

It's Enough to Make You Dizzy! Concussion Update 2017

Rachel A. Coel, MD, PhD, FAAP, CAQSM
Medical Director

Disclosures

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Objectives



The “Game Plan”

1. Review presentation of concussion
2. Update on management of concussion
3. Review return-to-play guidelines
4. Discuss injury prevention strategies and equipment
5. My plug for “EARLIER...”

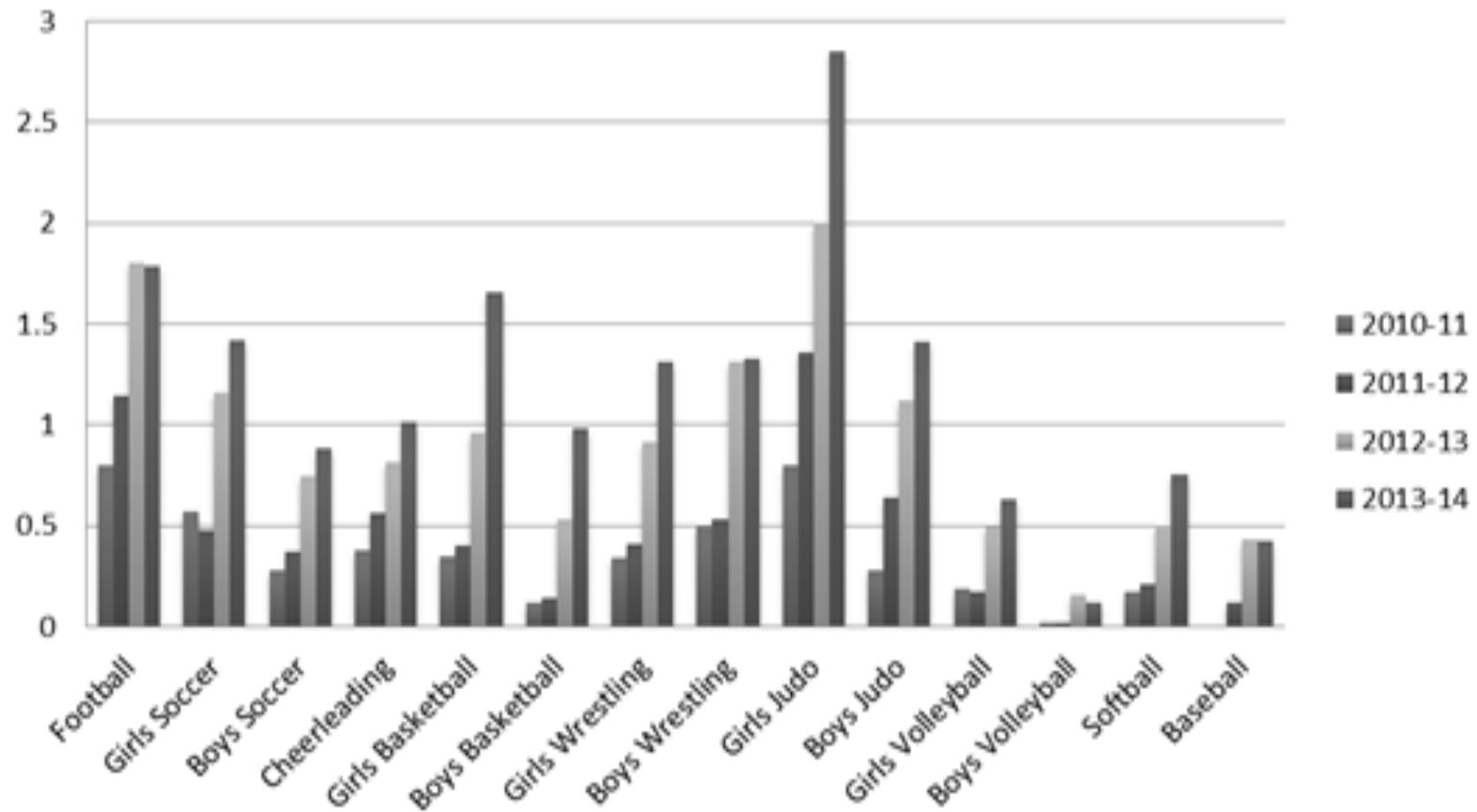


ImPACT baseline testing for 67 schools participating state-wide including private schools

School Year	# of Baselines	# of Concussions
2010-11	4683	446
2011-12	10,113	895
2012-13	10,496	1140
2013-14	10012	1370
2014-15	9451	1052
2015-16	9066	1092

Concussion Injury Rate per 1000 exposures

Concussion Injury Rate per 1000 exposures for 14 Sports during School Years 2010-2014



It's not just football...

