

Pediatric Concussion Care for Kids: It's a Team Sport!

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Washington, DC



Disclosure

■ Test Author

- ◆ Behavior Rating Inventory of Executive Function (BRIEF) Psychological Assessment Resources, Inc.
- ◆ Tasks of Executive Control (TEC)
- ◆ Pediatric Immediate Post-Concussion Assessment and Cognitive Testing (Pediatric ImPACT)
- ◆ Concussion Recognition & Response App
- ◆ Concussion Assessment & Response (CARE) Sport App
- ◆ Acute Concussion Evaluation



Objectives

- Achieve a working understanding of concussion
- Develop knowledge of evaluation & management of concussion
- Develop the concept of the Concussion Team, and awareness of the available clinical tools.

“Your Brain is Your Future”

(and the source of your parents' retirement...)

A concussion is a brain injury

Brain injuries threaten the Child's future

Need I say more?

Concussion Care for Kids: It's a TEAM Sport!

Who's on the Team?

Four Corners Approach to Concussion Care

Family

Child/ Teen

(Student, Athlete,
Son/Daughter,
Friend)

Medical Systems

Pre-Hospital (EMS) Emergency
Urgent
Primary Care
Specialty Care

School

Administrators
Teachers
School Nurse
Counselor
Psychologist
Certified Athletic Trainer

Athletic/ Recreational

Administrators
Coaches
Officials
Parents
Teammates
Certified Athletic Trainer

Silence on Concussions Raises Risks of Injury



Todd Heisler/The New York Times

Kelby Jasmon, left, like many high school teammates, said he would not tell his coach if he thought he had a concussion.

By [ALAN SCHWARZ](#)

Published: September 15, 2007

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.,

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Girls Are Often Neglected Victims of Concussions

Alan Schwarz (NY Times Oct. 2, 2007)



The New York Times

Consensus Statement on Concussion in Sport: the 3rd International Conference on Concussion in Sport held in Zurich, November 2008



P McCrory,¹ W Meeuwisse,² K Johnston,³
J Dvorak,⁴ M Aubry,⁵ M Molloy,⁶ R Cantu⁷

This paper is a revision and update of the recommendations developed following the 1st (Vienna) and 2nd (Prague)

conferences. The authors request, however that the document and/or the SCAT2 card be distributed in their full and complete

- Should athletes with persistent symptoms be screened for depression/anxiety?

Paediatric concussion

- Which symptoms scale is appropriate for this age group?
- Which tests are useful and how often should baseline testing be performed in this age group?
- What is the most appropriate RTP guideline for elite and non-elite child and adolescent athletes?

Future directions

- What is the best method of knowledge transfer and education?

British Journal of Sports Medicine 2009 43 (Supl I) i76-i84.

This document is designed to build on the principles outlined in the original Vienna and Prague documents and to develop further conceptual understanding of this problem using a formal consensus-based approach. A detailed description of the consensus process is outlined at the end of this document. This document is developed for use by physicians, therapists, certified athletic trainers, health professionals, coaches and other people involved in the care of injured athletes, whether at the recreational, elite or professional level. While agreement exists pertaining to principal messages conveyed within this document, the authors acknowledge that the science of concussion is evolving and

the consensus for the current consensus statement:

Acute simple concussion

- Which symptom scale and which sideline assessment tool is best for diagnosis and/or follow up?
- How extensive should the cognitive assessment be in elite athletes?
- How extensive should clinical and neuropsychological (NP) testing be at non-elite level?
- Who should do/interpret the cognitive assessment?
- Is there a gender difference in concussion incidence and outcomes?

Continued on page i76

The Zurich document additionally examines the management issues raised in the previous Prague and Vienna documents and applies the consensus questions to these areas.

SPECIFIC RESEARCH QUESTIONS AND CONSENSUS DISCUSSION

1. Concussion

1.1 Definition of concussion

A panel discussion regarding the definition of concussion and its separation from mild traumatic brain injury (mTBI) was held. Although there was acknowledgement that the terms refer to different

PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Clinical Report Sport-Related Concussion in Children and Adolescents
Mark E. Halstead, Kevin D. Walter and THE COUNCIL ON SPORTS MEDICINE
AND FITNESS

Pediatrics published online Aug 30, 2010;
DOI: 10.1542/peds.2010-2005

The online version of this article, along with updated information and services, is
located on the World Wide Web at:

<http://www.pediatrics.org>



Since June 2007

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Heads Up

Brain Injury
in Your Practice



Heads Up

Facts for Physicians About
Mild Traumatic Brain Injury
(MTBI)

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CENTERS FOR DISEASE CONTROL AND PREVENTION

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Four Corners Approach to Concussion Care

Family

Child/ Teen

(Student, Athlete,
Son/Daughter,
Friend)

**Athletic/
Recreational**

Administrators

Coaches

Officials

Parents

Teammates

Certified Athletic Trainer

Concussion/ mTBI

CDC Educational Materials

Heads Up: Concussion in High School Sports

Heads Up: Concussion in Youth Sports

Heads Up: Concussion in Your Practice

Heads Up to Schools: Know Your Concussion ABCs

www.cdc.gov/concussion

Public Awareness & Education

CONCUSSION

A Must Read for Young Athletes Let's Take Brain Injuries Out of Play

CONCUSSION FACTS

- A concussion is a brain injury that affects how your brain works.
- A concussion 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 court, or
 - being hit by a piece of equipment such as a lacrosse stick, hockey puck, or field hockey ball.
- A concussion can happen even if you haven't been knocked unconscious.
- If you think you have a concussion, you should not return to play on the day of the injury and until a health care professional says you are OK to return to play.

CONCUSSION SYMPTOMS

- Concussion symptoms differ with each person and with each injury, and may not be noticeable for hours or days. Common symptoms include:
 - Headache
 - Nausea or vomiting
 - Confusion
 - Bothered by light or noise
 - Difficulty remembering or paying attention
 - Double or blurry vision
 - Balance problems or dizziness
 - Slowed reaction time
 - Feeling sluggish, hazy, foggy, or groggy
 - Sleep problems
 - Loss of consciousness
 - Feeling irritable, more emotional, or "down"

WHY SHOULD I REPORT MY SYMPTOMS?

- Unlike with some other injuries, playing or practicing with concussion symptoms is dangerous and can lead to a longer recovery and a delay in your return to play.
- While your brain is still healing, you are much more likely to have another concussion. Repeat concussions can increase the time it takes for you to recover and the likelihood of long term problems.
- In rare cases, repeat concussions in young athletes can result in brain swelling or permanent damage to your brain. They can even be fatal.

During recovery, exercising or activities that involve a lot of concentration (such as studying, working on the computer, or playing video games) may cause concussion symptoms to reappear or get worse.

*For more information about concussion and other types of traumatic brain injuries, go to

www.cdc.gov/Concussion

A part of CDC's Heads Up series

What Should I Do if I Think I Have a Concussion?

DON'T HIDE IT. REPORT IT. Ignoring your symptoms and trying to "tough it out" often makes symptoms worse. Tell your coach, parent, and athletic trainer if you think you or one of your teammates may have a concussion. Don't let anyone pressure you into continuing to practice or play with a concussion.

GET CHECKED OUT. Only a health care professional can tell if you have a concussion and when it's OK to return to play. Sports have injury timeouts and player substitutions so that you can get checked out and the team can perform at its best. The sooner you get checked out, the sooner you may be able to safely return to play.

TAKE CARE OF YOUR BRAIN. A concussion can affect your ability to do schoolwork and other activities. Most athletes with a concussion get better and return to sports, but it is important to rest and give your brain time to heal. A repeat concussion that occurs while your brain is still healing can cause long-term problems that may change your life forever.

All concussions are serious. *Don't hide it, report it. Take time to recover.*
It's better to miss one game than the whole season.



Video Education

Coaches, Parents, Athletes



USA Football

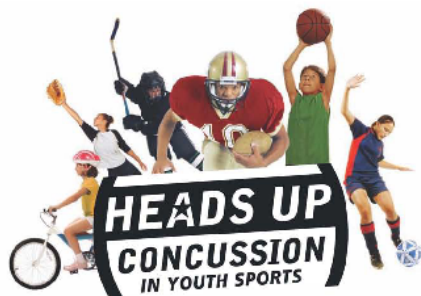


Play Smart.
Understanding
Sports Concussion

NAN-NATA w NFL/NHL
Raising Concussion Awareness
Educational DVD, "Concussions in
Football (Hockey): Signs,
Symptoms and Playing Safe"

**ACTive: Free Concussion
Training for Sports
Coaches**

Concussion Clipboard



SIGNS AND SYMPTOMS

These signs and symptoms may indicate that a concussion has occurred.

SIGNS OBSERVED BY COACHING STAFF	SYMPTOMS REPORTED BY ATHLETE
Appears dazed or stunned	Headache or "pressure" in head
Is confused about assignment or position	Nausea or vomiting
Forgets sports plays	Balance problems or dizziness
Is unsure of game, score, or opponent	Double or blurry vision
Moves clumsily	Sensitivity to light
Answers questions slowly	Sensitivity to noise
Loses consciousness (even briefly)	Feeling sluggish, hazy, foggy, or groggy
Shows behavior or personality changes	Concentration or memory problems
Can't recall events prior to hit or fall	Confusion
Can't recall events after hit or fall	Does not "feel right"

If you think your athlete has sustained a concussion... take him/her out of play, and seek the advice of a health care professional experienced in evaluating for concussion.

For more information and to order additional materials free-of-charge, visit:
www.cdc.gov/ConcussionInYouthSports

ACTION PLAN

If you suspect that a player has a concussion, you should take the following steps:

1. Remove athlete from play.
2. Ensure athlete is evaluated by an appropriate health care professional. Do not try to judge the seriousness of the injury yourself.
3. Inform athlete's parents or guardians about the known or possible concussion and give them the fact sheet on concussion.
4. Allow athlete to return to play **only** with permission from an appropriate health care professional.

IMPORTANT PHONE NUMBERS

FILL IN THE NAME AND NUMBER OF YOUR LOCAL HOSPITAL(S) BELOW:

Hospital Name: _____

Hospital Phone: _____

Hospital Name: _____

Hospital Phone: _____

For immediate attention, CALL 911

HEADS UP CONCUSSION IN LACROSSE



DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION



SIGNS AND SYMPTOMS

Athletes who experience any of the signs and symptoms listed below after a bump, blow, or jolt to the head or body may have a concussion.

Signs Observed by Coaching Staff	Symptoms Reported by Athlete
Appears dazed or stunned	Headache or "pressure" in head
Is confused about assignment or position	Nausea or vomiting
Forgets an instruction	Balance problems or dizziness
Is unsure of game, score, or opponent	Double or blurry vision
Moves clumsily	Sensitivity to light
Answers questions slowly	Sensitivity to noise
Loses consciousness (even briefly)	Feeling sluggish, hazy, foggy, or groggy
Shows mood, behavior, or personality changes	Concentration or memory problems
Can't recall events prior to hit or fall	Confusion
Can't recall events after hit or fall	Does not "feel right" or is "feeling down"

ACTION PLAN

If you suspect that an athlete has a concussion, you should take the following four steps:

1. Remove the athlete from play.
2. Ensure that the athlete is evaluated by a health care professional experienced in evaluating for concussion. Do not try to judge the seriousness of the injury yourself.
3. Inform the athlete's parents or guardians about the possible concussion and give them the fact sheet on concussion.
4. Keep the athlete out of play the day of the injury and until a health care professional, experienced in evaluating for concussion, says they are symptom-free and it's OK to return to play.

IMPORTANT PHONE NUMBERS

Emergency Medical Services

Name: _____

Phone: _____

Health Care Professional

Name: _____

Phone: _____

School Staff Available During Practice

Name: _____

Phone: _____

School Staff Available During Games

Name: _____

Phone: _____

IT'S BETTER TO MISS ONE GAME THAN THE WHOLE SEASON.

