Understanding the Standard of Care for Managing Sport-Related Concussions - Including an Update from the Berlin 2016 Conference

Thomas W. Kaminski, PhD, ATC, FNATA, FACSM, RFSA
Professor/Director of Athletic Training Education
University of Delaware

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The Troublesome Hits in Football (Futbal)

Contemporary Definition of Sport-Related Concussion (SRC)

- Concussion (commotio cerebri) – a traumatic brain injury induced by biomechanical forces.

CDC’s Concussion Video

Sports-Related Concussion in the United States
The Susceptible Patient

Concussion Research Group @ UD

The perfect storm of multi-system dysfunction and co-morbidities!

Head Impact Kinematics

Comparison with everyday activities (1) head strike 11 g's (2) chair plop 4 g's (3) head shake 4 g's, (4) “aggressive” pillow fight 19 g's

Newton's Cradle = 39 g's

If really interested here is an entire thesis devoted to everyday activities:

Newton's Cradle = 39 g's

Another Way of Looking at Brain Motion during Concussion

• Shake an egg hard enough and the yolk will scramble despite the shell remaining intact!

• The jello-like brain floating in the skull, surrounded by shock-absorbing membranes called meninges, is always late to catch up!

• Linear forces ripple top to bottom — no big deal, take plate and twist jello mold like a steering wheel — quite a mess on your hands

A West Point Tradition Gone Awry!

Risk-Weighted Exposure and Cumulative Head Impacts

Urban et al., 2013

Head Impact Kinematics

The Elephant in the Room - Subconcussive Head Impacts

- Subconcussive Blow/Repeated Head Impacts.
  - Blows to the head which do not cause concussion signs and symptoms are hypothesized to cause clinical and pathological findings (“slosh” phenomenon)
  - Greatest effect through repetitive occurrences whereby cumulative exposure is deleterious
  - Bailes et al, 2013
  - “Probably...genetic factors (APO E and IL-6) that play an important role in susceptibility to injury”
  - Bailes et al, 2013

Some Interesting Recent Headlines

Blood Biomarkers and Concussion Assessment

Diverse Medical Community Involved with Sport-Related Concussion Management

- There is much variation in the knowledge of health care providers managing concussed athletes. Extremely important to make sure the person clearing for return-to-sport is current with knowledge!
  - Physicians (MD/DO)
  - Physician Assistants
  - Nurse Practitioners
  - Chiropractors
  - Athletic Trainers
  - School Nurses
  - Physical Therapists
  - Neuropsychologists

- New and emerging research and technologies will lead to a continuing evolution of care

Extent of the Problem

- Professional/collegiate athletes get a great deal of attention but just tip of iceberg!
  - ~1700 NFL players
  - ~12,000 Collegiate players (NCAA D-1)
- Much more common in US high school than any other level due to large number of participants:
  - HS Sports Participants
    - Football - 1.14 million
    - Boys Soccer - 384,000
    - Girls Soccer - 345,000
    - Boys Basketball - 545,000
    - Girls Basketball - 444,000
Not Just a Football (or a “guy”) Problem

What has happened to make this such a big deal?

• THE MEDIA!!
• BETTER SCIENCE/RESEARCH!
• High profile cases
  – Second-Impact Syndrome (SIS)
    • Death or devastating brain damage when having a second injury when not healed from the first
  – Long-term effects
    • Possible long-term effects - dementia, depression, CTE

Problems for Athletes-Post-Concussion Syndrome

• 85-90% of concussed young athletes will recover within 1 to 2 weeks
• The remainder may have symptoms lasting from weeks to months interfering with school and daily life
• Subtle deficits may persist a lifetime

Parents, Stop Obsessing Over Concussions


Editorials in ATSHC and Elsewhere!

Athletic Training & Sports Health Care: The Journal for the Practicing Clinician

NFL goes on offense in how it handles concussion risk

http://www.healio.com/journals/atshc
Even the Kids are Involved Too!

So What’s The Big Deal for Health-Care Professionals?

As Allied Health Professionals we Must Be Held Accountable for Decisions Made

Strategies for Avoiding Legal Liability

Part I – The Legal Stuff

Strategies for Avoiding Legal Liability
No Need to Worry I’m Well-Versed in Treating Sport-Related Concussion!

- With more attention in the media on SRC’s the public has become more educated about the problem (some high-profile athletes involved)
- ATC’s (and others) have become a popular target of lawsuits alleging failures to meet the “standard of care”.
- In cases of unfortunate events the actions (or inactions) of the ATC, coach, physical educator are likely to be second guessed or blamed.