Girls Are Often Neglected Victims of Concussions

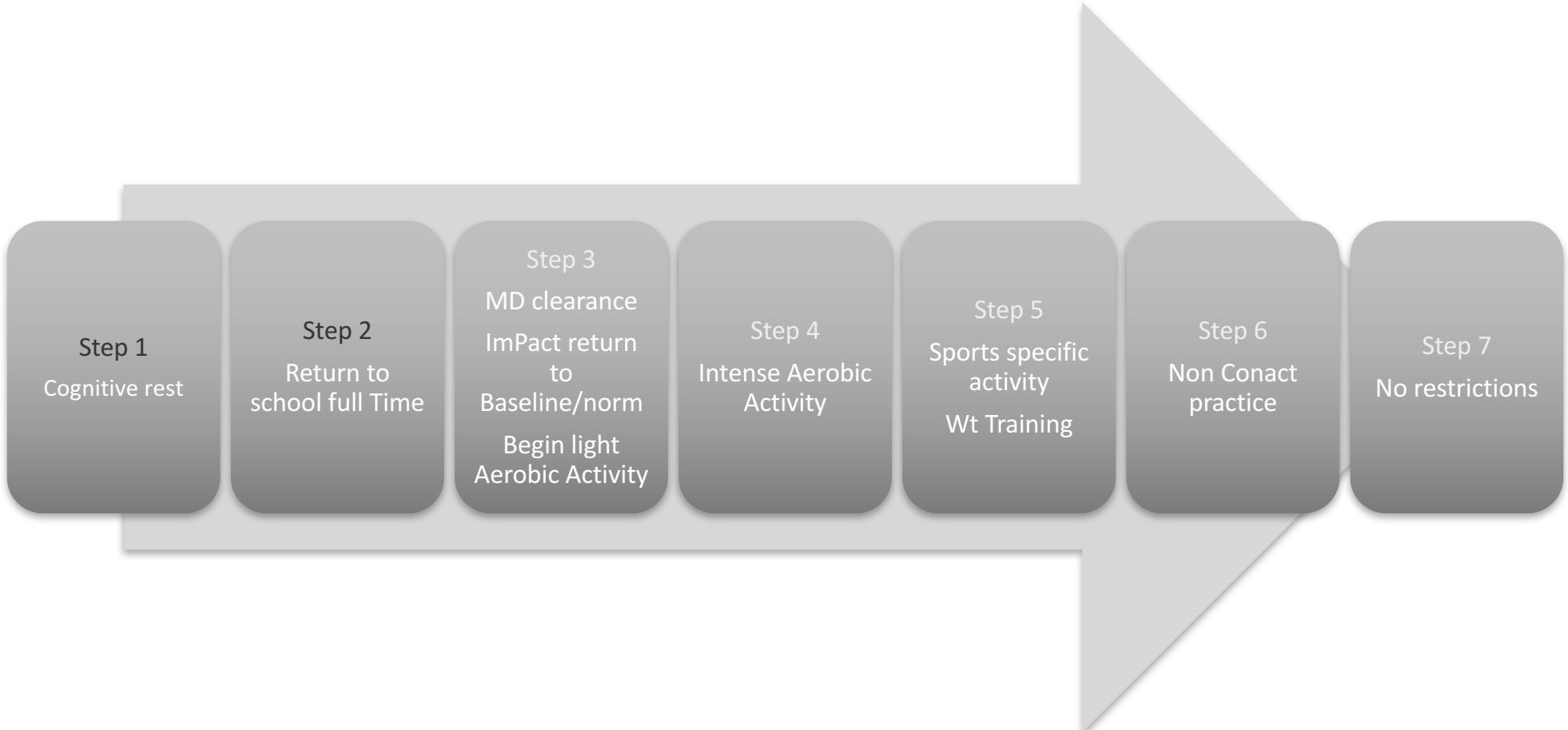


Suzy Allman for The New York Times

Hannah Stohler, center, a 16-year-old soccer player for Conard High in Connecticut, at a match Sept. 24. She has sustained three concussions.

Gradual Return to Play Protocol

Milestones of Concussion Recovery



so, what's the
problem?

Average Number of Sport Days Missed

Hawaii Concussion Awareness & Management Program (HCAMP)
Report from August 1, 2011 to July 31, 2016

Number of Days Missed		
Days Missed	MEAN	SD
August 1, 2015 – July 31, 2016 (n=1092)	21.68	19.08
August 1, 2014 – July 31, 2015 (n=1052)	31.68	21.68
August 1, 2013 – July 31, 2014 (n=1370)	26.15	25.17
August 1, 2012 - July 31, 2013(n=1140)	26.2	18.98
August 1, 2011 - July 31, 2012 (n=845)	23.5	16.5

Relationship Between Time in Each Step

School Year	2010-2012	2013-2014
Onset to Step 1	1.1	1.1
Step 1 to Step 2	3.0	3.0
Step 2 to Step 3 (school/cardio)	9.9	13.7
Step 3 to Step 4	2.0	2.3
Step 4 to Step 5	2.1	2.2
Step 5 to Step 6	2.6	2.8
Step 6 to Step 7	2.7	2.1

How do we get them moving sooner?

What concerns young athletes about concussions?

CJSM study (Stein) of 121 pediatric athlete patients

Worst thing about concussion:

- Symptoms – 58%
- Loss of activity – 56.2%
- Both symptoms and loss of activity – 14%

TABLE 2. Examples of Patients' Free-Text Responses to the Question, "What Is the Worst Thing for You About Having a Concussion?"

"Headache, fogginess"

"Miserable, falling behind in school work, bored, no fun"

"Having to be on brain rest—it is very boring"

"Cannot do anything and cannot drive"

"The worst thing for me is that if I get another one I could potentially not be allowed to play contact sports"

"I cannot watch television, use my phone, or play sports"

"Headaches, bright lights, not being able to concentrate, trouble reading"

"The headaches, not being able to do all of my school work like normal and not being able to play sports"

"Depression issues, low energy, insomnia, not being able to keep up in school"

"Not being able to go to gymnastics or soccer and not being able to be with friends"

"Feeling tired all the time"

"I can't play a sport until I am cleared by a doctor. Which can take forever"

"Not being able to do anything"

"I get really dizzy a lot"

"Headaches, not being able to remember things"