January 2010

For more information and safety resources, visit:
www.cdc.gov/Concussion and www.uslacrosse.org/safety.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION



State Legislative Action for the Youth Athlete:

3 Core Principles of the Maryland Law

- 1) Concussion Education: Coach, Parent, Athlete
- 2) Identification-Removal / Protection
- 3) Medical Evaluation & Written Clearance

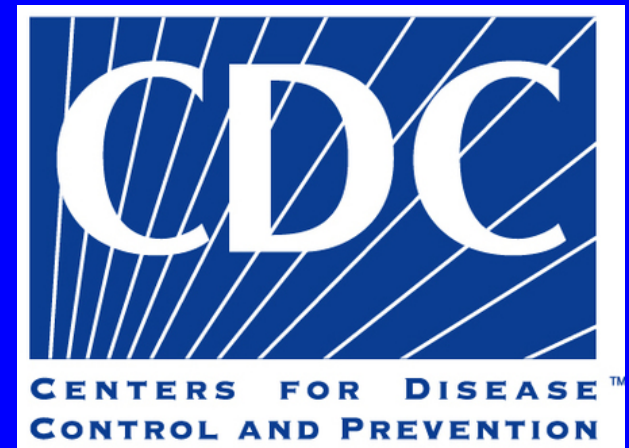


Youth Sports Challenge

Concussion = Invisible Injury

Knowledge
Awareness
Recognition

Once
recognized,
what do I do?



Empower with Recognition & Response

Teach Concussion
Recognition

1

Blow / Force to
Head / Body

2

Change in Function /
Behavior / Performance

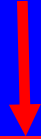
"I SUSPECT"

Post-Concussion Signs & Symptoms

<u>Physical</u>	<u>Cognitive</u>	<u>Emotional</u>	<u>Sleep</u>
Headache	Concentrate	Irritability	More
Fatigue	Memory	Emotional	Less
Balance/ Dizziness	Speed of Thinking	control Sadness	Cannot

Empower with R&R

Teach Concussion Response



“When in Doubt, Sit Them Out”

Response

Protect from further risk

Removal

Restrict Risk Activities

Rest / Recovery

Electronic Clipboard



Vomiting

Y

N

Balance problems

Y

N

Moves clumsily

Y

N

Loses consciousness

Y

N


Drowsy

Y

N



iPad 1:40 PM 25%
Menu Incident Summary

 **Doe, John**
Male 16
APR 29, 2011 1:39 PM

Concussion Suspected

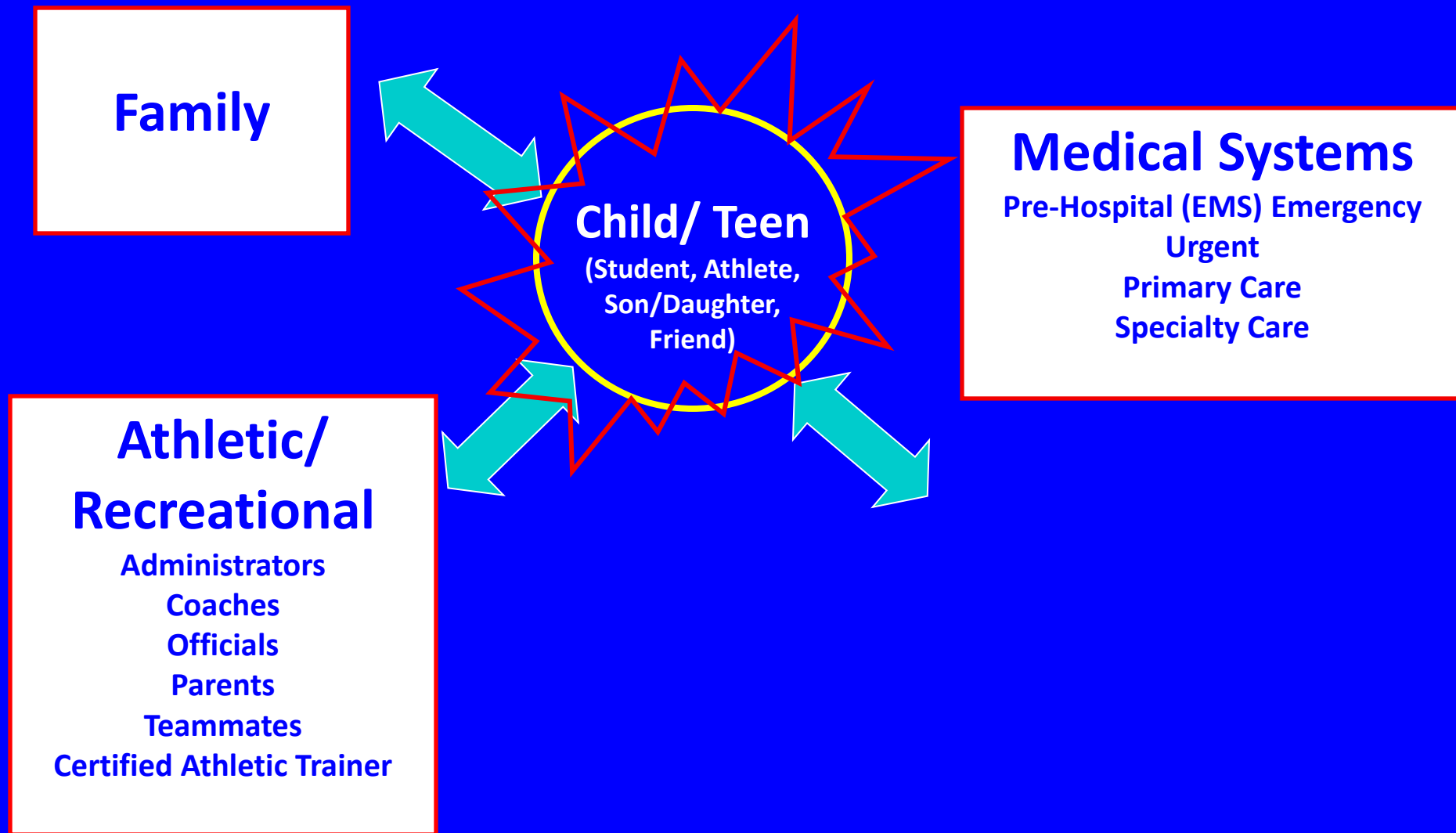
You indicated there was a likely blow to the head and 7 SIGNS or SYMPTOMS were reported.
Remove the youth from play RIGHT AWAY and restrict participation for the rest of today.

1. Inform parent/guardian of suspected concussion.
2. Recommend further medical evaluation.
3. Give parent ACE Post-Concussion Home/School Instructions.
4. Youth should be observed over next 24 hours. Do not leave him or her alone.
5. Instruct the parents to review and record symptoms every 1-2 hours and observe for danger signs.
6. Youth should return only when symptom-free and after being cleared by a health care professional for a gradual return.

Saw blow to head	YES
Signs observed (1)	(2)(3) Moves clumsily, Loss consciousness
Signs observed (2)	(1)(5) Mood/behavior changes
Signs observed (3)	(3)(4)
Symptoms experienced (1)	(2)(5) Headache/pressure...
Symptoms experienced (2)	(1)(4) Sensitivity to light/noise
Symptoms experienced (3)	(1)(5) Feeling foggy or grumpy
Cause of injury	Head to Head Hit
Force of blow	High
Seizures following injury	NO
Observer	Coach
Observer Age	18 years or older
Incident Type	Live Incident



Four Corners Approach to Concussion Care



Concussion 101

**Concussion =
Mild Traumatic Brain Injury**



Concussion/ mTBI

Definition

- **A concussion (or mild traumatic brain injury)** is defined as a
 - ◆ complex pathophysiologic process affecting the brain,
 - ◆ induced by traumatic biomechanical forces secondary to direct or indirect forces to the head.

Concussion/ mTBI

Definition

- Disturbance of brain function is related to:
 - ◆ neurometabolic dysfunction, rather than structural injury
 - ◆ typically associated with normal structural neuroimaging findings (i.e., CT scan, MRI).
- Concussion may or may not involve a loss of consciousness (LOC). (10-20%)

Concussion/ mTBI

Definition

- Concussion results in a constellation of symptoms:
 - ◆ physical, cognitive, emotional and sleep-related.
- Duration of symptoms are variable may last for as short as several minutes and last as long as several days, weeks, months or even longer in some cases.

Anatomical Timeline of a Concussion

Defining the Key Factors

C. Risk Factors

A. Injury Characteristics

B. Symptom Assessment

CONCUSSION

Pre-Injury Risks

Retro-grade Amnesia
20-35%



LOC
<10%

Antero-grade Amnesia
25-40%

Neurocog dysfx & Post-Concuss Sx's

Sec-Hrs

Sec-Min

Sec-Hrs

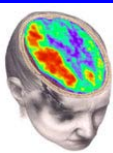
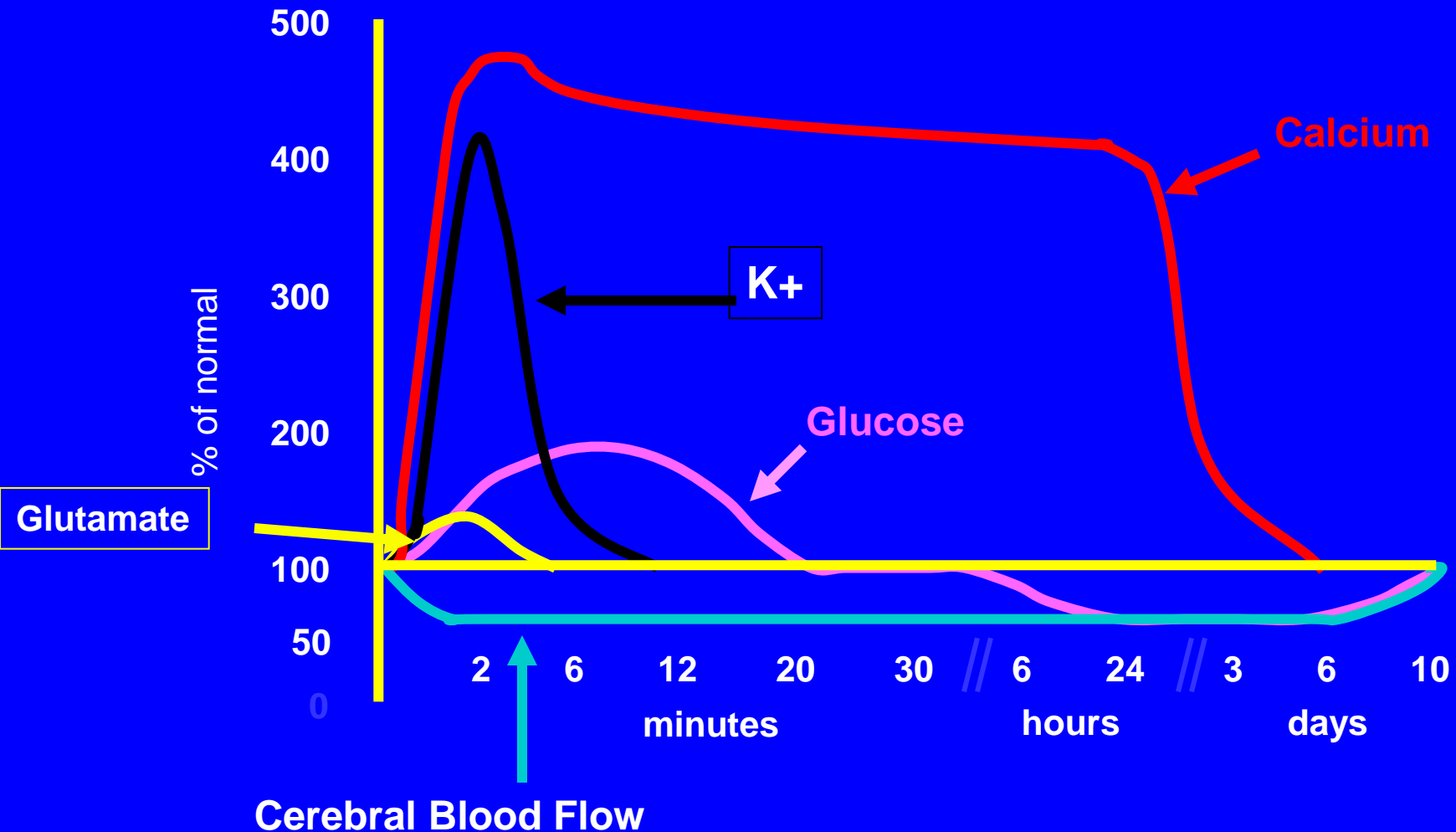
Hours - Days - Weeks+