Legal Attacks Typically Involve:

- The evaluation or testing of an athlete (or lack thereof)
- Documentation of the injury
- Communication with the athlete or with a physician about an athlete
- Education of the athlete

Are Federal Regulations on the Horizon?

H.R.2062 - Protecting Student Athletes From Concussions Act of 2015
H.R.829 - SAFE PLAY Act
H.R.4460 - Youth Sports Concussion Act

State Legislators Want a Piece of the Action Too!


State Concussion Legislation

- Most state legislation follows these main components:
  - Improve education on concussion and increase awareness
  - Immediate removal of any athlete suspected of sustaining a concussion (coach, athletic trainer or other medical personnel)
  - Cannot return-to-activity until properly cleared (individuals capable of clearing athletes differ from state to state)

Is the State of DE Impacted?

State of Texas - HB 2038 the Texas statute is one of the most detailed and comprehensive
Will This Legislation Change Things?

- Policy Evaluation of State Youth Sports Concussion/Return to Play Legislation
  - Cloudburst has been awarded a contract with the Centers for Disease Control and Prevention (CDC) National Center for Injury Prevention and Control (NCIPC) to conduct a policy evaluation of the implementation of state youth sports concussion/return to play laws, to report on and develop materials to disseminate key findings. Cloudburst will assess the implementation of youth sports concussion/return to play legislation from two states with existing legislation. Following completion of the evaluation, a report shall be created and a presentation shall be made to NCIPC that clearly demonstrates findings, promising practices, and unintended consequences of the state legislation implementation efforts.

http://www.cloudburstgroup.com/
Prior to resuming participation, a player who is otherwise properly certified to participate in interscholastic athletics must present to the administrative head of school or designee, a statement from a qualified physician that the player is physically able to participate if one of the following conditions has occurred:

3.1.5.1 The player is physically unable to compete due to illness or injury for five (5) consecutive days on which a practice, scrimmage or contest is held;

3.1.5.2 The player was apparently unconscious;

3.1.5.3 The player suffered a concussion.
Highlights from Berlin 2016

5th International Consensus Conference on Concussion in Sport – Berlin, Germany 2016

A series of 12 questions and sub-questions were developed and the expert panel members were required to perform a systematic review to answer each question. Following presentation at the Berlin meeting of the systematic review, poster abstracts and audience discussion, the summary Consensus Statement was produced. Further, a series of tools for the management of sport-related concussion was developed, including the Sport Concussion Assessment Tool Fifth edition (SCAT5), the Child SCAT5, and the Concussion Recognition Tool Fifth edition.

Topics Included:
- Definition & Sideline Screening
- SCAT Tool & Post Injury Assessment
- Advanced or Novel Testing & Treatment
- Physiologic Recovery & RTP
- Childhood Concussion
- Persistent Postconcussion Symptoms
- Risk Reduction

A Must Read

11 “R’s” of SRC Management:
Recognize
Remove
Re-evaluate
Rest
Rehabilitation
Refer
Recovery
Return to Sport
Reconsider
Residual Effects & Sequel
Risk Reduction

A Newer Must Read

Implementation of the 2017 Berlin Concussion in Sport Group Consensus Statement in contact and collision sports: a joint position statement from 11 national and international sports organisations

- Joe S Patrician, 1,2 Claire L Akers, 1,2 Michael Hauber, 1,2 Mark Auby, 1,2 Paul Bloomsfield, 1,3 Ciara Andrews, 1,3 Patrick O’Neill 11,1,2 Brendan J Snow, 1,2,11 Eoin A Kelly 11,1,2,11 Andrew R Eklund 11,1,2,11,11 Bernie D McCreary 11,1,2,11,11 Michael Love 11,1,2,11,11 Karen McManus 11,1,2,11,11 Willem Meeswisse, 1,2,11 Jiri Ondracek, 1,2 Caroline F Finch, 1,2 K. Alar Hoyer, 1,2 Paul McCrory 1,2

ABSTRACT
The purpose of this paper is to summarise the implementation of the 2017 Concussion in Sport Group (CISG) consensus statement within 11 national and international sports organisations (ISOs). The ISOs are of different sizes and play a variety of roles, including governing bodies, clinical organisations, research institutions, and regulatory authorities. The ISOs are linked to different sports, including American football, Australian rules football, basketball, boxing, cheerleading, ice hockey, rugby, soccer, water polo, and wrestling. They have participated in the process of implementing the CISG recommendations in their respective sports through a variety of methods and strategies. The ISOs have developed their own implementation plans, taking into account their specific needs and challenges. The implementation process has been ongoing since the publication of the 2017 Consensus Statement in July 2017. Some ISOs have completed the full implementation process, while others are still in the process of adapting and applying the recommendations. The ISOs have shown commitment to implementing the recommendations, and they have made progress in this regard. The implementation process has been facilitated by the CISG, which has provided guidance and resources to the ISOs. The ISOs have also shared their experiences and strategies with each other through workshops, webinars, and other forms of collaboration. The implementation process has highlighted the importance of collaboration and coordination between different stakeholder groups, including athletes, coaches, medical professionals, and parents. The ISOs have collaborated with these groups to ensure that the recommendations are understood and applied correctly. The ISOs have also demonstrated their commitment to continuous improvement and adaptation, as they continue to refine and enhance their implementation plans. This paper provides an overview of the implementation process and highlights the challenges and successes encountered by the ISOs. The ISOs have made significant progress in implementing the 2017 Consensus Statement, and they continue to learn and adapt as they move forward.
Defining/Diagnosing Concussion