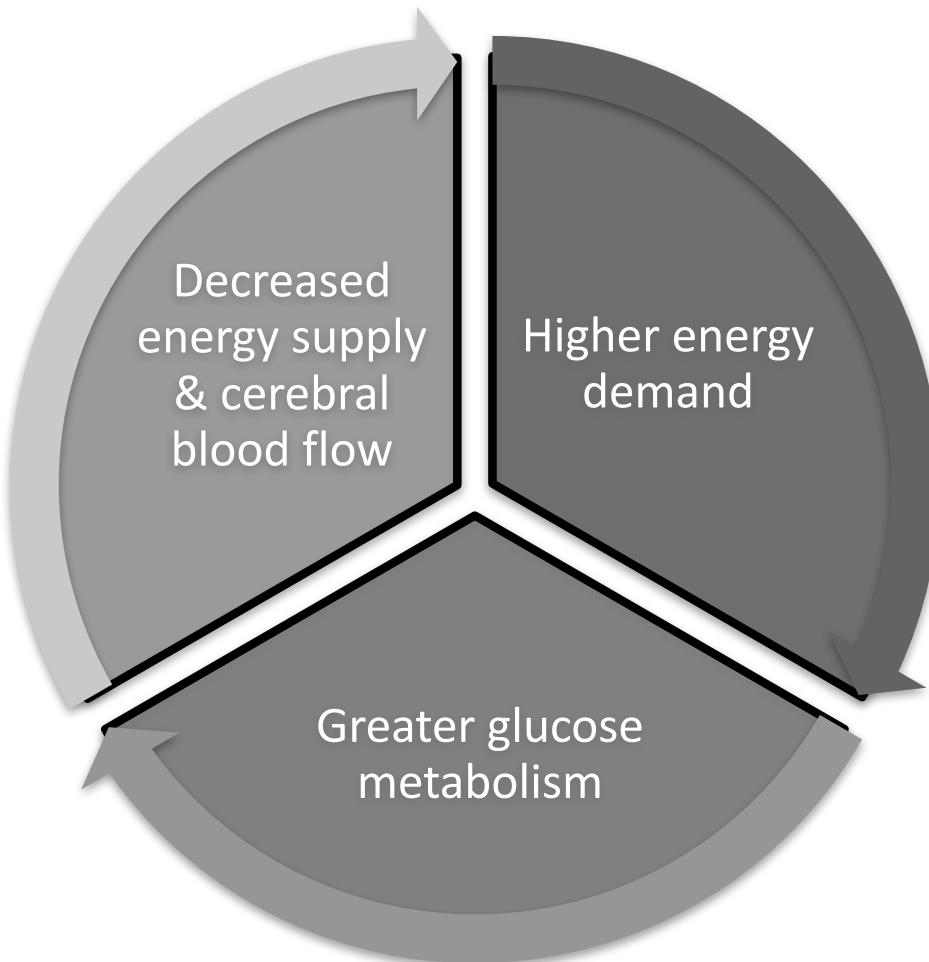
"Feeling like I can think/process something but not being able to do it, painful consistent headaches, and not being able to play soccer"

"I am not allowed to do the things I love"

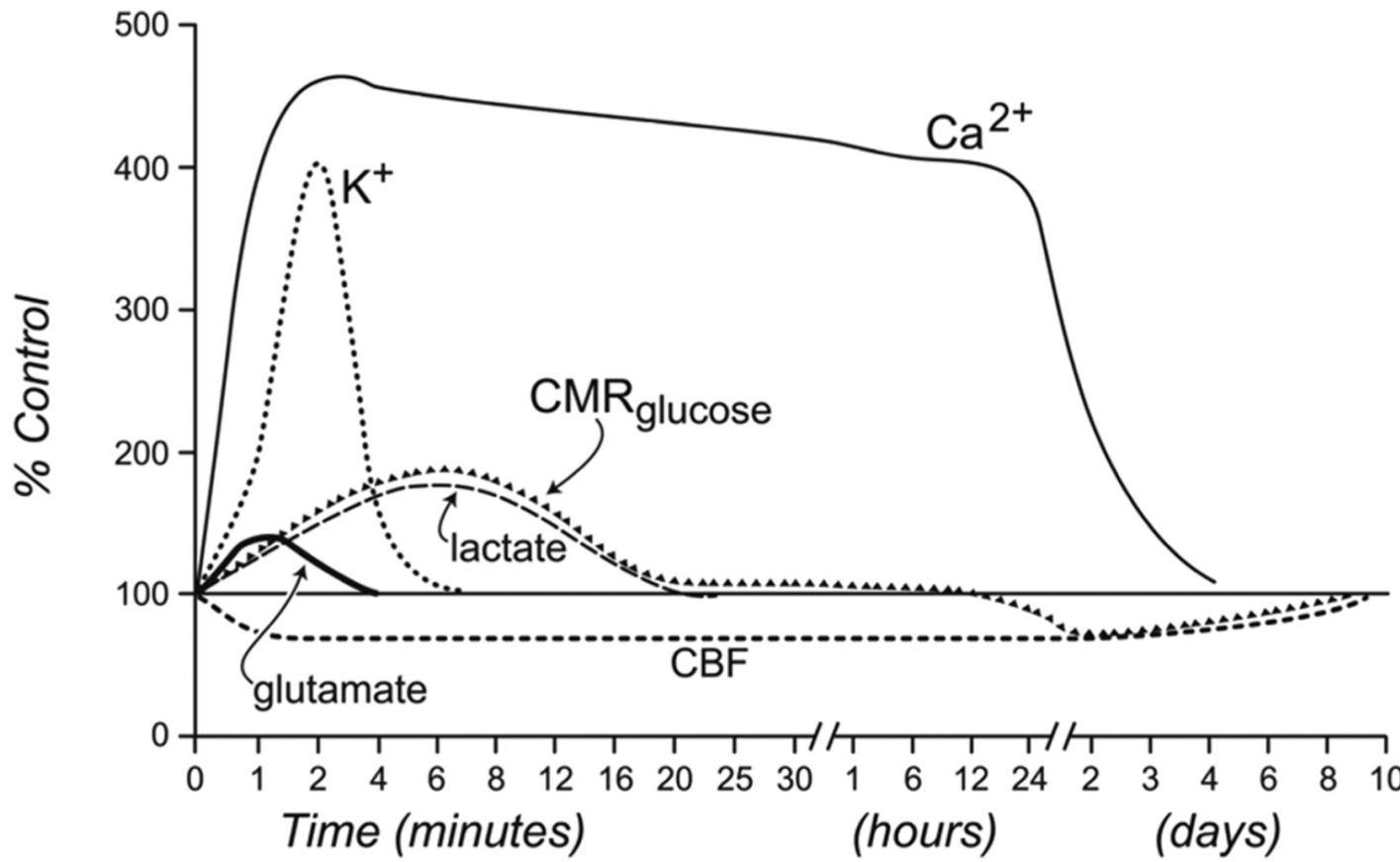
What happens in a concussion?