Effects of Concussive Forces on the Brain

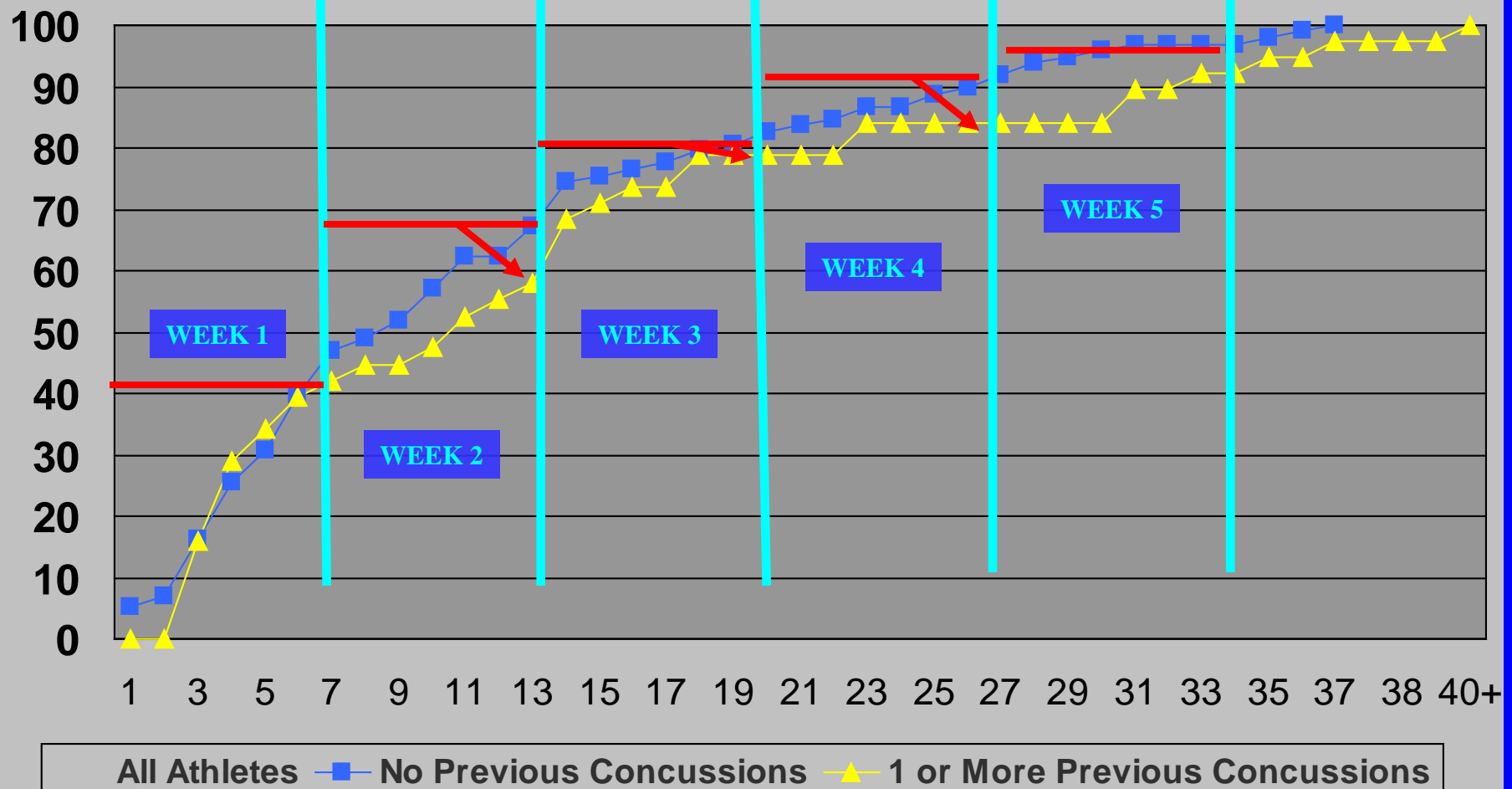
- Typically, the “software” of the brain is affected
 - ◆ Neurometabolic/ neurochemical processes
 - ◆ Physiological
- Not the “hardware”
 - ◆ Structure



Neurometabolic Cascade Following Traumatic Brain Injury (Giza & Hovda, 2001)



Recovery From Concussion: How Long Does it Take?



N=134 High School athletes

Collins et al., 2006, Neurosurgery

If we do not properly recognize and manage concussions...

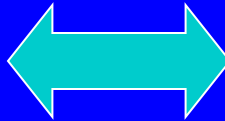
- RISKS INCREASE!!!
- Player is more likely to be re-injured.
- Second/ third... injuries:
 - ◆ Are more likely to be more severe
 - ◆ Could cause permanent brain damage
 - ◆ Can take longer to recover from
 - ◆ Increase risk of retirement from sport



Concussion TEAM

Injured Child

(Student, Athlete,
Son/Daughter,
Friend)



Medical Systems

Pre-Hospital (EMS) Emergency

Urgent

Primary Care

Specialty Care

Certified Athletic
Trainer



Since June 2007

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Heads Up

Brain Injury
in Your Practice



Heads Up

Facts for Physicians About
Mild Traumatic Brain Injury
(MTBI)

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Emergency Care

What's My Clinical Protocol?

Acute Concussion Evaluation
Emergency Dept. (ACE-ED)

ACE-ED Study (CDC funding)

Gioia, Atabaki, Zuckerbraun & Collins

■ Aims:

- ◆ Survey use of concussion evaluation & management tools in PECARN sites
- ◆ Modify ACE for use in ED
- ◆ Improve discharge process

■ Results

- ◆ Variability in tools used to assist concussion diagnosis and management among PECARN
- ◆ **Use of ACE-ED and ACE Discharge Instructions significantly increased follow up with primary care physician**

Acute Concussion Evaluation Emergency Dept. (ACE-ED)



CNMC

Acute Concussion Evaluation (ACE) Emergency Department Version

Gerard Gioia, PhD¹ & Micky Collins, PhD²
¹ Children's National Medical Center
² University of Pittsburgh Medical Center

Patient Name _____

DOB: _____ Age: _____

Date: _____ ID/MR# _____

Affix Patient Label Here

Date/Time of Injury: _____

1. Injury Description:

2. Blunt trauma to head: Yes _____ No _____

3. Key Injury Characteristics (check all that apply)

<input type="checkbox"/> Loss of Consciousness	<input type="checkbox"/> Retrograde Amnesia (No memory of <u>pre</u> -injury events)
<input type="checkbox"/> Seizures	<input type="checkbox"/> Post-Traumatic Amnesia (No memory of <u>post</u> -injury events)

4. Signs & Symptoms (check all that apply)

<u>Observed Signs</u>	<u>Physical Symptoms</u>	<u>Cognitive Symptoms</u>
<input type="checkbox"/> Appears dazed or stunned	<input type="checkbox"/> Headache	<input type="checkbox"/> Difficulty concentrating
<input type="checkbox"/> Confused about events	<input type="checkbox"/> Nausea or vomiting	<input type="checkbox"/> Difficulty remembering
<input type="checkbox"/> Repeats question	<input type="checkbox"/> Balance problems or dizziness	<input type="checkbox"/> Feeling foggy
<input type="checkbox"/> Answers questions slowly	<input type="checkbox"/> Blurry or double vision	
	<input type="checkbox"/> Fatigue	<u>Emotional Symptoms</u>
	<input type="checkbox"/> Drowsiness	<input type="checkbox"/> Irritable
	<input type="checkbox"/> Sensitivity to light or sound	<input type="checkbox"/> More emotional
	<input type="checkbox"/> Numbness or Tingling	<input type="checkbox"/> Just don't feel "right"

5. Risk Factors for Prolonged Post-Concussion Symptoms

Prior concussions: No _____ Yes _____ # _____

Prior diagnosis of migraine/chronic headaches: No _____ Yes _____

6. Concussion Diagnosed (check if applicable) ☐ (ICD-9: 850)

Concussion diagnosis requires:

- a) Positive blunt trauma to head (#2)
- b) Key injury characteristic (#3) **and/or** presence of any associated signs/symptoms (#4).

7. Follow Up

If concussion is diagnosed, provide *Emergency Department Concussion Discharge Instructions*.

8. ACE-ED Completed by (circle one):


MD RN EMT PA NP Medical Student

Signature: _____

ACE Concussion D/C Instructions

CNMC

EMERGENCY DEPARTMENT
CONCUSSION DISCHARGE INSTRUCTIONS



The injured person was diagnosed with a concussion (also known as a *mild* traumatic brain injury).
Following these instructions can prevent further injury and help recovery.

WHEN TO SEEK CARE URGENTLY:

Seek care quickly if symptoms worsen or if there are any behavioral changes.
Also, watch for any of the following serious symptoms:

Headaches that worsen	Very drowsy, can't be awakened	Can't recognize people or places
Seizures	Repeated vomiting	Increasing confusion
Neck pain	Slurred speech	Weakness/numbness in arms/legs
Unusual behavior change	Significant irritability	Less responsive than usual

If you observe any of the above signs, call your doctor
or return to the emergency department *immediately*.

COMMON SIGNS & SYMPTOMS:

It is common for a concussed child or young adult to have one or many concussion symptoms.
There are four types of symptoms: physical, cognitive, emotional and sleep-related.

Physical	Cognitive	Emotional	Sleep
Headache	Feeling mentally foggy	Irritability	Drowsiness
Nausea/Vomiting	Feeling slowed down	Sadness	Sleeping less than usual
Dizziness	Difficulty remembering	More emotional	Sleeping more than usual
Balance Problems	Difficulty concentrating	Nervousness	Trouble falling asleep

RETURNING TO DAILY ACTIVITIES:

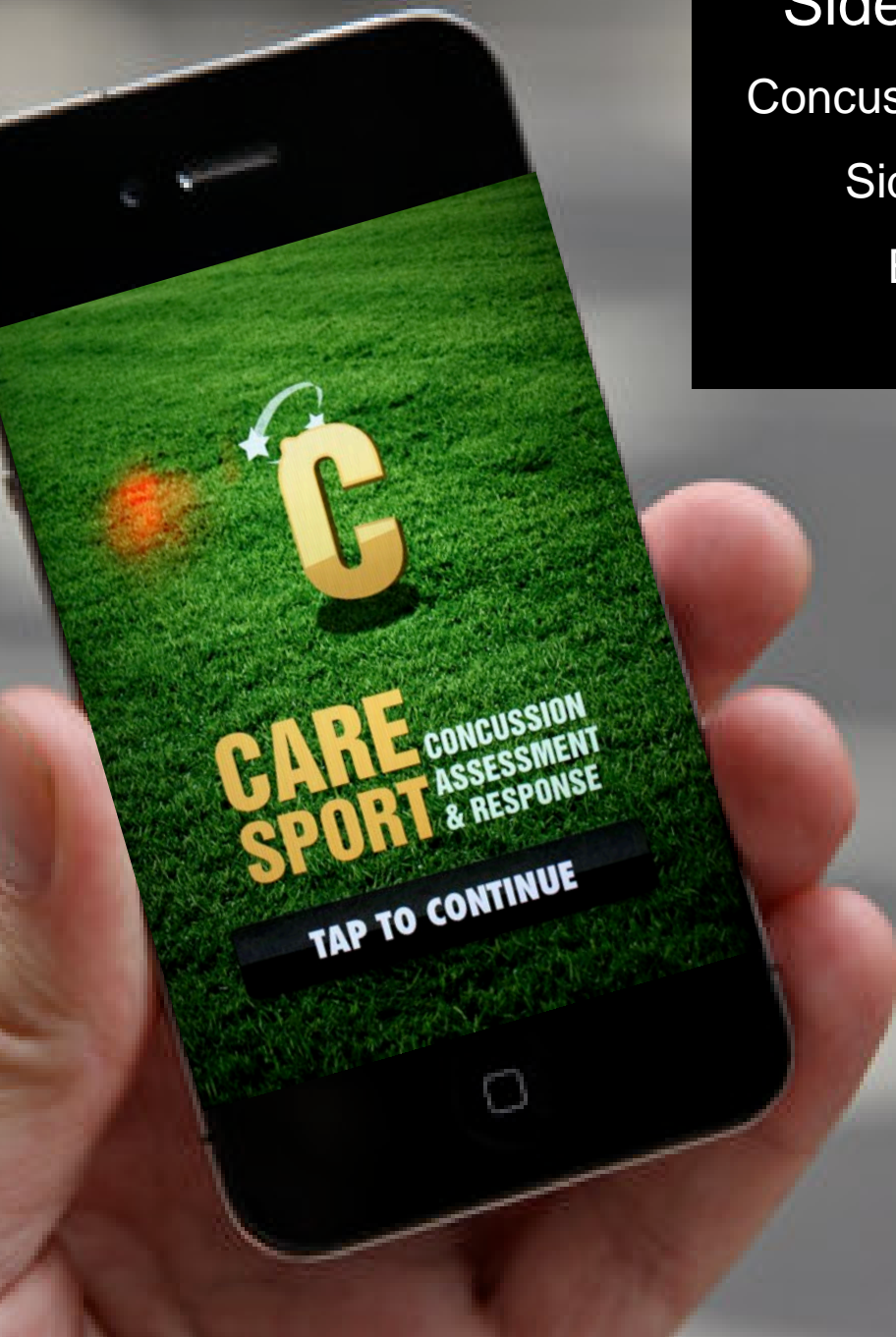
The key to recovery is sleeping, resting physically and mentally, and
avoiding activities that *might* cause head injury.

