clinical eval & symptom checklist
**1-3 hrs:** symptom checklist
**24 hrs:** follow-up clinical eval & symptom checklist

**Symptomatic**
1. Continued rest
2. Monitoring of s/s
3. If deteriorating – consider imaging

**Asymptomatic**
1. Neuropsychological testing
2. Postural stability testing
3. Monitoring of s/s
Serial Evaluations (con’t)

Once athlete has been asymptomatic for 24 hrs:

- Reassess on clinical measures and compare to baseline scores.
- Continue to monitor symptoms for 24 hrs after assessment.
- If remain asymptomatic, reassess on clinical measures to see where they are relative to baseline and to previous day.
- Start Graduated RTP Progression if:
  * 100% baseline achieved
  * no deterioration from previous day
5 Step Graduated Return to Play

- **Exertion Step 1:** 20 minute stationary bike ride (10-14 MPH)

- **Exertion Step 2:** Interval bike ride: 30 sec sprint (18-20 MPH/10-14 MPH)/30 sec recovery x 10; and BW circuit: Squats/Push Ups/Situps x 20 sec x 3

- **Exertion Step 3:** 60 yard shuttle run x 10 (40 sec rest); and plyometric workout: 10 yard bounding/10 medicine ball throws/10 vertical jumps x 3; and non-contact, sports-specific drills for approximately 15 minutes

- **Exertion Step 4:** Limited, controlled return to non-contact practice

- **Exertion 5:** Full sport participation in a practice
Working through the RTP Progression

- The 5 steps do not necessarily require 5 days.

- No more than 2 steps should be performed on the same day, which allows for monitoring of both acute symptoms (during the activity) and delayed symptoms (within 24 hrs after the activity).
  - In general, If the exertional activities do not produce acute symptoms, the athlete may progress to the next step.

- The athlete may advance to Step 5 and return to full participation once they have remained asymptomatic for 24 hrs following Step 4 of the protocol.

- Always document the process, day by day, step by step!
Impact Biomechanics: Acceleration/Deceleration

**Biggest challenge:** How do we manage the energy to prevent both concussion and severe TBI?
**The Concussion Equation**

- **Impact Biomechanics**
  - Linear acceleration
  - Angular acceleration
  - Frequency
  - Location

- **Quantify exposure**
  - Player positions
  - Helmet types and helmet fit
  - Open-field vs. interior line plays
  - Special teams vs. off/def plays

- **Acute Tx**
  - Omega 3-FA?
  - Hyperbarics?
  - Progesterone?

- **Acute Dx**
  - Biomarkers?

- **Symptoms**
  - Neurocognitive function
  - Balance
  - Chronic effects (PCS, depression, MCI)

- **Rule Changes?**
  - Behavior modification?
  - Helmet design changes?

**CONCUSSION**
CHAPEL HILL, N.C. — Alan Pelc has been taught how to block since his Houston boyhood, how to push and pulverize and punish oncoming defenders on the football field. This was different. He was learning how not to punish himself.

“Right there,” Dr. Kevin Guskiewicz said, pointing at a presentation screen showing more than a dozen arrows pointed straight into the top of a mannequin head. “These are all your recorded hits to the top of your helmet against L.S.U. Every time you drop your head. These are the ones we’re concerned about.”
Role of the cervical muscles?

67% ↑ in effective mass

Vianno, 2007
Introduction

Measurement

Literature

3D Kinematics

Conclusions
High School Players Shrug Off Concussions, Raising Risks

By ALAN SCHWARZ

To Kelby Jasmon, there was only one answer. The question: if he received yet another concussion this football season, while playing offensive and defensive line for his high school in Springfield, Ill., would he tell his coaches if he thought he had sustained one?

Matt Selvaggio, who plays with Jasmon on both lines, said: “Our coaches would shrug. They did not give any indication that it was a concern.”

The National Football League has recently faced questions about its handling of concussions after four former players were found to have significant brain damage as early as their mid-30s. But teenagers and their parents are more susceptible to immediate harm from repetitive concussions, experts say. Jasmon, 17, tested himself on a cart with his coaches, who used a computer to calculate how hard he was撞

Fed’s Ex-Chief Attacks Bush On Fiscal Role

G.O.P. Lost Principles, Greenspan Writes

By EDMUND L. ANDREWS and DAVID E. SANGER

WASHINGTON, Sept. 14 — Alan Greenspan, in a long-awaited memoir that reviews his nearly two decades as chairman of the Federal Reserve, paints a highly critical portrait of how, he says, President Bush, Vice President Dick Cheney and the Republican-controlled Congress abandoned their party’s principles on spending and deficits.