Metabolic Mismatch

BRAIN = ENERGY CRISIS



Timeline for Cellular Correction



7 – 10 DAYS

Giza CC, Hovda DA. Ionic and metabolic consequences of concussion. In: Cantu RC, Cantu RI. *Neurologic Athletic and Spine Injuries*. St Louis, MO: WB Saunders Co; 2000:80–100.

**Family
History?**

**Pre-
morbid
History?**

Stress?

Age?

**Doing
Too
Much?**

**???
Poor
Sleep/Nutrition?**

**Mechanism
of Injury?**

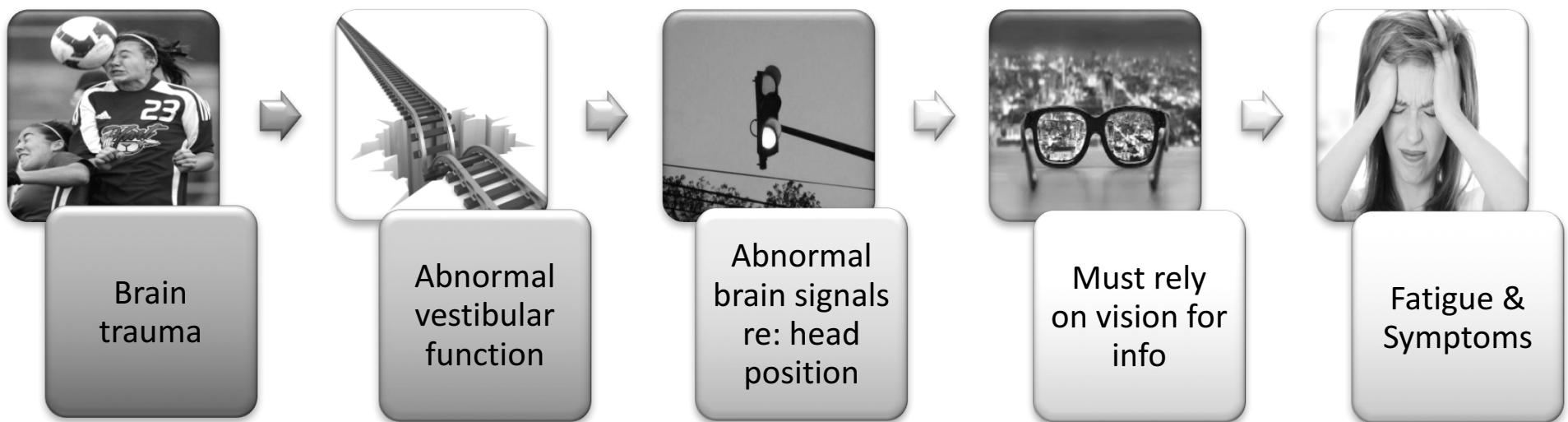
**Second
Injury?**

Genetics?