- **Avoid:**
 - Physical activities that produce concussion symptoms, as this might increase the recovery time.
 - Lengthy mental activities requiring concentration (ie. Homework, schoolwork, job-related work, and extended video game playing) as these activities worsen symptoms and prolong recovery.
- **Sleep:** Get good sleep and take naps if tired. No late nights or sleepovers. It is NOT necessary to wake up periodically.
- The injured person should not participate in **ANY** high risk activities that might result in head injury until examined and cleared by a qualified health professional. High risk activities include sports, physical education (PE), climbing, or riding a bike.
- It is hard to change from the normal routine. The injured person will need help from parents, teachers, coaches, and athletic trainers to help manage their activity level.

DO'S AND DON'TS:

It's OK to take pain medicine & sleep. You don't need to wake up every hour. Don't play sports or exercise!

IT IS OK TO:	THERE IS NO NEED TO:	DO NOT
Take pain medicine as prescribed	Stay in bed	Drive while you have symptoms
Use ice pack on head and neck for comfort	Wake up every hour	Exercise or lift weights
Go to sleep		Drink alcohol
Rest		Participate in sports or high-risk activities



Sideline Concussion Evaluation Tool

Concussion Assessment & Response (CARE Sport)

Sideline Assessment of Concussion (SAC)

Balance Error Scoring System (BESS)

Graded Symptom Checklist (GCS)

Primary Care

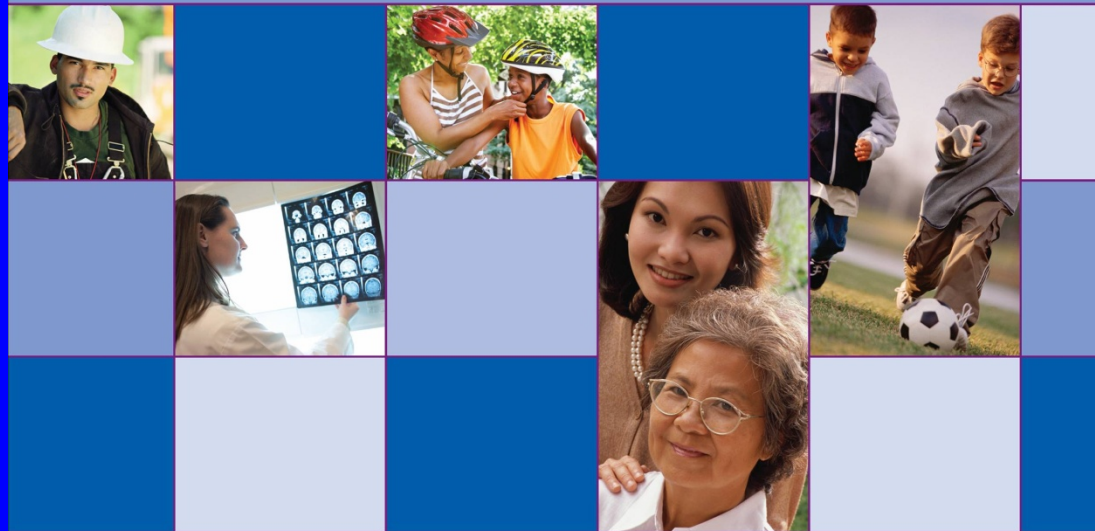
What's My Clinical Protocol?

Acute Concussion Evaluation (ACE)
Sport Concussion Assessment Tool, 2nd Ed
(SCAT-2)



Heads Up

Brain Injury in Your Practice





ACUTE CONCUSSION EVALUATION (ACE)

Physician/Clinician Office Version

Gerard Giola, PhD¹ & Micky Collins, PhD²

¹Children's National Medical Center

²University of Pittsburgh Medical Center

Patient Name _____

DOB: _____ Age: _____

Date: _____ ID/MR# _____

A. Injury Characteristics Date/Time of Injury _____ Reporter: Patient Parent Spouse Other

1. Injury Description _____

1a. Is there evidence of a forcible blow to the head (direct or indirect)? Yes No Unknown

1b. Is there evidence of Intracranial Injury or skull fracture? Yes No Unknown

1c. Location of Impact: Frontal Lt Temporal Rt Temporal Lt Parietal Rt Parietal Occipital Neck Indirect Force

2. Cause: MVC Pedestrian-MVC Fall Assault Sports (specify) _____ Other

3. **Amnesia Before (Retrograde)** Are there any events just BEFORE the injury that you/ person has no memory of (even brief)? Yes No Duration _____

4. **Amnesia After (Anterograde)** Are there any events just AFTER the injury that you/ person has no memory of (even brief)? Yes No Duration _____

5. **Loss of Consciousness:** Did you/ person lose consciousness? Yes No Duration _____

6. **EARLY SIGNS:** Appears dazed or stunned Is confused about events Answers questions slowly Repeats Questions Forgetful (recent info)

7. **Seizures:** Were seizures observed? No Yes Detail _____

B. Symptom Check List* Since the injury, has the person experienced any of these symptoms more than usual today or in the past day?

Indicate presence of each symptom (0=No, 1=Yes).

**Lovell & Collins, 1996 JHTR*

PHYSICAL (10)		COGNITIVE (4)		SLEEP (4)	
Headache	0 1	Feeling mentally foggy	0 1	Drowsiness	0 1
Nausea	0 1	Feeling slowed down	0 1	Sleeping less than usual	0 1 N/A
Vomiting	0 1	Difficulty concentrating	0 1	Sleeping more than usual	0 1 N/A
Balance problems	0 1	Difficulty remembering	0 1	Trouble falling asleep	0 1 N/A
Dizziness	0 1	COGNITIVE Total (0-4)		SLEEP Total (0-4)	
Visual problems	0 1	EMOTIONAL (4)		Exertion: Do these symptoms <u>worsen</u> with: Physical Activity <u> </u> Yes <u> </u> No <u> </u> N/A Cognitive Activity <u> </u> Yes <u> </u> No <u> </u> N/A Overall Rating: How <u>different</u> is the person acting compared to his/her usual self? (circle) Normal 0 1 2 3 4 5 6 Very Different	
Fatigue	0 1	Irritability	0 1		
Sensitivity to light	0 1	Sadness	0 1		
Sensitivity to noise	0 1	More emotional	0 1		
Numbness/Tingling	0 1	Nervousness	0 1		
PHYSICAL Total (0-10)		EMOTIONAL Total (0-4)			
(Add Physical, Cognitive, Emotion, Sleep totals)		Total Symptom Score (0-22)			



Acute Concussion Evaluation (ACE)

E. Diagnosis (ICD): Concussion w/o LOC 850.0 Concussion w/ LOC 850.1 Concussion (Unspecified) 850.9 Other (854) _____
 No diagnosis

F. Follow-Up Action Plan Complete ACE Care Plan and provide copy to patient/family.

 No Follow-Up Needed

 Physician/ Clinician Office Monitoring: Date of next follow-up _____

 Referral:

 Neuropsychological Testing

 Physician: Neurosurgery _____ Neurology _____ Sports Medicine _____ Physiatrist _____ Psychiatrist _____ Other _____

 Emergency Department

ACE Completed by: _____ MD RN NP PhD ATC

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Pediatric Assessment and Management of Concussions

Gerard A. Gioia, PhD

Concussions and mild traumatic brain injuries have become more widely recognized and understood during the past 5 to 10 years. Earlier and more active evaluation and management of this brain injury is necessary to reduce risk to the developing child and adolescent. Pediatricians play a central role in the evaluation and management of concussions and should develop a working understanding of the injury and its clinical manifestations.

An individualized approach to evaluation and management by the pediatrician requires the development of a skillset to define the characteristics of the injury, conduct a full assessment of post-concussion symptoms, and define any risk history that may modify recovery.

This evaluation forms the basis of concussion treatment, which involves the active management of the child's daily routines at home, school learning

Gerard A. Gioia, PhD, is Chief, Division of Pediatric Neuropsychology; Director, Safe Concussion Outcome, Recovery & Education (SCORE) Program, Children's National Medical Center; and Associate Professor, Depts. of Pediatrics and Psychiatry & Behavioral Sciences, George Washington University School of



and performance, and sports/recreational activities. The Acute Concussion Evaluation (ACE) and ACE Care Plan, published in the CDC's "Heads Up: Concussion in Your Practice," are presented as a set of tools that can assist the pediatrician in this endeavor.

PEDIATRICIAN'S RESPONSIBILITY

The primary care pediatrician's office is the first stop for most medical illnesses or injuries, and should be so in the case of

knowledge of the patient's post-injury status. Without the pediatrician's active and informed involvement, service coordination is not likely to be as effective, resulting in the possibility of increased risk to the child with poor management.

Injury to the child's brain can have both obvious and subtle consequences for their daily functioning at school and their social life. Proper management is critical to facilitate recovery and reduce risk of re-injury or protracted recovery. As a foundation,

Acute Concussion Evaluation (ACE)

- ACE is a clinical protocol to assist diagnosis of mTBI/ concussion in medical settings
- Ages 4-adult
- Elements of clinical assessment protocol are evidence-based
- Link to follow-up care via ACE Care Plan

Acute Concussion Evaluation (ACE) Key Elements

- A. Define Injury Characteristics
- B. Assess for Symptoms (22) (Lovell & Collins, 1998)
- C. Identify Risk Factors for Prolonged Recovery
- D. Red Flags for Neurological Deterioration
- E. Establish the Diagnosis
- F. Plan Follow-Up Action / Referral

Acute Concussion Evaluation (ACE)

A. Injury Characteristics

Injury Description

Cause

Amnesias (retrograde, anterograde)

Loss of Consciousness (LOC), Seizures

Early Signs

A. Injury Characteristics	Date/Time of Injury	Sept. 7, 2008	Reporter:	<input type="checkbox"/> Patient	<input checked="" type="checkbox"/> Parent	<input type="checkbox"/> Spouse	<input type="checkbox"/> Other
1. Injury Description							
Fell to ground, hit head on ground, kneed in right temporal region; dazed initially but continued to play with bad headache. Felt sluggish and confused.							
1a. Is there evidence of a forcible blow to the head (direct or indirect)?							
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown							
1b. Is there evidence of intracranial injury or skull fracture?							
<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown							
1c. Location of Impact:							
<input type="checkbox"/> Frontal <input type="checkbox"/> Lft Temporal <input checked="" type="checkbox"/> Rt Temporal <input type="checkbox"/> Lft Parietal <input type="checkbox"/> Rt Parietal <input checked="" type="checkbox"/> Occipital <input type="checkbox"/> Neck <input type="checkbox"/> Indirect Force							
2. Cause:							
<input type="checkbox"/> MVC <input type="checkbox"/> Pedestrian-MVC <input type="checkbox"/> Fall <input type="checkbox"/> Assault <input checked="" type="checkbox"/> Sports (specify) basketball <input type="checkbox"/> Other							
3. Amnesia Before (Retrograde) Are there any events just BEFORE the injury that you/ person has no memory of (even brief)?							
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Duration							
4. Amnesia After (Anterograde) Are there any events just AFTER the injury that you/ person has no memory of (even brief)?							
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Duration							
5. Loss of Consciousness: Did you/ person lose consciousness?							
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Duration							
6. EARLY SIGNS:							
<input checked="" type="checkbox"/> Appears dazed or stunned <input type="checkbox"/> Is confused about events <input checked="" type="checkbox"/> Answers questions slowly <input type="checkbox"/> Repeats Questions <input type="checkbox"/> Forgetful (recent info)							
7. Seizures: Were seizures observed? No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> Detail							

Acute Concussion Evaluation (ACE)

B. Symptom Checklist

B. Symptom Check List* Since the injury, has the person experienced any of these symptoms any more than usual today or in the past day?