In the 596-page book, “The Age of Turbulence: Adventures in a New World,” Mr. Greenspan describes the Bush administration as so captive to its own political operation that it paid little attention to fiscal discipline, and he described Mr. Bush’s first two Treasury secretaries, Paul H. O’Neill and John W. Snow, as essentially powerless.

Mr. Bush, he writes, was never willing to contain spending or veto bills that drove the country into deeper and deeper deficits as Congress abandoned rules that required that the cost of tax cuts be offset by savings elsewhere. “The Republicans in Congress lost their way,” writes Mr. Greenspan, a self-described “libertarian Republican.”

Democrats Push A Tactic To Shift Iraq War Policy

More Time Off For G.I.’s

Senators’ Ultimate Goal

Is to Force Faster Troop Pullout

By DAVID M. HERSZENHORN and DAVID S. CLOUD

WASHINGTON, Sept. 14 — Now that President Bush and Gen. David H. Petraeus have charted their course for the Iraq war, Democrats in the Senate say one of their proposals aimed at shifting the president’s strategy is finally close to winning enough Republican support for a real chance at being approved. It would require that troops spend as much time at home as on their most recent tours overseas before being redeployed.

The proposal, by Senator Jim Webb, Democrat of Virginia, has strong support from top Democrats, who say that the practical effect would be to add time between deployments and force General Petraeus to withdraw troops on a substantially swifter timeline than the one he laid out before Congress this week, and that it would protect troops from
“It’s not dangerous to play with a concussion. You’ve got to sacrifice for the sake of the team. The only way I come out is on a stretcher.”
“I couldn’t come out. My team needed me. You have to keep playing — until you can’t.”
WHAT CAN HAPPEN?

- Permanent brain injury
- Death (Second Impact Synd.)
- Out of school for months
- Never play sports again

(don’t believe it?...
Youth Sports & Concussion Laws

October 12, 2006

- Zackery Lystedt is 13 years old; middle school football.
- Play #32. Just three plays before halftime.
- No L.O.C.
- Official time-out and Zackery is removed.
- Zackery returned at start of 3rd quarter.
- Zackery plays 3rd and 4th quarters.
- Zackery collapses at end of game on field in dad’s arms.

Courtesy of Stanley Herring, M.D.
Youth Sports & Concussion Laws

Why was/is the Zackery Lystedt Law needed?

Assessing education’s impact:
- No “stickiness” to education alone.
- Attempts at policy changes are slow and inconsistent.
- Attempts at implementation of standards are slow and inconsistent.
- $A + B + C = \text{Patchwork of policies and procedures from one school district/sport organization to the next.}$
Youth Sports & Concussion Laws

Sports Concussion Legislation

- Essential components
  - Education (athletes, parents, coaches).
  - Instituting a concussion policy and emergency action plan.
  - Removal from practice or play at the time of suspected concussion.
  - Medical evaluation and return to play clearance by a health care provider with training in concussion management.
States with Legislation Addressing Youth Sports-Related Concussions  March 2009

NONE!
Football player dies after hit

THE ASSOCIATED PRESS

WINSTON-SALEM - A 15-year-old high school football player died early Sunday from a brain injury he suffered during the season-opening game, officials said.

Matt Gfeller was playing for Reynolds High School in Winston-Salem when he was injured in Friday night’s game against Page High School of Greensboro.

The sophomore linebacker had been on life support at Wake Forest University Baptist Medical Center and underwent brain surgery late Friday.

Reynolds coach Mike Propst said Gfeller was taken off life support Saturday night and died about five hours later at 2:15 a.m. Sunday. A hospital spokeswoman said it would provide no additional information.

This was Gfeller’s first year at Reynolds.

Assistant coach James Alexander said Gfeller was hit on the first play of the game nearly the same way he was hit on the day in which he was injured.

“It’s the worst hit that occurs once or twice a year around the world,” Paschal said.

Pastor school administrators and two pastors from local churches met with the 33 varsity players to help deal with Gfeller’s death.