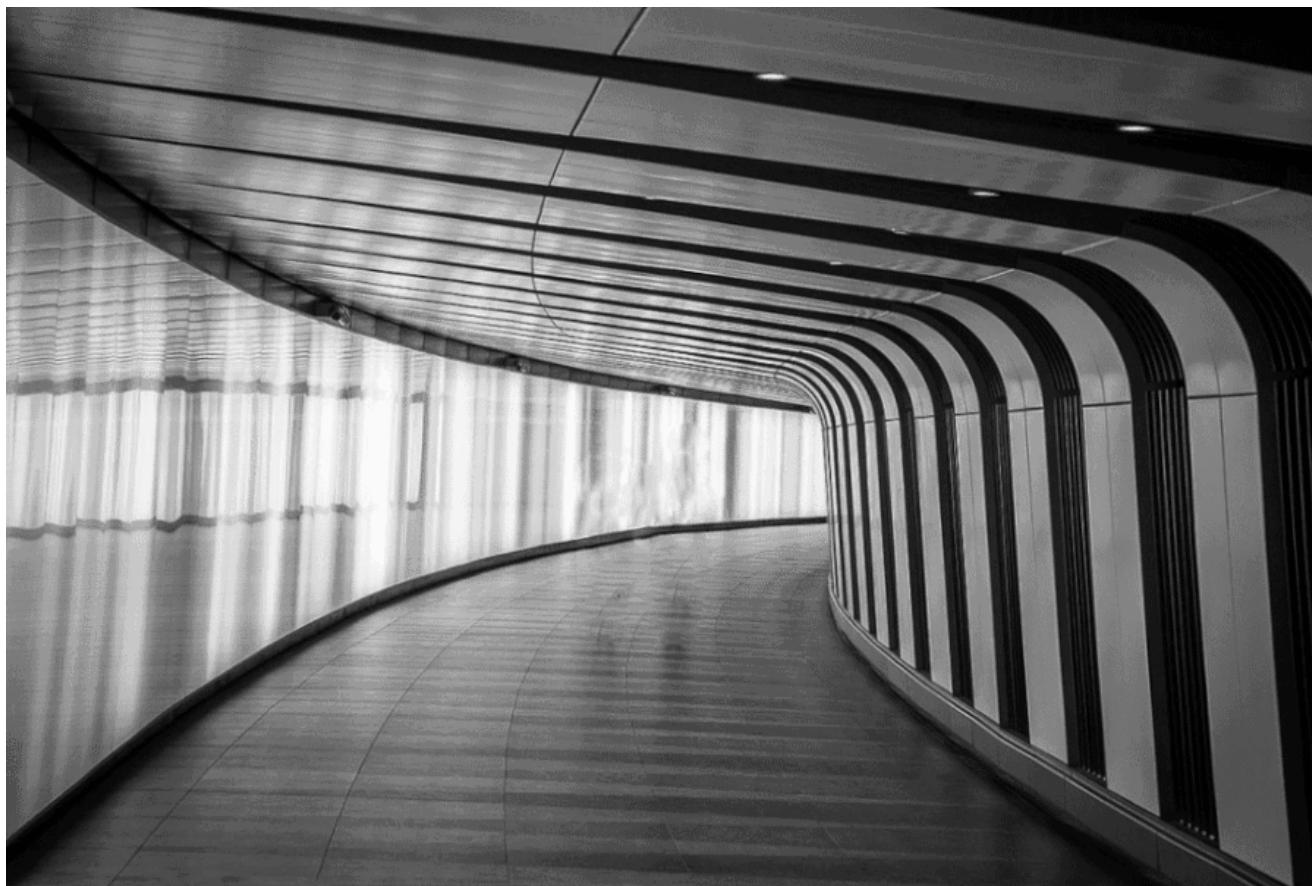
**Doing
Too
Little?**



Concussion & the Vestibular System



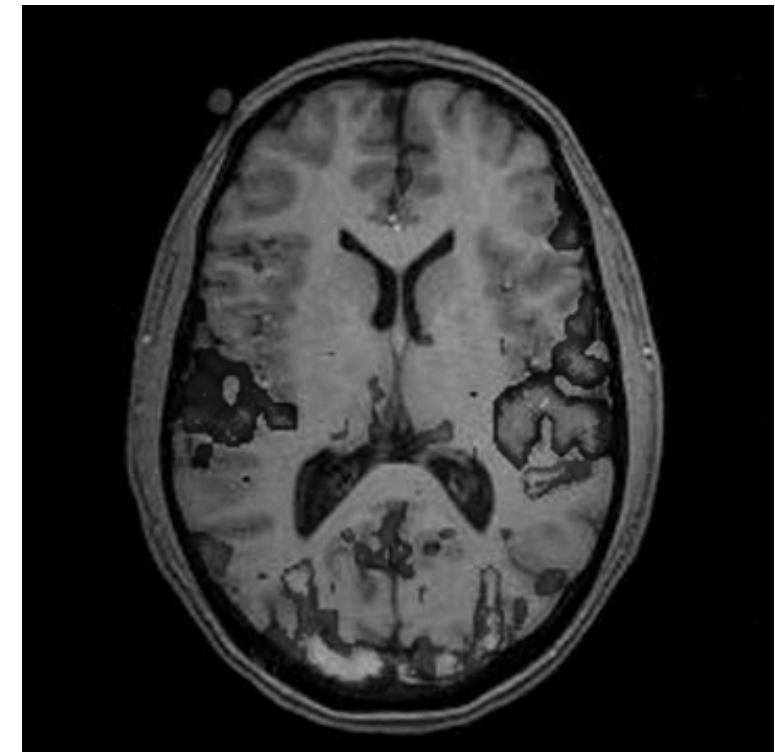
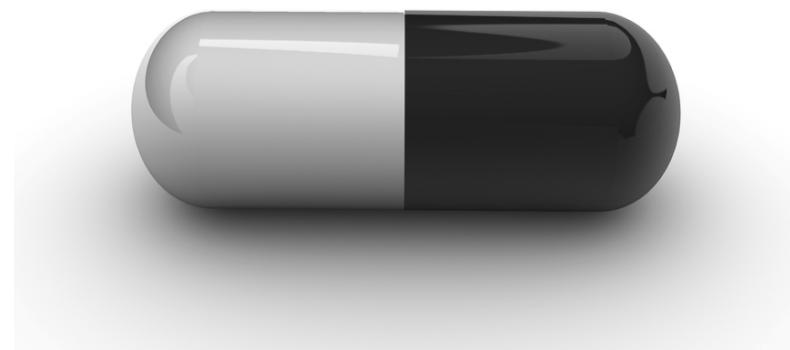
This is vestibular dysfunction!



What do I dream about?



Breathalyzer



Where are we currently?

- History & Symptom Checklists
- Physical Exam
- Balance Testing
- Imaging
- Computerized neurocognitive testing
- Neuropsychological testing
- Physical therapy
- Vision therapy
- Medication
- Coping



Computerized Neurocognitive Testing (ie. ImPACT)

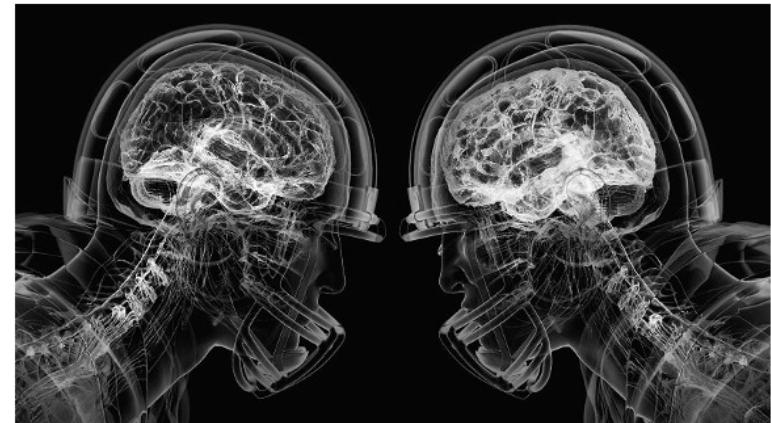
- First used in 1982
- Attempts to measure attention, memory, problem solving, and reaction time
- Baseline? Who? How often?
False sense of security?
Validity?
- Not formally recommended
- Comprehensive plan required
- Neuropsychologist evaluation is preferable

Concussion test may not be panacea

ImPACT sells tests and training to thousands, but some question program's validity

By Peter Keating | ESPN The Magazine

Updated: August 26, 2012, 11:21 AM ET



Bryan Christie Design; reference imagery: Purdue Neurotrauma Group / Purdue University



Treatment Options

- Physical Rest
- Cognitive Rest
- Vestibular therapy
- Cervical physical therapy
- Vision therapy
- Medication
- Exercise
- Coping / Psychology / Cognitive Behavioral Therapy
- Reassurance

My Current Approach...