Indicate presence of each symptom (0=No, 1=Yes).

*Lovell & Collins, 1998 JHTR

PHYSICAL (10)		COGNITIVE (4)		SLEEP (4)	
Headache	0 <input checked="" type="radio"/> 1	Feeling mentally foggy	0 <input checked="" type="radio"/> 1	Drowsiness	0 <input type="radio"/>
Nausea	0 <input checked="" type="radio"/> 1	Feeling slowed down	0 <input checked="" type="radio"/> 1	Sleeping less than usual	0 <input type="radio"/> 1 N/A
Vomiting	0 <input type="radio"/> 1	Difficulty concentrating	0 <input checked="" type="radio"/> 1	Sleeping more than usual	0 <input checked="" type="radio"/> 1 N/A
Balance problems	0 <input checked="" type="radio"/> 1	Difficulty remembering	0 <input checked="" type="radio"/> 1	Trouble falling asleep	0 <input type="radio"/> 1 N/A
Dizziness	0 <input type="radio"/> 1	COGNITIVE Total (0-4)	4	SLEEP Total (0-4)	2
Visual problems	0 <input type="radio"/> 1	EMOTIONAL (4)			
Fatigue	0 <input checked="" type="radio"/> 1	Irritability	0 <input checked="" type="radio"/> 1	Exertion: Do these symptoms <u>worsen</u> with: Physical Activity __Yes __No <input checked="" type="radio"/> N/A Cognitive Activity <input checked="" type="radio"/> Yes __No __N/A	
Sensitivity to light	0 <input checked="" type="radio"/> 1	Sadness	0 <input type="radio"/> 1		
Sensitivity to noise	0 <input type="radio"/> 1	More emotional	0 <input type="radio"/> 1		
Numbness/Tingling	0 <input type="radio"/> 1	Nervousness	0 <input type="radio"/> 1		
PHYSICAL Total (0-10)	5	EMOTIONAL Total (0-4)	1	Overall Rating: How <u>different</u> is the person acting compared to his/her usual self? (circle) Normal 0 1 2 <input checked="" type="radio"/> 3 4 5 6 Very Different	
(Add Physical, Cognitive, Emotion, Sleep totals)			12		
Total Symptom Score (0-22)					

Improving Identification and Diagnosis of Mild Traumatic Brain Injury With Evidence: Psychometric Support for the Acute Concussion Evaluation

Gerard A. Gioia, PhD; Michael Collins, PhD; Peter K. Isquith, PhD

Objectives: A dearth of standardized assessment tools exists to properly assess and triage mild traumatic brain injury (mTBI) in primary care and acute care settings. This article presents evidence of appropriate psychometric properties for the Acute Concussion Evaluation (ACE), a new structured clinical interview. **Participants:** Parent informants of 354 patients, aged 3 to 18 years, with suspected mTBI completed the ACE via telephone interview. **Measure:** Acute Concussion Evaluation. **Results:** Evidence is presented for appropriate item-scale membership, internal consistency reliability as well as content, predictive, convergent/divergent, and construct validity of the ACE symptom checklist. **Conclusions:** Overall, the ACE symptom checklist exhibits reasonably strong psychometric properties as an initial assessment tool for mTBI. **Keywords:** *acute concussion evaluation, assessment, concussion, mild traumatic brain injury, postconcussion symptoms, triage*

Acute Concussion Evaluation (ACE)

C. Risk Factors for Protracted Recovery

C. Risk Factors for Protracted Recovery <i>(check all that apply)</i>						
Concussion History? Y ___ N ___	✓	Headache History? Y ___ N ___	✓	Developmental History	✓	Psychiatric History
Previous # 1 2 3 4 5		Prior treatment for headache		Learning disabilities		Anxiety
Longest symptom duration Days___ Weeks___ Months___ Years___		History of migraine headache ___ Personal ___ Family_____		Attention-Deficit/ Hyperactivity Disorder		Depression
If multiple concussions, less force caused reinjury? Yes___ No___				Other developmental disorder_____		Sleep disorder
Other psychiatric disorder _____						
List other comorbid medical disorders or medication usage (e.g., hypothyroid, seizures)_____						

Research findings have linked these risk factors to longer periods of recovery

(ACE)

D. Red Flags for Neurological Deterioration

D. RED FLAGS for acute emergency management: Refer to the emergency department with <u>sudden onset</u> of any of the following:			
* Headaches that worsen	* Looks very drowsy/ can't be awakened	* Can't recognize people or places	* Neck pain
* Seizures	* Repeated vomiting	* Increasing confusion or irritability	* Unusual behavioral change
* Focal neurologic signs	* Slurred speech	* Weakness or numbness in arms/legs	* Change in state of consciousness

Physicians and parents/ patients need to be aware of signs that signal the need for emergency care.

Early Post-Injury Management

What do we tell families & kids?

ACE POST-CONCUSSION HOME/ SCHOOL INSTRUCTIONS



You have been evaluated for a suspected concussion.

Following these instructions can prevent further injury and help recovery.

WHEN TO SEEK CARE URGENTLY

Seek care quickly if symptoms worsen or if there are any behavioral changes.

Also, watch for any of the following Danger Signs:

Headaches that worsen	Very drowsy, can't be awakened	Can't recognize people or places
Seizures	Repeated vomiting	Increasing confusion
Neck pain	Slurred speech	Weakness/numbness in arms/legs
Unusual behavior change	Significant irritability	Less responsive than usual

If you observe any of the above Danger Signs, call your doctor
or return to the Emergency Department *immediately*.

COMMON SIGNS & SYMPTOMS

It is common to have one or many concussion symptoms. There are four types of symptoms: physical, cognitive, emotional, and sleep. Keep track of them and record them.

Physical		Cognitive	Emotional	Sleep
Headache	Visual Problems	Feeling mentally foggy	Irritability	Drowsiness
Nausea/Vomiting	Fatigue/ Feeling tired	Feeling slowed down	Sadness	Sleeping less than usual
Dizziness	Sensitivity to light or noise	Difficulty remembering	More emotional	Sleeping more than usual
Balance Problems	Numbness	Difficulty concentrating	Nervousness	Trouble falling asleep

RETURNING TO DAILY ACTIVITIES

The key to recovery is sleeping, resting physically and mentally, and
avoiding activities that *might* cause head injury.

• Avoid:

- Physical activities that produce concussion symptoms, as this might increase the recovery time.
- Lengthy mental activities requiring concentration (ie. Homework, schoolwork, job-related work, and extended video game playing) as these activities worsen symptoms and prolong recovery.

Danger Signs – Emergency Care

You have been evaluated for a suspected concussion.

Following these instructions can prevent further injury and help recovery.

WHEN TO SEEK CARE URGENTLY

Seek care quickly if symptoms worsen or if there are any behavioral changes.

Also, watch for any of the following Danger Signs:

Headaches that worsen	Very drowsy, can't be awakened	Can't recognize people or places
Seizures	Repeated vomiting	Increasing confusion
Neck pain	Slurred speech	Weakness/numbness in arms/legs
Unusual behavior change	Significant irritability	Less responsive than usual

If you observe any of the above Danger Signs, call your doctor or return to the Emergency Department *immediately*.

Home Care

COMMON SIGNS & SYMPTOMS

It is common to have one or many concussion symptoms. There are four types of symptoms: physical, cognitive, emotional, and sleep. Keep track of them and record them.

Physical		Cognitive	Emotional	Sleep
Headache	Visual Problems	Feeling mentally foggy	Irritability	Drowsiness
Nausea/Vomiting	Fatigue/ Feeling tired	Feeling slowed down	Sadness	Sleeping less than usual
Dizziness	Sensitivity to light or noise	Difficulty remembering	More emotional	Sleeping more than usual
Balance Problems	Numbness	Difficulty concentrating	Nervousness	Trouble falling asleep

RETURNING TO DAILY ACTIVITIES

The key to recovery is sleeping, resting physically and mentally, and avoiding activities that *might* cause head injury.

- **Avoid:**
 - Physical activities that produce concussion symptoms, as this might increase the recovery time.
 - Lengthy mental activities requiring concentration (ie. Homework, schoolwork, job-related work, and extended video game playing) as these activities worsen symptoms and prolong recovery.
- **Sleep:** Get good sleep and take naps if tired. No late nights or sleepovers. It is NOT necessary to wake up periodically.
- The injured person should not participate in **ANY** high risk activities that might result in head injury until examined and cleared by a qualified health professional. High risk activities include sports, physical education (PE), climbing, or riding a bike.
- It is hard to change from the normal routine. The injured person will need help from parents, teachers, coaches, and athletic trainers to help manage their activity level.

DO'S AND DON'TS

It's OK to take prescribed pain medicine & sleep. You don't need to wake up every hour.
Don't play sports or exercise!

<u>IT IS OK TO:</u>	<u>THERE IS NO NEED TO:</u>	<u>DO NOT</u>
Take pain medicine as prescribed Use ice pack on head and neck for comfort Go to sleep Rest	Stay in bed Wake up every hour	Drive while you have symptoms Exercise or lift weights Drink alcohol Participate in sports or high-risk activities

School Care

RETURNING TO SCHOOL

If symptoms are severe (cannot concentrate for more than 30-45 minutes without symptoms worsening), staying home and resting may be indicated until symptoms improve. If symptoms are less severe, rest breaks during school can help recovery.

- ***Please take these Instructions and the Return to School Form to your school.***
- Inform the teacher(s), school nurse, school psychologist or counselor, and administrator(s) about your child/teenager's injury and symptoms. Accommodations should be put in place immediately.
- Students who experience symptoms of concussion often need extra help to perform school-related activities and may not perform at their best on classroom or standardized tests.
- As symptoms decrease, the extra supports (rest breaks during school) can be removed slowly.

SCHOOL PERSONNEL

School personnel should watch for indications of worsening symptoms, specifically:

- Increased problems paying attention, concentrating, remembering or learning new information
- Needing longer time to complete a task
- Increased irritability or less of an ability to cope with stress

Sports/ Recreation Care

RETURNING TO SPORTS AND RECREATION:

The injured person should **NEVER** return to sports or active recreation with **ANY** symptoms unless directed by a health professional.

NO PE class, physical activity at recess, or sports practices or games.

- Tell the Physical Education teacher and all coaches of the injury and symptoms.
- When appropriate, have the student check in with a health care professional on the first day he/she returns.
- It is normal for the child/teenager to feel frustrated, sad, and even angry because they cannot return to sports or recreation right away. With an injury, a full recovery will lower the chances of getting hurt again. It is *better to miss one game than the whole season.*

STEPWISE RETURN TO ACTIVITY/PLAY:

Once the injured person's symptoms resolve at rest and a qualified healthcare professional clears the injured person to return to activity, increase physical and cognitive activity **SLOWLY**.

Pay attention to symptoms.

If symptoms return with increased activity, reduce the level of activity.