Became law in NC on June 16, 2011

High school football player’s death ruled accidental

By Tim Candon, HighSchoolOT.com editor

Posted: Today at 12:17 a.m.
Updated: Today at 8:35 a.m.

GREENVILLE, N.C. — A state medical examiner in Greenville ruled Tuesday that the death of a Greenville Rose football player was accidental and the result of “second impact syndrome.”

In a statement, Dr. M.G.F. Gilliland said Jaquan Waller died because of a “very rare condition which can occur when two relatively minor head injuries occur in a short time interval. It usually occurs in young athletes and is very rapidly fatal.”

Waller, a junior running back, left the field after being tackled in Rose’s game Friday against Wilmington Hoggard. He then collapsed on the sideline. Waller was taken to Pitt County Memorial Hospital, where he was placed on life support. He died Saturday morning. Waller had been hit in practice two days before the game and suffered a mild concussion.
Matthew Gfeller, Age 15
Reynolds High School, Forsyth County, North Carolina

Transported to Hospital

24 Aug 2008 : Surgical Repair Unsuccessful
Removed from Life Support
→ Difficult to Prevent this Fatality

Jaquan Waller, Age 16
Rose High School, Pitt County, North Carolina

17 Sept 2008 : Concussion in School Football Practice

19 Sept 2008 : Second Impact in School Football Game
Transported to Hospital

20 Sept 2008 : Died from Severe Swelling of Brain
Second Impact Syndrome – Med. Examiner
→ Very Preventable Fatality
→ Should not have been Playing while Injured

States with Legislation Addressing Youth Sports-Related Concussions  July 2012

34 State Laws Passed  14 State Laws Pending

Source: National Conference of State Legislatures  (www.ncsl.org)
CONCUSSION
A FACT SHEET FOR STUDENT-ATHLETES

WHAT IS A CONCUSSION?
A concussion is a brain injury that:
• Is caused by a blow to the head or body.
• From contact with another player, hitting a hard surface such as the ground, ice or floor, or being hit by a piece of equipment such as a bat, lacrosse stick or field hockey ball.
• Can change the way your brain normally works.
• Can range from mild to severe.
• Prevents itself differently for each athlete.
• Can occur during practice or competition in ANY sport.
• Can happen even if you do not lose consciousness.

HOW CAN I PREVENT A CONCUSSION?
Basic steps you can take to protect yourself from concussion:
• Do not initiate contact with your head or helmet. You can still get a concussion if you are wearing a helmet.
• Avoid striking an opponent in the head. Undercutting, flying elbows, stepping on or over an unprotected opponent, and sticks to the head all cause concussions.
• Follow your athletic department’s rules for safety and the rules of the sport.
• Practice good sportsmanship at all times.
• Practice and perfect the skills of the sport.

WHAT SHOULD I DO IF I THINK I HAVE A CONCUSSION?
Don’t hide it. Tell your athletic trainer and coach. Never ignore a blow to the head. Also, tell your athletic trainer and coach if one of your teammates might have a concussion.
Sports have injury timeouts and player substitutions so that you can get checked out. Report it. Do not return to participation in a game, practice or other activity with symptoms. The sooner you get checked out, the sooner you may be able to return to play.
Get checked out. Your team physician, athletic trainer, or health care professional can tell you if you have had a concussion and when you are cleared to return to play. A concussion can affect your ability to perform everyday activities, your reaction time, balance, sleep and classroom performance.
Take time to recover. If you have had a concussion, your brain needs time to heal. While your brain is still healing, you are much more likely to have a repeat concussion. In rare cases, repeat concussions can cause permanent brain damage, and even death. Severe brain injury can change your whole life.

IT’S BETTER TO MISS ONE GAME THAN THE WHOLE SEASON.
WHEN IN DOUBT, GET CHECKED OUT.
For more information and resources, visit www.NCAA.org/health-safety and www.CDC.gov/Concussion.

CONCUSSION
A Must Read for NFL Players
Let’s take Head Injuries Out of Play

What is a Concussion?
A brain injury that can occur in any sport and alters the way your brain functions.
Can occur after a blow to the head/body following:
• Contact with another player, including helmet to helmet contact.
• Contact with the ground or another object.
Most concussions occur without being knocked out (loss of consciousness).
Severity of injury depends on many factors and may not be known until symptoms resolve and brain function is back to normal.
Concussions are not created equal, each player is different, each injury is different and all injuries should be evaluated by your team medical staff.