- Close observation first 24-72 hrs!
- Limited medications (no defined role)
- Emphasize nutrition/stress/sleep hygiene
- Some cognitive and physical rest: decrease electronics, music, physical activity, and cognitive stress
- Return to school within 48-72 hours
- Return to symptom-limited light exercise within 3-5 days
- Exertional stress testing to determine tolerance
- Review expectations and return-to-play guidelines!
- Must return to school fully prior to returning to sports!

Vestibular Therapy



Concussion Home Exercise – Saccades Exercises (Vertical)

In this CHOC video, learn how to perform home exercises to deal with symptoms of concussion such as problems with vision, balance and dizziness.



Concussion Home Exercise – Saccades Exercises (Horizontal)

In this CHOC video, learn how to perform home exercises to deal with symptoms of concussion such as problems with vision, balance and dizziness.



Concussion Home Exercise – Two Thumb Exercise

In this CHOC video, learn how to perform home exercises to deal with symptoms of concussion such as problems with vision, balance and dizziness.



Concussion Home Exercise – Advanced Ball Exercise

In this CHOC video, learn how to perform home exercises to deal with symptoms of concussion such as problems with vision, balance and dizziness.

From Children's Hospital of Orange County website

What happened to...



Cocoon vs. Light Activity

- Prolonged rest and inactivity do not speed recovery time.
 - *Kids who returned to light activity (rest only 1-2 days) felt better faster than kids who underwent prolonged rest (5 days of strict rest).*
 - *Kids who rested longer had more severe symptoms and had longer lasting symptoms than the active kids.*

Hammeke et al. (2015) Benefits of Strict Rest After Acute Concussion: A Randomized Controlled Trial. *Pediatrics*. Vol 135, No 2.



PM R 8 (2016) S91-S100



www.pmrjournal.org

Advanced Sports Medicine Concepts and Controversies

The Role of Controlled Exercise in Concussion Management

John Leddy, MD, Andrea Hinds, PhD, Dan Sirica, BS, Barry Willer, PhD

Earlier Return to NON-CONTACT Exertion

- Earlier return to exertion (noncontact exercise and school) did not worsen symptoms or prolong healing time.
 - It is safe to try gradually increasing light activity.
- Concussion patients treated with cardio exertion returned to full work/activity more often than those treated with rest.
- Missing school for prolonged periods may worsen symptoms.
 - Stress, anxiety
 - Depression, sadness, isolation
 - Feeling overwhelmed, unfocused, frustrated

Normal Time to Recovery

Children/Adolescents: 4 Weeks

Adults: 10-14 days

Not all symptoms are concussion!



Sports must wake up about depression

By Reid Forgrave FoxSports



Speaking of Depression...

Mom Suing Pop Warner Wants to Stop Pre-Teen Tackle Football

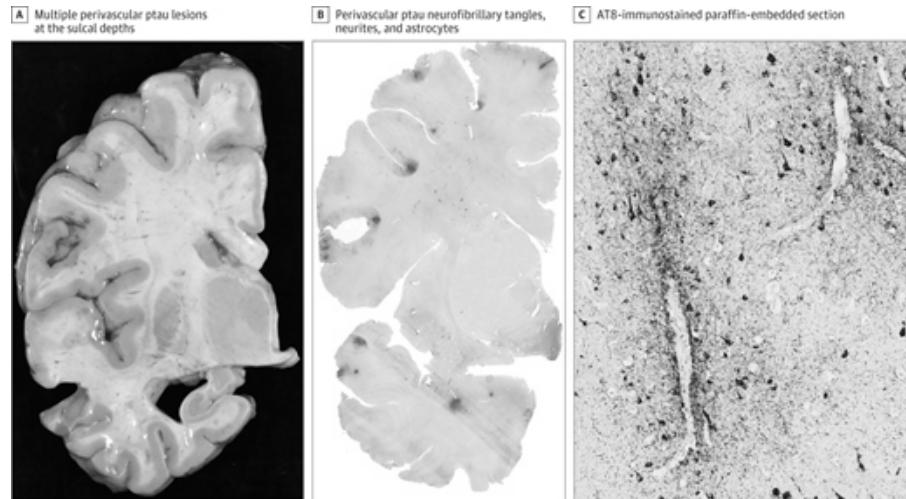
Study: Former NFL Players Who Played Tackle Football Before Age 12 at Increased Risk of Memory and Thinking Problems Later



Mom Sues Pop Warner Football for Son's CTE-Related Suicide

CTE

- Postmortem finding of increased tau deposition
- Also found in other conditions
- Not always correlated with symptoms
- Cause & Effect???
- Relationship overstated? Or just not well understood?
- Mostly still unknown...



What is risk of problems later in life?

- Study evaluated football players from 1956-1970
 - 296 football athletes, 190 other athletes
 - Compared to varsity swimmers, wrestlers and basketball players
- Head injury more likely reported in football
- *No increased risk in football players of neurodegenerative diseases and specifically dementia, Parkinsonism, and ALS*

Janssen PH, Mayo Clin Proc, 2017

It's Not Just the Brain We Should Be Worrying About...

**Concussion Increases Odds of Sustaining a →
Lower Extremity Musculoskeletal Injury After
Return to Play Among Collegiate Athletes**

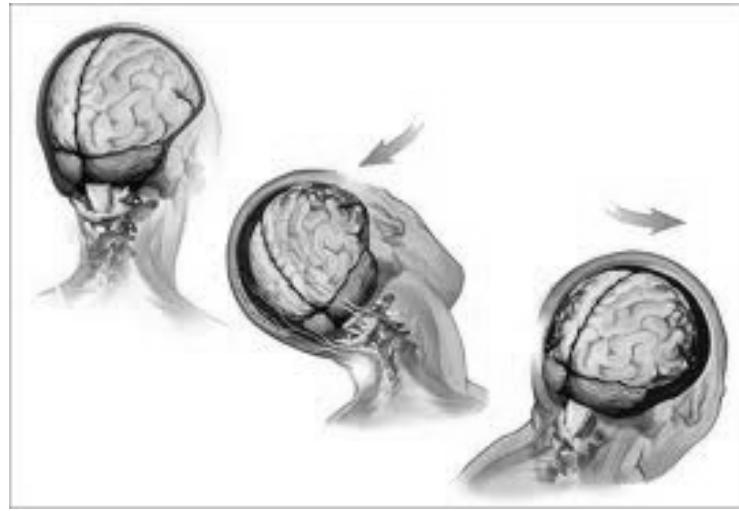
M. Alison Brooks, MD, MPH*,†,‡, Kaitlin Peterson, BS§, Kevin Biese, BS||,

**In 90 days following
concussion: 2.5x
increased risk of lower
extremity MSK injury**

Can We Prevent Concussion?