****The injured person should be evaluated and cleared by a qualified healthcare professional with training in concussion management before returning to contact sports.**

Importance of ‘Return-to-Learn’ in Pediatric and Adolescent Concussion

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

The concept of “return-to-play” after concussion is familiar to pediatricians who routinely care for injured student-athletes. Premature return-to-play of a student-athlete who is still injured from a concussion may result in more severe and potentially long-lasting deficits.¹

In contrast, “return-to-learn” plans for student-athletes have not received as much attention, perhaps because so much regarding concussion awareness comes from lay reports of professional athletes who play a sport for their livelihood, as compared with pediatric and adolescent-aged athletes for whom school is their primary “work.”



New Assessment Methods

Multi-modal Assessment Model

CDC # U17/CCU323352

- Computerized testing of specific cognitive skills
- Standardized symptom rating
 - Child/teen self-report
 - Parent
 - Teacher

*** All of these methods allow for monitoring of & guiding recovery over time ***

Catch Those Tiger Cubs!



Next

Remember that Trip!



Next



Beware of the
Tricky Wizard!



Next

WACKY TACKY

T/C TAC TOE

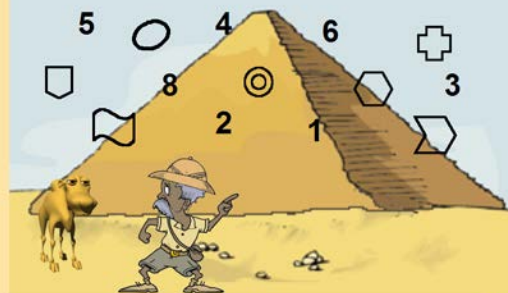
and

CATCH THE

BUGS

Next

The Pyramid's Code

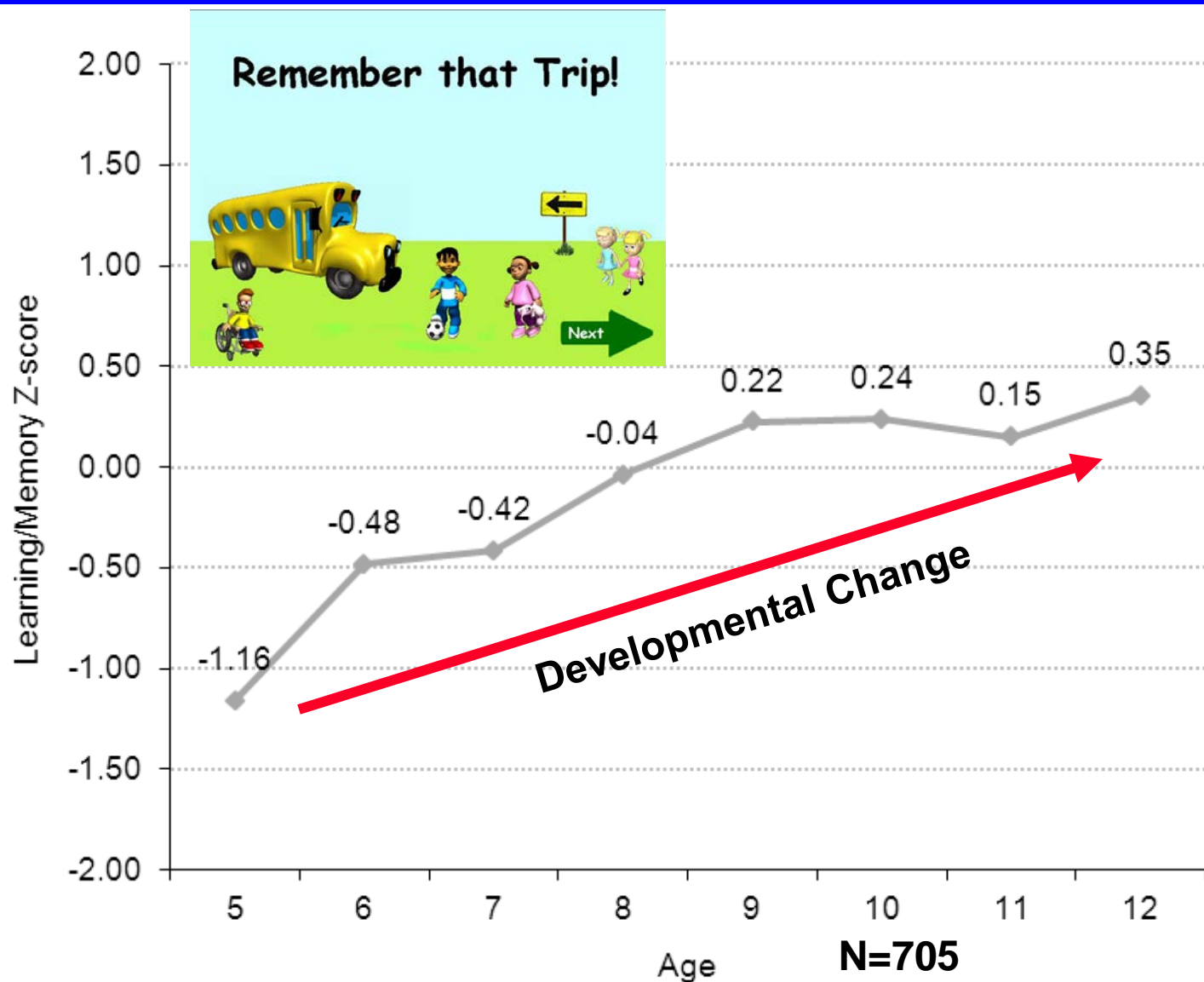


Next

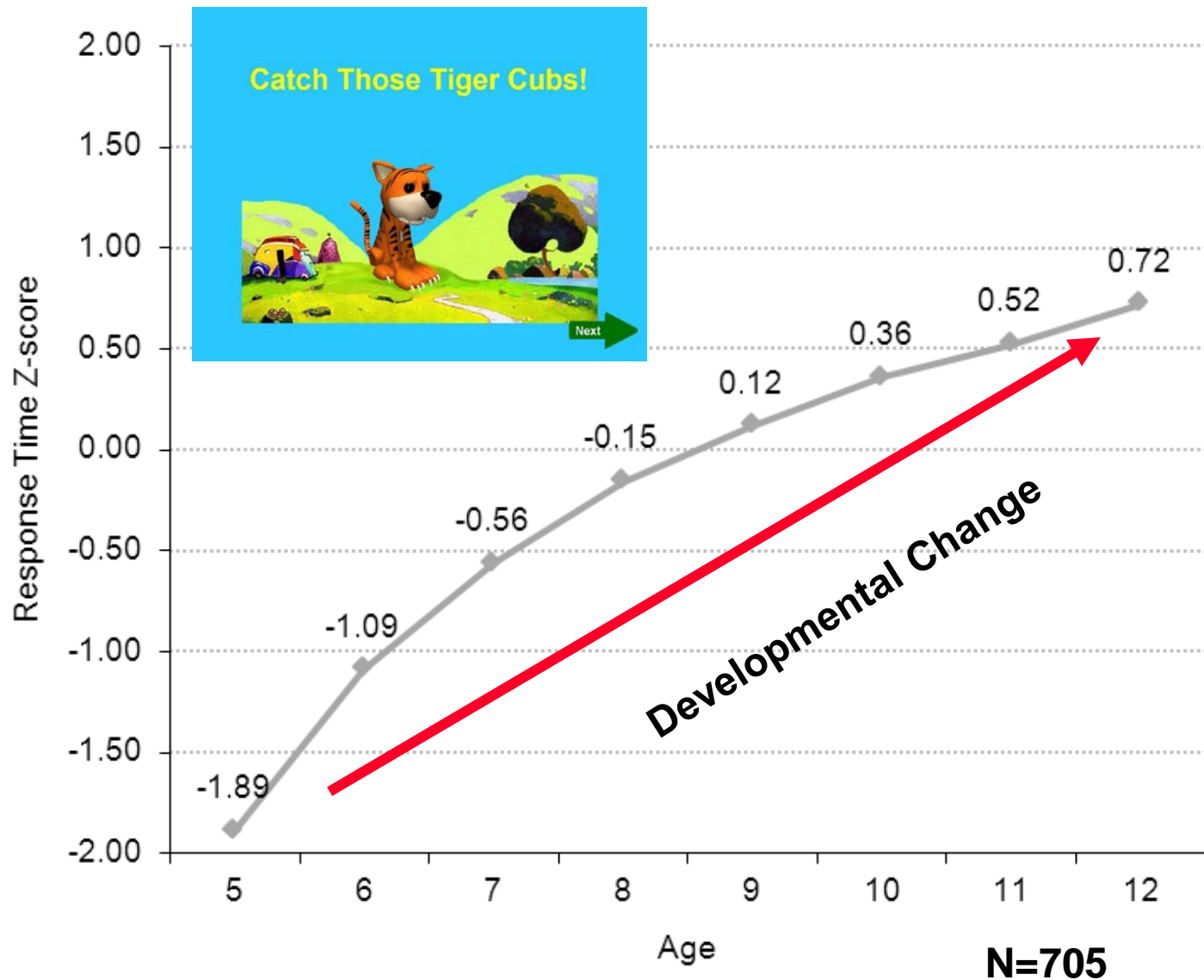
Funny
Fruits &
Vegetables

Next

Normal Age Trends – Learning & Memory



Normal Age trends – Response Time



Symptom Assessment

Which symptom assessments and approaches are uniquely appropriate for paediatric concussion?

G A Gioia,¹ J C Schneider,¹ C G Vaughan,¹ P K Isquith²

ABSTRACT

Objective: To (a) identify post-concussion symptom scales appropriate for children and adolescents in sports; (b) review evidence for reliability and validity; and (c) recommend future directions for scale development.

Design: Quantitative and qualitative literature review of symptom rating scales appropriate for children and adolescents aged 5 to 22 years.

Intervention: Literature identified via search of Medline, Ovid-Medline and PsycInfo databases; review of reference lists in identified articles; querying sports concussion specialists. 29 articles met study inclusion criteria.

Results: 5 symptom scales examined in 11 studies for ages 5–12 years and in 25 studies for ages 13–22. 10 of 11 studies for 5–12-year-olds presented validity evidence for three scales; 7 studies provided reliability evidence for two scales; 7 studies used serial

that requires early recognition and effective management to reduce serious or catastrophic outcomes.⁵

To effectively manage concussion in younger student-athletes, they must be understood differently than older, more neurologically mature, athletes.^{6–8} To do so, it is necessary to use age-appropriate clinical assessment measures and developmentally-appropriate evidence-based management guidelines. In their review of the clinical management of sport-related mild traumatic brain injury in younger children, Kirkwood, Yeates & Wilson⁶ assert that this age group has not received adequate attention. Younger athletes may be distinguished from older athletes along several dimensions, including biomechanical properties of injury, variations in pathophysiological responses



Post-Concussion Symptom Inventory (PCSI-P)
Post-Injury Assessment
Parent Report

Student's Name: _____ Today's date: _____ Date of Concussion: _____

Birthdate: _____ Age/ Grade: _____

Person Completing Form: _____ Relation: Mother ___ Father ___ Other ___

Instructions: We would like to know whether your child had any of these problems over the past day. Please answer all the items the best that you can. Do not skip any items. Circle the degree to which it has been a problem.

0 = Not a problem 3 = Moderate problem 6 = Severe problem

1	Complains of headaches	0	1	2	3	4	5	6
2	Complains of nausea	0	1	2	3	4	5	6
3	Vomiting	0	1	2	3	4	5	6
4	Has balance problems	0	1	2	3	4	5	6
5	Appears or complains of dizziness	0	1	2	3	4	5	6
6	Has trouble falling asleep	0	1	2	3	4	5	6
7	Sleeping <u>more</u> than usual	0	1	2	3	4	5	6
8	Sleeping <u>less</u> than usual	0	1	2	3	4	5	6
9	Appears drowsy	0	1	2	3	4	5	6
10	Sensitivity to light	0	1	2	3	4	5	6
11	Sensitivity to noise	0	1	2	3	4	5	6
12	Acts irritable	0	1	2	3	4	5	6
13	Appears sad	0	1	2	3	4	5	6
14	Acts nervous	0	1	2	3	4	5	6
15	Acts more emotional	0	1	2	3	4	5	6
16	Has or complains of numbness or tingling	0	1	2	3	4	5	6
17	Acts or appears slowed down	0	1	2	3	4	5	6
18	Acts or appears mentally "foggy"	0	1	2	3	4	5	6
19	Has difficulty concentrating	0	1	2	3	4	5	6
20	Has difficulty remembering	0	1	2	3	4	5	6
21	Has or complains of visual problems (blurry, double vision)	0	1	2	3	4	5	6
22	Appears more tired or fatigued	0	1	2	3	4	5	6



Symptom Assessment with Children

Over the past day....