What Symptoms Occur in Concussion?
Different symptoms can occur and may not show up for several hours. Common symptoms include:
• Confusion
• Headache
• Amnesia / Difficulty remembering (forget plays, assignments)
• Balance problems
• Irritability
• Dizziness
• Difficulty concentrating
• Nausea (feeling that you might vomit)
• Feeling sluggish, foggy or groggy
• Feeling unusually irritable
• Concentration or memory problems (forgetting game plays, facts, meeting times)
• Slowed reaction time.
Exercise or activities that require a lot of concentration, such as studying, working on the computer, or playing video games may cause concussion symptoms (such as headache or tiredness) to reappear or get worse.

Why Should I Report My Symptoms?
• Playing while still experiencing symptoms can prolong the time needed for recovery and return to play.
• Unlike other injuries, there may be significant consequences to “playing through” brain injury: Repetitive brain injury not treated promptly or properly may cause a permanent injury to your brain.

What Should I Do If I Think I’ve Had a Concussion?
Report it. Never ignore symptoms even if they appear mild. Look out for your teammates as well. Tell your athletic trainer or team physician if you think you or a teammate has suffered a concussion.
Get Checked Out. Your team medical staff can determine if you’ve had a concussion and when it’s safe to return to play. As players, you must trust your team medical staff to manage your injuries.
Take Care of Your Brain; It is Vital. Repetitive brain injury, especially when there is inadequate time to recover, may cause long-lasting damage including memory problems and even dementia, which can change your life and your family’s life forever.
“Work Smart, Use Your Head, Don’t Lead with it”

Be smart. Other athletes are watching...

Reference to any commercial entity or product on this page should not be construed as endorsement by the Government of the company or its products or services.
Gfeller-Waller Concussion Awareness Act

Overview
The Gfeller-Waller Concussion Awareness Act was drafted and implemented to protect the safety of student-athletes in North Carolina and was signed into law on June 16, 2011 by Governor Beverly Purdue. There are three major areas of focus in the law and these include: education, emergency action and postconcussion protocol implementation, and clearance/return to play or practice following concussion. A copy of the Gfeller-Waller Concussion Awareness Act is available here [PDF - 74 kb]. Each school should maintain documentation that they are in compliance with the law.

This website contains information and materials to be used by high schools and middle schools and medical professionals to comply with the law. At the top of the page are links for each major requirement stated in the law. This website includes forms, materials, and examples for schools to enable them to implement these changes into their schools or practices.

The Gfeller-Waller Concussion Awareness Act Resource Packet (item 10 below) contains a checklist to help guide your school through the compliance process. You can also read and print each of the individual items of the resource packet by clicking on the links at the top of this page. If you or someone at your school has questions about the Gfeller-Waller Concussion Awareness Act, please email gfellerwaller@unc.edu.

Below is a list of all Gfeller-Waller Concussion Awareness Act materials. Direct links to these materials for ease of reading and printing are also provided.

1) Gfeller-Waller Law Compliance Information and Checklist [PDF - 87 kb]
2) Student-Athlete & Parent/Legal Custodian Education & Statement Form [PDF - 160 kb]
3) School Representative (parent/coach/volunteer/school nurse/first responder) Education & Statement Form [PDF - 160 kb]
Youth Sports Issues: Concussion
Whose Responsibility Is It?

- Athletes
- Parents
- Physicians
- Athletic Trainers
- Coaches
- Researchers
- Tournament/Event Directors/Administrators
- Sport Governing Bodies
- State/Federal Policy
WHEN IN DOUBT - SIT THEM OUT!

No same day RTP

- Youth sports
- HS sports (NFSHSAA)
- College sports (NCAA)
- Pro sports (NFL, NHL)
- Elite/Olympic sports (Zurich Consensus/IOC)
Conclusions

A culture shift has been set in motion... but we have a long way to go.

- Concussion education is key.
- Establish an objective evaluation & standardized RTP protocol (graduated exertional exercises).
- Know “red flags” for a situation turning catastrophic and have an EAP.
- Think beyond the acute trauma
- Equipment safety & behavior modification
- State laws will make a difference!