A critical and time-dependent 1st step!

What are the critical elements of sideline screening that can be used to establish the diagnosis of concussion? A systematic review

If you look closely you will see that essentially nothing has really changed in terms of the tests administered for the SCAT5, however, they did improve the overall design of the testing materials and it seems like from first looks that it should be easier to use.

Should These Individuals Been Removed from Playing?
What domains of clinical function should be assessed post-injury? (e.g., cognitive, somatic, oculomotor, sleep, postural stability, vestibular, cervical spine)

- What is the evidence for these approaches?
- What tools/examination techniques should be used, and when?
- When is it appropriate to do baseline testing to assist in the interpretation of post-injury tests?
- Athletic Trainers need to become proficient at basic vestibular/vestibular screening techniques (e.g., NPC, VOMS, Tai)

What advanced or novel tests can assist in the evaluation of concussion?

- What is the role for advanced neuroimaging?
- What is the role for cerebrospinal fluid and blood biomarkers?
- What is the role for genetic or epigenetic testing?

What is the evidence for the role of specific treatment interventions? (e.g., active rehabilitation, pharmacological therapy, and rehabilitation techniques for SRC).

- What is the optimal length of cognitive and physical rest?
- Symptoms of headache, neck pain, feeling slowed down are predictive of longer recoveries
- “Stand Down Time” (i.e., RTP) should be determined by multimodal clinical assessments

Rest and Treatment Approach following SRC

- The effects of rest and treatment following sport-related concussion: a systematic review of the literature
- Table 1: Graduated return to play protocol

Rest and Treatment Approach following SRC

- Does this cause any concern among this audience of certified athletic trainers?
Rethinking the Prescription for Cognitive & Physical Rest

Cognitive rest following concussions: rethinking ‘cognitive rest’

Mark E Halstead, 1 Brenda Eagan Brown, 2 Karen McAvery 3

Determining if Rest Is Best After Concussion

What is the time course of physiological recovery after sports concussion?

• How does it compare to published data on time course of clinical recovery?
• Should there be a mandatory minimum stand-down period post-injury?
• Is there evidence supporting a change in the duration or content of the graded return to play?

What are the key modifiers of concussion outcomes?

• What factors are associated with a poorer prognosis or future risk following concussion?
• How do we best quantify the role of these modifiers?
• How many concussions are too many?
• How do sex differences impact concussion management?

What is the difference in concussion management in children as compared to adults?

• What factors must be considered in ‘return to school’ following concussion and what strategy or accommodations should be followed?

A Parting Quote

—What’s the hurry? After all it is the brain!

W. H. Earles writes in JAMA “Every case of recent head injury, however trivial it may appear, should, we believe, be treated with the greatest consideration, lest damage to hidden and important structures escape our attention, thus leaving a foundation for future trouble which too often is irreparable.”
What is the best approach to investigation and treatment of persistent postconcussive symptoms?

- What are the key domains that need to be evaluated as part of complete concussion care in the context of prolonged recovery?
  - This used to be the 10% group that appears to be expanding to 20%?
- What skills and expertise are appropriate to assess these domains? (Expanding the Care Team!)
  - Neuropsychologists
  - Neurologists
  - Specialized PT

What is the current state of the scientific evidence about the prevalence, risk factors, and causation of possible long-term sequelae like CTE and other neurodegenerative diseases, with respect to sports concussion?

- What are the definition, clinical features, and underlying pathophysiology (if any) of “subconcussive blows” and how can they be measured and monitored?
- What have we learned from the retired athlete population?

What strategies can be used to effectively reduce the risk of concussion in sport?

(For example, protective equipment, neck strengthening, and policy/rule changes)

Clinical Evaluation Tips

- Take your Time
- Take them Seriously
- Make it Personal
- Make it Technical
- Take Responsibility

The Concussion Solution
Do Our Concussion Assessment Tools Have Value?