**Have you had headaches?
Has your head hurt?**



YES



NO

Over the past day....

Have you had headaches?

Has your head hurt?

How much?

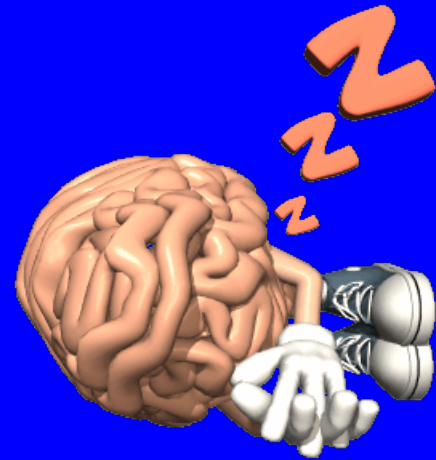


A Little?



A Lot?

Keys to Recovery



- Resting the brain & getting good sleep
- No additional forces to head/ brain
- Managing/ facilitating physiological recovery
 - ◆ Avoid activities that produce symptoms
 - ◆ Not over-exerting body or brain

Ways to over-exert

- Physical
- Emotional
- Cognitive! (concentration, learning, memory)

Concussion Pathophysiology: Rationale for Physical and Cognitive Rest

Matthew F. Grady, MD; Christina L. Master, MD; and Gerard A. Gioia, PhD

Matthew F. Grady, MD, is the Director of the Primary Care Sports Medicine fellowship program at The Children's Hospital of Philadelphia; and Assistant Professor of Clinical Pediatrics, Departments of Surgery and Pediatrics, Division of Pediatric Orthopedics and Sports Medicine, Perelman School of Medicine at the University of Pennsylvania. Christina L. Master, MD, is the Associate Director of the Primary Care Sports Medicine fellowship program at The Children's Hospital of Philadelphia; and Associate Professor of Clinical Pediatrics, Departments of Surgery and Pediatrics, Division of Pediatric Orthopedics and Sports Medicine, Perelman School of Medicine at the University of Pennsylvania. Gerard A. Gioia, PhD, is the Chief, Division of Pediatric Neuropsychology, and Director, Safe Concussion Outcome, Recovery & Education (SCORE) Program, Children's National Medical Center; and Associate Professor, Departments of Pediatrics and Psy-



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chiatric systems, particularly in youth.¹

Return-to-school after a concussion is a significant aspect of concussion management and, ultimately, requires an evidence-based, practical set of guide-

Centers for Disease Control and Prevention (CDC) defines a concussion as “a complex pathophysiologic process affecting the brain, induced by traumatic biomechanical forces secondary to di-

Mental/ Cognitive “Rest?”

- No prolonged concentration
- No prolonged homework
- No prolonged classes (block scheduling)
- No prolonged days

What is cognitive “rest?”

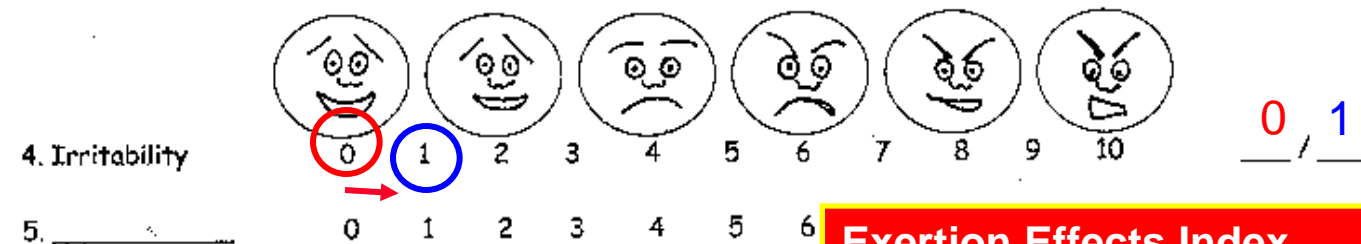
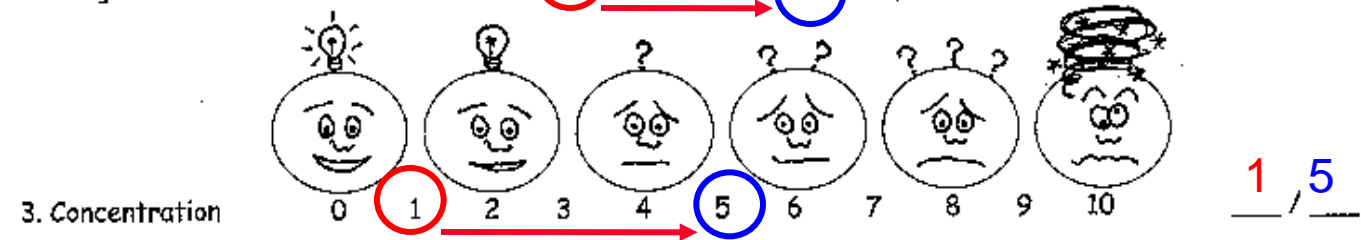
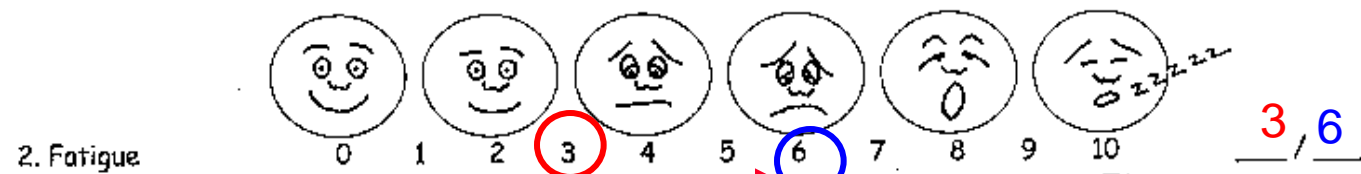
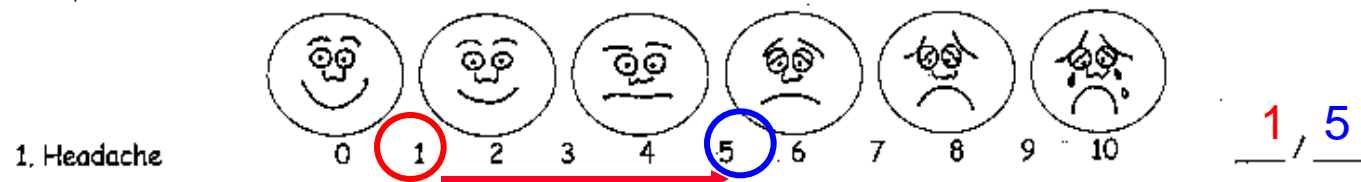
- The concept of cognitive exertional activity (and rest) viewed along a continuum of activity

No activity/full rest  Full activity/no rest

- In reality, no cognitive activity/full cognitive rest not practical/likely (unless asleep or comatose)
- Therapeutic goal is to limit cognitive activity to a level that is tolerable, and does not exacerbate or cause the re-emergence of symptoms
- **Cognitive Management**

Exertional Effects

Name: _____ Date: ____/____/____ Pre / Post



Indicate symptom rating at the beginning of the testing session (Pre) **AND** at the end of it (Post). (e.g., sensitivity to light and/or sound, etc.) as appropriate, but ask about headache, fatigue, concentration, and irritability.

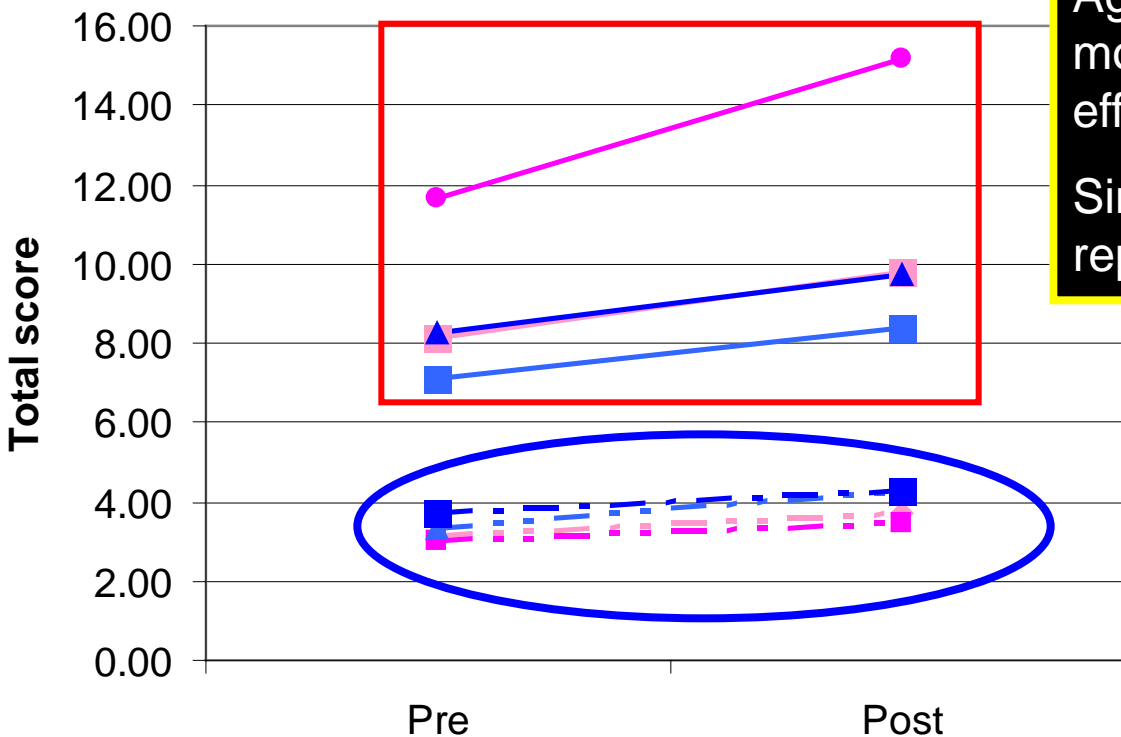
Exertion Effects Index

Difference Score = 17 - 5 = 12

Cognitive Exertion Effects

Age x Sex

Cognitive Exertion

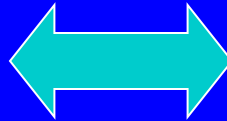


Boys & girls no different at BASELINE

Age x sex interaction: Adolescent girls most pronounced with exertional effects.

Similar pattern with general symptom report

Concussion TEAM



School

Administrators

Teachers

School Nurse

Counselor

Psychologist

Certified Athletic Trainer

Concussion's Effects on School Learning



"You can't educate a child who isn't healthy, and you can't keep a child healthy who isn't educated."