There is no concussion-proof helmet or head gear...

Helmets and head gear DO reduce the risk of skull fractures, severe head injury, eye injuries.



They DO NOT reduce the risk of concussion!

Head Gear in Soccer

- Insufficient evidence that current headgear prevents head injury
- May increase how aggressively athletes play?



Niedfeldt MW. Head Injuries, Heading,
and the Use of Headgear in Soccer.
CSMR 2011;10(6): 324-29

Gear should fit & be worn properly





TRY TO ROTATE HELMET
SHOULD NOT Wobble, TILT, OR ROTATE



3rd Party Add-Ons Don't Work

Guardian Caps



Unequal Technologies

HEAD PROTECTION ZONE

Unequal takes head protection to a new level by integrating function and design with our patented composite fortified with Kevlar® to provide concealed, customizable protection to athletes at every level.

We don't just talk about protection, we prove it. Unequal head products are extensively tested at independent third party ISO17025 accredited test labs. Tests show that our products reduce up to 50 percent of severity index, or measured impact. That's a number we can all feel good about.

GYRO is supplemental head padding that you simply Place-n-Play into full coverage hard shell football helmets. GYRO features a 35 mm thick padded band that is contoured and trimmed to give you customized, concealed protection with no helmet modification.

MAXX is supplemental head padding that you simply Place-n-Play into most full coverage hard shell helmets. This single pad can be easily cut to fit your helmet for added protection with no helmet modification.

DOME is a protective skull cap made with Unequal's patented padding concealed in the band and crown areas. Wear DOME for maximum comfort and protection. The DOME is fully adjustable for a custom fit.

BAND is a protective headband that conceals Unequal's patented supplemental head padding. Pads are removable for easy care. Fully adjustable for a custom fit.

HALO is supplemental head padding, designed for incidental contact, that you simply Place-n-Play into your existing hard shell caps. The HALO in baseball caps, golf caps, outdoor caps, and recreational caps.

NPADS Available in universal and specialty cut kits that supplement any helmet's existing pads. NPADS come in various shapes and features a sticky underside. Pre-cut specialty kits align perfectly with the pads in your helmet.

WARNING:
ANY PLAYER IN ANY SPORT CAN SUSTAIN A HEAD INJURY WITH EVEN THE VERY BEST HEAD PROTECTION. UNEQUAL PADS CAN NOT PREVENT CONCUSSIONS OR ELIMINATE THE RISK OF SERIOUS HEAD OR NECK INJURIES. Scientists have not reached agreement on how the results of impact absorption tests relate to concussions. No conclusions about a reduction of risk or severity of concussive injury should be drawn from impact absorption tests.

What about mouthguards???

Proven protection against dental and orofacial injury



Mouth guards DO NOT reduce risk of concussion

These don't prevent concussion!





Change the Sport?

- U11: no heading
- U12 & U13: max 30 minutes heading training/week
(max 15-20 hits/player)



Changing the Sport

Trying to Reduce Head Injuries, Youth Football Limits Practices

i.e.

NF

ESPN.c

e

PM ET



Scott A. Miller/Associated Press

A team at a Pop Warner game in 2009. More than 285,000 children, ages 5 to 15, compete in Pop Warner leagues.

By ANAHAD O'CONNOR

Published: June 13, 2012 | 79 Comments

AAP Policy Statement

American Academy
of Pediatrics



DEDICATED TO THE HEALTH OF ALL CHILDREN™

Tackling in Youth Football

COUNCIL ON SPORTS MEDICINE AND FITNESS

Pre-participation Exams

- Concussion history: #, length of symptoms
- Baseline SCAT5?
- Baseline symptom checklist?
- Computerized neurocognitive baseline?

- | |
|--|
| 34. Have you ever had a head injury or concussion? |
| 35. Have you ever had a hit or blow to the head that caused confusion, prolonged headache, or memory problems? |
| 36. Do you have a history of seizure disorder? |
| 37. Do you have headaches with exercise? |
| 38. Have you ever had numbness, tingling, or weakness in your arms or legs after being hit or falling? |
| 39. Have you ever been unable to move your arms or legs after being hit or falling? |

Educate, educate, educate...