Quantifying the Value of Multidimensional Assessment Models for Acute Concussion: An Analysis of Data from the NCAA-Dod Care Consortium

Do our Concussion Assessment Tools Have Value? - Quantifying the Value of Multidimensional Assessment Models for Acute Concussion: An Analysis of Data from the NCAA-Dod Care Consortium

What About Educational Programming

Concussion in Sports NCAA Sports Science Institute

NCAA Sports Science Institute

CDC: Heads Up: Concussion in High School Sports

http://www.cdc.gov/concussion/headsup/headsup_facts.html

ThinkFirst-SportSmart Concussion Education and Awareness Program

http://www.thinkfirstcanada.org/

NATA’s Concussion 101 Handouts

Nationwide Children’s Hospital: A Coaches Guide to Concussions

http://www.nationwidechildrens.org/coachs-guide-to-concussions

http://www.thinkfirstcanada.org/
A YouTube Video Worth Checking Out (Simplifies Sport-Related Concussion)

Concussion Research Group @ UD

http://www.youtube.com/watch?v=zCCD52Pty4A

Concussions 101, a Primer for Kids and Parents - Dr. Mike Evans

Suggested Roles and Responsibilities of the School Concussion Management Team and School Personnel

High School and Middle School Environments

- Certified athletic trainer (ATC)
- Student-athlete
- Parents and guardians
- School administrator
- School medical advisor
- Licensed health care professional
- School nurse
- Director of physical education and/or athletic director (AD)
- Coach
- Teacher/school counselor/school psychologist


Importance of 'Return-to-Learn' in Pediatric and Adolescent Concussion

Christina C. Master, MD; Gerard A. Gioia, PhD; John J. Leddy, MD; Matthew F. Grady, MD

Pediatric Annals - September 2012 - Volume 41 · Issue 9: e180-e185

One Final Thought – Can We Change Attitudes about Concussions at an Early Age by Utilizing Instruction by Health Educators?

- Children’s perceptions can be molded during their early years; so perhaps a good time to introduce concussion awareness instruction in PE and Health classes between 3rd – 5th grade?
- The concept I propose is a “mini-model” on concussion awareness:
  - When to suspect a concussion?
  - Who do I report it to?
  - What are the consequences of undiagnosed and untreated concussions?
- Could this work?

Introducing “Get aHEAD Safely in Soccer”™

http://www.nscaa.com/heading

“Get aHEAD Safely in Soccer”™
You Must Have Some Questions???

Thank You

Sport-Related Concussion Standard of Care Guidelines that Incorporate the 5th International Consensus Conference on Concussion in Sport (2016) Recommendations

Thomas W. Kaminski, PhD, ATC, FNATA, FACSM, RFSA
Professor/Director of Athletic Training Education
University of Delaware

Life Through Movement International Conference
Nelson Mandela University
Port Elizabeth, South Africa
October 5, 2018

NCAA/DOD CARE Project

Concussion Data from University of Delaware (approx. 625 SA’s)

- 2015-16
  - 40 concussions (31 sport & 9 non-sport)

- 2016-17
  - 45 concussions (34 sport & 11 non-sport)

- 2017-18
  - 43 concussions (30 sport & 13 non-sport)
Overview of the Baseline Testing

- Computerized NP Testing (ImPACT, ANAM, CNS Vital Signs)
- SCAT5 Symptom Evaluation
- Brief Symptom Inventory (BSI-18) — Quickly measure psychological symptoms (Q-17 be aware of 2+ scores)
- SAC
- BESS

SCAT5 Symptom Checklist

Brief Symptom Inventory (BSI-18)

Reminder — Red Flag (Q-17 be aware of 2+ scores)
**Tekscan Mobile Mat BESS**

**King-Devick Testing**

https://www.youtube.com/watch?v=Ga4ops3WFt8

**NPC-AR Measure**

- Accommodative Ruler (AR)
- AR placed on brow just above the nose, subject focuses on small target letter “T” as examiner moves target at a rate of 1-2 cm/s
- Subject instructed to verbalize when they see double, target is stopped and distance in cm is recorded

**NPC-TD Procedure**

- Tongue Depressor (TD)
- Subject moves TD and focuses on small target letter “T”
- Instructed to stop moving the target when they see double and distance in cm between target and tip of the nose is recorded with tape measure

**Trail Making Test**

**Tandem Gait**
Clinical Reaction Time (CRT)

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**Reaction Time Rating**

- Ultra slow
- Ultra fast
- Slow
- Very slow
- Average
- Very fast

Grooved Pegboard Testing

Today’s Lecture and Lab Handout can be viewed at the following web site link:

https://sites.udel.edu/chs-atep/lectures/