Joycelyn Elders

School

Kid's Major "Job"

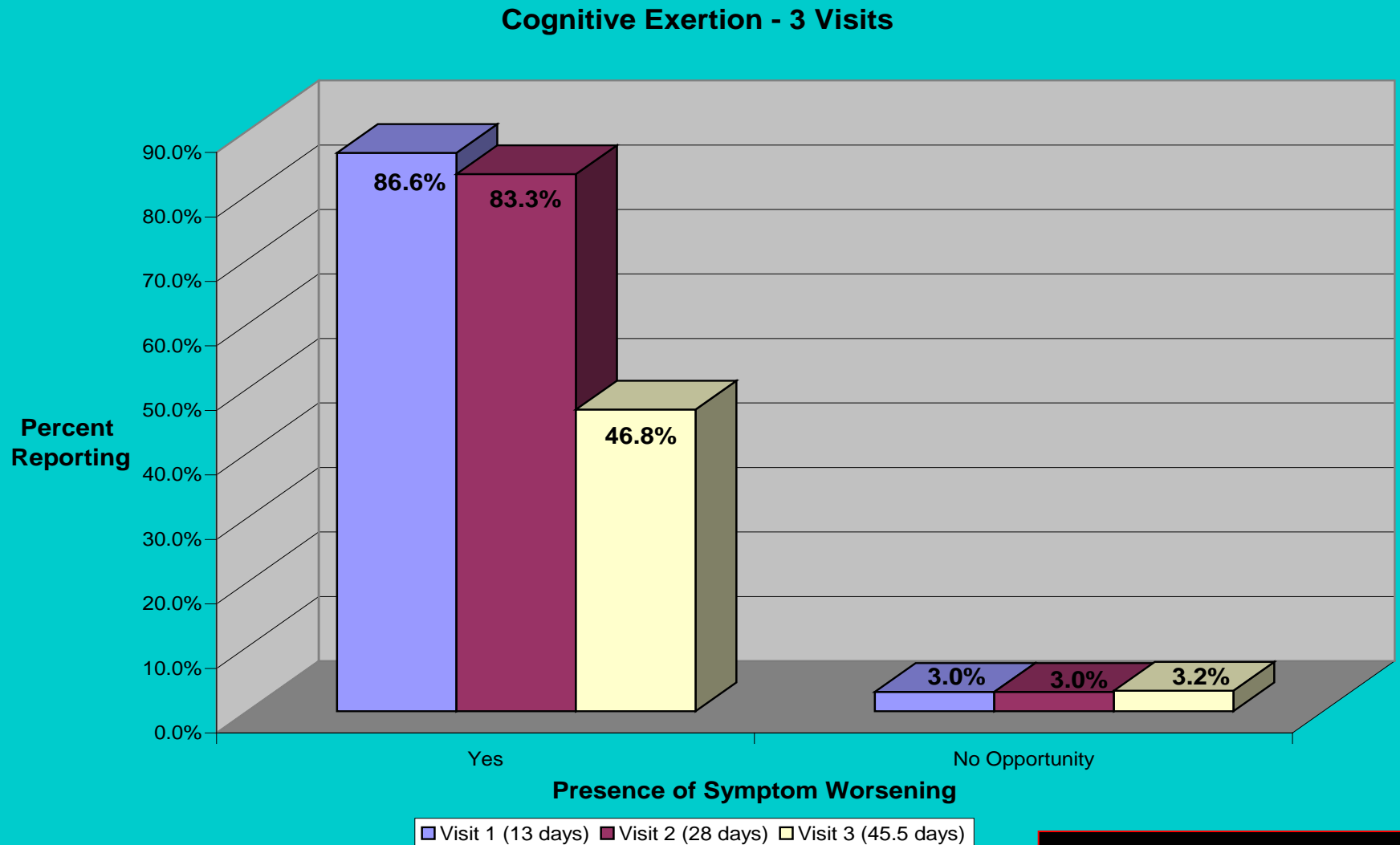


- New Learning/ Acquiring Knowledge
 - ◆ Academic
 - ◆ Social
- Practicing incompletely learned knowledge
- Mental/ Cognitive exertion is essential to new learning/ practice

Concussion's Effects on School Learning & Performance

- 80 students with concussions & parents
- “Which specific types of problems are you experiencing in school?”
- Students reported an average of 4 problems below.
 - ◆ Headaches interfering 71.3%
 - ◆ Can't pay attn in class 62.5%
 - ◆ HW taking much longer 59.5%
 - ◆ Difficulty studying for test/quiz 51.9%
 - ◆ Too tired 50.6%
 - ◆ Diffic understanding material 44.0%
 - ◆ Difficulty taking notes 28.8%

Cognitive Demands of School Worsen Symptoms



N= 72 Gioia et al., 2010

School and the Concussed Youth: Recommendations for Concussion Education and Management

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Gerard A. Gioia, PhD^{a,b,c}

Learning is the centerpiece of child and adolescent development. Children's organ of learning is their brain; any adverse event that impairs the brain's functioning, temporarily or permanently, poses a significant threat to learning. Traumatic brain injury (TBI) of any severity is an adverse event that can threaten the developing child's future ability to learn. Although more severe forms of TBI may be readily recognized as



Heads Up to Schools: KNOW YOUR CONCUSSION ABCs

Assess the situation
Be alert for signs and symptoms
Contact a health care professional



Signs and Symptoms of a Concussion

A concussion is caused by a bump, blow, or jolt to the head. Concussions can also occur from a fall or blow to the body that causes the head to move rapidly back and forth. Even what seems to be a mild bump to the head can be serious. Be alert for **any** of the following signs and symptoms.

SIGNS OBSERVED BY SCHOOL PROFESSIONALS

- Appears dazed or stunned
- Is confused about events
- Answers questions slowly
- Repeats questions
- Can't recall events prior to hit, bump, or fall
- Can't recall events after hit, bump, or fall
- Loses consciousness (even briefly)
- Shows behavior or personality changes
- Forgets class schedule or assignments

SYMPTOMS REPORTED BY THE STUDENT

Thinking/Remembering

- Difficulty thinking clearly
- Difficulty concentrating or remembering
- Feeling more slowed down
- Feeling sluggish, hazy, foggy, or groggy

Physical

- Headache or "pressure" in head
- Nausea or vomiting
- Balance problems or dizziness
- Fatigue or feeling tired
- Blurry or double vision
- Sensitivity to light or noise
- Numbness or tingling
- Does not "feel right"

Emotional

- Irritable
- Sad
- More emotional than usual
- Nervous
- Sleep*
- Drowsy
- Sleeps less than usual
- Sleeps more than usual
- Has trouble falling asleep

*only ask about sleep symptoms if the injury occurred on a prior day

What can school professionals do?



Know your Concussion ABCs:

A—Assess the situation

B—Be alert for signs and symptoms

C—Contact a health care professional

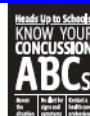
For more information and to order additional materials **FREE-OF-CHARGE**, visit:
www.cdc.gov/Concussion

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION



Concussion Signs and Symptoms

Checklist



Student's Name: _____ Student's Grade: _____ Date/Time of Injury: _____

Where and How Injury Occurred: (be sure to include cause and force of the hit or blow to the head) _____

Description of Injury: (be sure to include information about any loss of consciousness and for how long, memory loss, or seizures following the injury, or previous concussions, if any; see the section on danger signs on the back of this form.) _____

DIRECTIONS:

Use this checklist to monitor students who come to your office with a head injury. Students should be monitored for a minimum of 30 minutes. Check for signs or symptoms when the student first arrives at your office, fifteen minutes later, and at the end of 30 minutes.

Students who experience one or more of the signs or symptoms of concussion after a bump, blow, or jolt to the head should be referred to a health care professional with experience in evaluating for concussion. For those instances when a parent is coming to take the student to a health care professional, observe the student for any new or worsening symptoms right before the student leaves. Send a copy of this checklist with the student for the health care professional to review.

To download this checklist in Spanish, please visit: www.cdc.gov/Concussion.
Para obtener una copia electrónica de este formulario en español, por favor visite: www.cdc.gov/Concussion.

OBSERVED SIGNS	0 MINUTES	15 MINUTES	30 MINUTES	MINUTES not prior to leaving
Appears dazed or stunned				
Is confused about events				
Repeats questions				
Answers questions slowly				
Can't recall events prior to the hit, bump, or fall				
Can't recall events after the hit, bump, or fall				
Loses consciousness (even briefly)				
Shows behavior or personality changes				
Forgets class schedule or assignments				

PHYSICAL SYMPTOMS

- Headache or "pressure" in head
- Nausea or vomiting
- Balance problems or dizziness
- Fatigue or feeling tired
- Blurry or double vision
- Sensitivity to light
- Sensitivity to noise
- Numbness or tingling
- Does not "feel right"

COGNITIVE SYMPTOMS

- Difficulty thinking clearly
- Difficulty concentrating
- Difficulty remembering
- Feeling more slowed down
- Feeling sluggish, hazy, foggy, or groggy

EMOTIONAL SYMPTOMS

- Irritable
- Sad
- More emotional than usual
- Nervous

ACUTE CONCUSSION EVALUATION (ACE)

CARE PLAN

Gerard Gioia, PhD¹ & Mickey Collins, PhD²
¹Children's National Medical Center
²University of Pittsburgh Medical Center

Patient Name: _____
DOB: _____ Age: _____
Date: _____ ID/MP#: _____
Date of Injury: _____

You have been diagnosed with a concussion (also known as a mild traumatic brain injury). This personal plan is based on your symptoms and is designed to help speed your recovery. Your careful attention to it can also prevent further injury.

Rest is the key. You should not participate in any high risk activities (e.g., sports, physical education (PE), riding a bike, etc.) if you still have any of the symptoms below. It is important to limit activities that require a lot of thinking or concentration (homework, job-related activities), as this can also make your symptoms worse. If you no longer have any symptoms and believe that your concentration and thinking are back to normal, you can slowly and carefully return to your daily activities. Children and teenagers will need help from their parents, teachers, coaches, or athletic trainers to help monitor their recovery and return to activities.

Today the following symptoms are present (circle or check).				No reported symptoms	
Physical	Thinking	Emotional	Sleep		
Headaches	Sensitivity to light	Feeling mentally foggy	Irritability	Drowsiness	
Nausea	Sensitivity to noise	Problems concentrating	Sadness	Sleeping more than usual	
Fatigue	Numbness/Tingling	Problems remembering	Feeling more emotional	Sleeping less than usual	
Visual problems	Vomiting	Feeling more slowed down	Nervousness	Trouble falling asleep	
Balance Problems	Dizziness				

RED FLAGS: Call your doctor or go to your emergency department if you suddenly experience any of the following			
Headaches that worsen	Look groggy , drowsy, can't be awakened	Can't recognize people or places	Unusual behavior change
Seizures	Repeated vomiting	Increasing confusion	Increasing irritability
Neck pain	Stunned speech	Weakness or numbness in arms or legs	Loss of consciousness

Returning to Daily Activities

- Get lots of rest. Be sure to get enough sleep at night—no late nights. Keep the same bedtime weekdays and weekends.
- Take daytime naps or rest breaks when you feel tired or fatigued.
- Limit physical activity as well as activities that require a lot of thinking or concentration. These activities can make symptoms worse.
 - Physical activity includes PE, sports practices, weight-training, running, exercising, heavy lifting, etc.
 - Thinking and concentration activities (e.g., homework, classwork load, job-related activity).
- Drink lots of fluids and eat carbohydrates or protein to maintain appropriate blood sugar levels.
- As symptoms decrease, you may begin to **gradually** return to your daily activities. If symptoms worsen or return, **lessen** your activities, then **try again** to increase your activities **gradually**.
- During recovery, it is normal to feel frustrated and sad when you do not feel right and you can't be as active as usual.
- Repeated evaluation of your symptoms is recommended to help guide recovery.

Returning to School

- If you (or your child) are still having symptoms of concussion you may need extra help to perform school-related activities. As your (or your child's) symptoms decrease during recovery, the extra help or supports can be removed gradually.
- Inform the teacher(s), school nurse, school psychologist or counselor, and administrator(s) about your (or your child's) injury and symptoms. School personnel should be instructed to watch for:
 - Increased problems paying attention or concentrating
 - Increased problems remembering or learning new information
 - Longer time needed to complete tasks or assignments
 - Greater irritability, less able to cope with stress
 - Symptoms worsen (e.g., headache, tiredness) when doing schoolwork

—Continued on back page—

When Return to Play?

Criteria for RTP

- No longer have any symptoms
 - ◆ No longer need medicine to control symptoms.
- Neurocognitive function & balance back to “normal.”
 - ◆ After rest and gradual activity (exertion)
- Cleared by medical professional to begin gradual Return to Play (RTP) program
 - ◆ RTP conducted by ATC

State Legislative Action for the Youth Athlete:

3 Core Principles of the Maryland Law

- 1) Concussion Education: Coach, Parent, Athlete
- 2) Identification-Removal / Protection
- 3) Medical Evaluation & Written Clearance



Summary

- Concussion care for kids requires knowledge, skill and tools at multiple points
- Family, school, athletic/ recreational and medical systems must be knowledgeable and work together
- Develop a working team!