U.S. athletes still reluctant to admit head injuries: report

BY SUSAN HEAVEY

WASHINGTON | Thu Oct 31, 2013 10:26am EDT

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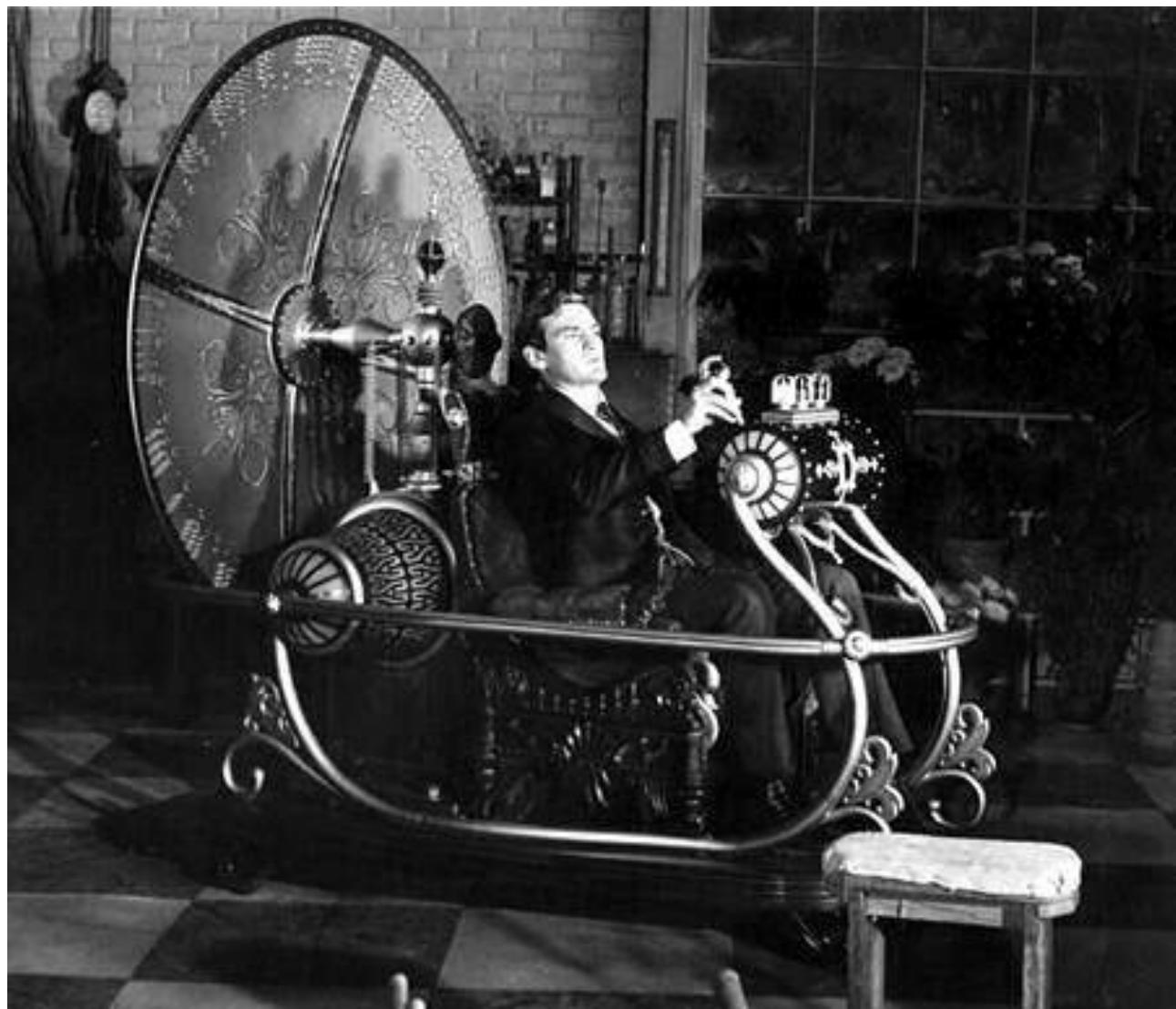


1 OF 7. Seventeen year-old Hannah Steenhuisen watches her high school's girls soccer team prepare for a game against Bishop Feehan in Attleboro, Massachusetts October 25, 2013.

CREDIT: REUTERS/BRIAN SNYDER

The Case of Judo Jane





1. Initiate medical care in the first few days



Optimal Recovery begins at time of injury!

**High school athletes who continued to play
with concussion symptoms**

**= 8.8x more likely to have protracted recovery
> 21 days**

College athletes

**= ~5 more days to recover than those removed
from play right away**

Elbin RJ, Pediatrics. Asken BM, J Athl Train.

Point of Entry

- Primary care
- Emergency Department
 - From 2001 to 2009 increased 100,000 visits/yr
- Sports Medicine
- Neurology
- Physical Medicine & Rehabilitation
- Neurosurgery

Original Investigation

Point of Health Care Entry for Youth With Concussion Within a Large Pediatric Care Network

Kristy B. Arbogast, PhD; Allison E. Curry, PhD; Melissa R. Pfeiffer, MPH; Mark R. Zonfrillo, MD, MSCE; Juliet Haarbauer-Krupa, PhD; Matthew J. Breiding, PhD; Victor G. Coronado, MD, MPH; Christina L. Master, MD



wiseGEEK

2. Earlier referral to appropriate sub-specialists



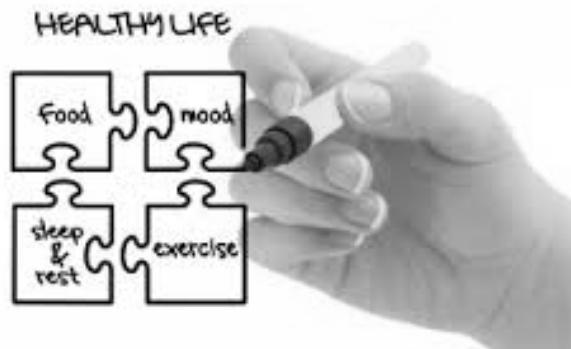
3. Earlier collaboration with school



4. Earlier return to routines



5. Earlier lifestyle interventions



6. Earlier care coordination of co-morbidities and RTP planning



Summary

Earlier referral to concussion specialist may:

- Reduce post-concussive sequelae
- Reduce time to return to play
- May facilitate earlier return to school
- Improve patient's mood
- Improve coordination between providers



Resources

CDC Head's Up Campaign

<http://www.cdc.gov/concussion/headsup>

National Federation of State High Schools

<http://nfhslearn.com/>

STOP Sports Injuries campaign

<http://www.STOPSportsInjuries.org>



Dr. Rachel Coel
Medical Director



Dr. Elizabeth Ignacio
Surgical Director



Ross Oshiro
Program Coordinator

THANK YOU!

Queen's Center for Sports Medicine
(808) 691-4449
rcoel@queens.org



Dr. Ryan Moore
Physical Therapist



Jessica Oshiro
Athletic Trainer



Dr. David Kurihara
Physical Therapist